Horizon 2020

Call: H2020-INFRAIA-2014-2015

Topic: INFRAIA-1-2014-2015

Type of action: RIA

Proposal number: 654109

Proposal acronym: ACTRIS-2

Table of contents

How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the previous steps in the submission wizard.

1 - General information

Topic	INFRAIA-1-2014-2015	Type of action	RIA
Call identifier	H2020-INFRAIA-2014-2015	Acronym	ACTRIS-2

Proposal title* Aerosols, Clouds, and Trace gases Research InfraStructure

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months *48*

Fixed keyword 1 *NATURAL SCIENCES* Add

Free keywords *climate change, air pollution, atmospheric hazards, services to end-users, technological innovation*

Abstract

ACTRIS-2 addresses the scope of integrating state-of-the-art European ground-based stations for long term observations of aerosols, clouds and short lived gases capitalizing work of FP7-ACTRIS. ACTRIS-2 aims to achieve the construction of a user-oriented RI, unique in the EU-RI landscape.
ACTRIS-2 provides 4-D integrated high-quality data from near-surface to high altitude (vertical profiles and total-column), relevant to climate and air-quality research. ACTRIS-2 develops and implements, in a large network of stations in Europe and beyond, observational protocols that permit harmonization of collected data and their dissemination. ACTRIS-2 offers networking expertise, upgraded calibration services, training of users, trans-national access to observatories and calibration facilities, virtual access to high-quality data products. Through joint research activities, ACTRIS-2 develops new integration tools that will produce scientific or technical progresses reusable in infrastructures, thus shaping future observation strategies.
Innovation in instrumentation is one of the fundamental building blocks of ACTRIS-2. Associated partnership with SMEs stimulates development of joint-ventures addressing new technologies for use in atmospheric observations.
Target user-groups in ACTRIS-2 comprise a wide range of communities worldwide. End-users are institutions involved in climate and air quality research, space agencies, industries, air quality agencies.
ACTRIS-2 will improve systematic and timely collection, processing and distribution of data and results for use in modelling, in particular towards implementation of atmospheric and climate services. ACTRIS-2 invests substantial efforts to ensure long-term sustainability beyond the term of the project by positioning the project in both the GEO and the on-going ESFRI contexts, and by developing synergies with national initiatives.

Remaining characters 94

Has this proposal (or a very similar one) been submitted in the past 2 years in response to a call for proposals under the 7th Framework Programme, Horizon 2020 or any other EU programme(s)? ○ Yes ◉ No

Proposal ID **654109** *Acronym* **ACTRIS-2**

Declarations

1) The coordinator declares to have the explicit consent of all applicants on their participation and on the content of this proposal.	☒
2) The information contained in this proposal is correct and complete.	☒
3) This proposal complies with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	☒

4) The coordinator confirms:

- to have carried out the self-check of the financial capacity of the organisation on https://ec.europa.eu/research/participants/portal4/desktop/en/organisations/lfv.html. Where the result was "weak" or "insufficient", the coordinator confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check); or	☒
- is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check); or	☐
- as sole participant in the proposal is exempt from the financial capacity check.	☐

5) The coordinator hereby declares that each applicant has confirmed:

- they are fully eligible in accordance with the criteria set out in the specific call for proposals; and	☒
- they have the financial and operational capacity to carry out the proposed action.	☒

The coordinator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the coordinator and each beneficiary applicant will be required to present a formal declaration in this respect.

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

Your reply to the grant application will involve the recording and processing of personal data (such as your name, address and CV), which will be processed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the processing of your personal data are available on the privacy statement. Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Warning System (EWS) only or both in the EWS and Central Exclusion Database (CED) by the Accounting Officer of the Commission, should you be in one of the situations mentioned in:
-the Commission Decision 2008/969 of 16.12.2008 on the Early Warning System (for more information see the Privacy Statement), or
-the Commission Regulation 2008/1302 of 17.12.2008 on the Central Exclusion Database (for more information see the Privacy Statement) .

2 - Administrative data of participating organisations

PIC	***Legal name***
999979500	*CONSIGLIO NAZIONALE DELLE RICERCHE*

Short name: CNR

Address of the organisation

Street	PIAZZALE ALDO MORO 7
Town	ROMA
Postcode	00185
Country	Italy
Webpage	www.cnr.it

Legal Status of your organisation

Research and Innovation legal statuses

Public body ....yes
Non-profit ....yes
International organisation ....no
International organisation of European interest ......no
Secondary or Higher education establishment ....no
Research organisation ....yes
Small and Medium-sized Enterprises (SMEs) ....no

Legal person .... yes

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Scienze del Sistema Terra e Tecnologie per l'Ambiente
Street	PIAZZALE ALDO MORO 7
Town	ROMA
Postcode	00185
Country	Italy

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: ◯ Male ◉ Female

First name: **Gelsomina**

Last name: **Pappalardo**

E-Mail: **pappalardo@imaa.cnr.it**

Position in org.: Senior scientist

Department: Istituto di Metodologie per l'Analisi Ambientale

Street: Contrada S. Loja

☐ Same as organisation address

Town: Tito (PZ)

Post code: 85050

Country: Italy

Website: www.imaa.cnr.it

Phone: +390971427265

Phone 2: +393204349366

Fax: +390971427271

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999997930	*CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE*

Short name: CNRS

Address of the organisation

Street Rue Michel -Ange 3

Town PARIS

Postcode 75794

Country France

Webpage www.cnrs.fr

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes
Non-profit .... yes
International organisation .... no
International organisation of European interest .... no
Secondary or Higher education establishment .... no
Research organisation .... yes
Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Laboratoire de Glaciologie et Géophysique de l'Environnement
Street	54, rue Molière
Town	Saint Martin d'Hères cedex
Postcode	38042
Country	France

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: (•) Male ( ) Female

First name: **Paolo**
Last name: **Laj**

E-Mail: **laj@lgge.obs.ujf-grenoble.fr**

Position in org.: Director

Department: Laboratoire de Glaciologie et Géophysique de l'Environnement

Street: 54, rue Molière
☐ Same as organisation address

Town: Saint Martin d'Hères cedex
Post code: 38402

Country: France

Website: http://lgge.osug.fr/

Phone: +33 4 76824277
Phone 2: +xxx xxxxxxxxx
Fax: +334 76 82 42 01

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Sabine	Philippin	s.philippin@opgc.univ-bpclermont.fr	+33473405277
Cellule Europe	CNRS Délégation Alpes	a.spv-europe@dr11.cnrs.fr	

Proposal ID **654109** Acronym **ACTRIS-2**

PIC	***Legal name***
999450850	*LEIBNIZ INSTITUT FUER TROPOSPHAERENFORSCHUNG e.V.*

Short name: TROPOS

Address of the organisation

Street Permoserstrasse 15

Town LEIPZIG

Postcode 04318

Country Germany

Webpage www.tropos.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... no

Non-profit .... yes

International organisation .... no

International organisation of European interest ...... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code - Not applicable

Department(s) carrying out the proposed work

Department 1

Department name	Remote Sensing of Atmospheric Processes
Street	Permoserstrasse 15
Town	LEIPZIG
Postcode	04318
Country	Germany

☒ Same as organisation address

Department 2

Department name	Experimental Aerosol and Cloud Microphysics
Street	Permoserstrasse 15
Town	LEIPZIG
Postcode	04318
Country	Germany

☒ Same as organisation address

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department 3

Department name	Atmospheric Chemistry
Street	Permoserstrasse 15
Town	LEIPZIG
Postcode	04318
Country	Germany

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: ◯ Male ◉ Female
First name: **Ulla**
Last name: **Wandinger**
E-Mail: **ulla@tropos.de**
Position in org.: Senior Researcher
Department: Remote Sensing of Atmospheric Processes
Street: Permoserstrasse 15
☒ Same as organisation address
Town: LEIPZIG
Post code: 04318
Country: Germany
Website: www.tropos.de
Phone: +4934127177082
Phone 2: +xxx xxxxxxxxx
Fax: +493412717997082

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Ariane	Pohlenz	pohlenz@tropos.de	4934127177183

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999653677	*NATIONAL OBSERVATORY OF ATHENS*

Short name: NOA

Address of the organisation

Street LOFOS NYMFON

Town ATHINA

Postcode 11810

Country Greece

Webpage www.noa.gr

Legal Status of your organisation

Research and Innovation legal statuses

Public body	yes	Legal person	yes
Non-profit	yes		
International organisation	no		
International organisation of European interest	no		
Secondary or Higher education establishment	no		
Research organisation	yes		
Small and Medium-sized Enterprises (SMEs)	no		

Nace code - Not applicable

Department(s) carrying out the proposed work

Department 1

Department name	Institute for Environmental Research and Sustainable Development
Street	I. Metaxa & Vas. Pavlou
Town	Palea Penteli
Postcode	GR-15236
Country	Greece

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.
Sex: (•) Male ( ) Female

First name: **Nikos**
Last name: **Mihalopoulos**

E-Mail: **mihalo@chemistry.uoc.gr**

Position in org.: Director of IERSD, NOA

Department: Institute for Environmental Research and Sustainable Development

Street: I. Metaxa & Vas. Pavlou
☐ Same as organisation address

Town: Palea Penteli
Post code: GR-15236

Country: Greece

Website: www.noa.gr

Phone: +30 210 8109121
Phone 2: +30 210 8109122
Fax: +30 210 8103236

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Joanna	Kolliakou	ioanna@noa.gr	+30 210 3256225

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999654162	*NORSK INSTITUTT FOR LUFTFORSKNING*

Short name: NILU

Address of the organisation

Street Instituttveien 18

Town KJELLER

Postcode 2027

Country Norway

Webpage www.nilu.no

Legal Status of your organisation

Research and Innovation legal statuses

Public body ....no

Legal person .... yes

Non-profit ....yes

International organisation ....no

International organisation of European interest ......no

Secondary or Higher education establishment ....no

Research organisation ....yes

Small and Medium-sized Enterprises (SMEs) ....no

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Dept. Atmospheric and Climate Research
Street	Instituttveien 18
Town	KJELLER
Postcode	2027
Country	Norway

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: ◯ Male ◉ Female
First name: **Cathrine**
Last name: **Lund Myhre**
E-Mail: **clm@nilu.no**
Position in org.: Senior Scientist
Department: Dept. Atmospheric and Climate Research
Street: Instituttveien 18
☒ Same as organisation address
Town: KJELLER
Post code: 2027
Country: Norway
Website: http://www.nilu.no/
Phone: +47-63898000
Phone 2: +47-63898042
Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Eva Beate	Andresen	eba@nilu.no	+47-63898020

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999591306	*ILMATIETEEN LAITOS*

Short name: FMI

Address of the organisation

Street Erik Palmenin aukio 1

Town HELSINKI

Postcode 00560

Country Finland

Webpage www.fmi.fi

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest ...... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Nace code 721 -

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Atmospheric Composition Research Unit
Street	Erik Palmenin aukio 1
Town	HELSINKI
Postcode	00560
Country	Finland

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title	Dr.		Sex	◉ Male ○ Female	
First name	**Heikki**		Last name	**Lihavainen**	
E-Mail	**heikki.lihavainen@fmi.fi**				
Position in org.	Head of Unit				
Department	Research and Development				
Street	Erik Palmenin aukio 1			☒ Same as organisation address	
Town	HELSINKI		Post code	00560	
Country	Finland				
Website	www.ilmatieteenlaitos.fi				
Phone	+358503623773	Phone 2	+35829 539 5492	Fax	+35829 539 5403

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999994923	*PAUL SCHERRER INSTITUT*

Short name: PSI

Address of the organisation

Street .

Town VILLIGEN PSI

Postcode 5232

Country Switzerland

Webpage www.psi.ch

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest ...... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Nace code 721 -

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Atmospheric Chemistry
Street	.
Town	VILLIGEN PSI
Postcode	5232
Country	Switzerland

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.
Sex: (•) Male ( ) Female

First name: **Urs**
Last name: **Baltensperger**

E-Mail: **urs.baltensperger@psi.ch**

Position in org.: Laboratory Head

Department: Atmospheric Chemistry

Street: .
[x] Same as organisation address

Town: VILLIGEN PSI
Post code: 5232

Country: Switzerland

Website: http://www.psi.ch/lac/

Phone: +41563102408
Phone 2: +xxx xxxxxxxxx
Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Irene	Walthert	irene.walthert@psi.ch	+41563102664

Proposal ID **654109**	*Acronym* **ACTRIS-2**

PIC	***Legal name***
999994535	*HELSINGIN YLIOPISTO*

Short name: UHEL

Address of the organisation

Street	YLIOPISTONKATU 4
Town	HELSINGIN YLIOPISTO
Postcode	00014
Country	Finland
Webpage	http://www.helsinki.fi/university/

Legal Status of your organisation

Research and Innovation legal statuses

Public body	yes	Legal person	yes
Non-profit	yes		
International organisation	no		
International organisation of European interest	no		
Secondary or Higher education establishment	yes		
Research organisation	yes		
Small and Medium-sized Enterprises (SMEs)	no		

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name	Department of Physics
Street	Gustaf Hällströmin katu 2a
Town	HELSINKI
Postcode	FI-00560
Country	Finland

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: (•) Male ( ) Female
First name: **Tuukka**
Last name: **Petäjä**
E-Mail: **tuukka.petaja@helsinki.fi**
Position in org.: Head of Aerosol Laboratory and SMEAR stations I, II
Department: Department of Atmospheric Sciences
Street: YLIOPISTONKATU 4
[X] Same as organisation address
Town: HELSINGIN YLIOPISTO
Post code: 00014
Country: Finland
Website:
Phone: +358-9-191 50878
Phone 2: +xxx xxxxxxxxx
Fax: +358-9-191 50860

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Satu	Vaisanen	kv-tutkimuspalvelut@helsinki.fi	
Hanna	Lappalainen	hanna.k.lappalainen@helsinki.fi	
Markku	Kulmala	markku.kulmala@helsinki.fi	

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999907138	*EIDGENOESSISCHE MATERIALPRUEFUNGS- UND FORSCHUNGSANSTALT*

Short name: EMPA

Address of the organisation

Street	Ueberlandstrasse 129
Town	DUEBENDORF
Postcode	8600
Country	Switzerland
Webpage	www.empa.ch

Legal Status of your organisation

Research and Innovation legal statuses

Public body	yes	Legal person	yes
Non-profit	yes		
International organisation	no		
International organisation of European interest	no		
Secondary or Higher education establishment	yes		
Research organisation	yes		
Small and Medium-sized Enterprises (SMEs)	no		

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	air pollution/environmental technology
Street	Ueberlandstrasse 129
Town	DUEBENDORF
Postcode	8600
Country	Switzerland

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr. Sex: (•) Male ( ) Female

First name: **Stefan** Last name: **Reimann**

E-Mail: **stefan.reimann@empa.ch**

Position in org.: senior scientist

Department: air pollution/environmental technology

Street: Ueberlandstrasse 129 ☒ Same as organisation address

Town: DUEBENDORF Post code: 8600

Country: Switzerland

Website: www.empa.ch/climate_gases

Phone: +41587654638 Phone 2: +41587651111 Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Georg	Spescha	georg.spescha@empa.ch	

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999916741	*EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS*

Short name: ECMWF

Address of the organisation

Street SHINFIELD PARK

Town READING

Postcode RG2 9AX

Country United Kingdom

Webpage www.ecmwf.int

Legal Status of your organisation

Research and Innovation legal statuses

Public body ....yes

Non-profit ....yes

International organisation ....yes

International organisation of European interest ......yes

Secondary or Higher education establishment ....no

Research organisation ....yes

Small and Medium-sized Enterprises (SMEs) ....no

Legal person .... yes

Nace code - Not applicable

Department(s) carrying out the proposed work

Department 1

Department name	Research Department
Street	SHINFIELD PARK
Town	READING
Postcode	RG2 9AX
Country	United Kingdom

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: ◯ Male ◉ Female
First name: **Angela**
Last name: **Benedetti**
E-Mail: **angela.benedetti@ecmwf.int**
Position in org.: Senior Scientist
Department: Chemical Aspects Section - Research Department
Street: SHINFIELD PARK
☒ Same as organisation address
Town: READING
Post code: RG2 9AX
Country: United Kingdom
Website: www.ecmwf.int
Phone: +44 118 949 9063
Phone 2: +xxx xxxxxxxxx
Fax: +44 118 9869450

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Richard	Engelen	richard.engelen@ecmwf.int	+44 118 9499606
Adam	Zonic	adam.zonic@ecmwf.int	+44 118 9499211

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999510893	*METEOROLOGISK INSTITUTT*

Short name: MET Norway

Address of the organisation

Street HENRIK MOHNS PLASS 1

Town OSLO

Postcode 0313

Country Norway

Webpage www.met.no

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Nace code - Not applicable

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Research and Development Department
Street	HENRIK MOHNS PLASS 1
Town	OSLO
Postcode	0313
Country	Norway

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: (•) Male ( ) Female

First name: **Michael**
Last name: **Schulz**

E-Mail: **michael.schulz@met.no**

Position in org.: Deputy Head, Climate Modelling and Air Pollution Section

Department: Research and Development Department

Street: HENRIK MOHNS PLASS 1
☒ Same as organisation address

Town: OSLO
Post code: 0313

Country: Norway

Website: www.met.no

Phone: +4722963330
Phone 2: +xxx xxxxxxxxx
Fax: +4722963050

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Per Helmer	Skaali	per.helmer.skaali@met.no	+4722963318

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999758243	*NATIONAL INSTITUTE OF RESEARCH AND DEVELOPMENT FOR OPTOELECTRONICS*

Short name: INOE

Address of the organisation

Street ATOMISTILOR STREET 409

Town MAGURELE

Postcode RO77125

Country Romania

Webpage http://inoe.inoe.ro

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Remote Sensing
Street	ATOMISTILOR STREET 409
Town	MAGURELE
Postcode	RO77125
Country	Romania

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title	Dr.	Sex	◯ Male ◉ Female
First name	**Doina**	Last name	**Nicolae**
E-Mail	**nnicol@inoe.ro**		
Position in org.	Department Coordinator		
Department	Remote Sensing		
Street	ATOMISTILOR STREET 409	☒	Same as organisation address
Town	MAGURELE	Post code	RO77125
Country	Romania		
Website	http://environment.inoe.ro/		
Phone	+40314053303	Phone 2	+40314378121
Fax	+40214574522		

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999978433	*LUDWIG-MAXIMILIANS-UNIVERSITAET MUENCHEN*

Short name: LMU

Address of the organisation

Street GESCHWISTER SCHOLL PLATZ 1

Town MUNCHEN

Postcode 80539

Country Germany

Webpage www.uni-muenchen.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... yes

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Nace code 853 -

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Fakultät für Physik, Meteorologisches Institut
Street	Theresienstrasse 37
Town	München
Postcode	80333
Country	Germany

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Volker**

Last name: **Freudenthaler**

E-Mail: **volker.freudenthaler@lmu.de**

Position in org.: Senior research scientist

Department: Fakultät für Physik, Meteorologisches Institut

Street: Theresienstrasse 37

[ ] Same as organisation address

Town: München

Post code: 80333

Country: Germany

Website: http://www.meteo.physik.uni-muenchen.de/

Phone: +498921804297

Phone 2: +498921804571

Fax: +492805508

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999992304	*JRC -JOINT RESEARCH CENTRE- EUROPEAN COMMISSION*

Short name: JRC

Address of the organisation

Street Rue de la Loi 200

Town BRUSSELS

Postcode 1049

Country Belgium

Webpage http://www.jrc.ec.europa.eu

Legal Status of your organisation

Research and Innovation legal statuses

Public body ....yes

Legal person .... yes

Non-profit ....yes

International organisation ....no

International organisation of European interest ......no

Secondary or Higher education establishment ....no

Research organisation ....yes

Small and Medium-sized Enterprises (SMEs) ....no

Nace code

Department(s) carrying out the proposed work

Department 1

Department name	Institute for Environment and Sustainability
Street	Via Enrico Fermi 2749
Town	Ispra
Postcode	21027
Country	Italy

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title	Dr.	Sex	(•) Male ( ) Female
First name	**Jean-Philippe**	Last name	**Putaud**
E-Mail	**jean.putaud@jrc.ec.europa.eu**		
Position in org.	Team leader of the JRC-IES station for atmospheric reseach		
Department	Institute for Environment and Sustainability-Air and Climate Unit		
Street	Via Enrico Fermi 2749	☐ Same as organisation address	
Town	Ispra	Post code	21027
Country	Italy		
Website	http://ccaqu.jrc.ec.europa.eu/		
Phone	+39 0332 78 50 41	Phone 2	+xxx xxxxxxxxx
Fax	+39 0332 78 5837		

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999862809	*UNIVERSIDAD DE VALLADOLID*

Short name: UVA

Address of the organisation

Street PLAZA SANTA CRUZ 8 PALACIO DE SANTA C

Town VALLADOLID

Postcode 47002

Country Spain

Webpage www.uva.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... yes

Research organisation .... no

Small and Medium-sized Enterprises (SMEs) .... no

Nace code - Not applicable

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Grupo de Óptica Atmosférica
Street	Paseo de Belen 7
Town	Valladolid
Postcode	47011
Country	Spain

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: (•) Male ( ) Female

First name: **Carlos**
Last name: **Toledano**

E-Mail: **toledano@goa.uva.es**

Position in org.: Researcher of "Ramón y Cajal" program

Department: Grupo de Óptica Atmosférica

Street: Paseo de Belen 7
[ ] Same as organisation address

Town: Valladolid
Post code: 47011

Country: Spain

Website: http://goa.uva.es

Phone: +34983423608
Phone 2: +34983423270
Fax: +34983423013

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999882015	*UNIVERSIDAD DE GRANADA*

Short name: UGR

Address of the organisation

Street CUESTA DEL HOSPICIO SN

Town GRANADA

Postcode 18071

Country Spain

Webpage www.ugr.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body	yes
Non-profit	yes
International organisation	no
International organisation of European interest	no
Secondary or Higher education establishment	yes
Research organisation	yes
Small and Medium-sized Enterprises (SMEs)	no
Legal person	yes

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name	Andalusian Institute for Earth System Research (IISTA-CEAMA)
Street	Avd/ Mediterráneo s/n
Town	Granada
Postcode	E-18071
Country	Spain

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title	Prof.	Sex	(•) Male ( ) Female
First name	**Lucas**	Last name	**Alados Arboledas**
E-Mail	**alados@ugr.es**		
Position in org.	Professor		
Department	Andalusian Institute for Earth System Research (IISTA-CEAMA)		
Street	Avd/ Mediterráneo s/n	☐ Same as organisation address	
Town	Granada	Post code	E-18071
Country	Spain		
Website	www.ugr.es		
Phone	+34958249749	Phone 2	+34679431821
Fax	+34 958 137246		

Other contact persons

First Name	*Last Name*	*E-mail*	*Phone*
José Antonio	Carrillo	jcarril@ugr.es	+34 958248024

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999991722	*AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS*

Short name: CSIC

Address of the organisation

Street CALLE SERRANO 117

Town MADRID

Postcode 28006

Country Spain

Webpage http://www.csic.es

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest ...... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Institute of Environmental Assessment and Water Research (IDAEA)
Street	C/ Jordi Girona 18-26
Town	Barcelona
Postcode	08034
Country	Spain

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title	Prof.			Sex	(•) Male ( ) Female
First name	**Andres**			Last name	**Alastuey**
E-Mail	**andres.alastuey@idaea.csic.es**				
Position in org.	Research Professor				
Department	Institute of Environmental Assessment and Water Research (IDAEA)				
Street	C/ Jordi Girona, 18-26			☐	Same as organisation address
Town	Barcelona	Post code	08034		
Country	Spain				
Website	http://www.idaea.csic.es/				
Phone	+34934006124	Phone 2	+34934006100	Fax	+34 932045904

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999518944	*KONINKLIJK NEDERLANDS METEOROLOGISCH INSTITUUT-KNMI*

Short name: KNMI

Address of the organisation

Street	UTRECHTSEWEG 297
Town	DE BILT
Postcode	3731 GA
Country	Netherlands
Webpage	www.knmi.nl

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes
Non-profit .... yes
International organisation .... no
International organisation of European interest ...... no
Secondary or Higher education establishment .... no
Research organisation .... yes
Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code L - Public administration & defence

Department(s) carrying out the proposed work

Department 1

Department name	Climate Research
Street	UTRECHTSEWEG 297
Town	DE BILT
Postcode	3731 GA
Country	Netherlands

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Mr. Sex: (•) Male ( ) Female

First name: **Arnoud** Last name: **Apituley**

E-Mail: **apituley@knmi.nl**

Position in org.: Senior Scientist

Department: Climate Research

Street: UTRECHTSEWEG 297 [X] Same as organisation address

Town: DE BILT Post code: 3731 GA

Country: Netherlands

Website: http://www.knmi.nl

Phone: +31302206418 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999507304	*CESKY HYDROMETEOROLOGICKY USTAV*

Short name: CHMI

Address of the organisation

Street NA SABATCE 17

Town PRAHA 4

Postcode 14306

Country Czech Republic

Webpage www.chmi.cz

Legal Status of your organisation

Research and Innovation legal statuses

Public body	yes	Legal person	yes
Non-profit	yes		
International organisation	no		
International organisation of European interest	no		
Secondary or Higher education establishment	no		
Research organisation	yes		
Small and Medium-sized Enterprises (SMEs)	no		

Nace code L - Public administration & defence

Department(s) carrying out the proposed work

Department 1

Department name	Kosetice Observatory
Street	Kosetice
Town	Kosetice
Postcode	394 22
Country	Czech Republic

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.
Sex: (•) Male ( ) Female

First name: **Milan**
Last name: **Vana**

E-Mail: **vanam@chmi.cz**

Position in org.: Head of Kosetice Observatory

Department: Kosetice Observatory

Street: Kosetice
[ ] Same as organisation address

Town: Kosetice
Post code: 394 22

Country: Czech Republic

Website: www.chmi.cz

Phone: +420565498015
Phone 2: +420725895574
Fax: *+xxx xxxxxxxxx*

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999901318	*LUNDS UNIVERSITET*

Short name: ULUND

Address of the organisation

Street Paradisgatan 5c

Town LUND

Postcode 22100

Country Sweden

Webpage www.lu.se

Legal Status of your organisation

Research and Innovation legal statuses

Public body ...... yes

Non-profit ...... yes

International organisation ...... no

International organisation of European interest ...... no

Secondary or Higher education establishment ...... yes

Research organisation ...... yes

Small and Medium-sized Enterprises (SMEs) ...... no

Legal person ...... yes

Nace code 853 -

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Division of Nuclear Physics, Department of Physics
Street	Paradisgatan 5c
Town	LUND
Postcode	22100
Country	Sweden

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.
Sex: (●) Male ( ) Female

First name: **Erik**
Last name: **Swietlicki**

E-Mail: **erik.swietlicki@nuclear.lu.se**

Position in org.: Professor

Department: Division of Nuclear Physics, Department of Physics

Street: Paradisgatan 5c
☒ Same as organisation address

Town: LUND
Post code: 22100

Country: Sweden

Website: www.lu.se

Phone: +46-46-2229680
Phone 2: +46-70-9924512
Fax: *+xxx xxxxxxxxx*

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
965934440	*THE CYPRUS INSTITUTE LIMITED*

Short name: CYI

Address of the organisation

Street	CONSTANTINOU KAVAFI 20
Town	LEFKOSIA
Postcode	2121
Country	Cyprus
Webpage	www.cyi.ac.cy

Legal Status of your organisation

Research and Innovation legal statuses

Public body ....no
Non-profit ....yes
International organisation ....no
International organisation of European interest ......no
Secondary or Higher education establishment ....yes
Research organisation ....yes
Small and Medium-sized Enterprises (SMEs) ....no

Legal person .... yes

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Energy, Environment and Water Research Center, EEWRC
Street	CONSTANTINOU KAVAFI 20
Town	LEFKOSIA
Postcode	2121
Country	Cyprus

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Mihalis**

Last name: **Vrekoussis**

E-Mail: **vrekoussis@cyi.ac.cy**

Position in org.: Research Scientist

Department: Energy, Environment and Water Research Centre (EEWRC)

Street: CONSTANTINOU KAVAFI 20

☒ Same as organisation address

Town: LEFKOSIA

Post code: 2121

Country: Cyprus

Website: www.cyi.ac.cy

Phone: +35722208698

Phone 2: +xxx xxxxxxxxx

Fax: +35722208625

Other contact persons

First Name	Last Name	E-mail	Phone
Marios	Demetriades	m.demetriades@cyi.ac.cy	+35722208613

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999968248	*RHEINISCHES INSTITUT FUER UMWELT-FORSCHUNG AN DER UNIVERSITAET ZU KOELN E.V.*

Short name: RIUUK

Address of the organisation

Street AACHENER STRASSE 209

Town KOLN

Postcode 50931

Country Germany

Webpage http://www.eurad.uni-koeln.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... no

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest ...... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Nace code 721 -

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Chemical Data Assimilation Research
Street	AACHENER STRASSE 209
Town	KOLN
Postcode	50931
Country	Germany

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Hendrik**

Last name: **Elbern**

E-Mail: **he@eurad.uni-koeln.de**

Position in org.: research group responsible

Department: Chemical Data Assimilation Research

Street: AACHENER STRASSE 209

☒ Same as organisation address

Town: KOLN

Post code: 50931

Country: Germany

Website: db.eurad.uni-koeln.de/en/index.php

Phone: +492214002220

Phone 2: +492214002258

Fax: +492214002320

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Susanne	Crewell	crewell@meteo.uni-koeln.de	+492214705286

Proposal ID **654109**	*Acronym* **ACTRIS-2**

PIC	***Legal name***
998059094	*DEUTSCHER WETTERDIENST*

Short name: DWD

Address of the organisation

Street	FRANKFURTER STRASSE 135
Town	OFFENBACH AM MAIN
Postcode	63067
Country	Germany
Webpage	http://www.dwd.de

Legal Status of your organisation

Research and Innovation legal statuses

Public body	yes	Legal person	yes
Non-profit	yes		
International organisation	no		
International organisation of European interest	no		
Secondary or Higher education establishment	no		
Research organisation	yes		
Small and Medium-sized Enterprises (SMEs)	no		

Nace code - Not applicable

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Hohenpeissenberg Meteorological Observatory
Street	Albin Schwaiger Weg 10
Town	Hohenpeissenberg
Postcode	82383
Country	Germany

☐ Same as organisation address

Department 2

Department name	Lindenberg Meteorological Observatory (Richard-Assmann-Obs.)
Street	Am Observatorium 12
Town	Tauche/Lindenberg
Postcode	15848
Country	Germany

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title	Dr.	Sex	(•) Male ( ) Female
First name	**Christian**	Last name	**Plass-Duelmer**
E-Mail	**christian.plass-duelmer@dwd.de**		
Position in org.	head of Hohenpeissenberg Meteorological Observatory		
Department	Hohenpeissenberg Meteorological Obs., Research and Development		
Street	Albin Schwaiger Weg 10		☐ Same as organisation address
Town	Hohenpeissenberg	Post code	82383
Country	Germany		
Website	www.dwd.de/mohp		
Phone	+496980629740	Phone 2	+xxx xxxxxxxxx
Fax	+496980629707		

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999975426	*UNIVERSITY OF LEEDS*

Short name: UNIVLEEDS

Address of the organisation

Street WOODHOUSE LANE

Town LEEDS

Postcode LS2 9JT

Country United Kingdom

Webpage www.leeds.ac.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest ...... no

Secondary or Higher education establishment .... yes

Research organisation .... no

Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name	School of Earth and Environment
Street	WOODHOUSE LANE
Town	LEEDS
Postcode	LS2 9JT
Country	United Kingdom

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	*Participant*	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Prof.
Sex: (•) Male ( ) Female

First name: **Ken**
Last name: **Carslaw**

E-Mail: **k.s.carslaw@leeds.ac.uk**

Position in org.: Professor of Atmospheric Science

Department: School of Earth and Environment

Street: WOODHOUSE LANE
☒ Same as organisation address

Town: LEEDS
Post code: LS2 9JT

Country: United Kingdom

Website: www.see.leeds.ac.uk

Phone: +44(0)1133431597
Phone 2: +xxx xxxxxxxxx
Fax: +44(0)1133435259

Other contact persons

First Name	*Last Name*	*E-mail*	*Phone*
Martin	Hamilton	eufunding@leeds.ac.uk	
Philippa	Johnstone	p.c.johnstone@leeds.ac.uk	+44(0)1133438826

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999989200	*NATURAL ENVIRONMENT RESEARCH COUNCIL*

Short name: NERC

Address of the organisation

Street Polaris House, North Star Avenue

Town SWINDON WILTSHIRE

Postcode SN2 1EU

Country United Kingdom

Webpage http://www.nerc.ac.uk

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest ...... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code 721 -

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	Centre for Ecology and Hydrology (CEH)
Street	Bush Estate
Town	Penicuik
Postcode	EH26 0QB
Country	United Kingdom

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: ◯ Male ◉ Female

First name: **Christine**

Last name: **Braban**

E-Mail: **chri2@ceh.ac.uk**

Position in org.: Atmospheric Composition Group Leader

Department: Centre for Ecology and Hydrology (CEH)

Street: Bush Estate

☐ Same as organisation address

Town: Penicuik

Post code: EH26 0QB

Country: United Kingdom

Website: http://www.ceh.ac.uk/staffwebpages/drchristinebraban.html

Phone: 00441314458482

Phone 2: 00441314454343

Fax: +xxx xxxxxxxxx

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999876195	*PANNON EGYETEM*

Short name: UPAC

Address of the organisation

Street EGYETEM U 10

Town VESZPREM

Postcode 8200

Country Hungary

Webpage www.uni-pannon.hu

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... yes

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Nace code 853 -

Department(s) carrying out the proposed work

Department 1

Department name	MTA-PE Air Chemistry Research Group
Street	EGYETEM U 10
Town	VESZPREM
Postcode	8200
Country	Hungary

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Gyula**

Last name: **Kiss**

E-Mail: **kissgy@almos.uni-pannon.hu**

Position in org.: scientific advisor

Department: MTA-PE Air Chemistry Research Group

Street: EGYETEM U 10

☒ Same as organisation address

Town: VESZPREM

Post code: 8200

Country: Hungary

Website: http://kt.mk.uni-pannon.hu/index.php?option=com_content&task=view

Phone: +3688624634

Phone 2: +xxx xxxxxxxxx

Fax: +3688624454

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
993674015	*B.I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus*

Short name: IPNASB

Address of the organisation

Street Nezavisimosti Ave 68

Town Minsk

Postcode 220072

Country Belarus

Webpage

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Laboratory of Optics of Scattering Media
Street	Nezavisimosti Ave 68
Town	Minsk
Postcode	220072
Country	Belarus

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (●) Male ( ) Female

First name: **Anatoli**

Last name: **Chaikovsky**

E-Mail: **chaikov@dragon.bas-net.by**

Position in org.: Head of laboratory

Department: Laboratory of Optics of Scattering Media

Street: Nezavisimosti Ave 68

☒ Same as organisation address

Town: Minsk

Post code: 220072

Country: Belarus

Website: http://ifanbel.bas-net.by

Phone: +375172949004

Phone 2: +xxx xxxxxxxxx

Fax: +375172840879

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999578211	*CONSORZIO NAZIONALE INTERUNIVERSITARIO PER LE SCIENZE FISICHE DELLA MATERIA*

Short name: CNISM

Address of the organisation

Street Via Ostiense 159

Town ROMA

Postcode 00154

Country Italy

Webpage http://www.fis.uniroma3.it/cnism/

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code - Not applicable

Department(s) carrying out the proposed work

Department 1

Department name	CNISM - Thematic area 1: Optics, atoms, molecules and plasmas.
Street	Via Ostiense 159
Town	ROMA
Postcode	00154
Country	Italy

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Vincenzo**

Last name: **Rizi**

E-Mail: **vincenzo.rizi@aquila.infn.it**

Position in org.: Senior scientist

Department: Scienze Fisiche e Chimiche - Università Degli Studi dell'Aquila

Street: Via Vetoio

[ ] Same as organisation address

Town: L'Aquila

Post code: 67100

Country: Italy

Website: http://dsfc.aquila.infn.it/it/

Phone: +390862433083

Phone 2: +393666802761

Fax: +390862433089

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999482181	*INSTITUTE OF NUCLEAR RESEARCH AND NUCLEAR ENERGY - BULGARIAN ACADEMY OF SCIE*

Short name: INRNE

Address of the organisation

Street Tzarigradsko Shose 72

Town SOFIA

Postcode 1784

Country Bulgaria

Webpage http://www.inrne.bas.bg

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... no
Non-profit .... yes
International organisation .... no
International organisation of European interest ...... no
Secondary or Higher education establishment .... no
Research organisation .... yes
Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code - Not applicable

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	BEO "Moussala"
Street	Tzarigradsko Shose 72
Town	SOFIA
Postcode	1784
Country	Bulgaria

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Dimitar**

Last name: **Tonev**

E-Mail: **mitko@lnl.infn.it**

Position in org.: Director

Department: INRNE

Street: Tzarigradsko Shose 72

☒ Same as organisation address

Town: SOFIA

Post code: 1784

Country: Bulgaria

Website: http://www.inrne.bas.bg

Phone: +35929743761

Phone 2: +35929790555

Fax: +35929753619

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Ivo	Kalapov	kalapov@inrne.bas.bg	+35929746310

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
999978045	*NATIONAL UNIVERSITY OF IRELAND, GALWAY*

Short name: NUIG

Address of the organisation

Street UNIVERSITY ROAD

Town GALWAY

Postcode

Country Ireland

Webpage www.nuigalway.ie

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Legal person .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... yes

Research organisation .... no

Small and Medium-sized Enterprises (SMEs) .... no

Nace code - Not applicable

Proposal ID **654109** *Acronym* **ACTRIS-2**

Department(s) carrying out the proposed work

Department 1

Department name	School of Physics & Centre for Climate and Air Pollution Studies
Street	UNIVERSITY ROAD
Town	Galway
Postcode	0000
Country	Ireland

☐ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** *Acronym* **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title	Prof.	Sex	(•) Male ( ) Female
First name	**Colin**	Last name	**O'Dowd**
E-Mail	**colin.odowd@nuigalway.ie**		
Position in org.	Professor of Physics and Director of Centre		
Department	School of Physics & Centre for Climate and AIr Polllution Studies		
Street	UNIVERSITY ROAD	☒ Same as organisation address	
Town	GALWAY	Post code	
Country	Ireland		
Website	www.nuigalway.ie www.macehead.org		
Phone	+353-87-811-4988	Phone 2	+xxx xxxxxxxxx
Fax	+xxx xxxxxxxxx		

Proposal ID **654109** *Acronym* **ACTRIS-2**

PIC	***Legal name***
996625337	*Instytut Geofizyki Polskiej Akademii Nauk*

Short name: IGF PAS

Address of the organisation

Street Ksiecia Janusza 64

Town Warsaw

Postcode 01-452

Country Poland

Webpage www.igf.edu.pl

Legal Status of your organisation

Research and Innovation legal statuses

Public body .... yes

Non-profit .... yes

International organisation .... no

International organisation of European interest .... no

Secondary or Higher education establishment .... no

Research organisation .... yes

Small and Medium-sized Enterprises (SMEs) .... no

Legal person .... yes

Nace code 721 -

Department(s) carrying out the proposed work

Department 1

Department name	Physics of the Atmosphere
Street	Ksiecia Janusza 64
Town	Warsaw
Postcode	01-452
Country	Poland

☒ Same as organisation address

Dependencies with other proposal participants

Character of dependence	***Participant***	

Proposal ID **654109** | Acronym **ACTRIS-2**

Person in charge of the proposal

The name and e-mail of contact persons are read-only in the administrative form, only additional details can be edited here. To give access rights and basic contact details of contact persons, please go back to Step 4 of the submission wizard and save the changes.

Title: Dr.

Sex: (•) Male ( ) Female

First name: **Aleksander**

Last name: **Pietruczuk**

E-Mail: **alek@igf.edu.pl**

Position in org.: Associate Profesor

Department: Physics of the Atmosphere

Street: Ksiecia Janusza 64

☒ Same as organisation address

Town: Warsaw

Post code: 01-452

Country: Poland

Website:

Phone: +486915877

Phone 2: +xxx xxxxxxxxx

Fax: +486915915

Other contact persons

First Name	Last Name	E-mail	Phone
Beata	Orlecka-Sikora	orlecka@igf.edu.pl	+486915950

Proposal ID **654109** *Acronym* **ACTRIS-2**

3 - Budget for the proposal

Participant	Country	(A) Direct personnel costs/€	(B) Other direct costs/€	(C) Direct costs of sub-contracting/€	(D) Direct costs of providing financial support to third parties/€	(E) Costs of inkind contributions not used on the beneficiary's premises/€	(F) Indirect Costs / € (=0.25(A+B-E))	(G) Special unit costs covering direct & indirect costs / €	(H) Total estimated eligible costs / € (=A+B+C+D+F+G)	(I) Reimburse-ment rate (%)	(J) Max. grant / € (=H*I)	(K) Requested grant / €
		?	?	?	?	?	?	?	?	?	?	?
CNR	IT	560 000	174 460	0	0	0	183 615	184 313	1 102 388	100	1 102 388	1 102 388
CNRS	FR	828 131	218 590	0	0	0	261 680	470 641	1 779 042	100	1 779 042	1 655 099
TROPOS	DE	278 000	67 600	0	0	0	86 400	356 750	788 750	100	788 750	788 750
NOA	EL	171 400	159 600	60 000	0	0	82 750	80 946	554 696	100	554 696	554 696
NILU	NO	388 960	58 400	0	0	0	111 840	0	559 200	100	559 200	559 200
FMI	FI	238 600	34 992	0	0	0	68 398	42 075	384 065	100	384 065	384 065
PSI	CH	130 000	32 100	0	0	0	40 525	104 000	306 625	100	306 625	0
UHEL	FI	181 462	47 538	0	0	0	57 250	97 099	383 349	100	383 349	383 349
EMPA	CH	110 000	10 000	0	0	0	30 000	0	150 000	100	150 000	0
ECMWF	UK	190 000	10 000	0	0	0	50 000	0	250 000	100	250 000	250 000

Proposal ID **654109** *Acronym* **ACTRIS-2**

Participant	Country	(A) Direct personnel costs/€	(B) Other direct costs/€	(C) Direct costs of sub-contracting/€	(D) Direct costs of providing financial support to third parties/€	(E) Costs of inkind contributions not used on the beneficiary's premises/€	(F) Indirect Costs / € (=0.25(A+B-E))	(G) Special unit costs covering direct & indirect costs / €	(H) Total estimated eligible costs / € (=A+B+C+D+F+G)	(I) Reimburse-ment rate (%)	(J) Max. grant / € (=H*I)	(K) Requested grant / €
MET Norway	NO	114 000	6 000	0	0	0	30 000	0	150 000	100	150 000	150 000
INOE	RO	31 350	51 450	0	0	0	20 700	151 849	255 349	100	255 349	255 349
LMU	DE	21 800	33 900	0	0	0	13 925	173 200	242 825	100	242 825	242 825
JRC	BE	145 040	29 403	0	0	0	43 611	0	218 054	100	218 054	218 054
UVA	ES	0	15 000	0	0	0	3 750	283 444	302 194	100	302 194	302 194
UGR	ES	269 035	137 565	0	0	0	101 650	39 184	547 434	100	547 434	547 434
CSIC	ES	53 000	8 000	0	0	0	15 250	32 613	108 863	100	108 863	108 863
KNMI	NL	216 075	57 500	0	0	0	68 394	92 637	434 606	100	434 606	429 887
CHMI	CZ	51 480	70 520	0	0	0	30 500	66 432	218 932	100	218 932	218 932
ULUND	SE	76 275	19 710	0	0	0	23 996	0	119 981	100	119 981	119 981
CYI	CY	122 024	30 847	0	0	0	38 218	0	191 089	100	191 089	191 089

Proposal ID **654109** *Acronym* **ACTRIS-2**

Participant	Country	(A) Direct personnel costs/€	(B) Other direct costs/€	(C) Direct costs of sub-contracting/€	(D) Direct costs of providing financial support to third parties/€	(E) Costs of inkind contributions not used on the beneficiary's premises/€	(F) Indirect Costs / € (=0.25(A+B-E))	(G) Special unit costs covering direct & indirect costs / €	(H) Total estimated eligible costs / € (=A+B+C+D+F+G)	(I) Reimburse-ment rate (%)	(J) Max. grant / € (=H*I)	(K) Requested grant / €
RIUUK	DE	105 260	7 540	0	0	0	28 200	0	141 000	100	141 000	141 000
DWD	DE	112 500	29 100	0	0	0	35 400	0	177 000	100	177 000	177 000
UNIVLEEDS	UK	193 800	34 200	0	0	0	57 000	0	285 000	100	285 000	285 000
NERC	UK	58 689	21 311	0	0	0	20 000	0	100 000	100	100 000	100 000
UPAC	HU	16 000	16 000	0	0	0	8 000	0	40 000	100	40 000	40 000
IPNASB	BY	24 200	16 600	0	0	0	10 200	0	51 000	100	51 000	51 000
CNISM	IT	67 000	13 000	0	0	0	20 000	0	100 000	100	100 000	100 000
INRNE	BG	14 250	22 550	0	0	0	9 200	0	46 000	100	46 000	46 000
NUIG	IE	9 234	21 166	0	0	0	7 600	50 060	88 060	100	88 060	88 060
IGF PAS	PL	21 300	19 500	0	0	0	10 200	0	51 000	100	51 000	51 000
Total		4 798 865	1 474 142	60 000	0	0	1 568 252	2 225 243	10 126 502		10 126 502	9 541 215

Proposal ID **654109** *Acronym* **ACTRIS-2**

4 - Ethics issues table

1. HUMAN EMBRYOS/FOETUSES		Page
Does your research involve Human Embryonic Stem Cells (hESCs)?	◯ Yes ◉ No	
Does your research involve the use of human embryos?	◯ Yes ◉ No	
Does your research involve the use of human foetal tissues / cells?	◯ Yes ◉ No	
2. HUMANS		**Page**
Does your research involve human participants?	◯ Yes ◉ No	
Does your research involve physical interventions on the study participants?	◯ Yes ◉ No	
Does it involve invasive techniques?	◯ Yes ◉ No	
3. HUMAN CELLS / TISSUES		**Page**
Does your research involve human cells or tissues (other than from Human Embryos/ Foetuses, i.e. section 1)?	◯ Yes ◉ No	
4. PERSONAL DATA (ii)		**Page**
Does your research involve personal data collection and/or processing?	◯ Yes ◉ No	
Does your research involve further processing of previously collected personal data (secondary use)?	◯ Yes ◉ No	
5. ANIMALS (iii)		**Page**
Does your research involve animals?	◯ Yes ◉ No	

Proposal ID **654109** *Acronym* **ACTRIS-2**

6. THIRD COUNTRIES		Page
Does your research involve non-EU countries?	○ Yes ◉ No	
Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)? (v)	○ Yes ◉ No	
Do you plan to import any material from non-EU countries into the EU? *For data imports, please fill in also section 4.* *For imports concerning human cells or tissues, fill in also section 3.*	○ Yes ◉ No	
Do you plan to export any material from the EU to non-EU countries? *For data exports, please fill in also section 4.* *For exports concerning human cells or tissues, fill in also section 3.*	○ Yes ◉ No	
If your research involves low and/or lower middle income countries, are benefits-sharing measures foreseen? (vii)	○ Yes ◉ No	
Could the situation in the country put the individuals taking part in the research at risk?	○ Yes ◉ No	
7. ENVIRONMENT & HEALTH and SAFETY See legal references at the end of the section. (vi)		Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants? *For research involving animal experiments, please fill in also section 5.*	○ Yes ◉ No	
Does your research deal with endangered fauna and/or flora and/or protected areas?	○ Yes ◉ No	
Does your research involve the use of elements that may cause harm to humans, including research staff? *For research involving human participants, please fill in also section 2.*	○ Yes ◉ No	
8. DUAL USE (vii)		Page
Does your research have the potential for military applications?	○ Yes ◉ No	
9. MISUSE		Page
Does your research have the potential for malevolent/criminal/terrorist abuse?	○ Yes ◉ No	
10. OTHER ETHICS ISSUES		Page
Are there any other ethics issues that should be taken into consideration? Please specify	○ Yes ◉ No	

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents. ☒

Proposal ID **654109** *Acronym* **ACTRIS-2**

5 - Call specific questions

Open Research Data Pilot in Horizon 2020

If selected, all applicants have the possibility to participate in the Pilot on Open Research Data in Horizon 2020[1], which aims to improve and maximise access to and re-use of research data generated by actions. Participating in the Pilot does not necessarily mean opening up all research data. Actions participating in the Pilot will be invited to formulate a Data Management Plan in which they will determine and explain which of the research data they generate will be made open.

We wish to participate in the Pilot on Open Research Data in Horizon 2020 on a voluntary basis	(●) Yes	( ) No

Participation in this Pilot does not constitute part of the evaluation process. Proposals will not be evaluated favourably because they are part of the Pilot and will not be penalised for not participating.

[1] According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.

Data management activities

The use of a Data Management Plan (DMP) is required for projects participating in the Open Research Data Pilot in Horizon 2020, in the form of a deliverable in the first 6 months of the project.

All other projects may deliver a DMP on a voluntary basis, if relevant for their research.

Are data management activities relevant for your proposed project?	(●) Yes	( ) No

A Data Management Plan will be delivered (Please note: Projects participating in the Open Research Data Pilot **must** include a Data Management Plan as a deliverable in the first 6 months of the project).	☒
Data Management is part of a Work Package.	☒
Data Management will be integrated in another way.	☐

Aerosols, Clouds, and Trace gases Research InfraStructure

ACTRIS-2

Call title: **Integrating and opening existing national and regional research infrastructures of European interest:INFRAIA-1-2014-2015**

Call identifier: **H2020-INFRAIA-2014-2015**

List of participants

Participant No *	**Participant organisation name**	**Country**
1 (Coordinator)	Consiglio Nazionale delle Ricerche (CNR)	Italy
2	Centre National de Recherche Scientifique (CNRS)	France
3	Leibniz Institut fuer Troposphaerenforschung e.V. (TROPOS)	Germany
4	National Observatory of Athens (NOA)	Greece
5	Norsk Institutt for Luftforskning (NILU)	Norway
6	Ilmatieteen Laitos (FMI)	Finland
7	Paul Scherrer Institut (PSI)	Switzerland
8	Helsingin Yliopisto (UHEL)	Finland
9	Eidgenoessische Materialpruefungs- und Forschungsanstalt (EMPA)	Switzerland
10	European Centre for Medium-Range Weather Forecasts (ECMWF)	United Kingdom
11	Meteorologisk Institutt (MET Norway)	Norway
12	National Institute of Research and Development for Optoelectronics (INOE)	Romania
13	Ludwig-Maximilians-Universitaet Muenchen (LMU)	Germany
14	JRC – Joint Research Centre – European Commission	Belgium
15	Universidad de Valladolid (UVA)	Spain
16	Universidad de Granada (UGR)	Spain
17	Agencia Estatal Consejo Superior De Investigaciones Cientificas (CSIC)	Spain
18	Koninklijk Nederlands Meteorologisch Instituut (KNMI)	The Netherland
19	Cesky Hydrometeorologicky Ustav (CHMI)	Czech Republic
20	Lunds Unviersitet (ULUND)	Sweden
21	Cyprus Institute Limited (CyI)	Cyprus
22	Rheinisches Institut für Umweltforschung an der Universitaet zu Koeln e.V. (RIUUK)	Germany
23	Deutscher Wetterdienst (DWD)	Germany
24	University of Leeds (UnivLeeds)	United Kingdom
25	Natural Environment Research Council (NERC)	United Kingdom
26	Pannon Egyetem (UPAC)	Hungary
27	B.I. Stepanov Institute of Physics of The National Academy of	Belarus

	Sciences of Belarus (IPNASB)	
28	Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia (CNISM)	Italy
29	Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences (INRNE)	Bulgaria
30	National University of Ireland, Galway (NUIG)	Ireland
31	Instytut Geofizyki Polskieu Akadmii Nauk (IG PAS)	Poland

Table of Contents

1. Excellence

Biological and Medical Sciences - Starting Communities

☐ Health information, clinical data, samples and medical images – support to population studies.

☐ New tools and resources for analysing and integrating genomic, epigenomic, proteomic, metabolomic and phenomic data.

☐ Plant and forestry material resources.

☐ European nanomedicine characterisation infrastructure.

☐ Research infrastructures supporting rare diseases research.

Biological and Medical Sciences - Advanced Communities

☐ High-containment biosafety facilities and virus collections including for high-risk animal/human pathogens.

☐ Vaccine infrastructures.

☐ Research Infrastructures for translating research on biological structures into innovation in biomedicine.

☐ Research infrastructures in aquaculture.

Energy - Starting Communities

☐ European facilities for electrochemical energy storage testing.

☐ Testing of wind turbines, ocean energy converters and electrical subsystems for grid integration under laboratory conditions.

Energy - Advanced Communities

☐ European smart grids research infrastructure.

Environmental and Earth Sciences - Starting Communities

☐ Research infrastructures for hydrological/hydrobiological research.

☐ Research infrastructures for research on crustal fluids and geo-resources.

☐ Research infrastructures for long-term ecosystem and socio-ecological research.

☐ Research infrastructures for ocean drilling.

Environmental and Earth Sciences - Advanced Communities

☒ Aerosol, clouds, and trace gases research infrastructure.

☐ Research infrastructures for environmental hydraulic research.

☐ Research infrastructures for terrestrial research in the Arctic.

☐ Research infrastructures for forest ecosystem and resources research.

☐ Research Infrastructures for integrated and sustained coastal observation.

Mathematics and ICT - Starting Communities

☐ Distributed, multidisciplinary European infrastructure on Big Data and social data mining.

Mathematics and ICT - Advanced Communities

☐ Integrating activity for facilitating access to HPC (High Performance Computing) centres.

Engineering, Material Sciences, and Analytical facilities - Starting Communities

☐ Advanced frontier research in nanoelectronics.

Engineering, Material Sciences, and Analytical facilities - Advanced Communities

☐ Advanced nanofabrication.

☐ Advanced material research based on large-scale facilities.

☐ Leading-edge research based on advanced laser sources.

☐ Functional materials for special applications.

- ☐ Facilities for research on materials under extreme conditions.
- ☐ Large-scale testing facilities for engineering applications.

Physical Sciences - *Starting Communities*

- ☐ European laboratory astrophysics.
- ☐ Research infrastructures for high-energy astrophysics.
- ☐ Science at deep-underground laboratories.
- ☐ Integrating gravitational wave research.

Physical Sciences - *Advanced Communities*

- ☐ Detectors for future accelerators.
- ☐ Research infrastructures for nuclear physics.
- ☐ European planetary science.

Social Sciences and Humanities - *Starting Communities*

- ☐ Generations and gender: a cross-national longitudinal data infrastructure for research on social cohesion and social inclusion and for the study of inter-generational relations in an ageing society.
- ☐ Research infrastructures for studying the role of intangible investment for economic growth and for the study of cultural, historical and institutional innovation processes.

Social Sciences and Humanities - *Advanced Communities*

- ☐ Contemporary European history: European Holocaust research infrastructure.
- ☐ European research infrastructuresfor restoration and conservation of cultural heritage.

1.1 Objectives

ACTRIS-2 (Aerosols, Clouds, and Trace gases Research InfraStructure) consolidates and improves services offered within FP7 funded Integrating Activities project ACTRIS (2011-2015). ACTRIS-2 takes up the overarching objectives of ACTRIS to further integrate the European ground-based stations equipped with advanced atmospheric probing instrumentation for aerosols, clouds, and short-lived gas-phase species. ACTRIS-2 responds to user needs:

- ✓ To maintain and increase availability of long-term observational data relevant to climate and air-quality research on the regional scale produced with standardized or comparable procedures throughout the ACTRIS network of stations;
- ✓ To further develop and disseminate integration tools to fully exploit the use of multiple atmospheric techniques at ground-based stations, in particular for the calibration/validation/integration of satellite sensors and for the improvement of the parameterizations used in global and regional-scale climate and air-quality models;
- ✓ To open calibration facilities and advanced observing platforms to Trans-National Access to the benefit of a large user community, including SMEs, and to further facilitate virtual access to high-quality information, tools and services enhancing the ACTRIS Data Centre;
- ✓ To maintain and enhance capacity of training in the field of atmospheric observations particularly directed to new users including those from non-EU developing countries;
- ✓ To increase the Technology Readiness Level of technologies for atmospheric observation of aerosols, clouds, and trace gases in close partnership with EU SMEs associated to the project.
- ✓ To develop a sustainable strategy for maintaining ACTRIS-services in the long-term, improving synergies with all relevant research infrastructures in the field of environmental sciences and coordination with national strategies in the EU.

ACTRIS-2 will represent a fundamental step towards the establishment of the atmospheric component of the Integrated European Observing System and a clear upgrade in services offered to users.

1.2 Relation to the work programme

ACTRIS-2 responds to the following topic: «*Aerosol, clouds, and trace gases research infrastructure*. *This activity should further integrate state-of-the-art European ground-based stations for long term observations of aerosols, clouds and short lived gases that are essential to climate and air-quality research. New integration tools and long-term sustainability should be addressed, in particular by linking with appropriate ESFRI projects.*»
ACTRIS-2 addresses the specific scope **of integrating state-of-the-art European ground-based stations for long-term observations of aerosols, clouds and short-lived gases** taking advantage of the I3 project ACTRIS as the fundament. ACTRIS was built on existing infrastructures EARLINET (European Aerosol Research Lidar Network, EU-FP5 and FP6 projects), EUSAAR (European Supersites for Atmospheric Aerosol Research, EU-FP6 project), and Cloudnet (started as an EU-FP5 project for observing cloud profiles) to which a trace gas network component was added.

ACTRIS-2 builds upon ACTRIS to achieve the construction of a user-oriented RI responding to needs expressed by a wide international atmospheric research community (see recent IPCC 2013 WGI, GEOSS, etc.). ACTRIS-2 is an integrated observing system providing high-quality data on aerosol, clouds and trace gases at ground level, vertical profiles and total-column information. It develops and implements in a large network of stations in Europe and beyond a number of observational protocols that permit harmonization of collected data and their dissemination. ACTRIS-2 will improve systematic and timely collection, processing and distribution of data and results for use in e.g. modelling, in particular in the context of MACC-III (Monitoring Atmospheric Composition and Climate, EU H2020-project) towards implementation of the Copernicus Atmosphere Monitoring Service.

ACTRIS-2 offers **networking** expertise, trans-national remote access to three upgraded **calibration services**, hands-on **trans-national access** to 18 different ground-based observatories, and enhanced **virtual access to high-quality data and products** through the **ACTRIS Data Centre**. ACTRIS-2 develops **new integration tools** through small-scale exploration projects in joint research activities that will produce scientific or technical progresses reusable in infrastructures, thus shaping future observation strategies. ACTRIS integrates diverse research communities that had weak interaction in the past and is a trans-disciplinary infrastructure within the atmospheric domain. **Associated partnership with SMEs** places innovation in instrumentation as one of the fundamental building blocks of ACTRIS-2. ACTRIS-2 maintains a strong component dedicated to **mobility of experts and training of new users and personnel** both within and outside the consortium. Capacity building actions, including training at calibration facilities, data workshops and courses, will regularly be held for students, new users as well as researchers, especially those from countries developing observation sites.

ACTRIS-2 invests substantial efforts to ensure **long-term sustainability beyond the term of the project,** positioning the project in the ESFRI context and interacting with ongoing ESFRI initiatives (i.e. ICOS, IAGOS and SIOS). ACTRIS-2 will dedicate efforts towards better harmonisation, integration and interoperability of data and metadata, applications and other services with other research infrastructures in the atmospheric domain and beyond. It will integrate products from ENVRI (Environmental Research Infrastructures project) and requirements from WIGOS and other international initiatives from the space science community. This will meet the end-user requirements and facilitate the use of the ACTRIS products by a larger user community in Europe and worldwide.

1.3 Concept and approach

1.3.1 Responding to scientific challenges

Models producing most reliable future atmosphere, **climate and air-quality predictions** are crucial for the European society in the context of a changing climate. Improvement to global and regional models requires implementation of emerging observation based findings of atmospheric interactions of aerosols, clouds and trace gases and their connection to biosphere and anthropogenic activities. **Aerosol distributions** are highly spatially inhomogeneous depending both on natural sources and on anthropogenic emissions related to the development level in different regions. **Trace gases** and atmospheric aerosols are tightly connected with each other via physical, chemical, meteorological and biological processes occurring in the atmosphere and at the atmosphere-biosphere – water cycle interfaces. The mixing ratios of volatile organic compounds (VOCs) and nitrogen oxides (NO_{xy}) in the atmosphere are very variable with strong impact on the oxidation capacity of the atmosphere and influence the climate, as they are precursors of secondary aerosols and tropospheric ozone. **Clouds** are one of the major sources of uncertainty in future climate predictions. The crucial question is how future clouds will respond to global warming. Climate models cannot properly deal with clouds, since the spatial resolution of these models is coarser than the scale of most cloud processes. A strong challenge will concern reliable prediction of climate change at regional scale. These priorities are clearly documented in the last IPCC 5th Assessment Report (IPCC AR5 WGI). Health effects due to **air pollution and the potential damage from climate change** are two of the most important environmental problems facing the European Union. Quantifying the contribution of different anthropogenic and natural sources of aerosol (and their precursors) is needed to implement efficient air-quality regulation. Understanding and detecting potential feedback mechanisms between climate and air quality is also a major challenge to the scientific community. **Indication of decreasing or increasing trends in atmospheric composition** is essential to our knowledge of global to regional cycling of atmospheric constituents, to validate past and present emission inventories, to test validity of models at different scales and for different applications. They are also needed in order to understand the effectiveness of future emission abatement strategies implemented in various countries to limit radiative forcing. Data documenting atmospheric variability and innovative data-products are still required to improve process understanding and model parameterization in relation to the interaction of 1) air quality and climate, 2) air quality and regional pollution, 3) aerosol, clouds, and precipitation, 4) climate change and weather, and the quantification of links to 5) water cycle and 6) natural and anthropogenic hazards. **ACTRIS-2 is the only RI in the European landscape integrating advanced observation platforms and providing harmonized data and data products to respond to these scientific challenges.**

1.3.2 Integrating the European Research Infrastructure landscape

ACTRIS-2 consolidates strategies amongst European partners for observation of aerosol, clouds, and trace gases. Proper investigation of the issues taken up in ACTRIS requires the polling of knowledge and expertise that can only be found at the European scale. ACTRIS-2 calls for the expertise of many research teams in the fields of aerosol, clouds, trace gases metrology, data analysis and modelling, data management and delivery procedures suitable for improving current observational capacity. **Experts participation** in networking activities brings the necessary degree of expertise to impact observing strategies even outside the defined ACTRIS-2 partnership. The data products from this integration will facilitate and enhance scientific exchange with user communities working on models, satellite retrievals, and forecast systems. This chain of complementary expertise can only be found at the European scale as no single country could provide the sufficient knowledge-based resources. ACTRIS-2 consolidates and strengthens services offered to a very wide community of users, including SMEs, responding to a demand that is continuously increasing.

ACTRIS-2 brings a 4-D view, from surface to upper troposphere, of short-lived climate forcers such as aerosols, clouds and trace gases and their variability that is unique and central in the EU landscape and an expertise not provided by any other existing RIs. Currently, three RIs include an atmospheric component: ICOS (ATC component), SIOS (atmospheric remote-sensing component) and IAGOS. ICOS focuses on the observation of carbon dioxide and other greenhouse gases (GHG) in Europe, their sources and sinks. The atmospheric component of SIOS brings a specific expertise in remote-sensing in the Arctic. IAGOS is a fleet of commercial airliners equipped with instrumentation to measure the atmospheric state along the fixed trajectories of the aircraft.

Data and data-products provided by ACTRIS-2 documenting the interaction of air quality and climate, air quality and regional pollution, aerosol, clouds and precipitation and their links to the water cycle and natural and anthropogenic hazards are outside the perimeter of current ESFRI RIs. ACTRIS-2 will complement IAGOS by providing another spatial and temporal dimension of the observations, and will have strong interactions with the SIOS observing system for sharing measurement protocols. ACTRIS-2 promotes shared use of resources with other RIs: technical issues related to aerosol measurements are shared with IAGOS; platforms are shared with SIOS and ICOS for surface-based measurements. Several ACTRIS-2 core sites are currently operated jointly with ICOS.

Finally, since the atmosphere is part of a larger connected and interlinked global environment including oceanic, cryospheric, biological and other aspects, ACTRIS-2 will contribute to **synergetic observation** of the global environment. It is a basis for engaging the community in more **trans-disciplinary** approaches to better understand processes and linkages in a sustained, integrated, and high-quality manner with complementary methods.

1.3.3 Synergies with national observing strategies and alert systems

ACTRIS-2 provides the essential added-value to investments and running operations (equipment and human resources) performed at stations, for data management and calibration facilities that are made at national level, bringing this to the scientific level required to meet the environmental challenges. National programs linked to ACTRIS are numerous and cannot be listed exhaustively. However, the link between national investments and ACTRIS-2 is facilitated with the establishment of National ACTRIS projects in to date 15 different EU countries. National ACTRIS projects were established to ensure that investments at national level are coherent with the EU ACTRIS strategy and ensure optimum harmonization strategy at all levels. The strong national base of ACTRIS-2 is essential and, in return, the well-functioning organization of ACTRIS has been essential, in the past, to leverage national funds in many countries required to operate the RIs. The Pan-European initiative and the coherence in investment and in access to data and products brought by ACTRIS is an essential added-value to fully exploit RI services that justify national investments. Likewise, the European dimension is unique to provide sufficient authority to ensure effective implementation of methodologies and protocols at national levels.

ACTRIS-2 is tightly linked to the new developments made in some countries to develop alert systems and operational observing networks, such as lidar or ceilometer networks, or regional air quality networks. Complementary strategy and efforts between the academic research community involved in long-term observations and operational networks play a key role in developing the most efficient observing system suited to both users in the climate and air quality research community and stakeholders involved in policies and risk prevention and environmental crisis management. ACTRIS-2 brings innovative technologies, products and methodologies coupling different instruments and the flexibility to deploy instruments on strategic locations whenever necessary. In turn, networks bring the operational expertise including the core measurements available on 24/7 (24 hours seven days a week) basis. Efficient transfer of information between ACTRIS-2 and operational networks will be essential to properly handle atmospheric hazards, either natural or anthropogenic, that are regularly impacting atmospheric composition: massive forest fires, regional dust outbreaks, volcanic eruptions, industrial or nuclear accidents which are all emitting enormous amounts of particulate matter with high impact on society and economy.

1.3.4 Integration in international framework

ACTRIS-2 supports international research projects in the field of air quality and climate change, e.g. GEOSS, GAW, EMEP and GCOS, while maintaining a strong link to the space component related to atmospheric observations. ACTRIS-2 develops close cooperation with other RI projects both within ACTRIS Joint Research Activities (JRAs) and within the ENVRI-plus project. Overall, ACTRIS-2 contributes greatly to strengthening the EU position and leadership in this research area by providing unique information, services, tools and reference methodologies that are used and applied by a very wide community also outside Europe (for example at non-EU GAW stations).

ACTRIS-2 builds on and directly supports the needs outlined in the monitoring strategies of the CLRTAP-EMEP program that have a European and long-term commitment through intergovernmental agreements, and serves to sustain basic operations of sites and instrumentation at decadal timescales. New issues linked to the evolution of the EU directive on air quality and to the Convention on Long-Range Transport of Atmospheric Pollutants (CLRTAP) have been transposed in the national legislation, leading to the development of monitoring stations in rural areas reporting basic information on PM mass and composition. ACTRIS-2 will bring the required scientific and technological expertise to the EMEP community to propose, whenever necessary, the harmonization/standardization procedures required for responding to EMEP missions and objectives. A strong interaction between EMEP and ACTRIS (and EUSAAR) has been established in the past that led to efficient transfer of recommendation now included in the EMEP monitoring strategy. This will be maintained and enhanced in ACTRIS-2, in particular with the extension of calibration facilities and the new services offered at the ACTRIS in-situ data centre (EBAS), which will directly benefit the EMEP community considering that EBAS is the joint EMEP-ACTRIS data centre.

ACTRIS-2 will also maintain links established in ACTRIS with the main international coalition of Earth Observations, the GEOSS, Global Earth Observation System of Systems. ACTRIS-2 data products are related to nearly all societal benefit areas of GEOSS: disasters, health, climate, water, weather, ecosystems, agriculture and biodiversity. Current ACTRIS links with the World Meteorological Organization (WMO), the European Space Agency (ESA) and the EU-funded Copernicus Services, which are also the potential end-users of novel aerosol and trace gases data products, will be even strengthened and enhanced by new products delivered in ACTRIS-2. These agencies have clearly recognized the role of ACTRIS as a major contributor to the observing system, not only in Europe but worldwide.

ACTRIS-2 will contribute to the recent global climate initiative called "the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants" involving several EU countries to reduce the short-lived climate pollutants in the atmosphere. The coalition will be a driving force for the development of national action plans and the adoption of policy priorities, building capacity among developing countries, mobilizing public and private funds for action, raising awareness globally, fostering regional and international cooperation, and improving scientific understanding of the pollutant impacts and mitigation. ACTRIS-2 can take a leadership in Europe by bringing a future-based long-term vision contributing metrological expertise (e.g. on black-carbon measurements) and on effectiveness of reduction policies in Europe, providing unique long-term trends for several compounds of interest. Here, Europe could lead the way to provide a point of reference not only for the USA, but also for Asian countries with their fast developing air pollution and climate issues in parallel with their growing economies.

1.3.4 The Organisation of ACTRIS-2

The organization of ACTRIS-2 calls for 5 Networking Activities (NA1-5), including management, 4 Transnational access Activities, including both physical access to calibration facilities (TNA1-3) and hands-on access to platforms (TNA4), one Virtual Access activity (VA1) and 3 Joint Research Activities (JRA1-3) (see Table 1.1).

This organization is required to reach the overarching objectives of ACTRIS-2, and respond to the following challenges:

- To maintain excellent level of functioning through efficient management structures (**NA1**);
- To maintain and expand provision of high-quality data and the implementation of the new protocols in the network of stations, whenever necessary (**NA2 and NA3**);
- To promote innovation and encourage joint collaboration with SMEs (**NA4, NA2,3; JRA1,2; TNA1-4**);

- To integrate ACTRIS into a larger European atmosphere observing infrastructure system that will facilitate its long-term sustainability (**NA5, VA1**);
- To offer specific calibration centres (**TNA1-3**);
- To open advanced observation platforms (strategically located to cover representative climates and air mass types) to trans-national access, facilitate a more efficient use of expensive and useful infrastructures, promote excellent science and opportunities to new users (**TNA4**);
- To support interaction and exchange with exploratory projects in the field of atmospheric science and climate expanding use of ACTRIS-2 observing strategies (**NA2-3 and TNA4**);
- To further facilitate access to data and metadata and their exploitation (**VA1);**
- To expand the capacity of ACTRIS calibration centres, to the benefits of end-users (**TNA1-3**);
- To develop higher level data products from further integration of the different components of ACTRIS-2 (remote sensing and in-situ techniques), and enhance services to end-users (**JRA1-3, NA2,3 and VA1**);
- To enhance use of ACTRIS-2 data and data products in regional models and for the implementation of the Copernicus Atmosphere Monitoring service activities (**VA1 and JRA3**);
- To support climate research with observation-based trend assessments and development of climate models (**JRA3**);
- To expand training and education activities to a larger number of end-users, including infrastructures operators, and users from academic research, private sector and operational networks (**NA2-5**);
- To strengthen the EU leadership by favouring adoption of ACTRIS-2 recommendations and technologies on global scale (**NA4, NA5**).

WP1/ NA1	*Management of the project, including management of TNA*	**WP6/ TNA1**	*Lidar Calibration Centre (LiCal)*	**WP11/ JRA1**	*Improving the accuracy of aerosol light absorption determinations*
WP2/ NA2	*Profiling of aerosols and clouds*	**WP7/ TNA2**	*AERONET-Europe Calibration Centre*	**WP12/ JRA2**	*The surface exchange and vertical transport of aerosols*
WP3/ NA3	*Near-surface measurements of aerosols, clouds and trace gases*	**WP8/ TNA3**	*European Centre for Aerosol Calibration (ECAC)*	**WP13/ JRA2**	*Model evaluation, assimilation and trend studies*
WP4/ NA4	*ACTRIS Innovation Platform*	**WP9/ TNA4**	*Physical access to advanced ACTRIS stations*		
WP5/ NA5	*ACTRIS-2 training, outreach and sustainability actions*	**WP10/ VA1**	*ACTRIS Data Centre*		

Table 1.1: ACTRIS-2 types of activities

1.3.5 Gender issues

As for ACTRIS, special attention was given in ACTRIS-2 to gender issues and important responsibilities within the project are already identified for women scientists. The ACTRIS-2 project is coordinated by Dr. Gelsomina Pappalardo who is senior scientist at the Consiglio Nazionale delle Ricerche (CNR) in Potenza (Italy). The management of the project will be under the responsibility of Dr. Sabine Philippin from Centre National de la Recherche Scientifique (CNRS) in Clermont-Ferrand, France. In addition, NA2 is coordinated by Dr. Ulla Wandinger who is a senior scientist at the Leibniz Institute for Troposheric Research (TROPOS) in Leipzig (Germany), Data Centre activity (VA1) is coordinated by Dr. Cathrine Lund Myhre from Norsk Institutt for Luftforskning (NILU) in Norway, JRA3 is coordinated by Dr. Angela Benedetti, senior scientist at ECMWF, and the specific lidar data centre under the coordination of Dr. Lucia Mona, junior scientist at CNR in Potenza (Italy). The Lidar calibration facility TNA1 is coordinated by Dr. Doina Nicolae, senior scientist at National Institute for Optoelectronics (INOE) in Bucharest, Romania and JRA2 is coordinated by

Leena Järvi, junior scientist at the University of Helsinki, Finland. In addition, numerous female (young) scientists are taking responsibilities at task level in ACTRIS-2.
Overall, ACTRIS-2 will promote participation of female scientists/engineers in all activities of the project, in particular through affirmative actions in TNAs and training sessions where participation of women, especially from new EU countries or ICPC countries, will be promoted. This was implemented in ACTRIS and is resulting now in a much stronger participation of women in the Executive Steering Group of ACTRIS-2. ACTRIS-2 project meetings and workshops will be organized such that it facilitates the participation of all project partners and reconcile work and family life for both men and women (e.g. the travelling and meetings will not interfere with weekends, and wherever possible, remote participation will be facilitated). ACTRIS-2 will promote women and young scientists as chairs and speakers at the ACTRIS-2 internal meetings and dedicated sessions of external meetings.

1.4 Ambition

1.4.1 Harmonizing observation strategies through Networking Activities

Networking activities are the backbone of ACTRIS-2. All partners contributing to the observations are included in NA2 and/or NA3 activities which will see the participation of many associate partners, including SMEs.

Networking Activity (NA1) is the management part of ACTRIS-2. It maintains the efficient structure of ACTRIS and includes management of Trans-National Access activities.

Networking Activities NA2 and NA3 serve the purpose of 1) harmonizing procedures for sampling, measuring and disseminating advanced aerosols, clouds and trace gases data in Europe, 2) ensuring traceability and improving quality of disseminated data and 3) providing hands-on training and expertise to users within and outside the consortium. NA2 and NA3 directly capitalize work performed in ACTRIS. Maturation and joint activities in the ongoing ACTRIS project permit further integration of the original communities into 2 single WPs focussing on remote-sensing (NA2) and surface-based measurements (NA3) of all 3 components of ACTRIS-2 (aerosol, clouds and trace gases). Common approaches developed in the two NAs together with regular joint NA2/NA3 workshops and transversal training in NA5 will promote the emergence of a single community capable of addressing all aspects of atmospheric observations. NA2 and NA3 will secure provision of high quality data to the data centre, develop new harmonized procedures when necessary and ensure their efficient implementation at partner and associated partner institutes.

Networking Activity (NA4) has the objective of enhancing and promoting cooperation with the private sector and in particular with European SMEs. Specific work is to maintain and further develop standard-making processes for technologies relevant to ACTRIS observations, promoting the use of ACTRIS infrastructure for testing novel instrumentation, promoting joint public-private collaboration for high-risk innovation and close-to-market activities applied to atmospheric observation technologies and establishing a platform for exchange of expertise and information with the private sector through their participation to workshops.

Networking Activity (NA5) has the objective of disseminating information beyond the project, either through training and further integration of the data with operational monitoring networks and international networks/programmes. NA5 will centralize the work towards long-term sustainability of ACTRIS by engaging in world class RI design and by strengthening appropriate links with current and new ESFRI projects, interaction with stakeholders and end users. NA5 will be central to interact with national ACTRIS initiatives and to promote international activities of ACTRIS.

1.4.2 Enhancing quality, quantity and diversity of Access

Access offered in ACTRIS-2 will be clearly enhanced with respect to ACTRIS, both for quality, quantity and diversity of services:

Trans-National Access to calibration facilities (TNA1-3) will be considerably enhanced with respect to ACTRIS, to the benefit of both partners and associated partners. Given the complexity of objects relevant to ACTRIS (aerosol, trace gases, clouds), expertise is distributed in Europe, resulting in 3 thematic calibration centres. Two of them were in their maturation phase during ACTRIS while one was already operational. The new **Lidar Calibration Centre (LiCal) – TNA1**, comprising 6 sub-units (fixed and mobile), offers a wide range of possibilities to test and calibrate lidars and ceilometers, starting from the characterization and optimization of single components to the assessment of the whole system's performance. It is mostly related to NA2 activities. The **AERONET-Europe calibration facility-TNA2** for sun/sky photometers is maintained and will provide 12% more access with respect to ACTRIS. It will also be extended to night time AOD measurement with Moon-photometer. It is operated in close collaboration with NASA AERONET calibration facility. The new **European Centre for Aerosol Calibration (ECAC)-TNA3** comprising 3 sub-units (laboratory-based), offers the capacity to perform calibration of the core surface-based aerosol variables (aerosol chemical, optical and physical properties). It is mainly related to NA3 activities. These Calibration facilities are expected to strongly contribute to increase the number of available quality assured data, in particular from associated partners. Because calibration facilities are funded at national level, they can be considered a long-term investment beyond the framework of ACTRIS-2. We expect use of calibration centres by SMEs and operational networks, as in ACTRIS.

Physical Trans-National Access (TNA4) is open to 18 different sites throughout Europe. This is 7 more sites with respect to ACTRIS and, overall, the access-units offered in ACTRIS-2 are 15% higher than in ACTRIS, in response to the strong demand from the research community. TNA is opened to "historical" ACTRIS sites offering access to infrastructures with an excellent combination of instruments and expertise. It is also opened to accessing sites with recent history of TNA but providing opportunities to perform experiments using the state-of-art equipment in atmospheric research which could be used for measurement campaigns or instrument tests. The high number of sites opened for TNA in ACTRIS-2 results from a comprehensive and shaped strategy to promote research at new field sites (which often benefited from significant national investments in recent years) and maintain TNA at historical sites. Enhancing the accessibility to the observatories and the exploitation of technical resources and knowledge through TNA are part of the training activities offered in ACTRIS-2.

Virtual Access activity (VA1) to all measurement data from ACTRIS stations and measurement platforms will be made available through the ACTRIS Data Centre (ACTRIS DC). QA ad QC will be performed in close collaboration with NA2 and NA3. Also access to relevant products and tools developed in NAs and JRAs will be provided, and the new products from NAs and JRAs will be implemented in the ACTRIS data portal. This access will be freely available, and the ambition is to provide access 24 hours per day, 365 days per year for all interested users, inside and outside the project.

1.4.3 Fostering RI development and innovation through Joint Research Activities

Joint Research Activities (JRA1, 2, and 3) are intended to upgrade and enhance the services offered by the RI in the future. **JRA1** addresses the issue of aerosol absorption for which new strategies and tools in long-term observations are needed to complement AERONET network and provide reliable inputs to model simulation. Synergetic use of surface-based in-situ and remote-sensing techniques will contribute to close the gap between measurement techniques and provide higher-level data products to the modelling community. **JRA2** addresses the issue of aerosol fluxes determination, using both surface-based and remote-sensing techniques. JRA2 is operated in close synergy with ICOS sites benefiting from ICOS flux towers. Finally, **JRA3** reinforces links with the regional model community and with the implementation of atmospheric services. It is crucial for ACTRIS-2 to be recognized as a major data provider for operational prediction, verification, bias correction anchoring and data assimilation, re-analyses of atmospheric composition trends and climate model error quantification.

1.4.4 Promoting innovation and standardization

Observation technologies and methodologies, including hardware and software, in-situ or remote methods, are fundamental building blocks of ACTRIS and its predecessor's projects EARLINET, Cloudnet, and EUSAAR. ACTRIS-2 will capitalize on ACTRIS to evaluate metrological performances, robustness, operation procedures including potential adaptation for long-term studies and costs of both commercial and custom-made instrumentation. The innovation potential of ACTRIS-2, which gathers world expert leaders in the field of instrumentation for aerosol, clouds and trace gases is well illustrated by the large number of private associate partners in ACTRIS (11) and by products and softwares available on the market directly achieved in ACTRIS or previous INFRA projects. Among others, we can list these past achievements:

- ✓ <u>Improving commercial instruments:</u> EARLINET has strongly collaborated with Raymetrics S.A. to enhance optical design of instruments. EUSAAR collaborated with ECOTECH (aerosol instrument supplier) to improve optical block in AURORA 3000 instrument now commercialized. EUSAAR and

ACTRIS collaborated with Aerosol d.o.o to test and improve AE31 and AE33 instruments and the data correction procedure. EUSAAR collaborated with H. MESSTECHNIK GMbH for the development of aerosol MAX DOAS, not yet in the market, Cloudnet collaborated with METEK for improving QA in their products.

- ✓ Developing new software and methods Software developed within ACTRIS are freely available: inversion program for particle number size distribution, GARRLIC and LIRIC softwares for active and passive remote-sensing instruments, GRASP software for coupling remote sensing observations. EUSAAR developed the Standardised Method for Measuring Organic and Elemental Carbon now adopted by EMEP through ACTRIS.
- ✓ Improving standard operating procedures (including calibration) The AERONET-Europe calibration centre is operated in close cooperation with Cimel Electronique Maintenance, exchange of expertise has been established in the context of the development of ceilometer and lidar networks, in particular in cooperation with JENOPTIK and LEOSPHERE, direct intercomparisons with EARLINET reference lidars were performed during the calibration campaigns EARLI09, SPALI10, ROLI10 (RAYMETRICS, LEOSPHERE), TSI, GRIMM GMbH and AEROSOL d.o.o officially participated to all intercalibration exercises at WCCAP, AERODYNE officially participated to ACMS calibration workshop held during ACTRIS.
- ✓ Developing standardization (CEN and ISO) and Standard Operating Procedures (SOP) ACTRIS experts participate to ISO/TC 146/SC 5/WG 6 Working group Lidar: a) ISO 28902-1:2012 "Ground-based remote sensing of visual range by LIDAR", published; b) ISO/WD 28902-2 "Ground-based remote sensing by Doppler wind lidar", under development, ACTRIS experts participate to CEN WG 35 for standardization of EC/OC measurements methods and to CEN TC 264 WG32 for standardization of particle number measurements, ACTRIS contributed to the definition of SOPs for nephelometer and SMPS measurements available through GAW.
- ✓ Improving networking with SMEs ACTRIS partners established collaboration in the framework of the Marie Curie ITN ITaRS for the training of young scientists in the field of atmospheric remote sensing including partnership with METEK, Cimel Electronique, Raymetrics, Selex Systems Integration and Radiometer Physics (www.itars.net), ACTRIS partners submitted the Marie Curie ITN AEROCLOUDGAS (decision pending) in close collaboration with Aerosol d.o.o, Kayser-Threde GmbH and AIrmodus Oy.

ACTRIS-2 will capitalize on ACTRIS maintaining through its associated partnership the established links with the private sector. By strengthening activities at ACTRIS-2 calibration facilities, creating new opportunities through NA4 activities where SMEs will be invited to all relevant workshops, by establishing a platform for exchange of expertise and information with the private sector and opening observation platforms through TNA to SME, we expect to further develop the innovation potential and the readiness transfer level of prototype instruments in close association with private companies. We anticipate that about 10% of user-days in TNA will be used by the private sector. Among others, we foresee new collaboration with:

- ➢ METEK for the development of radar calibration techniques, in which METEK is strongly interested, but also with respect to new data products based on Doppler spectra and polarization information (NA2).
- ➢ HALO Photonics, the supplier of commercial wind lidars currently being installed at a number of Cloudnet and EARLINET stations (NA2),
- ➢ RAYMETRICS in the context of NA2 with respect to lidar automation issues and the implementation of multi-wavelength polarization techniques,
- ➢ AEROSOL d.o.o contributes to the work of NA3 and is a direct beneficiary of JRA1 for the measurement of aerosol absorption coefficient,
- ➢ CIMEL Electronique to contribute to development and use of lunar photometry (JRA1),
- ➢ AERODYNE for support to the on-line aerosol chemistry calibration facility (TNA3),
- ➢ Quantel, LaserOptik, Continuum, Licel for testing and independent characterization of Lidar components (lasers, optics, electronics) in TNA1,
- ➢ Raymetrics S.A., Leosphere, EnviroScopY for direct intercomparisons, performance assessment and improvement of lidars (TNA1),
- ➢ AIRMODUS to participate in the work on sizing of small particles in NA3.

Companies are clearly interested in the technological innovation potential brought by the ACTRIS partnership, by the leading role of ACTRIS partners in standardization procedures (ISO and CEN), by the pioneer work of ACTRIS for developing new softwares and the capacity to improve current use of instrumentation. A potential large market exists in Europe for improving and developing cost-effective and innovative aerosol and gas monitoring instrumentation, and this is expanding regularly into industrial production applications that are expected to grow even more with the international air pollution monitoring market.

2. Impact

2.1 Expected impact

2.1.1 Impact on research communities

ACTRIS-2 was built with the overall grand challenges to respond to priorities highlighted by the community of atmospheric science accounting for the current status of the ERA in particular regarding Research Infrastructures. The largest uncertainties in our current knowledge on climate change and the related impact on air quality are associated with the complex feedback mechanisms in the climate system. Understanding and detecting feedback mechanisms that will now start to be measureable require maintaining and reinforcing the long-term sustainability of an integrated observation strategy providing high-quality data for ground level, vertical profile and column and ACTRIS-2 is an essential pillar of this current integrated observation system in Europe, bringing a unique expertise with respect to other RIs.

ACTRIS-2 will have the following impact:

- ACTRIS-2 represents a large community complementing IAGOS, SIOS and ICOS ATC. Maintaining the ACTRIS concept is required to develop the overarching management to foster joint work amongst infrastructures of the atmospheric domain, to maintain the backbone of common integrated supersites, where different projects and infrastructures integrate measurements, data collection and analysis, workshops and education. This is an objective of NA5.
- ACTRIS-2 is leading development of observational protocols for near-surface and remote sensing of short-lived atmospheric species. Its contribution is required to structure and maintain this harmonization effort that directly benefits international model intercomparison studies. This will be facilitated by ACTRIS-2 calibration facilities.
- There is a strong need to ensure that standards and measurement protocols developed in long-term projects are used in exploratory projects, so that they provide comparable data. ACTRIS (and predecessor projects in FP6) had a leading role for structuring field observations in EU projects EUCAARI, PEGASOS, etc.. This will be maintained with the on-going exploratory projects (BACCHUS, EMEP campaigns, etc..).
- Effort towards systematic and timely collection, processing and distribution of data and results for use in e.g. modelling is needed in the context of MACC-III towards implementation of the Copernicus Atmospheric Monitoring services and future Climate services. ACTRIS-2 closely works with MACC modelling community in NA5 and JRA3 to that objective and is a crucial data provider in the EU context.
- ACTRIS-2 fosters co-location of instruments and efforts to implement a number of selected supersites to explore/assess the complexity of the atmosphere and interconnections between Earth system components.
- ACTRIS-2 is engaged in an international partnership that clearly goes beyond Europe. Its leading role is recognized by GAW but also by the regional agencies such as NOAA in the USA. ACTRIS contributed to developing GAW regional and global stations outside Europe's political boundaries and ACTRIS-2 will maintain this effort in NA5 to explore where further atmospheric observations could be supported in geographic key regions.
- ACTRIS-2 will have strong impact to develop lively communities with a common future and a common culture by providing training, data workshops and courses for students as well as researchers, especially for researchers from countries developing observation sites (NA5 activities). It also secures exchange of students and scientists especially from developing countries and outside the infrastructure consortium through TNA activities.

- ACTRIS-2 strongly contributes to development of combined data (in JRA activities in particular) making them accessible, interoperable and harmonized through the ACTRIS Data Centre (VA1) so that users can elaborate an as complete description of the atmospheric state as possible. ACTRIS-2 candidates for participating in Open Research Data Pilot in H2020.

For that reason, ACTRIS-2 will considerably reinforce the European Research Area for the community involved in climate and air quality studies.

2.1.2 Impact on technologies and innovation

ACTRIS-2 devotes substantial efforts towards innovation and transfer of knowledge to SMEs, in particular in NA4. A potential large market exists in Europe for improving air pollution control and monitoring, use of renewable energy and for developing cost-effective and innovative instrumentation. ACTRIS-2 has already established links with several SMEs and a long history of joint technological developments that contributed to economic growth. In ACTRIS-2, several actions may reinforce partnership with SMEs and assets of EU-SMEs in the competitive eco-industry market, in Europe and elsewhere.

- Creating new opportunities for technology transfer to SMEs. The ACTRIS-2 industry platform established in NA4 will provide the proper framework to foster exchange of interest between RI partners and SMEs. This platform will facilitate technology transfer and joint public-private ventures for raising Transfer Readiness Level of emerging technologies developed within the RIs. Work is envisaged on a semi-confidential basis with interested SMEs.
- Addressing the need for standardization for essential atmospheric variables. The existing policy framework in the EU has proven to be crucial for the development of eco-industry sectors and remains a key instrument to sustain growth in these sectors. Establishing quality standards to comply with regulation is essential in this framework. ACTRIS-2 maintains its effort towards adoption of ISO/CEN standards in close relationship with SMEs participating to Networking Activities. This will directly benefit SMEs by providing clear technological targets and methodologies.
- Validation and calibration of new measurement technologies. Calibration facilities equipped with advanced instrumentation are available to SMEs. Affirmative action will be implemented in ACTRIS-2 to ensure that a fair fraction of user-days available through TNA is effectively used by the private sector. Mobilization of experts in the field of atmospheric technologies and use of advanced instrumentation helps the eco-industries to shape market prospection and build better industrial fabric serving community needs.

2.1.3 Impacts on societal services

ACTRIS-2 contributes to national and European systems for climate and weather prediction through re-analysis of trends of essential climate variables and to the evaluation of clouds, aerosol and other air pollutant schemes in forecast models. Of special relevance is the critical inquiry on the need of near-real-time dissemination of data for chemical weather prediction, to policy makers at all levels and to the general public (e.g. “Shared Environmental Information System” SEIS, WMO “Weather Information System” WIS). The EUMETNET (European Meteorological Services Network) Composite Observing System (EUCOS) Operational Program also provides a community for ACTRIS-2 to link its products to European weather services. The EUCOS operates a European observing network under EUMETNET and supports the development of better-quality numerical and general forecasts on a European scale.

ACTRIS data is needed for service development related to natural and anthropogenic hazards. Natural and man-made atmospheric hazards include, for instance, forest fires, sand-storms, dispersion of volcanic ash, etc. They have significant social, environmental and economic impacts. The ACTRIS-2 extensive network of monitoring stations is unique for providing the data products for evaluation of risks and potential impacts. In addition, through its expert teams, it provides the knowledge base that helps EU countries and international policy-makers and risk managers to respond to natural and man-made disasters. The role of EARLINET (and EUSAAR) during the 2010 volcanic crisis in Europe has been recognized at all levels. Since then, ACTRIS has established operational links with agencies in the various countries for atmospheric crisis management

No barriers or obstacles or framework condition to achievements of the expected impact are foreseen.

2.2 Measures to maximise impact

a) Dissemination and exploitation of results

1) Work-plan for dissemination of data and results

Target user-groups in ACTRIS comprise a wide range of communities, including climate and air quality research communities worldwide, universities and research institutions for training of researchers and young scientists, space agencies for validation and the development of new satellite missions, legislation-based monitoring networks of atmospheric compositional change, sensor industries for testing, prototyping and demonstrations, air quality agencies for validation of air pollution models, institutes for eco-system studies of the interaction of atmosphere and biosphere. The plan for dissemination and exploitation of the project results to the target communities capitalizes on ACTRIS and can be described as follows:

<u>Data</u>: Data and metadata resulting from ACTRIS-2 are available through the ACTRIS Data Centre (DC). Because ACTRIS DC is strongly connected with other DCs in the international framework, in particular with EMEP and GAW, data are available to a very large audience. Metadata are also interconnected with GAWSIS and the ACTRIS data centre handling of metadata is INSPIRE and WIS-ready.

<u>Protocols and Methodologies</u>: Many of the partners, either as institutions, as PIs or individuals, hold key positions in the existing national and international framework (GAW, EMEP, GALION, etc.) and will convey the value of the project findings in the relevant policy arenas. This is also true for transferring ACTRIS protocols to ISO/CEN standards with historical links between ACTRIS partners and Centres for metrology at national and EU levels (Centre Européen de Normalisation).

<u>Opportunities (TNA)</u>: Opportunities for TNA are advertised through the ACTRIS web portal.

<u>Meetings and workshops</u>: Opportunities are advertised through the ACTRIS web portal.

<u>Stakeholders and policy-makers</u>: Stakeholders meetings are organized at both national and European levels. At national scale, the national ACTRIS projects are recognized in 15 countries and stakeholders are directly aware of ACTRIS and ensure the most urgent knowledge is immediately transferred to relevant users whether they are end users or policy makers. Communication will be facilitated by the fact that some of the partners advise their national environmental agencies and ministries of environment on matters related to air pollution and climate and even on the technical underpinning of climate change policies. At international level, partners and the Advisory Board members will act in a similar manner. Establishment of a dedicated WP (NA5) will facilitate the relation to national authorities (environmental agencies, ministries of environment), to intergovernmental organisations like WMO and EEA, to international research programmes like IGBP, GAW, EMEP and to projects like MACC III.

<u>International dimension</u>: Contractors and associated partners of ACTRIS are involved in the following scientific and policy national and international bodies and projects: WMO GAW including SAG-Aerosol, IGAC, IGBP, IPCC, EarthCARE Joint Mission Advisory Group, CLRTAP UNECE, HTAP UNECE, COST Action ES0702, EG-CLIMET.

<u>Private sector</u>: Although opportunities for SMEs are advertised through the ACTRIS web portal, this is clearly not sufficient. This is why the ACTRIS-SME platform will be established and technical workshops with SMEs will be organized. A dedicated WP (NA4) will permit us to facilitate communication between SMEs and the project.

<u>Internal and external communication</u>: Communication is implemented first through public web pages (the ACTRIS web portal). To foster diffusion of information towards the atmospheric community as a whole, links from the ACCENT web portal will be implemented from the beginning of the project. A request is made to all partners either to use their institution web page to relay the information or to have a dedicated national ACTRIS web page. Other communication plans will include scientific publications, press releases, brochures, <u>participation in international scientific conferences</u> during the course of the project. We will regularly use opportunities offered by EU-publishers to explain and promote the role of ACTRIS-2. ACTRIS-2 will consider use of new communications technologies (Twitter, Facebook, etc.) for all the above communication.

2) Synergies with national strategies on atmospheric observations

ACTRIS-2 relies on national funding to operate observing platforms and centres (calibration facilities, data centres). Investment costs for a completely new fully equipped gas/aerosol/cloud supersite can amount up to 20M€, depending on instrumentation and supporting infrastructure. Part of these investments has already been made at several ACTRIS comprehensive sites. Running costs are country-dependent, but, based on experience from more than 15 year operations at several sites, operation procedures would require from 24 to 72 PM staff depending on instrumental deployment and organization. ACTRIS-RI staff is generally shared amongst different infrastructures and networks at specific locations. Costs for thematic centres such as a single calibration facility will depend on activities while managing costs for data centres are also very high. Requested EC funding corresponds to a limited fraction of the total cost of the RI which can be estimated on the country-level only. However, the EC contribution through participation to ACTRIS and ACTRIS-2 is primordial to leverage national funds, before any longer-term agreement is found among parties possibly through the national and EU ESFRI roadmaps.

In ACTRIS-2, the EC contributes only to a fraction of access and networking costs. In the case of access, this means TNA is sponsored by national funds. It is expected that JRA partners will invest substantial amounts to run the project, in addition to EC contribution. RTD Projects are funding use of ACTRIS-2 data and, in some cases, contribute to operating some stations of the ACTRIS network. In addition, R&D projects can contribute to using data and data-products as well as observing platforms. Overall the ACTRIS-2 business plan is based on synergetic use of national and EC funding and organized as follows (Figure 2.1):

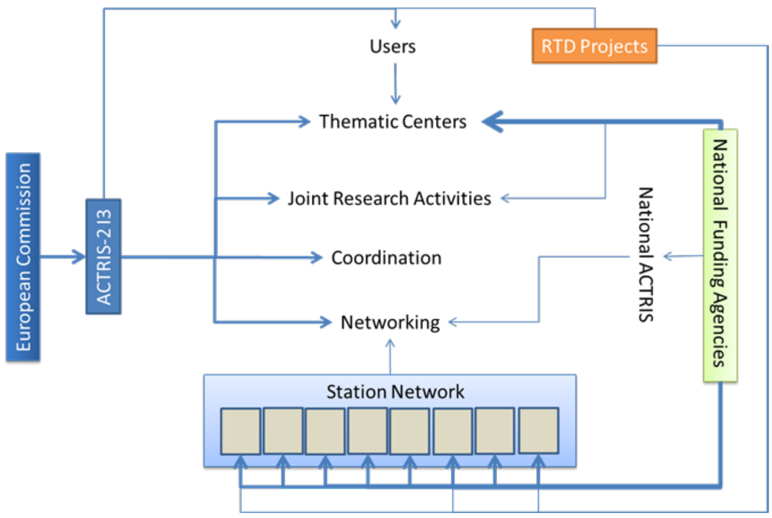


Figure 2.1: ACTRIS-2 business plan. Arrows represent contribution to funding operation costs

3) Data Management

The comprehensive ACTRIS data management of ground-based atmospheric data is unique in both the European and global perspective, with no other atmospheric data centre or data bases documenting the archiving and access to data from such a high number of sites, instruments and variables available through one portal. One of the highest priorities for ACTRIS-2 is to maintain and increase availability of long-term observational data relevant to climate and air-quality research. Numerous measurement approaches and methodologies will be used to meet this goal, and the ACTRIS data management needs to be well organized and mature. This has evolved gradually and successfully over many years through close interaction and involvement of both data providers and users. The ACTRIS research data management is unique worldwide in the sense that it uses modern data architecture concepts for covering a diverse set of observed quantities.

- ✓ Data Collection: Quality controlled and quality assured data are submitted by instrument principle investigator on an annual basis. As of April 2014 the data management system in ACTRIS-1 handles QC and QA ACTRIS measurement data from more than 50 European sites, and approximately 120 different atmospheric variables from 28 various instruments and methodologies. The variables include 90 different trace gases, 10 aerosol in situ variables, 8 aerosol profile variables and 8 cloud profile variables, with various time resolution. For almost 30 of the ACTRIS variables near real time (NRT) data flow is set up with direct interface between the data centre and the instrument.

- ✓ Data quality and standards: The measurements comply with recommended Standard Operating Procedures (SOPs) and standard methodologies and are accessible at different quality-level (level0, level1 and level2 in most cases); all is stated in the document "ACTRIS Data, Concept, and Variables". The use of the data is regulated through the ACTRIS data policy, and both documents are publically available e.g. at: http://www.actris.net/language/en-GB/ProjectResults/Dataconcept.aspx.
- ✓ Data management and use: In ACTRIS-2 the research data management will further progress and advance through the establishment of a complete "Data Management Plan - DMP" before month six. ACTRIS-2 aims to participate in the "Open Research Data Pilot" in Horizon 2020, and uses this action as a constructive tool for further progression and documentation of the research data management of such a complex project. The ACTRIS-2 research data will be free of charge and openly accessible through the ACTRIS data centre.
- ✓ Interoperability with other data centres: The architecture of the ACTRIS DC is not only adapted to the federated nature of the European research area, but also to the governance of international research frameworks, and can directly contribute to these, strengthening the European position in these frameworks. The ACTRIS DC is therefore ideally suited to connect and contribute to, e.g., the European Copernicus programme, here also with products in near-real-time, and international frameworks such as the WMO Information System (WIS) and the Global Climate Observing System (GCOS). ACTRIS DC metadata is INSPIRE- and WIS-ready, and offers a framework for data reporting traceable to the time of measurement, as well as for logging the version history of a data resource.
- ✓ Long-term data curation and preservation: The ACTRIS DC is funded on strong data base infrastructures, with proven and highly acknowledged long term sustainability to ensure data access and archiving also beyond the project period. EBAS is the ACTRIS topic data base for all ACTRIS in-situ data, and is hosted by NILU with strong international commitments, and hence a fundament for the data centre and ACTRIS data portal. EBAS has been in operation since the 1970ies, with basic funding secured through the EMEP protocol of the CLRTAP, and also used by a number of other national and international monitoring programs including WMO Global Atmosphere Watch (World Data Centre for Aerosols), Arctic Monitoring and Assessment Programme, OSPAR, HELCOM. This also provides a strong link to global data coverage and provisions. EBAS is also used by more than 50 different EU research projects. Recently, long-term commitments have been established also for the other topic data centres. EARLINET DB gives access to profiles back to the mid 1990's, and long term commitment by CNR is established. FMI has committed itself to take long term responsibility for the Cloudnet DB. ICARE-CNRS data centre benefits from long-term funding commitments from CNRS and CNES.

4) Management of Intellectual Property Right (IPR)

As a general statement, ACTRIS-2 follows the strategy implemented in ACTRIS with dissemination of open source software developed in the project. This is only restricted on case-to-case basis, under specific IPR agreement which will be developed, in particular when joint ventures with SMEs are involved.

ACTRIS-2 will undertake measures to make sure that the intellectual properties (IP) are respected for individual participants in the project's activities. The main IP conditions and procedures summarized as follows will be established and described in detail in the Consortium Agreement (CA).

Each party shall respect the confidentiality of information brought in and resulting from the project and ensure that the use and disclosure of such information is made in accordance with the terms of the ECGA and the ACTRIS-2 Consortium Agreement for the duration of the project and a fixed term thereafter. Each party remains the sole owner of its IPR over this background and has the right to exclude any background information from the other Parties' access as far as the restrictions are announced before the signature of the ECGA or inclusion of new Contractors in the project. If dissemination of knowledge does not adversely affect its protection or use, the Contractors will acknowledge their common interest in publishing the results produced within ACTRIS-2 to obtain recognition and to advance the state of knowledge in the field ensuring wide dissemination, and shall strive to disseminate their own results throughout the duration of the project and beyond. All publications or publicity shall indicate the contribution made by each of the Parties involved, acknowledge the project, and shall specify that ACTRIS-2 has received Community research funding.

ACTRIS-2 will implement an **Open access publishing ('gold' open access) strategy**. This will be made by rapidly opening special issues with on-line journal (as for example Atmospheric Chemistry and Physics and/or Atmospheric Measurement Techniques) that will ensure wide dissemination of information. For specific breakthrough articles published outside the ACP/AMT special issue, the ACTRIS-2 business model will be based on one-off payments by authors to ensure open-access to publication.

b) Communication activities

The ACTRIS-2 communication strategy embraces both the internal (within the project) and external dissemination actions. **Internal communication** will be implemented first through public web pages (building on the current ACTRIS web portal), by publicizing workshops, intercomparison exercises and training opportunities. Specific training sessions are dedicated to promotion of new-products in ACTRIS-2, following successful actions implemented during ACTRIS and seeking direct user-feedback on data products. The investment in the project will result in both research publications from partners and end-users outside the consortium. Monitoring research publications related to ACTRIS-2 will be implemented as part of both NA1 Management and VA1 Data Centre activities.

External communication (mainly under NA5 activities) aims at enhancing the use of ACTRIS-2 data and data products reaching new communities of end-users, and to develop and implement long-term ACTRIS RI strategy. Communication plans include press releases, brochures, presentation of opportunities in international conferences during the course of the project. We will regularly use opportunities offered by EU-publishers to explain and promote not only the scientific achievements but also results from collaborations between ACTRIS-2 and SMEs, highlighting the socio-economic impact of ACTRIS-2. Raising public participation and awareness is regularly achieved by ACTRIS-2 participants in their own countries. ACTRIS-2 will organize dedicated sessions at general meetings such as EGU. To foster diffusion of information towards the atmospheric community as a whole, links with current EU projects such as EU-BACCHUS, NORS, GAIA-CLIM, etc. will be implemented from the beginning of the project. External communication is also directed towards stakeholders at national and international level (including ESFRI related projects, and UN bodies as the Convention on Long-range Transboundary Air Pollution - CLRTAP-EMEP) to analyse the most suitable, long-term operational and organisational model for maintaining operations, services and collaborative bodies beyond the project life-time.

In addition to the central coordination of communication in NA5, ACTRIS-2 will ensure optimum efficiency and monitoring of communication activities through:

- **Online tracking of data usage**. Special efforts will be made in ACTRIS-2 to improve identification and citation for publishing data and documenting the data usage in scientific publications (VA1) in close links with international initiatives such as ENVRI-plus. Data policy in ACTRIS-2 opens access to an even larger community so that it becomes very difficult to track usage of ACTRIS data. It is however important for the RI and to respond to stakeholders funding the RI at national level, that data sources and their providers are properly acknowledged. There is therefore a strong need for common data citation tracking systems that allow data providers to identify downstream usage of their data within publications and to prove their importance and show the impact to stakeholders and the public, and also to strengthen the national funding situation. This will be implemented at the data centre in close collaboration with other European initiatives (e. g. DataCite, EPIC and possible up-coming activities EINFRA-1-2014, INFRADEV) on the subject to develop a common policy models for persistent identifiers for publishing and citing data. In parallel, work towards implementation of DOI and related metadata systems for ACTRIS data will be pursued. The well-defined internal data workflow and the already existing data transfers to user networks established in ACTRIS will facilitate this task. To document the use of ACTRIS data and mature data products, the ACTRIS DC would provide yearly public reports on the access of all ACTRIS data documented in D5.2 based on web analytical tools. This will include access and user statistics not only on various types of data, sites and methodologies, but also showing the geographical distribution of users, both in Europe and globally;
- **Self-documentation efforts from partners and associated partners**. Procedures engaged in ACTRIS will be maintained and developed in ACTRIS-2. Data usage is on **open policy**. Following GAW recommendation, ACTRIS-2 encourages communication between end-users and data providers “whenever substantial use of data is made”. Experience from ACTRIS and GAW-WDCA shows that

this policy has been generally followed by end-users. Associated partners and partners will then be required to communicate use of data/products to ACTRIS management;

- **Participation of associated partners in ACTRIS-2 activities**. Effectiveness of communication strategies will also be measured by increasing participation of external members to ACTRIS-2 activities. The project will communicate opportunities (see section above) and we target to have more than 70% beneficiaries from associated partnership, including 10% SME participation.

3. Implementation

3.1 Work plan — Work packages, deliverables and milestones

ACTRIS-2 consists of one management and 12 other work packages, devoted to harmonizing observation methods (NA2 and NA3), improving services through physical (TNA1, TNA2, TNA3 and TNA4) and Virtual Access, fostering Research and Innovation for the RI through 3 Joint Research Activities (JR1, JRA2, and JRA3). Work with SMEs for innovation is organized in a single Networking Activity (NA4) as well all Outreach, Training and Dissemination Activities (NA5). The WPs are further organized in Tasks (and sub-tasks) with an identified leading Partner. The structure of the individual work packages is designed to maintain internal cohesion and exchange and to offer a clear organisation to users, which can benefit from the RI through multiple entries. The overall coordination/management activities are organized between NA1 and NA5. Table 3.1 shows the overall project timing (GANTT chart).

Table 3.1: Timing of the different work packages and their components (Gantt chart)

Table 3.1a: Work package description

Work package number	1		**Start Date or Starting Event**			Month 1	
Work package title	**NA1 Management**						
Participant number	1	2					
Short name of participant	**CNR**	CNRS					
Person-months per participant:	26	48.5					

Objectives

The aim of this work package is to provide overall project coordination and management. The specific objectives are:

- To ensure efficient management of ACTRIS-2 and implement appropriate quality control measures for monitoring the progress of the project activities.
- To optimize the information flow with the partners, scientific community, and end-users /stakeholders through regular project meetings and ACTRIS-2 web portal.
- To provide joint management of trans-national access provision.

Description of work

This WP will ensure adequate coordination and management of all ACTRIS-2 work packages in all scientific, technical, administrative, financial, and legal matters and the day-to-day management tasks and the liaison with its Consortium partners. The Coordinator and coordination office will guarantee high-quality management of 31 partners, 17 joint research unit members, and a large number of associated partners through the following key tasks:

Task 1.1: Administrative management and quality control (CNR, CNRS)

This task will ensure that the contractual aspects within the Consortium are carried out in a timely manner, including partner accession to the contract, establishment of and compliance with the Consortium agreement, and fulfilment of the beneficiaries' contractual obligations. It will implement appropriate quality control tools to monitor the work progress including deliverables and milestones, prepare and coordinate the periodic project reports with the partners, and ensure timely delivery to the EU. It will moderate potential internal conflicts, propose resolutions and corrective actions. It will be responsible for the financial and administrative management and consistency of overall the resources used, and manage the distribution of the Community financial contribution between the contractors and activities in accordance with the contract and the decisions taken by the Consortium. It will be in charge of the day-to-day execution of the management tasks and the internal communication within the Consortium.

Task 1.2: Project meetings (CNR, CNRS)

A kick-off meeting and regular official project meetings (one General Assembly per year, two Executive Steering Group meetings per year, two-monthly telecons) will be organized in order to review the work progress, measure the project results against the set objectives, and foster constructive work. The Coordinator will chair the project management meetings, prepare the meetings, agendas, and draft the minutes.

Task 1.3: ACTRIS web portal and communication (CNRS, CNR)

The project coordination office will be responsible for implementing and maintaining the centrally managed ACTRIS-2 web portal. The web portal will be the central platform for information exchange with partners and associated partners, the international science community, end users, stake holders, and the general public. It will publish and advertise opportunities for remote and hands-on access transnational access offered within the project and inform on the research facilities, the related access procedures and outcomes, and provide access to the ACTRIS-2 Data Centre. It will report on ongoing activities and inform on upcoming events, disseminate project results, publications, and provide documentation material. An internal pass-word projected intranet website will be created to host project internal information relevant for efficient project operation: deliverables, dissemination material, official documents, workshop material, reports. Internal and external project communication will be reinforced through adequate information tools with project partners and associated partners, e.g., specific mailing lists, and new communication tools.

Task 1.4: Joint coordination of trans-national activity provision (CNRS, CNR)

To ensure efficiency and optimize the use of the services by the scientific community, the provision of transnational access for all TNA1-4 activities will be jointly coordinated by the project management team (PMT, responsible to the coordination office) and access providers. Efficiency has already achieved a high level of expertise built in ACTRIS and predecessor projects since FP6. A central procedure with harmonised and enhanced interfaces will be put in place at project start i) to advertise the opportunities for access, ii) to implement and coordinate the procedures of proposal submission, evaluation, and selection, and iii) to report on the access provided. The ACTRIS-2 web portal will be the unique entry point and central interface between external users, infrastructures, and PMT. The PMT will coordinate the proposal review which will be carried out by a TNA user selection panel (TNA-USP). The TNA-USP consists of separate TNA subpanels for the remote access (TNA1,2,3) and for the hands-on access TNA4 as a function of scientific proposal topic covered (aerosol, clouds, trace gases). Each TNA user panel is represented by an independent expert team. The coordination of the TNA activities TNA1-4 is common, however, the modalities of access of the remote TNA (calibration activities TNA1-3) are specific. TNA1-3 foresee an additional internal management module led by the main TNA host institution in collaboration with the PMT. Pertinent details in the procedure and details are, therefore, described in the corresponding work packages WP 6,7,8. The modality of access, outreach to new users, and review procedure for the hands-on TNA4 is unique and, therefore, described only once in the following. WP9 will focus on the description of the infrastructures, services provided, and support offered.

Modality of access under the proposal (general aspects TNA4):
The TNA4 activity offers researchers and research teams from the scientific community and industry free hands-on access to 18 experimental research infrastructures, chosen for their uniqueness in Europe, offering an excellent combination of state-of-the-art equipment, services, and training for measurement and ACTRIS-2 related research projects. TNA may be requested at any time to any of the 18 sites which are open to any interested user following an official call for access. The call for access is continuously open and complemented by specific calls where necessary in case of particular training events or measurement campaigns. Request for TNA is made through central submission of a TNA proposal via the web portal, it will provide information the project PI and participating users needed to carry out the project, a project description including scientific objectives, motivation, and succinct description of the work plan including information on training and/or mobility of experts (added value to infrastructure), project length, estimated costs, and expected output. Typical TNA4 research projects are on the order of several days to 2-3 weeks with 2-5 users per project. Access will be aligned and integrated into station operation and will generally cover the necessary preparatory work and training to use the facility and instruments, and participate in the routine measurements or specific campaigns. Users will have access to the observation infrastructure, instrumentation, and data from permanent instruments. Additional work space will be available to bring and use own instruments. Advanced visitors are given more independency in their operation while new users are trained to comply with local procedures and safety regulations. The TNA4 access costs for 14 stations are declared on the basis of unit costs due to availability of reliable 2-year operation costs. One station's operation costs (MAIDO-OPAR) is based on unit costs although the reference period for calculating unit costs is reduced to one year due to a reconstruction of the observatory until 2012; the units costs for the 12-month period are considered reliable and representative. Three stations (PUY, CAO, HYM) for which auditable data are not continuously available for the past two years declare the access costs on actual costs. The unit of access to all 18 infrastructures is one research-person working day (1 rwd).

Outreach to new users:
The opportunities of TNA to the 18 sites will be largely advertised through the ACTRIS-2 web portal including description of the research facilities, but also through dedicated websites of each infrastructure. TNA will be largely publicised through newsletters and mailing lists of international networks and projects and cooperating scientific communities, and promoted at international conferences, scientific workshops, summer/winter schools, and through project brochures. The participation of the observation stations in various international networks and multidisciplinary measurement campaigns maintains visibility and high

profile, the access providers will be very active in attracting new users. Further visitors and new users targeted are e.g., users interested in participating in scientific intensive campaigns, for developing specific expertise, for instrumental synergies not available at the site (added value), for interdisciplinary research projects or those involving a unique combination of instruments (e.g., tower and ground-based measurements), for new users taking advantage of open collaboration with networks outside Europe (Latin America, USA, Russia, China etc.). Results of TNA projects will be presented at conferences and published in the peer reviewed journal publications. Financial support foreseen to the research teams will facilitate the TNA and particularly attract new users. Access aimed at innovative research projects involving SME are particularly promoted in cooperation with NA4. Most of the sites are TNA-experienced and are expected to be similarly successful as during ACTRIS (the actual access was often higher than claimed), interest for visits by users are already indicated until the year 2016.

Review procedure:

Incoming proposals are verified by the PMT for formal compliance with the EU regulations (eligibility criteria) and are then forwarded to the independent TNA-USP for peer-review based on scientific merit. The selection panel consists of individual TNA subpanels which are composed of international panel members having strong expertise in the specific ACTRIS-2 discipline. They will evaluate and select the proposals according to clearly defined criteria (scientific quality/originality, innovation aspects, impact: 60% weight), priority will be given to new users for high quality research (20%) and to support training of young scientist (respecting promotion of female participation) to become future leaders and the field (20%). Particular efforts will be made to promote scientific excellence in less-favoured regions in Central and Eastern Europe or beyond. A minimum of 3 reviews are considered for final acceptation of each proposal, which must receive a minimum threshold of points to pass. The PMT centralizes the review results and informs the applicants of the final decision. Upon acceptation, the project PI is invited to contact the access provider of the planned infrastructure to organize the access. Financial support may be allocated to the users to facilitate the TNA and is offered on request and is decided jointly following assessment results by the PMT with the access provider. Reimbursement of the financial grant is made after project completion and after submission of all requested TNA-related documentation via online forms on the web portal (e.g., TNA user report, confirmation of visit justifying the quantity of access provided, detailed scientific activity report). All TNA reporting documents will be collected, verified, and archived by the PMT, and provided on the project intranet and the EU. Users are encouraged i) to make available the data from TNA projects via the ACTRIS-2 data portal and ii) to present and publish results from work carried out under the ACTRIS-2 TNA with the necessary acknowledgements. The TNA documentation reported will be the basis for an intermediate and a final TNA report (provided as deliverable within the work package)

Deliverables

D1.1 ACTRIS web portal (M1)
D1.2 Minutes of the project Kickoff meeting (M4)
D1.3 Minutes of the first official project meeting (M14)
D1.4 Minutes of the second official project meeting (M26)
D1.5 Minutes of the third official project meeting (M38)
D1.6 Minutes of the final official project meeting (M48)

Work package number	2	**Start Date or Starting Event**									Month 1								
Work package title	**NA2: Profiling of aerosols and clouds**																		
Participant number	3	1	2	4	6	12	13	14	16	18	21	22	23	24	27	28	29	30	31
Short name of participant	**TROPOS**	CNR	CNRS	NOA	FMI	INOE	LMU	JRC	UGR	KNMI	CyI	RIUUK	DWD	UNIVLEEDS	IPNASB	CNISM	INRNE	NUIG	IGF PAS
Person-months per participant	26	18	23.5	13	6	4	3	1.6	13	5.9	4.5	7	6	17.5	9	13	8	1	4

Objectives

The overall objective of this activity is to consolidate and optimize the European observing capabilities for investigating aerosols, clouds, and their interactions, with high vertical and temporal resolution throughout the troposphere by means of an advanced network of coordinated lidar and cloud-radar stations in such a way that the data they provide can be efficiently integrated with other observations and effectively shared with a wide user community. The specific objectives are:

- To optimize the ACTRIS aerosol profiling component established in the framework of EARLINET by improving instrumentation, standardization, data processing and quality assessment, implementing additional observation capabilities and new data products and providing them to end users together with tools to fully exploit the products.
- To optimize the ACTRIS cloud profiling component established in the framework of Cloudnet by improving observation strategies, enhancing the processing chain, implementing new data products, providing them to users, and developing suitable radar calibration methodologies to improve data accuracy.
- To integrate the observing capabilities of aerosol and cloud remote-sensing networks and to make best use of synergy by supporting the co-location of EARLINET, Cloudnet and AERONET sites, implementing new instruments capable of contributing to aerosol and cloud research, defining common standards and developing common products and data processing algorithms.

To enhance the shared scientific and technological knowledge on remote sensing of aerosols and clouds among the participants and to provide an interface to the internal and external scientific community through exchange of expertise with focus on the strengthening of the ACTRIS observing capabilities.

Description of work

ACTRIS comprises two advanced remote-sensing networks for the observation of the vertical aerosol and cloud distribution over Europe: EARLINET, with currently 27 stations (most of them co-located with AERONET stations), and Cloudnet, with 9 stations. Both networks have been operated for more than a decade and have already provided the world's largest database on aerosol and cloud four-dimensional (space-time) distributions at continental scale. At the same time, they have pioneered the task of establishing standards for aerosol and cloud data products and processing algorithms. In particular, EARLINET has developed a suite of quality-assurance methods at both the hardware and software level to ensure the quality of lidar products, which now is considered to be mature enough to set up a Lidar Calibration Centre in ACTRIS-2 (WP6).

The goal of this networking activity is to consolidate, further optimize, harmonize and integrate EARLINET and Cloudnet instrumentation, observing strategies, processing chains and data products. Regarding hardware, focus is on the implementation of new observing capabilities by either improving existing instrumentation and data acquisition or adding recently implemented equipment and by establishing the respective standards. On the software side, the existing processing chains will be improved and new data products will be included. A challenging and innovative task is the exploitation of synergies between EARLINET and Cloudnet and the envisaged development of common observing strategies and algorithms, with the ambition to provide both cloud and aerosol products in near-real time for fast analysis of hazardous events, instantaneous evaluation of numerical-weather-prediction and atmospheric-transport models as well as for data assimilation purposes.

A large part of the work planned in NA2 will consolidate developments started in ACTRIS and will strongly benefit from innovations of the previous JRAs on “Lidar and sun photometer” and “A framework for cloud-aerosol interaction studies”. Developments initiated by ITaRS (ITN on Initial Training for atmospheric Remote Sensing) will be considered as well. The implementation of new data products will lead to significantly enhanced EARLINET and Cloudnet databases, accessible through Virtual Access, and will thus require cooperation with WP10. Development of quality-assurance standards for new aerosol products and consolidation of existing methodologies within EARLINET will be performed in close collaboration with the Lidar Calibration Centre (WP6). A specific subtask is proposed in this NA to work on radar calibration strategies, which are not yet well established. Activities on calibration techniques and new hardware quality standards will be carried out in collaboration with European SMEs supplying commercial cloud radars and aerosol lidars. Furthermore, interaction of this NA with JRA1 by providing lidar products related to aerosol absorption, with JRA2 by contributing expertise for remote flux measurements, and with JRA3 by supporting the use of aerosol and cloud profiles for modelling tasks is planned. The JRAs will also facilitate a close link between remote-sensing and in-situ endeavours (NA3). Close interaction with NA4 for innovation activities and with NA5 for education, collaboration and outreach is envisaged.

Task 2.1: Optimization of aerosol profiling (CNR, CNRS, TROPOS, NOA, FMI, INOE, LMU, JRC, UGR, KNMI, CyI, DWD, IPNASB, CNISM, INRNE, IGF PAS)

This task is dedicated to the innovative and sustainable advancement of aerosol lidar observations within EARLINET. The current observing strategy and product design of EARLINET had been first established within the Fifth Framework Programme (2000-2003). Usually, observations are performed during limited, fixed time periods (two hours, three times a week) in order to establish the unbiased aerosol climatology. Additional measurements are carried out for special cases on an alert basis. The shortened temporal coverage was mainly due to limited automation of the instruments and high expenses of hardware, software and person power. The strong demand from the scientific community for long-lasting or even continuous observations and the technological progress over the past decade have motivated respective renewals and require accompanying efforts for hardware and software developments, also in collaboration with commercial suppliers (SMEs). Next to instrument improvements, the major goal of this task is to set up a rigorous, level-based, user-friendly product chain, reaching from near-real-time (NRT) visualization of measurements to statistical and climatological products based on long-term observations.

Task 2.1.1: *Improvement of instrumentation, standardization and quality assessment (TROPOS, CNR, CNRS, NOA, FMI, INOE, LMU, JRC, UGR, KNMI, CyI, DWD, IPNASB, CNISM, INRNE, IGF PAS)*

The following three goals were identified regarding the required optimization of instruments.

- Implementation of new measurement capabilities: The upgrading of existing lidar instruments has been a continuously progressing effort since the start of EARLINET. Nowadays, most stations operate multi-wavelength Raman-polarization lidars. Further upgrades that will be facilitated in ACTRIS-2 will consider Raman daytime capabilities following recommendations from the previous ACTRIS JRA1 and polarization observing capabilities at two or more wavelengths in order to better identify different aerosol types.
- Optimization of instruments for long-lasting or continuous (unattended) operation: In principle, modern lidar instruments are capable of operating continuously, and several EARLINET stations already provide continuous data (24 hours/7 days a week). The expertise in the network will be used to facilitate developments for automated operation and remote control of lidar instruments at EARLINET stations.
- Protocols and quality check procedures will be further optimized, in particular for new products. As in the past, all EARLINET lidar stations have to apply regular quality tests and take action in case of observed instrumental non-compliance.

Task 2.1.2: *Implementation of new data products and optimization of the processing chain (CNR, CNRS, TROPOS, NOA, INOE, UGR, DWD, IPNASB, UNIVLEEDS)*

The EARLINET processing chain or Single Calculus Chain (SCC) will be enhanced and coupled with other processing chains in order to serve data providers and end users with a sophisticated level-based product chain, starting with raw lidar data uploaded by the individual EARLINET stations and leading to advanced geometrical, optical, and microphysical aerosol products. The chain will include tools for NRT data provision on alert, campaign, or continuous basis. The following data processing steps are to be realized:

- The existing SCC Preprocessor, which converts individual *Level 0* raw signals into standardized, quality-assured *Level 1* lidar data, will be used to develop a homogeneous network-wide, open and freely accessible quicklook database (high-resolution images of time-height cross sections). Tools for cloud/aerosol masking and layer identification as partly already developed in ACTRIS will be deployed. The standardized *Level 1* data will serve as input for any further processing of lidar data, within the SCC as well as in other processing algorithms (e.g., combined retrievals with sun photometer, combined retrievals with Cloudnet, see below).

- The efforts to calculate improved *Level 2* optical and geometrical data products (e.g., combined optical data, layer products, and statistical products will be continued. New data products following from the implementation of new measurement capabilities (see Task 2.1.1) will be considered.
- A new, advanced product level (*Level 3*) of the EARLINET database will be developed and implemented. *Level 3* products include climatological products from long-term observations, microphysical aerosol products based on inversion of multi-channel lidar data, and microphysical aerosol products from combined lidar and sun-photometer observations based on algorithms developed in the previous JRA on "Lidar and sun photometer". Processing of the latter products will be partly implemented at the ICARE Data Centre.

All developments will include standardization of the products, definition of metadata, definition and implementation of error products, and documentation.

Task 2.2: Optimization of cloud profiling (UNIVLEEDS, CNR, CNRS, TROPOS, FMI, KNMI, RIUUK, DWD, NUIG)

The objective of Task 2.2 is the innovative and sustainable advancement of cloud-related observations within Cloudnet. In contrast to EARLINET, the fully commercial equipment of Cloudnet allowed the installation of a continuously (24/7) measuring network with NRT data provision and direct links to six NWP models already during the first implementation phase in the Fifth Framework Programme (2001-2005). Cloudnet was considerably enhanced during ACTRIS, when the number of stations was increased from four to nine, despite the high costs involved in the setup of a standard Cloudnet station, consisting of at least a cloud-profiling radar, a microwave radiometer and a ceilometer. Cloudnet stations possess a relatively high level of standardization of instruments as well as data processing. A common, modular, level-based processing chain has been implemented, and automated transfer of data to the Cloudnet database is possible. A challenge for Cloudnet is the immense amount of data delivered in particular by the cloud radars, which so far leads to restrictions in the full storage and exploitation of radar information. Furthermore, radar retrievals of cloud and precipitation microphysical properties suffer from the uncertainty in the absolute calibration of the instruments and the attenuation of up to 10 dB when the radome/antenna is wet. Both challenges will be tackled in close collaboration with the commercial cloud-radar supplier in ACTRIS-2.

Task 2.2.1: *Improvement of observing strategies, implementation of new data products and optimization of the processing chain (UNIVLEEDS, TROPOS, FMI, KNMI, CNR, RIUUK, CNRS, DWD, NUIG)*

Cloud radar Doppler spectra contain the full hydrometeor vertical motion distribution. Hence, it is possible to diagnose the presence of two or more distinct hydrometeor classes within a single volume, separate each component, and perform microphysical retrievals on the two components independently. Discrimination between liquid and ice in mixed-phase cloud, precipitation and liquid cloud, and between multiple ice populations arising from competing growth mechanisms, are all achievable. However, storing raw Doppler spectra from continuous measurements over longer periods runs into practical issues because of the huge data volume. Therefore, specific storing and evaluation strategies will be developed with the aim to evaluate Doppler spectra during the observation and store only compressed information on multiple peaks and skewness of the spectra, from which higher-level data can be obtained off-line. Other new data products planned to be implemented in the Cloudnet processing chain are the turbulent kinetic energy calculated from radar and lidar velocity information (see also Task 2.3) and cloud microphysical products as, e.g., obtained from the Doppler spectra. The developments will include standardization of the products, definition of metadata, definition and implementation of error products, and documentation.

Task 2.2.2: *Calibration and standardization of cloud radars (KNMI, CNRS, UNIVLEEDS)*

Deducing quantitative information on cloud microphysical parameters requires the absolute calibration of radar reflectivity measurements and the quantification of errors. Calibration information is usually provided by the manufacturer, but with limited accuracy. A standardized methodology for radar calibration is not available yet. Therefore, it is proposed to evaluate different approaches within ACTRIS-2 and to develop a standard calibration procedure for cloud radars in order to better harmonize Cloudnet observations. Three complementary approaches are considered. The calibration with atmospheric targets, in particular rain, will be investigated by comparing cloud-radar and precipitation-radar observations for known rainfall rates using the facilities at Chilbolton and Cabauw. Calibration with external sources using reflectors or transponders mounted on side-arms of a tower or flown on drones will be examined at the Cabauw site. Both methods will be cross-checked with a mobile FMCW (frequency-modulated continuous wave) radar that is calibrated against a corner reflector at the Palaiseau site. A radar attenuation correction for the wet radome/antenna, based on the detection of increased background noise caused by the attenuator, will be implemented. Recommendations for calibration activities at all Cloudnet sites will be provided.

Task 2.3: Integration of aerosol and cloud observation capabilities (TROPOS, CNR, CNRS, NOA, FMI, INOE, KNMI, RIUUK, DWD, UNIVLEEDS, CNISM, NUIG)

This task is dedicated to the synergy of EARLINET and Cloudnet. It is driven by the increasing scientific interest in combined aerosol and cloud observations to study aerosol-cloud interactions. Up until now, four permanent Cloudnet and EARLINET stations have been co-located. It is expected that this number will grow in future and that the number of joint deployments of mobile Cloudnet and EARLINET instrumentation in field campaigns will increase as well. Beside such direct combination of sites, there is common interest in the implementation of additional observing capabilities in both networks. In particular, profiles of water vapor and vertical wind are of high importance, e.g., to study aerosol vertical exchange, hygroscopic particle growth and the formation of clouds in the planetary boundary layer (PBL). Therefore, the exploitation of synergies and the development of common observing strategies and standards are the main objectives of this task.

Task 2.3.1: *Instrument synergy (CNR, CNRS, TROPOS, NOA, FMI, INOE, JRC, KNMI, RIUUK, DWD, UNIVLEEDS, CNISM, NUIG)*

Joint efforts of Cloudnet and EARLINET regarding instrument synergies are focusing on three aspects:

- Implementation of Doppler lidar at selected Cloudnet and EARLINET sites: Several Cloudnet and EARLINET sites have started to implement Doppler lidars, which have recently become commercially available for reasonable prices. It is expected that all Cloudnet sites will deploy Doppler lidars in the near future. Doppler lidars allow the observation of horizontal and vertical wind in the PBL and at cloud base. They can complement Doppler radar observations, but are also capable of obtaining aerosol vertical fluxes when combined with aerosol lidar (see JRA2).
- Implementation of multi-wavelength/polarization lidars at Cloudnet sites: Aerosol information at standard Cloudnet sites is limited to the qualitative recognition of aerosol presence by ceilometers. Quantitative retrievals, classification of aerosols, e.g., in terms of pollution or dust, and investigation of aerosol-cloud interactions are only possible with more sophisticated lidars based on multiwavelength and polarization techniques as applied in EARLINET.
- Implementation of water-vapour Raman lidars at selected Cloudnet and EARLINET sites: Water-vapor profiles are of particular interest to investigate hygroscopic particle growth and cloud formation. Many EARLINET lidars are already equipped with water-vapor Raman channels, but the measurements are not standardized and the information content is not made available yet in the network. Since Raman-lidar observations are limited at daytime and in the presence of clouds, the combination of Raman lidar and microwave radiometer to synergistically derive water-vapor profiles at combined stations is planned.

Task 2.3.2: *Optimization of observing strategies, standardization and quality assessment (TROPOS, UNIV-LEEDS, CNR)*

Both EARLINET and Cloudnet have developed their own observing strategies and quality standards in the past. Work has to be performed to harmonize and synchronize the standards at integrated stations. For instance, continuous high-resolution observations with NRT data provision following Cloudnet procedures require new methodologies to obtain absolutely calibrated lidar signals in near-real time. The development and implementation of such procedures is one goal that will also serve as input for Task 2.1. On the other hand, there are no sophisticated aerosol products available from Cloudnet. Here, EARLINET expertise will be used to implement the quality standards for Level 2 aerosol products at Cloudnet sites equipped with sophisticated lidar instruments. Another objective is the provision of standards for EARLINET and Cloudnet stations equipped with Doppler lidar, e.g., the recommendation of a scan strategy to obtain horizontal and vertical winds from Doppler lidar with sufficient resolution.

Task 2.3.3: *Development of common data products and processing (UNIVLEEDS, CNR, TROPOS, RIUUK)*

Following the developments in Tasks 2.3.1 and 2.3.2, common algorithms to obtain new data products will be put in place in the processing chains. The preprocessor of the EARLINET SCC will be adapted to derive standardized Cloudnet Level 1 lidar signals. Afterwards, an improved target classification for aerosols and clouds and the implementation of data products describing aerosol-cloud interaction will be possible. Products following from the implementation of Doppler lidar (horizontal and vertical wind, PBL height, skewness, turbulent kinetic energy, energy dissipation rate) will be provided via a common processor module. Further common modules will be developed for combined lidar and sun photometer optical products (optical depth, Angström exponent) and for water-vapour retrievals (see Task 2.3.1). Again, all developments shall include standardization of the products, definition of metadata, definition and implementation of error products, and documentation.

Task 2.4: Exchange of expertise, support to campaigns and new users (UGR, CNR, CNRS, TROPOS, NOA, FMI, INOE, LMU, JRC, UGR, KNMI, CyI, RIUUK, DWD, UNIVLEEDS, IPNASB, CNISM, INRNE, NUIG, IGF PAS)

This task will be the backbone of the networking activity through which the participants get the opportunity to interact, exchange their expertise, discuss new ideas and concepts, share the outcomes of the tasks, and provide education and critical insight to (young) scientists. In addition, it provides a means of interfacing with the other activities of the project in a more focused way than in the GA and, to some extent, reaching out to the external scientific and technical community, the industry (in particular SMEs) as well as the general public. The task will support the following items:

- Organization of annual workshops and task-related technical meetings (UGR, CNR, UNIVLEEDS, TROPOS): Annual technical workshops will be organized to discuss progress of the tasks as well as specific topics (e.g., user requirements, instrument and data analysis optimization, external collaboration). The workshop participants are in particular the partners (full and associated) involved in aerosol and cloud remote-sensing observations, but the workshops will be open to all ACTRIS partners. Scientific or technical external stakeholders will be invited for specific topics. Next to the workshops, task-related technical meetings will be fostered to facilitate progress of specific developments.
- Implementation of EARLINET and Cloudnet processors, products and QA procedures during campaigns (CNR, UNIVLEEDS, TROPOS): The increasing use of EARLINET- and Cloudnet-like mobile systems in field experiments requires specific support such as adaption of the processing chains and databases, including model links, consideration of specific sites and platforms (e.g., ships) etc. Respective expertise will be provided to users on request.
- Support to new stations (INOE, UNIVLEEDS, LMU, TROPOS): EARLINET and Cloudnet are still growing. New stations must fulfill a large number of requirements to adjust to the networks' standards. Necessary guidance and support will be provided.

Documentation, websites, and outreach (UGR, CNR, UNIVLEEDS, TROPOS): Documentation of meeting results, task-related documentations, standardization protocols, technical descriptions and any information relevant for the users will be made available through publication on the ACTRIS website and via task-related websites and interfaces.

Deliverables

D2.1: Documentation on the structure of the level-based EARLINET data processing chain (M6) [Task2.1.2]

D2.2: Documentation on the structure and upgrade strategy of the Cloudnet processing chain (M6) [Task2.2.1]

D2.3: Documentation on radar calibration and standardization concepts (M6) [Task2.2.2]

D2.4: Minutes of the first NA2 annual workshop (M10) [Task2.4]

D2.5: First report on technical upgrades and QA activities at EARLINET and Cloudnet stations (M12) [Task2.1.1 and 2.2.1]

D2.6: Minutes of the second NA2 annual workshop (M22) [Task2.4]

D2.7: Second report on technical upgrades and QA activities at EARLINET and Cloudnet stations (M24) [Task2.1.1 and 2.2.1]

D2.8: Implementation of the lidar quicklook database (M26) [Task2.1.2]

D2.9: First report on NA2 user support activities (M30) [Task2.4]

D2.10: Minutes of the third NA2 annual workshop (M34) [Task2.4]

D2.11: Third report on technical upgrades and QA activities at EARLINET and Cloudnet stations (M36) [Task2.1.1 and 2.2.1]

D2.12: Recommendations on radar calibration and standardization at Cloudnet stations (M42) [Task2.2.2]

D2.13: Implementation of EARLINET Level 3 products (M46) [Task2.1.2]

D2.14: Implementation of common EARLINET/Cloudnet algorithms and products (M46) [Task2.3.2 and Task 2.3.3]

D2.15: Minutes of the fourth NA2 annual workshop (M46) [Task2.4]

D2.16: Second report on NA2 user support activities (M46) [Task2.4] D2.17: Fourth report on technical upgrades and QA activities at EARLINET and Cloudnet stations (M48) [Task2.1.1 and 2.2.1]

Work package number	3	**Start Date or Starting Event**									Month 1												
Work package title	**NA3: Near-surface observations of aerosols, clouds and trace gases**																						
Participant number	4	9	1	2	3	5	6	7	8	14	16	17	18	19	20	21	23	24	25	26	28	29	30	31
Short name of participant	**NOA**	EMPA	CNR	CNRS	TROPOS	NILU	FMI	PSI	UHEL	JRC	UGR	CSIC	KNMI	CHMI	ULUND	Cyl	DWD	UNIVLEEDS	NERC	UPAC	CNISM	INRNE	NUIG	IGF PAS
Person months per participant	16	12	6	29.5	12	5	2.5	6	8	3.9	3	13	4.7	5	7	5.5	16	2.9	1	12	2.5	10.6	1	10

Objectives

The overall objective of the activity NA3 is to consolidate and optimize the European capabilities to observe *near-surface-based* climate and air quality relevant properties of aerosol particles, cloud droplets as well as trace gases concentrations in the troposphere from ground-based stations. ACTRIS-NA3 focuses on improving harmonization of observation methodologies for such variables not yet covered by operational networks. Enhancing provision and dissemination of surface-based high-quality measurements respond to a strong demand of a wide user community. The specific objectives are:

- To maintain and consolidate provision of high quality data for the variables addressed by ACTRIS in order to assure the quality and stability of the network composed of more than 40 ACTRIS labelled stations around Europe (Task 3.1).
- To establish new standardized methodologies and procedures for high quality measurements of relevant gaseous, cloud and aerosol variables, when necessary and ensure their implementation (Task 3.2).
- To implement on- and off-site procedures to further improve data quality and achieve timely identification of instrument malfunctions (Task 3.3).

To exchange expertise and provide scientific and technical support to station operators including new users and dissemination outside the ACTRIS consortium (Task 3.4).

Description of work

Task 3.1: Improvement of instrumentation, standardization and quality assessment of essential climate and air quality variables (<u>EMPA</u> + all NA3 partners)

Regular control procedures were implemented in ACTRIS for harmonization of measurement procedures, quality control and data submission for a specific set of variables relevant to air quality and climate studies. These procedures included regular control exercises through round-robin tests and inter-calibration campaigns and ensured that measurements of in-situ chemical, physical and optical aerosol properties, Nitrogen Oxides (NO_x) and Volatile Organic Carbon (VOC) concentrations were performed according to common standard procedures to guarantee traceable high quality. This successful work will be further developed in Task 1 of ACTRIS-2 with the aims to increase the amount and quality of delivered data, to

control implementation of existing Standard Operation Procedures (SOPs) and to eventually propose revisions. This will be achieved via inter-laboratory comparison exercises (round-robin), use of ACTRIS TNA (WP8) or external calibration facilities, travelling standards or target gases and calibration campaigns, according to procedures implemented during ACTRIS. ACTRIS-2 will maintain and further optimize the procedures when necessary. In addition to core variables controlled in ACTRIS (Organic/Elemental carbon – OC/EC-, number and number size distribution of particles, absorption and scattering coefficient of particles, low-level NO_x, specific VOCs and specific organic tracers), ACTRIS-2 will implement control procedures for Cloud Condensation Nuclei, new biogenic precursors and oxygenated VOC (OVOCs), additional oxygenated reactive nitrogen (NO_y) components, and one additional organic tracer for which SOPs were recently agreed upon in ACTRIS. The frequency of QA/QC activities follows ACTRIS implementation plan and covers at least one exercise in two different years of the project for each considered variable.
Whenever necessary, inter-calibration campaigns will benefit from and complete ACTRIS experience for specifically targeting identified variables (campaign in the summer months with higher biogenic precursors and OVOC levels). Similarly, inter-laboratory comparison (ILC) studies will be also performed for selected organic aerosol (OA) tracers used for OA source apportionment. The ILC will use both synthetic standards and ambient air test samples to support the establishment of SOPs for variables not already addressed by ACTRIS, such as tracers for primary and secondary OA from biogenic sources, as well as traffic OA, and to determine the quality performance of the participating laboratories.
NA3 strongly relies on ACTRIS calibration facilities. For OC, EC and physical and optical aerosol variables, technical parts of the inter-comparison exercise (e.g. the pure calibration, intercomparison and hands-on training activities) will be performed at World Calibration Centre for Aerosol Physics (WCCAP, WP8) and European Laboratory for Air Pollution (ERLAP, WP8) facilities whereas decisions about data QA strategy, recommendation to users and standardization issues will be addressed in NA3.

Task 3.2: Implementation of new data products and optimization of the processing chain (TROPOS+ all NA3 partners)
The aim of this task is to establish standardizations for high quality measurements for new relevant, cloud, aerosol and gas phase variables for which there is a strong request from a large user community. Some of these new variables were the target of previous JRA in ACTRIS. Each of these developments shall include standardization of the products, definition of metadata, definition and implementation of error products, and documentation. Specifically, Task 3.2 will comprise the following sub-tasks:

Task 3.2.1: *Development of a measurement standardization and data submission protocol for aerosol particle mass spectroscopy based on Aerosol Chemical Speciation Monitor (ACSM) products (CNRS, PSI)*
Previous JRAs have demonstrated the reliability and robustness of the ACSM to monitor in near real-time and on a yearly basis the chemical composition of fine aerosols and sources of organic aerosols over more than 10 European supersites. The aim of this task is to get homogenous quality-controlled ACSM datasets at a European scale and homogenize calibration and data processing and in particular the source apportionment of organic aerosol data. Precision and accuracy of these measurements will be evaluated with various co-located instruments from such as TEOM-FDMS, SMPS, OC-EC Sunset Field analyzer, PILS-IC, filter sampling …).

Task 3.2.2: *Development of a measurement standardization and data submission protocol for cloud relevant products (Liquid Water Content (LWC) and droplet effective radius (Re);(CNRS, PSI)*
Instruments capable of characterizing clouds properties are diverse in the community. The first aim of this activity is to harmonize the standard operation procedures for the measurement of LWC and Re by the bulk probes (PVM) and evaluate their performances, compared to the other existing probes. We will also provide the recommendations and standard operating procedures to the ACTRIS community and define data format for submitting data through the ACTRIS data portal.

Task 3.2.3: *Development of a measurement standardization and a data submission protocol for VOCs based on PTRMS and TOF-MS measurements (CNRS, EMPA)*
PTRMS and TOFMS instruments are now used to perform high-time resolution VOC measurements. They are also of great interest when combined to speciated measurements of aerosols (AMS and ACSM). ACTRIS-2will provide the scientific community with standard operating procedures for PTRMS and TOFMS measurements to ensure proper management of interferences, as well as a good quality of blanks and standard gases. Recommendations will be inferred from the intercomparison of OVOC instruments

(Task 1) and from the experience gained by PTRMS and TOFMS experts. In a joint effort with the aerosol working group, PTRMS and TOFMS will be implemented during ACSM intercomparison to check whenever organic aerosol sources can be determined based on the synergy between ACSM and PTRMS.

Task 3.2.4: *Development of a measurement standardization and data submission protocol for coarse mode particle number size distribution measurements based on aerodynamic and optical particle size spectrometers (TROPOS).*
In EUSAAR and ACTRIS standardization protocols have been developed and implemented for particle number size distribution measurements based on mobility particle size spectrometers covering the sub-micrometer particle size range. Since most of the ACTRIS stations use aerodynamic and optical particle size spectrometers for the super-micrometer particle size range, standardization protocols will be developed for these measurements to cover also the optically and microphysically relevant size range of coarse particles.

Task 3.2.5: *Development of reference instruments for multi-wavelength absorption measurements (TROPOS).*
Since multi-wavelength absorption photometers are more and more used, there is a need to define a laboratory reference method to be able to validate the retrieved multi-wavelength absorption coefficients of such photometers during calibration and intercomparison workshops. Extinction monitors and integrating nephelometer will be the base of the future ACTRIS reference method for the multi-wavelength particle light absorption coefficient.

Task 3.3: Development and implementation of advanced data quality-check tools from station operation to data submission (NILU + all NA3 partners)
The aim of this task is to perform on- and off-site quality assurance studies to further improve data quality and facilitate rapid identification of instrument malfunctions. In this frame, elaborated tools and semi-automated interactive statistical procedures for assessing the quality and consistency of measurement data will be developed and implemented throughout the network of stations. This comprises advanced tools for both on-line/off-line identification of instrument failure/deviations and facilitation of submission procedures. This task will comprise the following sub-tasks (*in parenthesis in Italics the sub-task leader(s)*):

Task 3.3.1: *Development and implementation of advanced on-line QC tools. (NILU, EMPA, DWD, TROPOS, CNRS, JRC): On-line tools will be developed and distributed to stations operators to ensure more rapid identification of instrumental failures.* The probably most sensitive test for hard-to-detect instrument malfunctions is the physical consistency between different instruments (closure). Examples of such tests are check of ratios of trace gas concentrations and comparison of aerosol properties measured directly and calculated from collocated observations of microphysical aerosol properties. Three concrete activities are listed below.

- *Closure studies for total particle number concentration* (*TROPOS*). Up to four transfer Condensation Particle Counters (CPC) will be employed for on-site intercomparisons against mobility particle size spectrometers. Each CPC will travel from station to station and finally quality assured at the calibration centre WCCAP.
- *Closure studies for particle light scattering coefficient* (*NILU, TROPOS*). For stations which operate an integrating nephelometer together with a mobility particle size spectrometer and additionally an optical aerodynamic particle size spectrometer, automatic intercomparisons of the measured(integrating nephelometer) and calculated particle light scattering and backscattering (Mie-model for spherical particles and e.g. a T-Matrix method for spheroidal particles) will be performed to assess a quality assurance of both measurements methods (correct determination of the particle number size distribution of the accumulation and coarse mode range and the calibration of the integrating nephelometer).
- *Mature automatic QA/QC checks for incoming VOC and NOx data.* (*EMPA, DWD*).Checks will include the comparison of monthly means between different sites and ranges of trace gas ratios, both within one station and between different stations. These tools will be developed within task 3.2. This will allow a straightforward preliminary feedback of the data quality, which then will be further elaborated before final submission in task 3.2.

Tools will also be implemented within the in-situ data centre EBAS to the benefits of all users (partners and associated partners). One direct impact of the centralized on-line tool will be to increase the number of stations providing data in near-real-time. This will clearly serve interaction of the infrastructure with models for operational weather prediction in JRA3. This will be achieved by creating demonstrator use cases for near-real-time (NRT) data in collaboration with JRA3, thus increasing the motivation of data submitters to participate in the NRT infrastructure by demonstrating the data's relevance. Software packages implementing the NRT data submission at station level will be shared to lower the threshold for participation. If considered mature, new instruments and parameters will be added to the NRT infrastructure.

Task 3.3.2:*Reactive trace gases consistency checks, using trace gas ratios and chemical concepts (EMPA, DWD, NOA).* NOx and VOCs trace gas ratios are an important tool for checking the consistency of trace gas data both at one station between different years and between different stations. This includes consideration of background values, emission ratios, photochemical ageing, NO_x-photo-stationary-state. Mature products will be transferred to task 3.1 and partners will be trained and annual workshops well in advance of the actual data submission will be organized to ensure the compliance with QA/QC procedures and intercomparability of the submitted data within ACTRIS-2.

Task 3.3.3: *Development and implementation of automatic and interactive sanity and consistency checks for in situ surface-based data submission (NILU):* Despite careful double manual quality assurance by data provider and data centre, some errors in submitted data and metadata are not detected before archiving. Experience shows that many of these errors can be avoided, and thus data quality improved, by adding automatic checks of syntax, metadata consistency, and data boundary / outlier checks on top of manual sanity checks. To this end, the named automatic checks will be implemented for data submitted by FTP to the ACTRIS data centre, together with a feedback mechanism by e-mail. In addition, a website will allow data submitters to perform the same checks interactively on their prospective data submission. This will reduce the turn-around time for feedback to data submitters significantly. In total, this will result in an improved user experience for data submitters as well as better data quality for data users. An expert workshop early in the project will specify the details of the sanity tests.

Task 3.4: Exchange of expertise, support to campaigns and new users (NOA + all NA3 partners)
This task will be the backbone of the networking activity through which the participants (partners and associated partners) share scientific and technical expertise relevant to NA3, discuss outcomes of Tasks 3.1, 3.2 and 3.3 and implementation procedures throughout the research infrastructure. Task 4 provides opportunities to exchange and transfer technical expertise and advice in particular to new users. The task will support the following items:

- *Organization of annual workshops and task-related technical meetings (NOA, CNRS, TROPOS, DWD, EMPA):* Annual technical workshops will be organized to discuss progress of the tasks as well as specific topics (such as user requirements, instrument and data analysis optimization, external collaboration, etc.). Workshops will be open to partners and associated partners including SMEs. Next to the workshops, task-related technical meetings will be fostered to facilitate progress of specific developments.
- *Implementation of ACTRIS products and QA procedures within the network and in support of large research EU-projects field campaigns (TROPOS, CNRS, NOA, DWD, EMPA*): The increasing use of instruments for physicochemical and optical properties of aerosols and trace gases measurements such as ACSM, PTR-MS etc. in field experiments requires specific support such as consideration of specific sites and platforms (e.g., ships) etc. Respective expertise will be provided to users on request.
- *Support to new stations (TROPOS, CNRS, NOA, DWD, EMPA):* NA3 partners will provide guidance and technical support to new stations implementing NA3 relevant instrumentation. As *near-surface* ACTRIS network for aerosols, trace gases and cloud variables is still growing, new stations must fulfil a large number of requirements to adjust to the networks' standards.

Documentation, websites, and outreach (NOA, CNR, CNRS, TROPOS, DWD, EMPA): Documentation of meeting results, task-related documentations, standardization protocols, technical descriptions and any information relevant for the users will be made available through publication on the ACTRIS website and via task-related websites and interfaces.

Deliverables
D3.1: An expert workshop to determine the targeted set of OA tracers (M6) [Task3.1]

D3.2: Minutes of the first NA3 annual workshop (M10) [Task3.4] D3.3: Standardization and data submission protocol for aerosol particle mass spectroscopy measurements (M12) [Task3.2] D3.4: Standardization and data submission protocol for coarse mode particle number size distribution measurements (M12) [Task3.2] D3.5: Report on NO2 side-by-side intercomparison (M18) [Task3.1] D3.6: First version of QC tools for NA3 data submission available (M18) [Task3.3] D3.7: Implementation of closure studies for total particle number concentration (M18) [Task3.3] D3.8: Report on procedure for QC of reactive trace gases (M18) [Task3.3] D3.9: Minutes of the second NA3 annual workshop (M22) [Task3.4] D3.10: Inter-laboratory comparison (ILC) studies for the targeted set of OA tracers (M24) [Task3.1] D3.11: Reference instruments for multi-wavelength absorption measurements (M28) [Task3.2] D3.12: Standardization and data submission protocol for PVM measurements (M28) [Task3.2] D3.13: Implementation of closure studies for particle light scattering coefficient (M28) [Task3.3] D3.14: Minutes of the third NA3 annual workshop (M34) [Task3.4] D3.15: Standard Operating Procedures (SOPs) for the targeted set of OA tracers (M36) [Task3.1] D3.16: Implementation report on increasing number of NA3 stations and instruments providing data in near-real-time (M40) [Task3.3] D3.17: Updated Measurement Guideline for NOx and VOCs (M42) [Task3.1] D3.18: Minutes of the fourth NA3 annual workshop (M46) [Task3.4]

Work package number	4	**Start Date or Starting Event**			Month 1	
Work package title	**NA4: ACTRIS Innovation Platform**						
Participant number	1	2	3	4	12	7	8
Short name of participant	**CNR**	CNRS	TROPOS	NOA	INOE	PSI	UHEL
Person-months per participant:	6	3	4	5	4	4	2

Objectives

The overall objective of this activity is to enhance and promote cooperation with the private sector and in particular with European SMEs.

Specific objectives are:

- To maintain and further develop standard-making processes for technologies relevant to ACTRIS observations in cooperation with SMEs.
- To promote use of ACTRIS by SMEs to test novel instrumentation at observing sites or calibration centres.
- To promote joint public-private collaboration for high-risk innovation and close-to-market activities applied to atmospheric observation technologies.
- To establish a platform for exchange of expertise and information with the private sector.

Description of work

This WP aims at the central coordination of the innovation aspects which are covered in detail in the different ACTRIS-2 activities and mainly in NA2, NA3, JRA1 and JRA2. It is a specific activity to enhance and promote cooperation with the private sector and in particular with European SMEs. Currently, 11 SMEs (7 European-based) are associated to ACTRIS. The goal of the activity is to increase the number of the associated SMEs by the end of the project, favour joint initiatives between ACTRIS partners and SMEs in particular in relation to standardization and promote the use of TNA by the private sector.

This WP intends to combine harmonize/develop standard procedures, and to use the partners scientific expertise in order to enforce the SME's and industry involvement.

The work is split into three Tasks:

Task 4.1. Technological standardization (INOE, CNRS, CNR, TROPOS, NOA)

This task is devoted to maintain and further develop standard-making processes for technologies relevant to ACTRIS observations in cooperation with specific SMEs and national, European and, when applicable, international centres for normalization and standards.

Current involvement of ACTRIS in CEN and ISO initiatives will be maintained and reinforced. In particular, and in addition to existing activities, specific actions are foreseen related to lidars and black-carbon technologies, considering the increasing demand for these technologies from the market. A strategy to improve and harmonize the operation activities of ACTRIS infrastructure will also be developed (e.g. standardization of techniques and procedures for data quality assurance, automation of data collection, processing and transfer, etc.), taking into consideration the increasing role on the market of the end-user services and products emerging from ACTRIS activities.

This task will also include specific information and communication activities to enhance awareness and understanding of the standardization processes among ACTRIS partners and associated partners through the provision of guidelines and information packages and specific meetings with the entire ACTRIS-2 consortium co-located with the project General Assemblies.

Beside technical (hardware) standardization, this task will be also devoted to support ACTRIS-2 partners in getting EU license for specific software products developed within the project.

Task 4.2 Tests of new instrumentation by SMEs (CNRS, CNR, TROPOS, INOE)

ACTRIS-2 provides a large number of installations/facilities where novel instruments in the field of atmospheric observations could be tested. In particular here the use of the ACTRIS stations providing TNA in WP9 and the Calibration Centres (WP6-8) from SMEs will be promoted.

The 18 ACTRIS stations providing TNA (listed in WP9) represent a unique set of facilities equipped with state-of-the-art instrumentation and offering the best scientific and technical expertise available in Europe in the field of aerosol, clouds and trace-gases observations. The three ACTRIS-2 Calibration Centres, the Lidar Calibration Centre – WP6, the AOD Calibration facility – WP7 and the European Centre for Aerosol Calibration – WP8, represent the only facilities in Europe for calibrating and testing new lidar instrumentation, sun/lunar photometers and aerosol in-situ instruments for atmospheric applications. This offer from ACTRIS-2 represents a unique opportunity for European SMEs for testing new instrumentation to be launched on the market.

Specific experimental tests and calibration from SMEs will be promoted in cooperation with Task 4.1 for technological standardization and using the specific protocol for exchange of expertise and information with the private sector that will be developed in Task 4.3.

Task 4.3 Exchange of expertise (CNR, CNRS, TROPOS, NOA, INOE, PSI, UHEL)

ACTRIS intends to continue to support all the EU SMEs operating on the market for technologies and services related to atmospheric observations. This collaboration with the private sector will carried out under a mutual-support concept that will allow the bilateral exchange of expertise and information.

A specific protocol will be developed together with the private sector for assuring that this exchange of expertise and information respects the intellectual property rights on both sides and classified information from the industry. For that purpose a specific workshop will be organized during the first year of the project and all the SMEs operating in the specific sector will be invited. The outcome of this workshop will be the basis to establish a platform for a continuous exchange of expertise with the private sector in particular for promoting joint public-private collaboration for high-risk innovation and close-to-market activities applied to atmospheric observation technologies.

Associated SMEs will be also invited to technical workshops (NA1, NA2, JRA1, JRA3) during the whole duration of the project in order to continue and reinforce the mutual cooperation.

Deliverables
D4.1: Progress report on standard-making process. (M22) [Task 4.1] D4.2: Progress report on the use of ACTRIS facilities and calibration centres for testing novel instruments. (M22) [task 4.2] D4.3: Progress report on innovation (M24) [Task 4.3] D4.4: Final report on Innovation (M48) [Task 4.3]

Work package number	5	**Start Date or Starting Event**			Month 1		
Work package title	**NA5: ACTRIS-2 training, outreach and sustainability actions**						
Participant number	2	1	8	5	6	3	23	
Short name of participant	**CNRS**	CNR	UHEL	NILU	FMI	TROPOS	DWD	
Person-months per participant:	7	4	9	1	3.1	0.5	0.5	

Objectives

Proper integration of ACTRIS-2 in National, European and International landscape is key to its sustainability beyond the term of the project. It will require actions towards both end-users and stakeholders that will address education, training, and dissemination of ACTRIS results to the community and the public. In parallel, actions are required to implement integration strategies in the ESFRI context and further connect with international atmospheric observation programmes and networks. Specific objectives are:

- To ensure proper training of scientists/engineer across the ACTRIS components and beyond, and to expand interoperability of ACTRIS DC outside the RI.
- To enhance cooperation with international programmes and networks.
- To ensure the long-term sustainability of ACTRIS by engaging in world-class RI design with appropriate links to current and new ESFRI projects, interaction with stakeholders and end users and with national ACTRIS initiatives.
- To coordinate proper dissemination of the ACTRIS results and initiatives.

Description of work

Task 5.1: Training and education (<u>UHEL</u>, FMI, TROPOS, NILU, CNR, CNRS)

Efficient use of ACTRIS Research Infrastructure platforms requires both knowledge of the scientific relevance of observations and skills to optimize use of instruments and data sources within the experimental framework. ACTRIS-2 will maintain its unique cross-border training courses that have made the reputation of the RI. The aim is to offer opportunities within and outside the ACTRIS consortium to train new users on the ACTRIS products and tools. Different training courses will be offered corresponding to different user typologies. Two basic courses dedicated towards use, quality control and data submission procedures will be organized (some under the umbrella of GAWTEC) and are most targeted to new users. Two advanced courses for specific training on newly developed ACTRIS tools and products will be organized for advanced users in the academics, capitalizing successful training activities engaged in ACTRIS. On-site training activities will also include dedicated ACTRIS courses held outside Europe to international associated partners and an online MOOC (Massive Open Online Course) -type ACTRIS course directed towards new operators of observing facilities (to be accessed through the ACTRIS data centre). Continuing the successful experience in ACTRIS, internal tutorial workshops will be organized in co-location with GAs to improve knowledge transfer amongACTRIS-2 partners and associated.

Task 5.2: Establishing full interoperability with data centres of atmospheric infrastructures (<u>NILU</u>, CNR, FMI, CNRS).

Internal interoperability between the topic data centres and the data portal has been established in ACTRIS but work is still needed to expand interoperability to other data portals outside of ACTRIS, mostly with those relevant to atmospheric studies. The task comprises at least three aspects:

1) data access modalities/data policy;
2) vocabularies and data formats used in data exchange;
3) protocols for exchange of metadata and data.

ACTRIS-2 will advance the integration of its participating data centres by further developing the data policy to a unified data policy modelled onto the WMO GAW fair-use data policy, in close cooperation with other projects such as the cluster project of environmental research infrastructures (ENVRI+). This will implement the EU requirements of free and open data access and simplify data exchange significantly. For vocabularies and data formats, the emerging community standard of CF standard names and corresponding NetCDF data format specifications will be used, and vocabulary defined with the convention where missing. Also for metadata and data exchange, existing or emerging standards will be deployed (OAI-PMH for metadata, OGC WFS for data exchange). With this strategy, the ACTRIS-2 data infrastructure will connect to larger data infrastructures such as the WMO Information System, GEOSS and with most data centres of environmental research infrastructures.

Task 5.3: Long-term sustainability plans of ACTRIS at national and European levels. (FMI, UHEL, CNR, CNRS).

This task capitalizes the work already initiated within ACTRIS. At national level, ACTRIS is officially established in 15 EU countries through administrative structures that differ from country to country either as independent association or included in a broader framework with other RIs in the environmental domain. At the European level, the ACTRIS European roadmap strategy towards ESFRI has already been initiated. The task will focus on several activities, such as **1)** to define a clear ACTRIS roadmap for the next 5 to 10 years. This will be achieved by reinforcing cooperation with other infrastructures of the atmospheric domain (IAGOS, ICOS *in primis*) and the wider research communities within the atmospheric science; **2)** to consolidate and enhance interoperability with other research infrastructures in the atmospheric subdomain. This is performed by organizing a series of meetings for discussing with other atmospheric RIs the required level of interoperability for technologies (including QA/QC), training and outreach. Interoperability with data management is dealt in Task 5.2and the interactions with RIs in the larger environmental domain will be performed in the context of ENVRI+. Whenever necessary, ACTRIS will import and apply ENVRI reference models to improve ACTRIS data management and enhance the interoperability with other environmental RIs. **3)** to maintain and enhance activities of the several national ACTRIS initiatives currently on-going in 15 different member states. This is achieved providing to national entities all information and material needed to maintain and improve current national structuration and enhance communication with national stakeholders. The task will raise awareness at national and, possibly, regional levels for opportunities to consolidate national coordination and investments in ACTRIS activities such as for example the use of European Structural and Investment Funds in line with the relevant smart specialisation strategies.

Task 5.4: International and strategic collaboration with operating networks (CNRS, CNR, FMI, NILU, TROPOS, DWD, UHEL).

There is a great potential for improving the integration of observations across the various international networks engaged in systematic atmospheric long-term observations. International collaboration and establishment of joint procedures and standards is therefore essential to ensure implementation of common strategies for international networks. Further, there is a need to develop cost-efficient monitoring capacity in regions currently inadequately covered. The specific task is to improve comparability of data, work towards more uniform data quality standards, share QA/QC approaches in relation to ACTRIS calibration facilities, increase synergy of measurements and prevent unnecessary duplication and, finally, promote the ACTRIS concept outside Europe. This will be done in the international framework of GAW and GCOS. This includes also the transfer of standards and methodologies to more operational networks (e.g. those covered by the EU Met Services in EUMETNET, EMEP, whenever possible). The second aspect within task 5.4 is to ensure proper representation of ACTRIS and adoption of ACTRIS standards, when applicable, in international initiatives such as COOPEUS, RDA, PEEX, ILEAPS, IGAC, etc.

Deliverables

D5.1: ACTRIS roadmap report for the next 5 to 10 years (M12) [Task 5.3]

D5.2: Flyers and other needed materials on ACTRIS roadmap provided for ACTRIS national, regional, European and international actor (M16) [Task 5.3]

D5.3: Online ACTRIS MOOC on observing technologies (M24) [Task 5.1]

D5.4: Report on data interoperability (M36) [Task 5.2]

D5.5: Final report on ACTRIS training and education programme (M46) [Task 5.1]

D5.6: Final report on cooperation between ACTRIS and other European and international RIs, networks and programmes (M48) [Task 5.4]

Work package number	6	**Start Date or Starting Event**			Month 1			
Work package title	**TNA1: Lidar Calibration Centre (LiCal)**							
Participant number	12	13	1					
Short name of participant	**INOE**	LMU	CNR					
Person-months per participant:	0	0	0					

Objectives:

To offer a wide range of services to test and calibrate lidars and ceilometers, starting from the characterization and optimization of single components, to the assessment of the whole system's performance. At least 20 systems with different configurations will be calibrated (at level of components, blocks, channels), 10 systems will be intercompared to the EARLINET's reference systems, and 40 operators will be trained to check and maintain the calibration.

Provision of access to the following infrastructure(s): Lidar Calibration Centre (LiCal)

Description of the infrastructure

Name of the infrastructure (and its installations, if applicable): Lidar Calibration Centre (LiCal), a multi-installation facility:

1. Lidar Calibration Training Laboratory (LiCalTrain)
2. Lidar Components Testing Laboratory (LiCoTest)
3. Mobile reference lidar (POLIS)
4. Fixed reference lidar (MUSA)
5. Mobile reference lidar (MUSA-mobile)
6. Lidar Remote Quality Assurance (LiReQA)
7. Lidar Check-up Unit (LiCheckUnit)

Location (town, country) of the infrastructure: The National Institute of R&D for Optoelectronics (INOE), located in **Magurele, Romania** is hosting the Lidar Calibration Training Laboratory and the Lidar Components Testing Laboratory. Ludwig Maximilians University, Meteorological Institute **Munich** in **Germany** (LMU) operates the Mobile reference lidar POLIS (at the user's site), the Lidar Remote Quality Assurance and the Lidar Check-up Unit (at the user's site). The Institute of Methodologies for Environmental Analysis- National Research Council of Italy (CNR) operates the Reference lidar MUSA in two configurations: at fixed location in **Potenza, Italy**, and mobile at the user site. The three sites were selected based on the existing infrastructure and expertise, to provide specific services: components characterization and calibration training – INOE, Romania; remote testing, inspection and optimization – LMU, Germany; direct intercomparisons – LMU, Germany and CNR, Italy. An added value of distributing the LiCal installations between three countries is a perfect coverage of all possible lidar sites (in terms of location and instrument configuration), as well as a long-term sustainability.

Web site address: lical.inoe.ro

Annual operating costs (excl. investment costs) of the infrastructure (€): 619977 €/year (unit cost)

Description of the infrastructure: Lidar calibration is a complex process, relying on the quantitative assessment of the instrument's performance (systematic errors) and its continuous control. LiCal combines a series of direct and remote techniques, involving both the equipment and the operators, to ensure a proper evaluation, maintenance, calibration and operation of the lidar. Each of the seven installations has a specific role in this process, offering together **a complete characterization and optimization of lidar instruments**. (see Fig. TNA1.1):

- **The Lidar Calibration Training Laboratory** (LiCalTrain) operates a multiwavelength depolarization Raman lidar, a scanning depolarization UV lidar, a tropospheric ozone lidar and complementary instrumentation (Scanning Microwave radiometer, C-ToF Aerosol Mass Spectrometer, Aerosol Chemical Speciation Monitor, Aethalometer, Aerodynamic Particle Sizer, Integrating nephelometer), as well as dedicated software tools to test, characterize, calibrate and validate lidar measurements. It is ideal to train the operators how to apply regular check-ups and maintain the calibration.
- **The Lidar Components Testing Laboratory** (LiCoTest) has a long expertise in characterizing laser beams and optical components using power and energy meters, Tektronics oscillioscopes, Beam Profiler with M^2 option, BeamScope, goniometer and interferometer. This lab also covers spectroscopic ellipsometry measurements and spectral characterization of interferential filters, beam splitters and dichroic mirrors, characterization of the aging process with the Perkin Elmer UV-VIS NIR Spectrometer. Electronic blocks are tested with Agilent and Tektronics pulse/form generators and analysers. This installation delivers full characterization of the optical and electronic components which are part of the transmitter and receiver, essential when assessing the instrumental (systematic) errors.
- **The mobile reference lidar POLIS** measures at two elastic wavelengths - 355 nm and 532 nm and their N_2-Raman shifted wavelengths - 387 nm and 607 nm, and linear depolarisation ratio at 532 nm and 355 nm. It can be easily moved to the user's site to perform side-by-side intercomparison. It is the only reference lidar with depolarization at 355 nm.
- **The reference lidar MUSA** (in fixed or mobile configuration) is a multi-wavelength depolarization Raman with 3 elastic – 1064, 532, 355 nm, 2 Raman – 607, 387 nm, and linear depolarization ratio at 532 nm. It is the only reference instrument operating simultaneously 3 elastic (including the infrared) and 2 Raman channels. The system can be moved at the user site (if the user's lidar is fixed) or can be operated at the host for longer intercomparisons.
- **The Lidar Remote Quality Assurance** (LiReQA) operates dedicated software tools (raytracing for analyzing the transmitter and receiver optics, lidar polarization analysis software, lidar radiation power budget analysis software, analysis of test measurements specialized for individual lidar setups) to perform fault diagnosis of any lidar system.
- **The Lidar Check-up Unit** (LiCheckUnit) is a portable unit (laser power meter, polarization analysis instruments for inspection of transmitter and receiver optics, adapted instruments for checking the alignment of the lidar system, e.g. CCD camera & special optics adapted to the lidar system, lidar pulse simulator for inspection of the detection electronics) which can be used at the user site to inspect and debug the instrument.

Services offered:

- **Characterization of basic components** (laser, optical and electronic parts) is performed at LiCoTest: laser beam characterization, optical and spectral characterization of lenses, filters, mirrors and fiber optics, spectroscopic ellipsometry measurements, polarization measurements, paraxial analysis of optical systems, electronic modules synchronization, stability, response time/speed.
- **Assessment of the overall system's performance** is made by side-by-side comparison with POLIS or MUSA**,** which are both EARLINET reference mobile lidar systems. The availability of the two systems provides a good geographical coverage and reduces time delays between demand and

supply. These systems can be used as reference for scientific lidars but also for different instruments (as ceilometers, sunphotometer or in situ measurements), both commercial and scientific.

- **Systematic quality assurance** of the optical and electronic chains and fault diagnosis is performed at LiReQA. Users trained at LiCalTrain collects test files and send them to be analysed, collecting feed-backs and recommendations. This ensures a homogeneous characterization of the instruments, and identification of possible biases or instrumental problems. The procedure is applied regularly to check the long-term stability of the systems.
- **Inspection, debugging and optimization** of lidars is performed by LiCheckUnit. This installation relies on the high-level expertise of its operator to identify the cause of improper operation, and find solutions to improve the performances of the lidar.
- **Intensive training to maintain and check the calibration** is provided at LiCalTrain, focusing on good practices in lidar measurements and correct application of QA tests for the assessment and optimization of the optical\electronic chains.

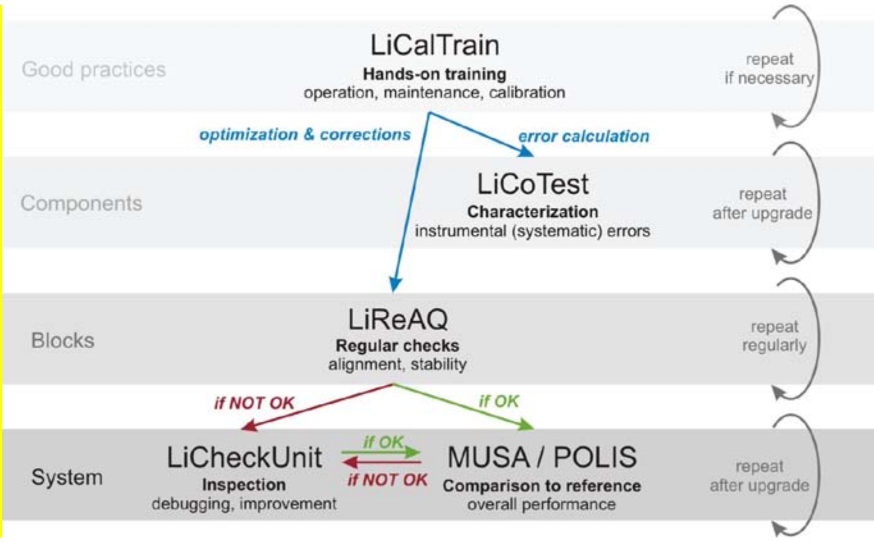


Fig. TNA1.1: Various aspects of lidar calibration, periodicity, and links to LiCal installations

The various installations of LiCal have offered in the last years a significant number of accesses within EARLINET, ACTRIS, ESA-CEOS, ITaRS, as well as for the master and doctoral programs at the Romanian, Italian and German Universities, and national research programs. On average, LiCal installations have hosted about 48 projects (intercomparisons, sample analysis, training, system inspection) and 1260 access days per year, for a number of 51 external users per year, out of which 30 international users. Within the frame of EARLINET and ACTRIS, LiCal has been serving the scientific community (about 20 active lidar stations, regular access), the user community (several lidar/ceilometer operators belonging to weather services and aviation) and the private sector (about 3 companies / developers and integrators). LiCal was also involved in several intercomparison (SLiCE2000, EARLI09, SPALI10, SOLI10, ROLI10, AQUILI12, NALI13, LELI13) and scientific campaigns (ACTRIS SUMMER 2012 Campaign, Charmex EARLINET 72h exercise - Jul. 2012, EMEP summer and winter campaign - Jun.-Jul. 2012 and Jan.-Feb. 2013, Charmex 2013).
This activity strongly contributed to increase the number of available quality assured EARLINET data as demonstrated by the large number of publications collected in the last years (a complete list is reported at www.earlinet.org). In particular EARLINET data have been recently used for aerosol characterization in terms of optical and microphysical properties in conjunction with in situ measurements and transport models (e.g. Pappalardo et al., 2013, Sicard et al., 2012, Wagner et al., 2013, Nicolae et al., 2013). The long-term EARLINET quality assured database is the basis for climatological studies, systematic comparison with models and satellite observations (Mona et al., 2014, Pappalardo et al., 2010). New products were derived as further outcome of this calibration activity, e.g the calibrated linear volume depolarization ratio (Bravo Aranda et al., 2013), the particle linear depolarization ratio (Freudenthaler et al., 2009). At the same time, more and more lidars were upgraded with Raman and depolarization channels.
Up to now LiCal was mainly used by research networks (with a limited number of past accesses). However, the extension of research and operational networks (lidar and ceilometer) in the last years favours an increase of demand for calibration services both from users and manufacturers (generally SMEs). Being unique in

Europe and in the world with its reference lidars (POLIS and MUSA), testing and debugging (LiCoTest, LiReQA, LiCheckUnit) and expert training facilities (LiCalTrain), the Lidar Calibration Centre is now able to offer to the external community access to the QA tools, procedures and standards developed by EARLINET and implemented and tested at network level during ACTRIS. Moreover, the new developments foreseen in NA2, will be picked-up by LiCal as soon as they will be fully tested and documented.

Description of work

Modality of access under this proposal: Access will be provided to one or more LiCal installations, based on the user's request and identified needs. The user has to shortly describe the system to be calibrated and the problems identified / suspected. Facts such as "last calibration date", "major upgrades", "expertise of the operators", "application and recommended measurement accuracy" will be taken into consideration by the LiCal User Selection Panel when recommending and granting access to (a) specific LiCal installation(s).

Physical access will be provided by LiCalTrain, LiCheckUnit, POLIS and MUSA. At **LiCalTrain (Romania)**, users (especially new or not very experienced lidar/ceilometer operators, 1-2 persons / station for 5 days) will be trained to apply standard procedures for lidar measurements (lidar alignment, cleaning of the telescope mirror and optical components, telescope alignment and check-up tools) and correct application of QA tests for the assessment and optimization of the optical\electronic chains (telecover test for optical alignment checkups, depolarization calibration tests and procedures, Rayleigh fit test for alignment checkups, laser trigger-detection synchronization tests). **POLIS (Germany)** and **MUSA-mobile (Italy)** will be used for access at the user site (approx. 2 weeks), as reference for direct comparison and intensive training. The choice between the two installations will be made considering the configuration of the system to be calibrated. A report containing the intercomparison result will be sent after analysis. The same services will be provided by MUSA at its original location (Potenza) for users / manufacturers of mobile / portable lidars. To investigate malfunction of their instrument, users will be granted access to **LiCheckUnit (Germany)**. The installation will be moved to the user site location for approx. one week, and the expert will inspect the instrument, identify the causes and recommend solutions. A report containing the findings will be delivered.

Remote access will be provided by LiCoTest and LiReQA. At **LiCoTest (Romania)**, users can send samples (components and blocks) to be characterized. At **LiReQA (Germany)**, users can send test data (special format, collected by the operators) to be analysed. In both cases, a report containing the results will be sent back to the user, with recommendations.

For all installations, the modality to declare access costs is on the basis of unit cost, or a combination with actual costs (for POLIS, MUSA-mobile and LiCheckUnit, which involve access at the user site). Unit costs include direct costs and operating personnel costs. Actual costs include shipment of the instruments and travel of the operators to the user site.

Support offered under this proposal: At LiCal, logistic support is routinely offered to the external and international users in terms of travel assistance and fiscal authority. Within the available budget, selected proposals can be provided with support money for travel. For all activities involving training, users are provided with documentation, training material, and have access to lecture rooms, internet, instruments and software. For scientific and technical support, the LiCal experts are directly involved and at the disposal of the users for explanations and clarifications. Access to the characterization, testing and check-up installations helps the users to properly assess the instrumental errors, optimize the systems and quantify the data uncertainty. Access to the hands-on training installations (including during intercomparisons) provides the user with the necessary expertise to properly operate, maintain and calibrate their systems on long term, therefore to allow quantitative measurement of relevant aerosol parameters (Angstrom coefficients, lidar ratio, linear particle depolarization ratio, microphysics).

Outreach to new users: While regular users (e.g. EARLINET stations) are accessing LiCal installations systematically in order to fulfil the agreed standards and ensure homogeneous data quality, it is expected that the number of new users will increase considerably during the project. These are weather services and aviation safety administrations, which are now in the process of implementing such systems for warning or monitoring purposes, as well as lidar/ceilometer developers. Moreover, within the research community new lidar stations will be soon operational in countries which have recently joined EU or are now in the process (Serbia, Croatia, Republic of Moldova, etc.). In order to promote LiCal and services offered to these new users, advertisement will be done via ACTRIS, ITaRS, EARLINET and own web site, as well as during conferences, workshops and project meetings. Relevant e-mailing lists will be also considered. Dissemination of the TNA achievements will be done based on conference contributions (at least one per TNA project) and papers (at least one ISI paper per year). Reports on results and documentation will include summaries published online, and detailed documentation submitted to the ACTRIS community and following ACTRIS protocols.

Review procedure under this proposal: The transnational access to LiCal installations will be jointly coordinated by the project management team (PMT) and WP6 leader (INOE). INOE will manage and follow-up on the proposals onsite. The call for TNA to LiCal will be an open, continuous call and requests will be accepted at any time from any eligible researcher or research team. The request for accessing LiCal infrastructure will be addressed online to the PMT in the form of a short proposal (template will be available), including the motivation for the access, description of the instrument to be calibrated, problems to be tackled (instrument problem? training? components/blocks characterization? regular testing? overall performance?), people in charge, expected outcomes, etc. Following verification of the proposals by the PMT for formal compliance with EU regulations, INOE will coordinate proposal review with the **LiCal User Selection Panel** to evaluate and select the proposal according to clearly defined selection criteria. Proposal selection will be based on the scientific quality, priority will be given to new users. It will apply the principles of transparency, fairness and impartiality. The decision on the specific installation(s) to be accessed belongs to the LiCal User Selection Panel, based on the user needs which are expressed in the access proposal. The LiCal User Selection Panel will consist of representatives of the three LiCal partners, and six reputable scientists having expertise in lidar, optics and/or electronics (at least half of them will be independent from ACTRIS-2). The members of the LiCal User Selection Panel will be proposed by the WP leader and appointed by the General Assembly.

Deliverables

D6.1: Intermediate Report on Access to LiCal (M24)
D6.2: Final report on access to LiCal (M48)

Work package number	7	**Start Date or Starting Event**					Month 1
Work package title	**TNA2: AERONET-EUROPE Calibration Centre**						
Participant number	2	15					
Short name of participant	**CNRS**	UVA					
Person-months per participant:	0	0					

Objectives

The main objective is to support, mostly in Europe, long-term aerosol observation and monitoring efforts from a ground-based automatic photometer network. This activity is a support from EU to the NASA AERONET program producing routinely, in real time and publically available, high quality aerosol column integrated properties such as AOD (Aerosol Optical Depth), optical and microphysical properties and many others derived-radiative properties quite relevant and widely used by academic and industrial actors involved in climate and air-quality fields. This activity is strongly contributing, at the European level, to several relevant integration/synergetic activities with LIDAR, in situ observation, satellite and modelling. This TNA is therefore clearly a continuation based on the success and strong demand we had, during ACTRIS, to provide a fast and efficient calibration and standard maintenance service for sun/sky/polar photometers as requested by the users. This is only possible in Europe thanks to the unique AERONET-EUROPE research infrastructure operated by France and Spain. In ACTRIS-2, we will offer the same service plus the monitoring of the instrument status (Quality Check) during operation in the field and Quality Assurance (QA) both increasing the observation period). Moreover, thanks to partnerships developed between academic research and industry within ACTRIS, a lunar photometer has been developed and will offer, for the first time, night-time observation capability. ACTRIS-2 will offer calibration and maintenance service to users operating this new instrument.

Provision of access to the following infrastructure(s): 335 units of access or calibrations (165 for LOA, 100 for GOA and 70 for AEMET). During ACTRIS, 300 units of access were provided.

Description of the infrastructure

Name of the infrastructure: **AERONET-EUROPE** Calibration Centre (AERONET-EUROPE)

Installations:
1- LOA
2- GOA
3- AEMET-IZANA

Location of the infrastructure: The infrastructure is composed of separate and complementary installations:

The leading and entrance installation is CNRS-LOA (Laboratoire d'Optique Atmosphérique), University of Lille 1, Villeneuve d'Ascq city (France). The other complementary installations are in Spain (AEMET-CIAI-IZANA) and GOA-UVA (Group of Atmospheric Optics, University of Valladolid UVA)

Web site address: http://www.actris.net/language/en-GB/AERONETEurope.aspx

Annual operating costs (excl. investment costs) of the infrastructure (€):
995 521 € divided in 648 309 € (LOA) -149 556 € (GOA) - 197 656 € (AEMET)

Description of the infrastructure: As TNA, AERONET-EUROPE Calibration & Maintenance Centre offers a unique sun/sky/lunar photometer facility, complementing the NASA calibration centre in the USA, for calibration and basic maintenance in the frame of AERONET (AERosol RObotic Network). AERONET is a ground-based standardized automatic sun/sky-photometer network devoted to the characterization and monitoring of aerosol properties, water vapour content and, more recently, cloud optical deptAs TNA, AERONET-EUROPE Calibration & Maintenance Centre offers a unique sun/sky/lunar photometer facility, complementing the NASA calibration centre in the USA, for calibration and basic maintenance in the frame of AERONET (AERosol RObotic Network). AERONET is a ground-based standardized automatic sun/sky-photometer network devoted to the characterization and monitoring of *aerosol* properties, water vapour content and, more recently, cloud optical depth.
The AERONET-EUROPE Calibration Service is a unique European infrastructure enabling AERONET operation and potential network expansion, thanks to complementary Calibration Centres developed in Europe, under the leadership of (CNRS-LOA), in Lille (France), in Valladolid (Spain) at GOA (University of Valladolid) and at Izaña Observatory, Tenerife Island, Spain at AEMET-Izana). CNRS-LOA and GOA-UVA facilities are designed for maintenance and calibration transfer from reference instrument to field instrument. It must be outlined that both CNRS-LOA (more relevant for users from Northern Europe) and GOA (more relevant for users from Southern Europe) installations are necessary since none of them can, separately, provide enough access to the European users. AEMET-Izana installation is designed for calibrating reference instrument required by CNRS-LOA and GOA.

CNRS-LOA (Laboratoire d'Optique Atmosphérique) calibration/maintenance facilities are composed of indoor and outdoor platforms (60 m a.s.l). The indoor platforms include a dark room for calibration relying on NASA-NIST traceable integrating spheres, solar-simulator. This facility is the only one in the world operating a dedicated polarized light source for the calibration of the polarized version of CIMEL sun/skyphotometer.
A maintenance and repair room as well as a spectrometer for filters characterization and a thermal chamber for temperature response characterization are also available. A dedicated computer, linked to AERONET/NASA database, is operated for computing the calibration coefficients and data reprocessing. Outdoor platforms (about 100 m2 horizon) are used for transferring sun calibration from reference instrument to field instruments and for functional tests. Since 2010 CNRS-LOA has a permanent capability to calibrate simultaneously 8 field instruments thanks to 2 reference instruments.

GOA-UVA (Group of Atmospheric Optics of the University of Valladolid) installation is composed of one outdoor horizon-free platform located at Valladolid (705 m a.s.l.) designed for transferring calibration simultaneously to 6 field instruments thanks to 2 reference instruments. One indoor lab equipped with dark room with integrating sphere, thermal chamber, NIST-traceable calibration references, plus a maintenance and repair room. A computer is linked to AERONET/NASA centralized database for calibration coefficients computation and data reprocessing. GOA receives every 3 months a new set of 2 reference instruments calibrated at Izaña by CNRS-LOA.

AEMET-IZANA (Izaña Atmospheric Research Centre-CIAI) is a platform (2400 m a.s.l) hosting permanently a set of 6 reference instruments continuously in operation and available for the needs on the CNRS-LOA and GOA-UVA installations. These reference instruments are recalibrated every 3 months in order to preserve measurements accuracy in the network. The facility, also unique in Europe, is equivalent to the NASA site located in Hawaï on Mauna Loa island. This facility also maintains a reference lunar photometer for nocturnal calibrations

Services currently offered by the infrastructure: In the framework of ACTRIS, the infrastructure has been designed to provide annual calibration, maintenance, weekly checks (QC), quality assurance (QA), and production of Near Real Time Aerosol Optical Depth, downward sky total and polarized radiances and derived columnar aerosol optical and microphysical properties, Water Vapour (WV) and Cloud Optical Depth (COD). In average, the infrastructure provides, each year, 80 access units to international users. ACTRIS demonstrated the wide interest of several communities for using AERONET EUROPE. The "LIDAR" community, for example EARLINET in Europe, is now widely using AERONET EUROPE since joint aerosol retrievals, as those developed in ACTRIS, require sun-photometer products. AERONET EUROPE also supported other sun-photometer networks, for example in China, through the regular calibration of reference instruments used by these networks. The satellite community is strongly relying on AERONET EUROPE for the main purpose of aerosols products validation (for example, CCI program from the European Space Agency). The "modelling" community makes also intensive use of the data provided by the instruments calibrated by AERONET-EUROPE with, as main examples, AEROCOM, MACC-II, GMES-COPERNICUS, SDS-WAS projects or programs. Finally, AERONET EUROPE provided support to several SMEs aiming at developing both advanced instruments (sun/sky/lunar photometer alone and combined with micro-LIDAR) and low-cost instruments for educational purposes.

All users operating either a standard or a polarized CIMEL sun/sky/lunar photometer located in Europe or in the world can request access by submitting a proposal to the Selection Panel, at any time. Accounting for recent introduction in the market of the advanced-CIMEL sun/sky/lunar photometer, any new instrument sold by CIMEL SME is now including both sun and lunar capability. AERONET-EUROPE will provide this additional calibration to the user. Calibration and maintenance are performed free of charge and proposals are granted on the basis of a TNA selection panel review process. Instrument shipments expenses from and to the user site are not included and must be covered by the user institution. This TNA strongly contributes to reduce calibration time, to increase observation time at user site, to reduce shipping time and custom's issues and is offering a unique polarization calibration facility at CNRS-LOA;

The overall services provided yields:

. Improvement of measurement technology (advanced instrumentation, day and night)

. Improvement of calibration methodology (accuracy and speed)

. Improvement of data processing capacity (including synergies with in situ and profiling systems)

. Increasing of data quality, dissemination of good practices

. Acceleration of the calibration process (reducing data lack and lost)

. Increasing the number of relevant stations, networks contributing to an harmonized ground-based observation relevant for satellite remote sensing and modellers communities (large user communities).

Description of work

Modality of access under this proposal: *Remote Access*

AERONET-EUROPE is a remote access infrastructure providing access for calibration and maintenance. Access is offered for sun/sky/polar/lunar photometer belonging to two types of users: (1) owners/users of CE318 sun/lunar/sky-photometer (including AERONET users), (2) other types of instrument (mobile

systems, other networks, prototypes, supports for innovation in link with SMEs). The instrument stays within the infrastructure for, on average, 1 month (excluding shipment time).
The access costs are declared on the basis of a unit cost. The unit of access is one calibration (i.e., instrument calibration and/or maintenance), the access provision per instrument will depend on user type 1 or 2 since dealing with other type of instrument requires more time to the staff. The general sequence defining one unit access is summarized in several actions: (1) reception of instrument sent by the user to CNRS-LOA or GOA-UVA; (2) *post*-field calibration; (3) maintenance; (4) p*re*-field calibration; (5) final functional test at CNRS-LOA or GOA-UVA; (6) inform user when his instrument is ready for the shipment back to the site; (7) calibration coefficients update in AERONET database; (8) deliver the Calibration Certificate to the user; (9) request for the Quality Assurance analysis to GSFC/NASA. There are two additional options yielding adjustment of the number of access units provided. For the most recent instrument including both solar and lunar capabilities, the infrastructure will count 2 access units. Additionally, if training at the infrastructure is requested by new users, an extra 0.5 unit access unit will be applied to each calibration. Finally, when the previous standard sequence (calibration) has to be repeated due to instrument failure then the access provided will be adjusted in accordingly.

The call for access to AERONET-EUROPE is continuously open (permanent call). Proposals are accepted at any time and from any eligible researcher in charge of a sun/sky/lunar photometer deployed for long-term measurements or specific field campaigns. The trans-national access to AERONET-EUROPE will be jointly coordinated by the project management team (PMT) and WP7 leader (CNRS-LOA). CNRS-LOA will manage and follow-up on the proposals onsite.

<u>Support offered under this proposal</u>:
. Provide standard access/services for sun/sky/polarization calibration (daytime downward sky total and polarized radiances, AOD, Aerosols columnar properties, water vapour content, cloud optical depth).
. Monitoring of the instrument, warning, data quality assurance as added-value service.
. Provide lunar calibration and nighttime AOD and water vapour to cover expected new user needs (added-value from AERONET-EUROPE).
. User will be given access to calibration and <u>standard</u> cleaning/maintenance services. Standard maintenance includes filters, polarisers and internal batteries changes for head and control box parts as well as microswitch and belt for robot. Once the calibration is achieved, data reprocessing and Quality Assured data/products will be made available via AERONET (http://aeronet.gsfc.nasa.gov/).
. User benefitting from TNA adheres to the AERONET QA rules which includes the following local maintenance procedures:
(i) weekly check and local maintenance of instrument following AERONET rules
(ii)prompt reply to any alarm sent regarding instruments problems detected by LOA, GOA. In the framework of AERONET, all instruments in operation in the field are monitored in near real time. A system of error detection is in operation and, after analysis by operator of the infrastructure, alarms/recommendations are sent to the user for solving the technical problems.
(iii) management of shipping issues to the infrastructure and back (ULISSE/CNRS service recommended).

. For QA reasons, in the AERONET network it is strongly recommended to re-calibrate any instrument every 12 months, on average. A new proposal must be submitted each year to the infrastructure.

<u>Outreach to new users</u>: Promotion of *AERONET-EUROPE* is made through AERONET, CNRS-LOA, GOA-UVA, AEMET-Izana and ACTRIS-2 websites and through meetings, conferences. Additionally, during ACTRIS, AERONET-EUROPE reached a high level of efficiency and has already high relevance status within Europe and beyond. Moreover, the new eligibility criteria will allow new users out of Europe and in yet poorly covered regions to apply for TNA.

<u>Review procedure under this proposal</u>: All users operating for their research activity a sun/sky/lunar/polar photometer must submit a proposal to the PMT at any time (template available on ACTRIS-2 website). CNRS-LOA will coordinate the proposal review with the AERONET-EUROPE User Selection Panel. The User Selection Panel is composed of three AERONET representatives (AERONET-USA, AERONET-EUROPE and four independent scientists involved in the operation of other international sun-photometer and LIDAR networks (Canada, China, Germany, Switzerland; at least half of them will be independent from ACTRIS-2). The proposal evaluation and selection will be based on scientific merit, priority will be given to

new users. It will apply the principles of transparency, fairness and impartiality, The main criteria for the selection are (i) relevance/originality of the scientific and/or technical project, (ii) interest to the scientific community, (iii) relevance of the geographical location and optimization of the geographical coverage of the network (support user in region poorly or not yet covered); (iv) supporting multi-instrumented atmospheric stations; (v) ability to follow the rules of the AERONET network (not applicable for new user), and (vi) possible impact on SME activity. Recurrent users are asked to send a new proposal (new publications, evolution of the project), each year to CNRS-LOA.

The calibrations of LOA/GOA *reference instruments* are performed at Izaña under supervision of LOA. For that purpose, LOA submits a unique proposal per year with the number of reference instruments/access needed for operating the network with corresponding tentative schedule.

Deliverables
D7.1: Intermediate Report on Access to AERONET-EUROPE Calibration Centre (M24)
D7.2: Final Report on Access to AERONET-EUROPE Calibration Centre (M48)

Work package number	8	**Start Date or Starting Event**		Month 1
Work package title	**TNA3: European Centre for Aerosol Calibration (ECAC)**			
Participant number	3	14	2	
Short name of participant	**TROPOS**	JRC	CNRS	
Person-months per participant:	0	7.3	0	

Objectives

- Quality-assurance of physical, optical, and chemical in-situ aerosol measurements
- Capacity building to perform high-quality physical, optical, and chemical in-situ aerosol characterization

Provision of access to the following infrastructures:

The infrastructure will provide 605+180+60 units of access (1 UoA = 1 RWD (research-working day) of 8 labour hours) over the duration of the project. Between 2 and 10 UAs are needed to inter-calibrate each instrument, depending on its complexity. The amount of instruments to be inter-calibrated or round-robin tests yearly is in average about 70-80.

Description of the infrastructure

Name of the infrastructure and its installations:

European Centre for Aerosol Calibration.

which consists of 3 installations:

- the World Calibration Centre for Aerosol Physics (WCCAP)
- the European Laboratory for Air Pollution (ERLAP)
- the Aerosol Chemical Speciation Monitor Calibration Centre (ACMCC)

Location (town, country) of the infrastructure:

- WWCAP: Leipzig, Germany
- ERLAP: Ispra, Italy
- ACMCC: Gif / Yvette, France

These 3 installations address the instruments used to determine the main physical, optical, and chemical aerosol properties, which are not independent from each other. Monitoring the quality of these measurements is crucial since all these properties are used to determine the sources and environmental impacts of aerosols.

A thorough assessment of data uncertainty will be provided by each of the 3 installations.

Web site address:

- WCCAP: http://www.wmo-gaw-wcc-aerosol-physics.org/
- ERLAP: https://ec.europa.eu/jrc/en/research-facility/european-reference-laboratory-air-pollution
- ACMCC:https://acmcc.lsce.ipsl.fr

Annual operating costs (excl. investment costs) of the infrastructure (€):

- WCCAP: 283167 €
- ERLAP: 17755 €
- ACMCC: 86 453 €

Description of the infrastructure:

The infrastructure ECAC consists of 3 installations, which have demonstrated their expertise in providing calibration and inter-laboratory comparison services to the scientific and air quality monitoring communities for several years. It addresses instruments that measure particle number concentration and size distribution, cloud condensation nucleus concentration and spectrum, particle light scattering and absorption coefficients, and main chemical constituents, i.e. organic and elemental carbon, the main inorganic volatile compounds such as ammonium, nitrate, sulfate, and organic fragments. ECAC has been particularly active in standardizing these measurements in the frame of the projects EUSAAR and ACTRIS for the past 8 years. The experience gained during these projects makes ECAC mature enough to provide inter-calibration service as TNA to a wide community including traditional ACTRIS partners and associates, new users like scientific communities dealing with e.g. air pollution and health, air quality monitoring networks, as well as SMEs manufacturing aerosol instruments. This service is indispensable to trace the quality of the in-situ aerosol data delivered by European stations to international open data banks (including data required by the Directive 2008/50/EC), which are further used for air pollution source and effect assessments. It also stimulates innovation from manufacturers to develop instruments delivering more precise, accurate, and traceable data. The whole infrastructure has become an essential part for data quality assurance of the European but also the worldwide aerosol scientific and network community with recognitions, especially in Asia, North- and South-America due to the WMO-GAW program.

1. World Calibration Centre for Aerosol Physics (WCCAP):

The WCCAP was founded in 2002 to serve as a competence centre for in-situ physical and optical aerosol measurement as part of the world-wide GAW-program (Global Atmosphere Watch) of the WMO (World Meteorological Organization). This WCCAP is world-wide unique for the quality assurance of physical and optical in-situ aerosol measurements and station audits to improve infrastructures. It is presently used by partners and associate partners of the research infrastructure project ACTRIS (previously EUSAAR), by the European (often also partners and associate partners of ACTRIS) and international GAW-community, in regional EU-projects, and for GUAN (German Ultrafine Aerosol Network), whose members are also partly involved in ACTRIS as associate partners. The WCCAP is well established and recognized worldwide and coordinates activities with NOAA (National Oceanic and Atmospheric Administration). Nationally, the WCCAP is the aerosol competence centre for the German “Umweltbundesamt” and the Saxonian State Office. SMEs for particle technology participated frequently in the intercomparison activities.

2. The European Reference Laboratory for Air Pollution (ERLAP):

ERLAP was founded in 1994 to serve as a calibration facility for measurements of particulate matter and gaseous air pollutants in Europe. Inter-laboratory comparison exercises have been organized yearly or more for 2 decades. As a service of the European Commission, ERLAP provides support independently of national or private interests, which makes it unique in Europe. In the field of OC and EC measurements, it has been mainly used by EUSAAR and ACTRIS partners and associates, members of EMEP (the program underpinning the UN convention on long-range trans-boundary air pollution), GAW global and regional stations, and European National Reference Laboratories (AQUILA) since 2006.

3. The ACSM calibration centre (ACMCC)

This installation offers unique logistic facilities to compare up to 15 Aerosol Chemical Speciation Monitors (ACSM). It provides a large set of independent co-located on-line/off-line aerosol measurements for chemical, physical and optical parameters, which for some of them are calibrated at the WCCAP and used to validate ACSM data through chemical, mass and optical closure studies. This calibration centre is presently mainly used by ACTRIS partners and associates, and French Regional Air quality networks. During ACTRIS, ACMCC served as the calibration site for ACSMs from14 major European Stations.

Services currently offered by the infrastructure:

The service offered by the infrastructure includes:

- Inter-comparisons and hands-on capacity building of operators for instrument operation and data processing at ECAC installations for Condensation Particle Counters, Aerosol Electrometers, Mobility, Aerodynamic and Optical Particle Size Spectrometers, Extinction monitors, Integrating Nephelometers, Absorption Photometers, Cloud Condensation Nuclei Counters (including reference instruments) at the WCCAP and Aerosol Chemical Speciation Monitors at the ACMCC
- Inter-laboratory comparisons of OC and EC measurements based on synthetic standards and ambient test samples provided by the ERLAP facility (remote access).
- On-site intercomparisons with reference instruments of physical and optical in-situ aerosol instruments, including station audits
- Hands-on capacity building of fundamentals in aerosol physics, physical and optical aerosol in-situ instruments, and aerosol in-situ sampling

ECAC is able to serve 70-80 projects/users every year (usually one project is related to one user), depending on the instruments type. As a calibration infrastructure, ECAC produced recommendations and standards for various measurements widely applied across the world.

Description of work

Modality of access

The call for TNA to the different ECAC installations will be continuously open. The access to ECAC installations will be jointly coordinated by the project management team (PMT) and WP8 leader (TROPOS). The request for accessing the calibration infrastructure as a whole (independently of the installation) should be addressed online to the PMT in the form of a short proposal (template available), including the scientific objectives for the access, description of the instrument to be calibrated, as well as people in charge. Applications from groups fulfilling the ACTRIS standardization criteria will have a priority to be accepted by the evaluation panel.

TROPOS will manage and follow up on the proposals with the calibration installation leaders, with support by NA3 task leaders. The decisions to be taken with NA3 include:

1. Recommendation for a minimum frequency of the instrument intercomparisons, calibrations for various instruments types, and round robin tests for partners in the consortium (a minimum frequency is required in order to be compliant with ACTRIS standards).
2. Recommendation for stations to qualify for on-site intercomparisons with a reference instruments

The work is divided in three activities, 1) instrument intercomparison and calibration at the calibration installations, 2) round-robin intercomparisons based on test samples, and 3) on-site intercomparisons with reference instruments at the stations. The support offered has already been routinely provided to external users for about 1 decade for activities (1) and (2). Activity (3) was successfully performed within other WCCAP-related activities such as in in regional EU-projects “UFIREG” or “Ultraschwarz” as well as within GUAN.

Every year, centralized instrument inter-comparisons or calibrations will be offered by ECAC to the European and international community for the types of instruments listed below. The costs for WCCAP are based on a combination of unit and actual costs; actual costs are applied to expenses related to on-site intercomparisons with reference instruments at user stations (non fixed costs). ACMCC is based on unit costs. For the unit costs, one unit of access (UoA) is defined as 1 RWD (research-working day) which is equivalent to 8 labour hours of the installation staff. The access costs for ERLAP are calculated on the basis of actual costs since the costs of the installation operation cannot reliably be split between the activities and groups (outside the project) for the past two years.The number of units of access needed for each instrument to be calibrated or intercompared at WCCAP or ACMCC are following:

- Mobility, aerodynamic and optical particle size spectrometers (4 UoA per instr.)
- Monitors for scattering and absorption coefficients (4 UoA per instr.)
- Condensation particle counters (2 UoA per instr.)
- Cloud condensation particle counters (5 UoA per instr.)
- Organic and elemental carbon analyzer (3 UoA per instr.)
- Aerosol chemical speciation monitor (10 UoA per instr.)

A limited number of on-site intercomparisons with reference instruments are offered for following instruments:

- Mobility particle size spectrometers (10 UoA)
- Condensation particle counters (3 UoA)

After the instrument intercomparison, calibration, or round robin test, the user will obtain a certificate about the performance of the instrument or the analysis.

Activity 1: Intercomparison and calibration workshops at calibration facilities (WCCAP and ACMCC)

The typical sequence for an instrument intercomparison and calibration workshop is as follows: (1) pre-workshop preparation of the laboratory including quality assurance of the reference instruments, (2) reception of the candidate instruments, (3) unpacking and technical check together with the operator and the manufacturer (Aerodyne Res. Inc.) for ACSM, (4) status intercomparison against the reference instrument, (5) fixing technical problems, (6) hands-on capacity building for state-of-the-art operation and calibration, (7) calibration of the candidate instrument, (8) daily briefings discussing the progress and status, (9) final intercomparison against the reference instrument, (10) packing of instrument together with the operator, (11) shipping of the candidate instrument, and (12) post workshop writing of the intercomparison and calibration report.

Activity 2: Round-robin intercomparison based on test samples (ERLAP)

The typical sequence for a round robin test for OC/EC analysis is as follows: (1) provision of test material (traceable calibration material, synthetic and/or ambient particulate matter filter samples), (2) assessment of the test material homogeneity, (3) distribution of test material aliquots to participants, (4) collection, tabulation, and evaluation of the round-robin test results according to ISO methods 5725-2 and 13528:2005(E), (5) report writing and publication, and (6) interaction with under-performing participants

Activity 3: On-site intercomparisons with reference instruments (WCCAP)

The typical sequence for an on-site intercomparison is as follows: (1) quality assurance of the reference instruments before shipment, (2) shipping of the reference instrument to the station, (3) travel to the station, (4) unpacking and technical check of the reference instrument, (5) status intercomparison against the reference instrument, (6) fixing technical problems, (7) hand-on capacity building for state-of-the-art operation and calibration, (8) calibration of the candidate instrument, (9) station audit of the aerosol program, (10) final intercomparison against the reference instrument, (11) packing and shipping of the reference instrument, (12) post on-site writing of the intercomparison and calibration report.

Scientific, technical and logistical support:

For ERLAP and ACMCC, shipping support can be offered to the external and international partners. Assistance for customs clearance is provided when needed. Instruments are stored in a safe and dry place at room temperature upon receipt. Within the available budget, selected applicants can be provided with support money for travel. During the intercomparison and calibration activities, users will be offered hand-on training. This training will be partly supported by Aerodyne Res. Inc. (MA, USA) for ACSM. Furthermore, additional training material, as well as access to internet and data evaluation software will be provided.

Outreach to new users:

The promotion of the TNA activities will be made through the WCCAP, ERLAP, ACMCC, and ACTRIS websites to provide comprehensive information on upcoming instrument calibration workshops and access opportunities. The institutes in charge of the installations will also promote the access to ECAC through E-mailing lists of various networks beside ACTRIS in which they are involved (WMO-GAW, EMEP-TFMM, AQUILA, GUAN etc.). One major emphasize will be given to SMEs to obtain access to TNA intercomparison and calibration activities to 1) quality assure new commercial aerosol instrumentation as well as 2) to enhance the transfer of technology and standardizations between ACTRIS and the SMEs.

Review procedure under this proposal:

Following verification of the applications by the PMT for formal compliance with EU regulations, they will then be followed-up on by TROPOS and forwarded for peer review to the TNA “in-situ aerosol” User Selection Panel. The User Selection Panel will be composed of the leader of NA3, the responsible TNA task leader and at least two independent international experts. Requests will be accepted at any time from any eligible group. The applications will be thoroughly evaluated against clearly defined selection criteria. The selection panel bases its selection on scientific merit. Beside user groups within the consortium, priority will be given to user groups, who did not use the installatiosn, previously, and especially who work in countries in which no equivalent research infrastructures exist. Applications will be treated due to the principles of transparency, fairness and impartiality.

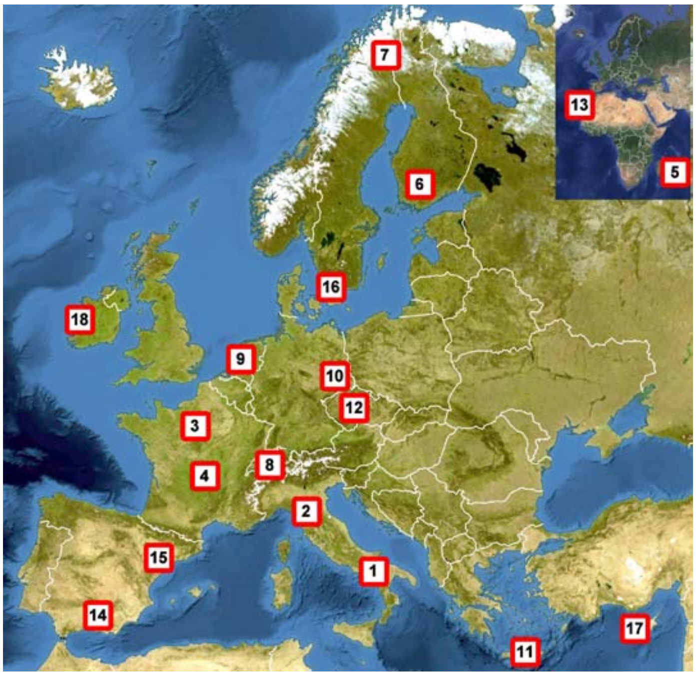
Deliverables
D8.1: Intermediate Report on Access to the ECAC infrastructure (M24)
D8.2: Final report on Access to the ECAC infrastructure (M48)

Work package number	9	**Start Date or Starting Event**					Month 1
Work package title	**TNA4: Physical access to advanced ACTRIS stations**						
Participant number	2	1	3	4	7	8	9	15
Short name of participant	**CNRS**	CNR	TROPOS	NOA	PSI	UHEL	FMI	UVA
Person-months per participant:	16	0	0	0	0	0	0	0
Participant number	16	17	18	19	20	21	30	
Short name of participant	UGR	CSIC	KNMI	CHMI	ULUND	CYI	NUIG	
Person-months per participant:	0	0	0	0	5	22.8	0	

Objectives

Transnational access in ACTRIS-2 offer hands-on access to eighteen world-class observing platforms in Europe. Access is opened to external users including those from the private sector. The research infrastructures were selected based on their uniqueness within Europe, offering a comprehensive measurement programme at the forefront of the advancement of research in the specific domains covered within ACTRIS (vertical aerosol distribution, in-situ aerosol properties, trace gases, cloud-aerosol observations) together with state-of-the-art equipment, high level of services, and capacity to provide research-driven training to young scientists and new users. Except for the very new stations, all TNA platforms can document long record and experience of access to external researchers or research teams. It is expected that at least 10% of the total access provided will benefit to users from the private sector.

Provision of access to the following infrastructure(s):



1 CIAO (CNR, IT)
2 CMN (CNR, IT)
3 SIR (CNRS, FR)
4 PUY (CNRS, FR)
5 MAIDO (CNRS, FR) at 21.1°S, 55.4°E
6 SMR (UHEL, FI)
7 PAL (FMI, FI)
8 JFJ (PSI, CH)
9 CESAR (KNMI, NL)
10 MEL (TROPOS, DE)
11 FKL (NOA, GR)
12 KOS (CHMI, CZ)
13 ISAF (UVA, ES) at 28.3°N, 16.5°W
14 GRA (UGR, ES)
15 MSY (CSIC, ES)
16 HYM (ULUND, SE)
17 CAO (CYI, CY)
18 MHD (NUIG, IE)

Description of the infrastructures

(1) CNR IMAA Atmospheric Observatory (CIAO)

Installations (if applicable): -
Location (town, country): Tito Scalo, Potenza, Italy
Web site: http://www.ciao.imaa.cnr.it/
Annual operating costs: 134.044 € (excl. investment costs)

Description of the infrastructure: CIAO combines in an unique site multi-wavelength lidar for aerosol and water vapour vertical profiling performing systematic measurements with operational scanning cloud radar, microwave profiler, sun-photometers and ceilometers. The wide range of measurements provided at the facility makes it an ideal site for calibration and intercomparison campaigns. The site is affected by typical mountain weather strongly influenced by Mediterranean atmospheric circulation. Phenomena like orographically-induced effects on cloud formation can be studied at this location. Moreover, the site is particularly interesting for studying aerosol properties in the Central Mediterranean region.

Services currently offered: CIAO is s one of the most advanced infrastructures for ground based remote sensing in Europe and the unique Mediterranean site equipped by multi-wavelength lidar and scanning cloud radar plus operative instruments. CIAO observatory provided more than 650 rwd accesses in the last 2 years of which 545 rwd to international users. The main equipments currently running at CIAO are multi-wavelength Raman lidar for aerosol and water vapour vertical profiling, CIMEL CE-318 Sun photometer, PREDE POM 02 Sun Photometer, MIRA35 scanning Ka-Band Doppler radar, Scanning microwave profiler MP3014, 905 nm laser ceilometers,1064 nm laser ceilometers, surface radiation station, GPS antennas/receiver, scanning elastic lidar, radiosounding systems, meteo station, pyranometer and all sky imager. CIAO data follow data quality protocol developed in the frame of the international networks and based on redundancy of the instruments.

(2) Monte Cimone taking advantage of Po Valley facility (CMN)

Installations (if applicable): -
Location (town, country): Monte Cimone (Sestola-MO), Italy
Web site: http://www.isac.cnr.it/cimone/

Annual operating costs: 112.868 € (excl. investment costs)

Description of the infrastructure: The CMN geographical location together with the long-term atmospheric compounds characterization available and the instrumental equipment deployed (complete characterization of aerosol and gases, vertically distributed) make the infrastructure an ideal site to investigate the vertical export of absorbing aerosol and polluted air masses from the Po Valley, one of the European pollution hot spots, to the free troposphere of Southern Europe and Mediterranean basin.

Services currently offered: CMN offers a complete characterization of aerosol physical, chemical and optical properties, trace gases composition since 1996. This long-term monitoring activity helps in quantifying the existing trend of climate-altering substances and atmospheric pollutants both in the boundary layer and free troposphere. The following observations are available at CMN: Surface ozone, Carbon monoxide, nitric oxides, sulfur dioxide, methane, nitrous oxide, halogenated gases, sulfur hexafluoride, VOCs, aerosol scattering and absorption coefficients, total aerosol size distribution (based on scattering, time of flight and electrical mobility), total number of particles, aerosol chemistry, PM1 and PM10 mass. All these observations are carried out continuously at 2165 m. Some of these are performed also in the boundary layer, both at urban and rural site, where a complete characterization is also available during field campaigns. Scientists from about 15 European and US research groups have accessed the CMN stations in the last two years. CMN observations follow data quality protocol developed in the frame of the international networks and based on redundancy of the instruments.

(3) SIRTA Atmospheric Research Observatory (SIR)

Installations (if applicable): -
Location (town, country): Palaiseau, France (25 km South of Paris)
Web site: http://www.sirta.fr
Annual operating costs: 221 667 € (excl. investment costs)

Description of the infrastructure: SIRTA is a French national atmospheric research observatory dedicated to research on cloud, aerosol, an d trace-gas physical and chemical processes. The infrastructure supports research on formation mechanisms of gaseous and particulate pollution and all physical processes between aerosols and clouds. The SIRTA infrastructure also supports Global Circulation Model and Numerical Weather Prediction model evaluations and studies based on ground and satellite remote sensing synergies.

Services currently offered: Services offered includes access to the observation infrastructure and data composed of permanent routine multi-instrument observations (multi-wavelength Raman Lidar; 95 GHz Doppler Cloud radar; wind profiling Sodar; BSRN surface radiation station; AERONET sunphotometer; GPS receiver; 14-channel microwave radiometer; sonic anemometers and rapid sensors for flux measurements; weather sensors for surface meteorology, and 00 and 12UT radiosonde profiles (Météo-France); Real-time chemical measurements of fine aerosols and other relevant parameters (absorption, light scattering, number size distribution, and possibly CCN); O3 and NO/NO2. VOCs measurements are available (bi-weekly on a routine basis and on-line (GC-FID and PTR-MS) during intensive campaigns). SIRTA offers access to users to organize field campaigns, instrument tests, data analysis and training of young scientists at post-doc, PhD and master level. In the past 4 years over 750 user-access days were provided by SIRTA as part of international field campaigns (250 TNA user-access and 500 user-access days other than TNA). Each year nearly 100 international student-access days are provided as part of international summer schools.

(4) Puy de Dôme (PUY)

Installations (if applicable): -
Location (town, country): Clermont-Ferrand, France
Web site: http://www.opgc.univ-bpclermont.fr/SO/mesures/
Annual operating costs: 321.622 € (excl. investment costs)

Description of the infrastructure: The PUY station is a high altitude station (1465 m a.s.l.) located at the top of a N-S mountain chain, facing prevailing western winds. This feature leads to an absence of valley winds, observed in more complex topographies. The PUY station is one of the very few high altitude stations worldwide measuring a complete set of in situ measurements of the gas (9 parameters) and particulate (11 parameters) phases, coupled with co-located RADAR, LIDAR and sun photometer measurements at its base (400 m a.s.l.).

Services currently offered: Due to its altitude, the station is well situated to sample different layers of the atmosphere. Previous work shows that the station is representative of the regional background (Asmi et al. 2011 ; Henne et al., 2010) and measurements were used for evaluating global climate models (Spracklen et al. 2011, Reddington et al. 2012). In addition to the complete set of instrumentation for gaz and particulate phase characterization, specific inlets are available to study aerosol-cloud interactions. A whole air inlet capable of sampling cloud droplets together with interstitial (non-activated) particles (whole air inlet (WAI)), and a second inlet capable of sampling only interstitial particles. These inlets provide the means to measure the chemical and physical properties of CCN (Asmi et al. 2012). This opportunity to sample natural clouds has been a major drive for yearly intensive campaigns designed for aerosol-cloud interactions studies

(EUCAARI (2008), EMEP (2009, 2012, 2013), GFG-CNRS (2010), Clermont-Cloud (2013); one to two international team per year).

(5) Maïdo Observatory – Observatoire de Physique de l'Atmosphère à La Réunion (MAIDO-OPAR)

Installations (if applicable): -
Location (town, country): Le Guillaume, La Réunion, France
Web site: http://opar.univ-reunion.fr
Annual operating costs: 922.368 € (excl. investment costs)

Description of the infrastructure: Maïdo observatory is a high-altitude and remote-site research infrastructure (2160m asl, 21.1°S, 55.4°E, 600m2 building) located at La Réunion in the southwest tropical Indian Ocean and devoted to perform long-term series of atmospheric observations in the framework of several international networks (NDACC, SHADOZ, AERONET, ICOS, GAW) and to welcome field experiments. Because the observatory is new (official opening in October 2012 after a reconstruction), the reference period is based on the 2013 year. The station is equipped with state-of-the-art instruments: lidars for vertical profiles (temperature, wind, water vapour, ozone, and aerosols), FTIR for molecules' partial columns, ozone radiosounding, continuous wave cloud-radar, lightning sensor, transient luminous event camera, all sky camera, thermal infrared radiometer, in-situ greenhouse reactive gases and aerosols analysers, in-situ aerosols analysers, chemical filters for aerosol chemistry, and GPS ground-based receiver (water vapor total column).

Services currently offered: Since its opening, one of the main scientific achievements of MAIDO-OPAR has been the calibration and study of performances of the lidars (e.g., the water vapour Raman lidar, Dionisi et al., 2014) which are involved in the NDACC-labelling campaign MORGANE (Maïdo ObservatoRy Gas and Aerosol Ndacc Experiment) in collaboration with NASA (september-october 2014). MAIDO-OPAR observatory is also part of the ground network for CAL/VAL exercises of sensors on board satellites (e.g., the wind lidar ALADIN on board ADM-AEOLUS, the CO2 total-column spectrometer on board Orbiting Carbon Observatory-2). Several European research teams have already shown interests for MAIDO-OPAR, like Martine de Mazières' group (Belgian Institute for Space Aeronomy) with two FTIRs installed at MAIDO-OPAR, and Nicklaus Kämpfer's group (University of Bern) with 3 microwave radiometers installed at MAIDO-OPAR ; all previous instruments being involved in the NDACC network.

(6) Station for Measuring Ecosystem – Atmosphere Relations II (SMR)

Installations (if applicable): -
Location (town, country): Juupajoki, Finland
Web site: http://www.atm.helsinki.fi/SMEAR
Annual operating costs: 1.738.219 € (excl. investment costs)

Description of the infrastructure: The SMR represents background boreal forest site consisting of main site at scots pine forest and additional flux measurements in wetland fen and boreal lake environments. Continuous measurements since 1995. SMR provide detailed in-situ aerosol and ion physical, chemical and optical characterization 1nm – 20 um, cloud condensation nuclei concentration (total and size segregated), sun photometer (AERONET) for column aerosol burden, ceilometer, cloud radar, Halo Photonics lidar for aerosol vertical profiling, trace gases, greenhouse gases (ICOS), spectrally resolved solar radiation, albedo, radon, external radiation, soil chemistry and dynamics, forest growth from cell level to canopy level, forest physiology (EXPEER), fluxes.

Services currently offered: SMR has hosted around 50 multidisciplinary intensive observation campaigns varying from few weeks to years in duration. The most comprehensive atmospheric in-situ active remote sensing observations by AMF2 mobile facility was in SMEAR in 2014 for 8 months monitoring extensively in-situ aerosol concentrations, their vertical variability and cloud properties and precipitation, which was part of NASA precipitation verification experiment.

All data in SMEAR II is stored in an open, searchable database. Data is open access. SMR staff offers services from research planning, instrument development, technical help and instrument monitoring and maintenance for observations during extended periods. Over 2300 users annually. SMR data has provided novel insights into processes leading to aerosol formation from biogenic sources, aerosol-cloud-climate interactions, and atmosphere-biosphere interactions including e.g. carbon sink, photosynthesis and biogenic emissions of volatile organic vapors. These results are published in over 30 Nature or Science papers.

(7) Pallas-Sodankylä Global Atmopheric Watch Station

Installations (if applicable): -
Location (town, country): Pallas-Yllästunturi National Park, Muonio, Finland
Web site: http://fmigaw.fmi.fi/

Annual operating costs: 123.969 € (excl. investment costs)

Description of the infrastructure: PAL in Finnish Lapland, on the border of the Arctic on a pristine area is a GAW station since 1994. The main station building is located on top of a Sammaltunturi hill, providing a unique possibility for aerosol-cloud interaction studies. Continuous in-situ aerosol measurements, harmonized for GAW/ACTRIS, as number size distributions, optical properties and hygroscopity, and continuous and campaign-based measurements of cloud microphysical properties and EC on snow are available. The chemical components measured are: trace elements, PAH compounds and basic ions analyzed from filter samples and precipitation samples, gaseous mercury and mercury in precipitation, ozone (O_3), nitrogendioxide (NO_2), sulphur dioxide (SO_2) and volatile organic compounds, measured using in-situ gas-chromatograph.

Services currently offered: PAL provides access to a site on the close proximity of the Arctic to study transport and aging of aerosols from various sources (Arctic, marine, continental east, long-range transport from Europe). It provides facilities for cloud-aerosol interaction studies with different inlet systems built to collect both whole and interstitial particles during inside-cloud periods. This has been used in regular international Pallas Cloud Experiments (PACE) taking place in autumns. The site supports various measurements by its continuous, long-term aerosol and trace-gas in-situ and remote sensing data series, with the longest ones dating back 20-years in history. The station has facilities for accommodation and transport services, and help in logistics is offered.

(8) High Altitude Research Station Jungfraujoch

Installations (if applicable): -

Location (town, country): CH-3801 Jungfraujoch, Switzerland

Web site: http://www.hfsjg.ch/jungfraujoch/

Annual operating costs: 374.128 € (excl. investment costs)

Description of the infrastructure: The high alpine research station Jungfraujoch is situated at 3500 m asl in the Swiss Alps. It is the highest research station in Europe that is accessible all year round by rail, and it is the only accessible observation point in Europe with adequate infrastructure that is within the free troposphere most of the year. This special geographical situation offers the opportunity to monitor background concentrations but also to investigate the transport of anthropogenic pollutants from the boundary layer to the free troposphere.

Services currently offered: The Jungfraujoch is involved in more than thirty national and international networks for atmospheric research. The JFJ is one out of the 29 Global GAW stations and one of the most comprehensive stations worldwide. More than 70 gaseous species of reactive gases and greenhouse gases including some of their isotopes are continuously measured together with all aerosol variables recommended by GAW, including physical, optical and chemical properties of the aerosol. The site is also part of the Network for the Detection of Atmospheric Composition Change (NDACC). Scientific and technical support to users is provided through collaboration with existing research and monitoring activities at the site as well as specifically with PSI and EMPA. A broad range of auxiliary data (e.g. meteorological data) will be made available for interpretation of the data. The Foundation HFSJG provides administrative support (e.g. on customs). There is custodian couple on duty at the site all year round who help in supervising instrumentation. As a result of this, around 40 articles that describe results obtained at Jungfraujoch appear each year in peer-reviewed scientific journals.

(9) KNMI – Cabauw Experimental Site for Atmospheric Research (CESAR)

Installations (if applicable): -

Location (town, country): Lopik, The Netherlands

Web site: http://www.cesar-observatory.nl

Annual operating costs: 1.218.906 € (excl. investment costs)

Description of the infrastructure: The CESAR location (213 m high, 50 km far from North sea) is ideal for meteorological research on relations between the atmospheric boundary layer, land surface and weather. The site is also representative for long-term atmospheric studies because surroundings do not differ significantly from those in 1972. CESAR is one of very few observatories around the world that monitors such a wide scope of relevant processes in atmospheric chemistry and physics, hydrology and meteorology.

Services currently offered: The CESAR suite of instruments covers all ACTRIS and ACTRIS follow-up themes. Many of the observations are embedded in networks and benefit from the associated QA/QC protocols and the respective data-bases. The observatory serves as a test bed for new observation techniques, either for the development of new methodologies, algorithms or new instruments.

The observatory offers many possibilities for the training of young scientists. This might be during national and international observation campaigns at the site, PhD programs at universities or as part of EU-funded access programs. The observations are backed-up by experienced researchers.Data collected at CESAR is stored in a database: http://www.cesar-database.nl. Typically, one large international campaign is held at the site every other year, e.g. EUCAARI-IMPACT (2008), GEOMON-CINDI (2009), FP7-PEGASOS (2012), etc. in addition to numerous short term visits, about 4 per year.

(10) TROPOS Research Station Melpitz

Installations (if applicable): -
Location (town, country): Melpitz, Germany (12°56’E, 51°32’N, 86 m a.s.l.)
Web site: http://www.tropos.de/forschung/grossprojekte-infrastruktur-technologie/koordinierte-beobachtungen-und-netzwerke/tropos-forschungsstation-melpitz/
Annual operating costs: 125.938 € (excl. investment costs)

Description of the infrastructure: The research site is situated in the typical rural background for East-Germany lowlands in Central Europe. Especially during winter here continental air masses from East are influenced by long-range-transported anthropogenic emissions. The existing size segregated long-time characterization of chemical and physical aerosol properties by offline methods in combination with chemical analysis for ions OC/EC and for specific organic tracers (e.g. PAK, Alkanes, Hopanes with CPP-GCMS, Sugars and sugar alcohols with HPAEC-PAD) and state of the art online methods (e.g. particle number and size distribution, aerosol absorption and scattering coefficient, aerosol mass spectro-meter as HR-ToF-AMS, ACSM and CI-Api-ToF-MS and with MARGA) provides a comprehensive dataset. With the possibility for quantification of vertical aerosol distribution and cloud-aerosol observations (e.g. Multiwavelegth Raman lidar, Sun photometer, Doppler Lidar, cloud radar) Melpitz is a unique research infrastructure in Europe and a perfect site to study changes in atmospheric composition.

Services currently offered: The research site Melpitz is a place for “hands-on” access (e.g. research projects, measurement campaigns, intercomparisons). The following specific research domains served: vertical aerosol distribution, in-situ aerosol properties, trace gases and cloud-aerosol observations. There is a widespread interest for international users (e.g. field experiment HD(CP)2 2013, EMEP measuring campaigns 2012/13, 2008/09, intercomparison OC/EC, 2013). Users will profit from the extraordinary broad range of expertise in tropospheric research by the TROPOS staff. Results of special campaigns can be integrated in long-term series. Quality controlled data have been saved in the IBAS data base. Melpitz and the surrounding are additionally situated for the operation of small aircrafts and helicopters from a nearby airport.

(11) FINOKALIA Atmospheric Observatory (FKL)

Installations (if applicable): -
Location (town, country): Finokalia, Crete, Greece
Web site: http://finokalia.chemistry.uoc.gr/
Annual operating costs: 100.507 € (excl. investment costs)

Description of the infrastructure: The FKL sampling station is situated at Finokalia (35°20'N, 25°40'E) on the north coast of Crete. The nearest large urban centre is Heraklion with 150 000 inhabitants located 70 km west of Finokalia. The station is located at the top of a hilly elevation (250 m asl) facing the sea within a sector 270° to 90°. No significant human activities occur at a distance shorter than 15 km within the above mentioned sector. The area is characterized by the existence of two well-distinguished seasons: the dry season (from April to September) mainly characterised by increased levels of pollution and biomass burning events and the wet season (from October to April). Important transport from Sahara (S/SW winds; occurrence up to 20%) takes place during the intermediate season (spring and autumn).

Services currently offered: Access to FKL infrastructure has a multitude of strong-points: 1) Address/include the majority of the main activities concerning ACTRIS: e.g., in situ aerosol characterisation (physical, chemical, optical), aerosol 3D distribution (i.e., lidar), gas precursors (VOC, NOxy). 2) It is located in a unique environment: FKL is in the southern most point of Europe, with high insolation which favours photochemical activity and fast processing of aerosols. It is located in an area where climatic impact induced by aerosols is expected to be higher compared to GHGs (especially in summer) and thus the climatic role of aerosols can be studied. 3) Offers to the scientific community a number of state of the art instruments for high quality research including an ACSM and PollyXT multi-wavelength lidar (backscatter Raman depolarization). 4) Disposes the longest time series in the eastern Mediterranean with more than 20 years of continuous operation and measurements of gaseous and aerosols. 5) It is a collocated ACTRIS-ICOS station.

(12) Košetice-Křešín u Pacova (KOS)

Installations (if applicable): -

Location (town, country): Košetice, Czech Republic

Web site: http://www.chmi.cz/files/kosetice_en.html

Annual operating costs: 156.724 € (excl. investment costs)

Description of the infrastructure: The infrastructure, that represents the background level of air quality in the Czech Republic and Central Europe, is administered and operated by three institutions: CHMI operates the Observatory, Global Change Research Centre operates the Atmospheric and Ecosystem station, and Institute of Chemical Process Fundamentals operates the special aerosols measurements. The infrastructure covers both climate and air quality issues. The uniqueness of the infrastructure is based on: collocation of ICOS and ACTRIS stations, long term (27y) air quality measurements at EMEP-GAW station, participation to international programmes and projects.

The atmospheric station is an open access research infrastructure and access to Central Laboratories of CHMI is provided. A new 250 m tall atmospheric tower constructed primarily for scientific purpose will be made accessible.

Services currently offered: Widespread interest of national and international users is demonstrated by numerous visitors at the site yearly (e.g. about 120 in 2013 participants to international school and seminar). Data measured at the co-located station served as a basis of well cited papers (e.g. Aas et al., ACP 2012,; Asmi et al. ACP 2011, Dvorská et al., Atmos Env. 2011). Access to following measurements at the infrastructure is offered: in-situ chemical, and physical properties of aerosols (Particle number size distribution, Aerosol light absorption, Aerosol Light Scattering , OC/EC, size-resolved chemical composition, size-resolved aerosol hygroscopicity), the vertical gradient of GHGs (CO2, CH4, CO, N2O), air quality (O3, Hg) and meteorological parameters at 10, 50, 125, 230 and 250 m, flask sampling of 13C and 18O in CO2, H2, N2O, SF6, O2/N2, CO2, CH4, CO, 14C in CO2 , 222Rn at 250 m, an ecosystem station (e.g. Eddy covariance system measuring energy and matter fluxes; net radiation, PAR radiation), air quality automatic measurements (NO-NO2-NOx, ozone, SO2, CO, PM10, PM 2,5), air quality manual measurements (VOCs, PAHs, PM10, Base cat-ions, PM 2,5), and precipitation and meteorology measurements.

(13) Izana Subtropical Access Facility (ISAF)

Installations (if applicable): -

Location (town, country): Izana mountain (28.3°N, 16.5°W, 2.370 m a.s.l.), Tenerife, The Canary Islands, Spain

Web site: http://izana.aemet.es

Annual operating costs: 358.388 € (excl. investment costs)

Description of the infrastructure: Izaña Subtropical Access Facility (ISAF) is a GAW observatory located on a mountaintop at 2370 m.a.s.l. on Tenerife, Canary Islands, most of the time under free-troposphere conditions. The site allows performing in-situ measurements of the NW North Atlantic airflows which may contain species linked to anthropogenic emissions from North America. In summertime Izaña is into the Saharan Air Layer, which brings large amounts of desert dust mixed with minor secondary anthropogenic aerosols. ISAF provides data and scientific added-value on the chemical composition and related physical characteristics of the atmosphere and their trends.

Services currently offered: ISAF is the only existing infrastructure for the observation of the atmosphere located in the free troposphere of the subtropical North Atlantic. Izana offers unique opportunity for studying: African dust transport, Long-range transport of aerosols and pollution: Europe-Africa pollution "exchange" and North America-North Africa atmospheric transport, new particles formation in the subtropical free-troposphere, dust-cloud interaction through ice nuclei and CCN, dust-radiation processes, radiation and aerosols instruments calibration/evaluation, satellite-based products validation and chemical transport and dust models evaluation. Izana provides important ancillary added-value data from other permanent programs (FTIR, Ozone and UV, Greenhouse Gases and Carbon Cycle). ISAF participates in different international networks and atmospheric systems/facilities (ACTRIS, AERONET, BSRN, EAN, E-GVAP, EUBREWNET, EUREF, WMO-GAW, GALION, ICOS, INGOS, MPLNET, NDACC, NOAA/ESRL, RBCC-E, SDS WAS) providing more than 500 accesses per year to external users.

(14) GRANADA Atmospheric Observatory (GRA)

Installations (if applicable): -

Location (town, country): Granada, Spain

Web site: http://atmosfera.ugr.es

Annual operating costs: 156.736 € (excl. investment costs)

Description of the infra-structure: GRA station is located in the city of Granada that is a medium-sized city surrounded by mountains of high elevation. North Africa constitutes a significant source of mineral matter, especially during spring and summer when desert dust outbreaks affect the area more frequently. The availability of monitoring sites at different elevations at the close slopes of Sierra Nevada Mountains offers a unique opportunity for the combination of remote sounding and in-situ techniques. This is an added value for validation of vertical profiles of aerosol microphysical properties retrieved by inversion of remote sensing data and for PBL-free troposphere interactions studies. This special geographical situation offers the opportunity to monitor background concentrations but also to investigate the transport of anthropogenic pollutants from the boundary layer to the free troposphere.

Services currently offered: The station is well-equipped for the study of the relative humidity growth effects using in-situ techniques with tandem nephelometers and combining remote sensing techniques like LIDAR, MW radiometers and all sky imagers. Different instruments for the measurement of the absorption coefficient based on the transmission method are continuously run at the UGR station (MAAP, PSAP, AE31 and AE33). These systems can be deployed during special campaigns at mountain sites where it is possible to measure the direct impact of mineral dust plume coming from North Africa. The station also includes some mobile systems, like a scanning Raman Lidar with depolarization suitable to be deployed during special campaigns at the ICOS experimental site operated by the group, where it is possible to measure the particles fluxes using eddy covariance. Along the last years scientist from different EU and non-EU countries developed their research activity in our station with an average of 2 visitors per year with stays that last around 2 weeks.

(15) CSIC Montseny (MSY)

Installations (if applicable): -

Location (town, country): Montseny, Barcelona, Spain

Web site: http://www.idaea.csic.es/; http://contaminacion-atmosferica.es/

Annual operating costs: 48.920 € (excl. investment costs)

Description of the infra-structure:Montseny site (MSY, 720 ,m a.s.l), NE Spain, is operated by IDAEA CSIC in collaboration with the Catalan Government. It is a well-equipped site for in-situ characterization of aerosols (optical, physical, and chemical offline and online -ACSM) and trace gases (NOx, SO2, O3, CO). In-situ measurements are complemented by columnar (CIMEL sun photometer) and profile measurements (LIDAR) carried out by UPC and BSC in Barcelona (40 km from MSY). Measurements at this site are complemented by measurements routinely performed at the other CSIC sites: Montsec (MSC, 1600 m a.s.l., 140 km from Barcelona) and Barcelona (BCN, 70 m a.s.l.) urban background monitoring site. Data and instruments operating at the BCN and MSC satellite sites will be available for the visiting scientist improving and facilitating the interpretation of results, and permitting to connect air quality and climate research.

Services currently offered:In-situ ground measurements at the MSY CSIC site started in 2002. Since 2008, as MSY formed part of EUSAAR, the number of measured parameters notably increased. Since 2014 the site has been improved including a country house permitting to offer accommodation for external scientist and instruments and also the performing of training and summer courses.

The WMB is an area of growing interest in atmospheric research. Two major international campaigns were organized by CSIC carried out at the MSY site in the recent years are: 1) DAURE–2009 (http://cires.colorado.edu/jimenez-group/wiki/index.php/DAURE , Pandolfi M, et al. JGR-Atmospheres (2014) and 2) SAPUSS -2010, (Dall'osto M., et al.ACP (2013). MSY has benn involve in other international campaigns such as those organized by EMEP and CHARMEX.

Despite the relatively short history, there are, so far, more than 30 scientific articles published in scientific journals of high quality, based on results obtained at the site.

(16) Hyltemossa (HYM)

Installations (if applicable): -

Location (town, country): Southern Sweden; Nearest small town: Perstorp; Municipality: Klippan; Province: Skåne; Country: Sweden (56° 5' 52" N, 13°25' 8" E; 18.5 km ENE of current ACTRIS site Vavihill.)

Web site: http://www.icos-sweden.se/; http://www.icos-sweden.se/sites_hyltemossa.html

Annual operating costs: 215.000 € (excl. investment costs)

Description of the infra-structure: During 2014-2015, ULUND will move all aerosol research activities from our current ACTRIS site *Vavihill* to the newly established ICOS-Sweden site at *Hyltemossa* in southern

Sweden (56° 5' 52" N, 13°25' 8" E, 18.5 km ENE of *Vavihill*). The collocation of ICOS and ACTRIS observational capabilities at *Hyltemossa* will offer a comprehensive infrastructure that is essential for studying the multiple and tightly interlinked processes that control the land ecosystem – atmosphere – climate system. The site is unique in the sense that it is situated in a highly productive and well-managed 35 years old Norway spruce forest (*Picea abies*), representing typical Northern European forest management conditions aiming mainly to optimize commercial yields. The air masses and pollution levels at *Hyltemossa* are very similar to those at the present ACTRIS site *Vavihill*. First TNA access to the site is January 2016.

Services currently offered: A 150 m high tower was erected in March 2014 at the *Hyltemossa* forest site, and installation of ICOS instrumentation and sensors will be finalized and made fully operational during 2014. ICOS measurements at the *Hyltemossa* tall tower include profiles of CO_2, CH_4, CO and H_2O, radiation balance, eddy covariance fluxes of CO_2, H_2O, heat and momentum and various soil properties. The aerosol instrumentation for continuous measurements are: PM10/PM2.5, aerosol size distributions (AIS, DMPS, APS), absorption (Aethalometer, MAAP) and scattering (nephelometer), cloud activation (CCNC), and OC/EC. Gas measurements include NO/NO_2 and O_3. OC/EC filter samples are also analyzed for organic tracers and ^{14}C for organic aerosol source apportionment. Campaign-wise measurements of aerosol chemical composition (Aerodyne HR-ToF-AMS with a Soot Photometer), VOC (PTR-ToF-MS), Aerosol particle density (DMA-APM), and hygroscopicity (H-TDMA). The site will also be equipped with a multi-wavelength Raman depolarization LIDAR that will operated according to ACTRIS/EARLINET procedures. Data from the EUSAAR/ACTRIS site *Vavihill* has been extensively used over the years, resulting in 35 peer-reviewed journal publications between 2007–2014, one of which in Nature Geoscience.

(17) Cyprus Atmospheric Observatory (CAO)

Installations (if applicable): -
Location (town, country): Agia Marina Xyliatou, Nicosia district, Cyprus
Web site: http://www.cyi.ac.cy/cao
Annual operating costs: 31.294 € (excl. investment costs)

Description of the infra-structure: The Cyprus Atmospheric Observatory in Agia Marina Xyliatou (35.04N–33.06E) is a remote inland monitoring station at 532 m a.s.l. The station has been placed in such a way that it is not influenced by agglomerations or industrial sites in its vicinity. The closest city is Nicosia to the northeast of the station at a distance of 30km. Its unique location provides representative observations of the of transboundary pollution levels. Especially during autumn and springtime, frequent dust events occurrences are recorded in the area.

Services currently offered:1) Process studies in atmospheric chemistry and physics based on a unique set of state-of-the-art complete instrumentation for aerosol and trace-gases_(including precursors) monitoring composing of a Q-ACSM, an OPC (GRIMM), a nephelometer 3L (TSI), two aethalometers (AE31), a SMPS (GRIMM), a MAAP, O_3, NO_y, SO_2, CO, BTEX analyzers, TEOM analyzer, Gravimetric particulate matter sampling (PM_1, $PM_{2.5}$, PM_{10}), meteorological parameters, and wet and dry deposition collectors. 2) Access to a long database of trace gases and aerosols and relevant studies (e.g. Kalabokas et al., 2008; Middleton et al., 2008; Querol et al., 2009; Moussiopoulos et al., 2012; Kleanthous et al., 2014). 3) A unique environment for observations of air masses of various origin and chemical composition. 4) Collocated vertical profiles of trace gases and aerosol physicochemical properties with the use of unmanned aerial vehicles –UAV- depending on their availability at the time of measurements.

(18) Mace Head Research Station (MHD)

Installations (if applicable): -
Location (town, country): Carna, County Galway, Ireland
Web site: www.macehead.org
Annual operating costs: 399.858 € (excl. investment costs)

Description of the infra-structure: Mace Head is Europe's premier marine-based atmospheric observing infrastructure. Approximately 50% of the time it encounters the cleanest background marine air entering into Europe and the other 50% it encounters continental export of pollution into the Atlantic region. It is a GAW global station and an EMEP supersite as well as being in the AGAGE network. Its suite of measurements including in-situ aerosol physics, chemistry, radiative properties; remote sensing of atmospheric structure, optical properties, aerosols, clouds, cloud microphysics etc. in terms of gases, it routinely monitors greenhouse gases, CFC/HFC, reactive gases (O3, sulphuric acid, OH, NOx) along with meteorological parameters.

Services currently offered: MHD provides operation data products every which are webcast every 10 minutes. Uniquely, MHD provides realtime aerosol mass spectrometry for aerosol source apportionment and chemical characterisation, realtime cloud-microphysics products using the NUIG-developed SYRSOC retrieval mechanism, realtime vertical profiles of aerosols, along with in-situ CCN, hygroscopic growth, and aerosol microphysics. These realtime datastream products enable users to have unique access to all the relevant parameters in the aerosol-clouds-radiation system. The MHD datasystem allows access from all platforms including PDA for streaming data to RAID storage databases with capacity currently in excess of 100TB. In addition, the MHD website operationally calculates and stores 6 hourly air mass back-trajectories and provides its own (NUIG) meteorological and air quality forecasts to facilitate field-experiment management.

Description of work

The management of the trans-national access activity is jointly coordinated by the TNA management team in collaboration with the access providers. A central procedure with harmonised and enhanced interfaces will be implemented and include a unique entry point for proposal submission, review and evaluation, outreach, and reporting. Therefore, the following elements are common for all 18 infrastructures and the description is only given once under the networking activity NA1: Modality of access under this proposal, Outreach to new users, Review procedure under this proposal. The below description of work will focus only on the **support offered** under this proposal including additional station-specific access modalities.

(1) CNR IMAA Atmospheric Observatory (CIAO): Visiting scientists may access both the infrastructure database and the instruments for a know-how transfer only or to perform well-defined experiments with a special focus devoted to aerosol, clouds and their interactions. Each visitor will be supervised by an expert scientist and will be assisted by the technical co-ordinator of the site. The staff at the facility will offer the necessary scientific and technical support to each visitor. The access to the facility includes a computer, internet connection and a desk space. Administrative support will be offered in terms of travel assistance, fiscal authority, provision of spare parts and consumable supplies.

(2) Monte Cimone taking advantage of Po Valley facility (CMN): The combination of instruments and the expertise present at CMN on long time on aerosol and gases advanced measurements gives the opportunity to provide training on the atmospheric pollution transport observations. Technical and scientific assistance during campaign or visiting will be provided by ISAC personnel at the station. Transportation of instruments to the station will be provided by ISAC-CNR. Scientific support and collaboration for data analysis and interpretation is guaranteed, including previous data sharing. Administrative support for eventual custom procedures, organization of travel to the station and accommodation at station or in the villages nearby.

(3) SIRTA Atmospheric Research Observatory (SIRTA): SIRTA will provide technical, scientific and administrative support. Already 3-6 months before the access, the team operating SIRTA will specify precise access needs and constraints to the user. During the access, SIRTA team will provide technical assistance for deployment of equipment and for accessing to routine SIRTA data. Users deploying equipment are expected to operate their own equipment and must take full responsibility for it. Users will be given an opportunity to present their project to the SIRTA scientific board that includes members from ten research laboratories in France.

(4) Puy de Dôme (PUY): Technical support is offered for: installation of instrumentation prior, transport to the station, and access data remotely. An engineer supervises the work and offers to built specific pieces if needed to adapt the instrument inlet to the station sampling lines. A secretary ensures the administrative aspect of the access. Hosting capabilities is offered (8/10 people capability). Scientific support is offered for analysing the continuous measurements, and interpretation of data collected during the campaign in regard of the long term data set.

(5) Maïdo Observatory – Observatoire de Physique de l'Atmosphère à La Réunion (MAIDO-OPAR): Users will be supported to investigate hot topics of the research and innovation front in the geophysical context of La Réunion and to participate to the data interpretation. Support may concern research-driven training to young scientists and new users, and/or involvement in intensive observation periods. The technical support covers the preparatory work for the installation of the instruments, the technical training on the site, and the data acquisition. Depending on the availability, accommodation at the observatory can be offered. Upon agreement, technical staff will support logistics and maintenance on the instruments if users' will leave instruments working at MAIDO after the access.

(6) Station for Measuring Ecosystem – Atmosphere Relations II (SMR): The access covers travel, local accommodation costs, food from the cafeteria, installation and preparatory costs for the measurements.

Instrument shipping costs or customs costs are not included. Training to integrate visitor instruments to SMR infrastructures and data flows is provided, if needed. The local scientific and technical staff will provide suggestions to improve instrumentation, operation procedures and installations as well as scientific outcomes based on their long expertise.

(7) Pallas-Sodankylä Global Atmopheric Watch Station: Users of the infrastructure are offered with logistics help with different transportation means and services by station manager, accommodation facilities, internet, access to data from the station, scientific support and collaboration at the visits. Part of these services are already routinely provided and existing, additional personnel help will be offered here, which due to the remoteness of the site is of comfort.

(8) High Altitude Research Station Jungfraujoch: Users will have access to the JFJ infrastructure (measurement platforms to deploy and operate an instrument) and to all data from permanent instruments (access to current and historic data files). Users will be accommodated in the 10 bedrooms available at the station. Scientific support to users is provided through collaboration with existing activities, mainly of PSI and EMPA. This concerns the preparation of visit, the support during the campaigns as well as the data analysis and publication. As demonstrated in the past years this will allow the users to perform cutting edge research. In addition, administrative support (e.g. on customs), as well as logistical support will be provided by the research foundation.

(9) KNMI – Cabauw Experimental Site for Atmospheric Research (CESAR): Users have access to single instruments (also for operation in non-standard configuration for operation or outside CESAR Observatory), the surface flux field, BSRN site, the aerosol inlet manifold, the remote sensing field or the 200 m meteorological mast for own user equipment, data of the running observational program, the radar calibration facility, and lidars will be offered as a reference and training facility. Each visitor will be supervised by an expert scientist and will be assisted by the technical coordinator of the site. Moreover, the visitor is offered access to other experts within the CESAR consortium. Included in the service are computer and network infrastructure, and a working place.

(10) TROPOS Research Station Melpitz: Scientific support to users is provided through collaboration with existing research and monitoring activities. Joint work at TROPOS ample opportunity for networking and exchange of scientific findings. For interpretation of results data from past years (since 1993) are available. The local support includes assistance by technical staff and access to sampling systems. Help is also offered in the planning of TNA activities. The Melpitz infrastructure can be used over the whole year.

(11) FINOKALIA Atmospheric Observatory (FKL): Access is offered to sampling systems for aerosol gaseous and LIDAR measurements, and to automatic equipment for unattended operation. Scientific and technical support to users is provided through collaboration with existing research and monitoring activities. Help is also offered in the planning of the activities at the FKL. The FKL management team provides administrative support (e.g. on customs), information about work at the FKL, and assistance with travel to the site. Local support includes assistance by the custodians and access to the infrastructure of the research station. Auxiliary data will be made available for interpretation of the data. In addition access and training to the analytical equipment existing at the hosting Institute (NOA) for analysis of the gaseous and aerosol samples is possible.

(12) Košetice-Křešín u Pacova (KOS): A contact person will be indicated for organization of TNA tasks at the site. Technical support is offered for installation of new devices, data flow and operation and maintenance of instruments. Scientific staff will help for the validation, evaluation and multidisciplinary interpretation of measured data. Administrative support is provided for communication (free wi-fi, copy and scanning machines), administrative issues, administration of open access, English communication skills, accommodation (at the Observatory and in the close vicinity of Prague airport).

(13) Izana Subtropical Access Facility (ISAF): Users will also have access to data from the different observation programs (including data from satellite stations located at Pico Teide, Santa Cruz and Botanico garden) if needed. Prior to any access, visitor scientists will interact with ISAF team to identify and agree access needs. During access, ISAF will provide administrative support and technical assistance to users for deployment their own equipment. Accommodation facilities (residence with 7 double-rooms) are available at the site (Izaña mountain) and at nearby small villages (30-40 km distant). ISAF has transportation service available on schedule for displacement from Santa Cruz to ISAF.

(14) GRANADA Atmospheric Observatory (GRA): Each visitor will be supervised by an expert scientist and will be assisted by the technical coordinator of the site. GRA will provide technical, scientific and administrative support. Prior to any access, user will interact with the team operating GRA to specify precise access needs and constraints (e.g. electrical, network, safety, and security constraints related to instrument deployments). The GRA team will provide technical assistance to users for deployment of equipment (connections, remote access, storage, safety). Users deploying equipment are expected to operate their own equipment and must take full responsibility for it.

(15) CSIC. Montseny (MSY): Preparatory work and training courses are part of the access provision. Prior to any access, users will interact with the IDAEA CSIC team to specify precise access needs. During access, IDAEA CSIC will provide administrative support and technical assistance to users for deployment of their own equipment and for the operation of the CSIC instruments. Data from the observational program (including data form the MSC and BCN satellite sites) and scientific support will be also offered for data interpretation. Accommodation facilities are available at the infrastructure and at nearby small villages. The CSIC has vehicles available on demand for displacement from Barcelona to the sites.

(16) Hyltemossa (HYM): Potential users may house their instrumentation either in the existing cottage at the foot of the tall tower, or alternatively place their own small containers nearby. One cottage is dedicated to office space and living quarters for the scientists stationed at *Hyltemossa* as well as for visiting researchers. This cottage has excellent accommodation facilities and the office part has fast internet access and table space for guest researchers. ULUND will provide technical, scientific and administrative support. All ICOS data is openly accessible.

(17) Cyprus Atmospheric Observatory (CAO): Access will be offered to the facilities of the station to use the current instrumentation under the supervision of a trained researcher and to deploy additional instrumentation outside or inside the CAO premises. The CyI will offer the following common support to the users: Administrative support (e.g. on-site logistic support, planning of travelling), Access help (travelling assistance, setup of instruments, electricity-water supply provision, internet connection), Scientific support (training on the instrumentation if needed, discussions, dissemination of results).

(18) Mace Head Research Station (MHD): Users of the infrastructure are offered with logistics help with different transportation means and services by station manager, accommodation facilities, internet, access to data from the station, scientific support and collaboration at the visits. Technical staff will also oversee the installation of new user equipment deployed on the project and will introduce users to station guidelines, data systems and health & safety issues. Senior and experienced research staff will give brief but detailed training sessions on the sophisticated instruments for which access is given, along with essential training on how to analyse various data-streams. Users will be exposed to a vibrant and dynamic research team ranging from students to high-profile international scientists both within NUIG and external experts in the groups network.

Deliverables
D9.1: Intermediate report on access to advanced ACTRIS stations (M24)
D9.2: Final report on access to advanced ACTRIS stations (M48)

Work package number	**10**	**Start Date or Starting Event**			Month 1			
Work package title	**VA1: ACTRIS Data Centre**							
Participant number	5	1	2	6				
Short name of participant	**NILU**	CNR	CNRS	FMI				
Person/months per participant:	34	38	15.5	20				

<u>Name of the infrastructure:</u> ACTRIS Data Centre

<u>Location (town, country):</u> The main structure and installations of the ACTRIS Data Centre is located at NILU - Norwegian Institute for Air Research, Kjeller, Norway. The other installations are at National Research Council - Institute of Environmental Analysis (CNR), Tito Scalo, Potenza, Italy, at University of Lille, Villeneuve d'Ascq, France, and at Reading University, Reading, UK. There will be a transfer of the

installation from Reading University to FMI (Finnish Meteorological Institute) in Helsinki, Finland, during the course of the project.

Web site address:
ACTRIS dataportal, EBAS: http://actris.nilu.no/, http://ebas.nilu.no/
EARLINET DB: http://access.earlinet.org/EARLINET/LoginPage.aspx
Cloudnet DB: http://www.cloud-net.org/data
ICARE Data Centre: http://www.icare.univ-lille1.fr

Annual operating costs (excl. investment costs) of the infrastructure (€):
Legal name of organisation operating the infrastructure: NILU - Norwegian Institute for Air Research
Location of organisation (town, country): Kjeller, Norway
Annual operating costs (excl. investment costs) of the infrastructure (€):2388293
(1232493 € for NILU, 71600 € for CNR, 946000 € for CNRS, 138200 € for FMI).

Description of the infrastructure:
The overall goal of the ACTRIS Data Centre is to provide scientists and other user groups with free and open access to all ACTRIS infrastructure data, complemented with access to innovative and mature data products and tools for QA, data analysis and research.

ACTRIS-2 will further develop the data centre in the ACTRIS project, taking full advantage of all of the efforts and achievements in ACTRIS. The numerous measurement methodologies applied in ACTRIS result in a considerable diversity of the data collected. In accordance with these requirements, the ACTRIS Data Centre consists of three topic data bases archiving the measurement data, which are all linked in the ACTRIS data portal. Furthermore, ICARE will contribute with production and provision of satellite data linked to ACTRIS ground based data. Hence, ACTRIS Data Centre is founded on 4 virtual infrastructures:

I EARLINET DB *(hosted by CNR)* includes all aerosol profile data provided by ACTRIS partners, associated partners, and stations not participating in the ACTRIS project (e.g. from EARLINET). The aerosol profiles are quality-assured through standardized protocols developed within EARLINET and ACTRIS. More advanced products developed in NA2 will be implemented during ACTRIS-2, in collaboration with NA2. Access to new types of data will be offered. These products will be designed and optimized within NA2 activities and then made accessible through the EARLINET database and in the ACTRIS data portal.

II Cloudnet DB *(hosted by UNIVLEEDS, transfer to FMI)* provides vertical profiles of cloud and precipitation properties at high spatial and temporal resolution from ACTRIS sites and partners, associated partners, and stations not participating in the ACTRIS project (e.g. within the Cloudnet network). All products are quality-assured through standardized protocols developed during Cloudnet and ACTRIS. Meteorological profiles extracted from climate and weather forecast models are also provided. New measurements and products arising from NA2 activities will be implemented within ACTRIS-2. Ancillary datasets (e.g. NWP or reanalysis profiles) will be provided for short-term campaigns, as will online tools for objective evaluation of model upgrade testing. The database will be transferred to FMI during first year to ensure long-term technical support.

III EBAS *(hosted by NILU)* includes all ACTRIS *near-surface* data, both quality assured data and NRT data, in addition to data from numerous relevant networks such as EMEP, GAW-WDCA, AMAP, and research projects such as InGOS (EU FP7), EUSAAR (EU FP6), CREATE (EU FP5), EUCAARI and many more. EBAS offers specialized products for in-depth analysis of trace gas and aerosol *near-surface* data. These have been developed in ACTRIS and other projects, with new data submission, QA, and improved plotting tools being provided within the course of ACTRIS-2 after development and implementation in collaboration with NA3.

IV: ICARE *(hosted by CNRS)* provides services to support in fields related to aerosols, clouds, radiation, water cycle, and their interactions. ICARE's primary focus is the production and distribution of satellite remote sensing data from various space agencies. ICARE develops science algorithms and production codes, building on the expertise from expert partners, and distributes products to the user community. ICARE generates value-added aerosol products pertinent to ACTRIS, combining complementary ground-based measurements such as lidars and sunphotometers. ICARE will also complement the ACTRIS data centre with various data services, including visualization, reprojection, colocation, reformatting, and satellite vs. ground-based observations comparisons, to facilitate the combined use of ACTRIS ground-based measurements with satellite observations and model outputs.

The ACTRIS Data Portal *(hosted by NILU)* links the 3 topic databases archiving ACTRIS-2 measurement data, and provides access to all data through one joint portal. The portal facilitates the combined analysis of all ACTRIS data, offering advanced tools for plotting and combining ACTRIS data from the topic data bases, and mapping tools for user defined visualization of the variables across atmospheric sites, networks and projects. The ACTRIS data portal will further develop and provide access to mature tools and products developed in ACTRIS-2 NAs and JRAs. ACTRIS SOPs, recommendations, and meta data descriptions will be provided in accordance with the progress and development in NA2, NA3 and JRA3.

Services currently offered by the infrastructure:
The ACTRIS Data Centre established during ACTRIS provides a comprehensive data management service, including open access to all ACTRIS data and products. As of April 2014, the data management in ACTRIS handles ACTRIS data from more than 50 European sites, with approximately 120 different atmospheric variables from 28 instruments and methodologies. The variables include 90 different trace gases, 10 aerosol *in situ* variables, 8 aerosol profile variables and 8 cloud profile variables. These measurements are all QA and, furthermore, around 25 of these variables are available in NRT. Service and support on personal and technical level are offered to the data providers and personnel at the sites to achieve and maintain this huge task. Hence, the ACTRIS data management service comprises development and set up of correct procedures for data transfer from the various instruments and sites, active participation in QA and QC of data, collection of data in accordance with defined ACTRIS procedures set in the NAs. Continuous service and maintenance of the infrastructures ensure open access to all data, day and night, all year round.

The comprehensive ACTRIS data management of ground based data is unique in the European and global perspective, both with respect to number of variables and sites and also proven long term sustainability of data preservation. All ACTRIS data will be collected and archived in long-term sustainable databases. The data centre also has a global link to GAW through NILU and EBAS. EBAS hosts the GAW-WDCA. GAW activities are voluntary based, and ACTRIS also offers a crucial service to GAW, not only hosting GAW-WDCA, but EBAS serves as a node data centre for WDCGG as well improving European data represented in WDCGG. Open access and download of all relevant data in EBAS is in place within the ACTRIS portal. This includes data from long-term monitoring programs EMEP and GAW, as well as AMAP, InGOS (halocarbons), EUSAAR, CREATE, EUCAARI, GUAN SOGE, and other projects. Access to data from the EU-project PEGASUS will also be set up in 2015. Access to all data from EARLINET and Cloudnet is also offered as well through the portal, in addition to a selection of data from other relevant frameworks not available in the core data bases; e.g. all NDACC data.

Both access and download of ACTRIS data has been monitored throughout ACTRIS. This reveals that since the project start (2011), almost 2 million data files with ACTRIS variables have been downloaded through the data centre, and more than 2000 unique users identified from 50 different countries, from all continents. In addition to individual scientists and users, central user communities outside the project are e.g. MACC, MACC2, EMEP, IPCC 5th AR, WGI, (e.g. *Chapter 2: Observations: Atmosphere and Surface,* in particular).

Modality of access under this proposal:
Access to all measurement data will be made available through the ACTRIS data web portal, as well as through the web pages of the core databases, to ensure suitable interfaces covering with the widespread of user needs. Access to the relevant products and tools developed in NAs and JRAs will be provided through the ACTRIS data portal. This access will be freely available and the ambition is to provide access 24h per day, 365 days per year. Free and open access means unrestricted access at no cost for all interested individuals, whether they are within or outside of the project, but an acceptance of the ACTRIS data policy will be required. For ground-based remote sensing data, registration and password may be required to have access, but no restrictions apply. Access to all data and data products will be recorded through web-based monthly user statistics for all virtual access activities.

Support offered under this proposal:
The ACTRIS Data Centre will further develop under this proposal, and will ensure a continuation of the existing data centre and all efforts and achievements in ACTRIS. The ACTRIS Data Centre offers extensive and broad support for all users of ACTRIS RI data and tools, and is a continuation of the support currently

offered. The support offered is divided into the following 5 main tasks:

Task 10.1: Scientific and technical support with collection, archiving and access to all ACTRIS-2 measurement data (NILU, CNR, FMI)
This is the core activity of the data centre and includes support for the data management of all ACTRIS measurements. Data from more than 50 sites employing ca. 25 different observational methodologies are expected. It is an unambiguous goal of the project that all ACTRIS measurements data will be collected and made available for the project participants, as well as for a broad user community at all times. Thus this support benefits all possible users, internal and external to the project. Support will be given to both data providers and users, and also for new types of data defined within NA2 and NA3. ACTRIS-2 aims to participate in the "*Open Research Data Pilot*" action in Horizon 2020. As a part of this, ACTRIS-2 will establish a complete "Data Management Plan - DMP" for the full project specifying all data the project will generate, the data repositories and security/back-up systems, and how data and data products will be made accessible for verification and use during project period, and beyond. The DMP will be revised during the project in accordance with the needs.

Task 10.1.1: Managing the ACTRIS data portal (NILU): This includes maintenance and operation of the ACTRIS data portal during the project, including the implementation and access to new data, functionalities and tools developed in NAs and JRAs. Support for extraction of large data volumes of selected *in situ data* and profiles will be offered. An interface (e.g. machine-to-machine transfer, ftp, specified formats/procedures etc.) will be set up for ACTRIS NRT data provision to operational models for model evaluation and data assimilation, to facilitate the objectives of JRA3. Active interaction between modelling partners and data providers will be facilitated. This will be done in close collaboration with WP5, task 10.2 and the work on data interoperability. Special efforts will be made in collaboration with WP5 to improve identification and citation and data-usage tracking in ACTRIS-2.

Task 10.1.2: Data management of aerosol profile data in the EARLINET DB (*CNR*): This includes maintenance and operation of the EARLINET DB during the ACTRIS-2 project. At present, the network includes about 27 stations with profiles of 10 aerosol variables. During the project the number of stations and observed variables are expected to increase. In particular, the development of a new database structure planned in NA2 will lead to a significant increase of variables and files accessible through the database. Furthermore, a closer link to GALION will be explored in ACTRIS-2 to strengthen global access to data as well.

Task 10.1.3: Data management of cloud data in the Cloudnet DB (*FMI*): The Cloudnet database provides the framework encompassing the data collection, quality control, processing routines, and subsequent product generation of ACTRIS cloud data. This ensures the harmonization of procedures at ca. 10 sites, with provision for NRT data flow. Support for all users in utilizing the processing suite will be further developed in ACTRIS-2. The ACTRIS cloud processing suite provides a framework for instrument data processing and ingest, and for the rapid incorporation of new algorithms. Tools, assistance, development and testing of processing routines for new instrumentation and products will be provided in NA2. Once new algorithms become mature and accepted by the community (through collaboration within NA2), these will also be implemented transparently and automatically across all cloud-profiling sites within ACTRIS.

Task 10.1.4: Data management of in situ data in EBAS (NILU): This task includes data management of all ACTRIS-2 quality assured annually reported data, and NRT data flow, as well as the operational service on daily basis. Based on what has been achieved in ACTRIS, and the plans in ACTRIS-2, it is expected that the workload will be handling data from about 35 sites, comprising 12 aerosol *in situ* variables, and ca. 100 different trace gases. User support includes first line assistance in data formatting and submission in accordance with the ACTRIS procedures and deadlines. This is offered through our support system on a daily basis and also through implementation of QA/QC tools and dedicated training courses during the project. The support offered is in close collaboration and agreement with NA3. EBAS is also widely used by other projects, e.g. EMEP, GAW-WDCA, AMAP. ACTRIS-2 will take full advantage of this and complement these activities. We also suggest strengthening our support for GAW-WDCA data providers in ACTRIS-2.

Task 10.2: Access to interactive data submission portal (NILU, CNR,FMI)
Task 10.2.1: Interactive submission tools for ACTRIS near-surface data (NILU): For ACTRIS *in situ* data, the submission site http://ebas-submit.nilu.no offered by NILU will be further developed in ACTRIS-2 in accordance with the project requirements and provide access to an interactive website for syntax and

consistency checking of submitted aerosol and trace gas in situ data (e.g. meta data included, check for data boundaries and outliers). This will also be accessible from the ACTRIS portal. The tools will be available for all EBAS data providers and contribute to an improved overall data quality for the benefit of the broad scientific community. Hence, this support benefits all possible data submitters, internal and external, to the project as 3rd parties, and also improves data submitted by other frameworks such as GAW and EMEP.

Task 10.2.2: Interactive submission tools for ACTRIS profile data (CNR, FMI): The interactive access to the Single Calculus Chain (SCC) for aerosol lidar data analysis will be offered by CNR-IMAA through the ACTRIS data portal to both internal and external data submitters. The SCC has been developed during EARLINET-ASOS and ACTRIS projects and will be furthermore implemented during the ACTRIS-2 project with new functionalities. The SCC will be made freely available through the ACTRIS data portal for all users. This will promote the SCC to external users and harmonization of the data within other framework as GAW – GALION. Documentation and tutorials on the use of SCC will be available through the ACTRIS data portal.

Access to the Cloudnet processing suite will be offered by FMI to sites operating the requisite instrumentation. Data submission for Cloudnet is automatic as all sites use the processing suite ensuring that all data ingested conforms to ACTRIS standards through pre-processing. Additional products will be implemented through updates to the processing suite.

Task 10.3: Access to QA/QC tools for ACTRIS aerosol measurement data (CNR, NILU, FMI)
Starting with the experience from the ongoing ACTRIS project, various tools for QA/QC will be implemented and made accessible for both near-surface trace gases and aerosols, and profiling of aerosol and cloud. Building on ACTRIS, QA/QC tools will be developed in NA2 and NA3 in collaboration with the data centre, and implemented in this task for wide user access. This includes improved plotting and access to QA tools. Proposed tools include routines for checking the consistency of the data in terms of ratios between specific trace gases (near-surface data), aerosol extinction–to-backscatter ratio, depolarization ratio and Ångström exponent (lidar data) and consistency between aerosol variables from different instruments through closure tests (using in situ aerosol). Data will also be checked through the comparison with climatological data. The work will be guided by the needs for these tools in the respective network activities (NA2 and NA3) and from the feedbacks of external users (NA5 and JRA3). The implementation of these tools will improve the data quality. Tools will be available to all potential users of ACTRIS data, both internal and external, enlarging the data centre impact.

Task 10.4: Access to value-added products using ACTRIS data in mature algorithms (CNRS, CNR)
ICARE has developed a production framework capable of processing ground-based remote observations to generate value-added products that will benefit ACTRIS-2. ICARE is collaborating with CNRS/LOA to implement several algorithms capable of deriving aerosol properties from lidar and sunphotometer measurements. One is a new algorithm named GARRLiC (Generalized Aerosol Retrieval from Radiometer and Lidar Combined data) which has been developed and tested during ACTRIS, and has reached a mature stage, although further developments will be made during ACTRIS-2 in NA2. ICARE proposes to transfer this algorithm from research mode to operational, generating a consistent suite of integrated products across the whole ACTRIS network. ICARE proposes to retrieve and process quality-assured level-1 lidar data from the EARLINET DB, then provide the derived products to CNR-IMAA to complement the EARLINET DB. ICARE will make these new products available as soon as the operational implementation is validated, potentially by month 24 of the project. ICARE will further consider integrating possible algorithm improvements coming from NA2 during the course of ACTRIS-2, including the implementation of new alternate algorithms when they reach a sufficient level of maturity to consider routine production. In addition, through its infrastructure and expertise, ICARE can offer technical resources and support at a marginal cost for ACTRIS participants who would wish to deploy across the whole database other algorithms of common interest which are not listed here.

Task 10.5: Access to aggregated data and products combining ACTRIS measurements with model or satellite data (NILU, CNR, FMI, CNRS)
This task offers user support and access to innovative scientific products for a wide user community through the ACTRIS data portal. Typical products that will be provided are aggregated data such as, daily, monthly or annual means of selected variables. Extensive support for extraction of selected specific *in situ* measurements and aerosol profiles in support for the development and work in JRA3 will be offered. The

VA10.5 task will be guided and performed in close collaboration with JRA3 and will undergo revisions in accordance with scientific requests during the project. To be able to meet user needs and requests that might emerge during the project, some funding is possible to distribute to the most relevant and qualified partner or SME during the project for successful implementation of new products defined during the project.

Task 10.5.1: Access to the mature products resulting from ACTRIS activities (NILU, CNR, FMI)
Access to the mature products resulting from ACTRIS will be implemented, as will online access to the outcomes and results from the work in JRA3. This includes comparisons of aggregated data and time series of observations with model outputs. Trend products developed in JRA3, task 4, will be made accessible when relevant, and efforts will be made to implement an interface with tools for trend assessments for advanced users.

Task 10.5.2 : ACTRIS NRT data to model community (NILU)
An interface (e.g. machine-to-machine) will be set up for ACTRIS NRT in situ data provision and operational models for model evaluation and data assimilation (see JRA3, task 1).This will be based upon requests and can also be used by 3rd parties and users outside the project, after acceptance of the data policy.

Task 10.5.3: Evaluation of user-submitted model runs employing ACTRIS (FMI)
Cloudnet provides a framework for objective NWP and climate model evaluation. Current functionality for monthly, seasonal, diurnal and inter-annual composites and variability will be developed further in ACTRIS-2 to include climatic / synoptic regime compositing and interactive user selection of time period of interest. Provision of an online portal for evaluation of user-submitted model runs (upgrade testing, parallel suites, reprocessing over specific time periods, microphysics parameterization experiments) and accompanying assistance will be implemented.

Task 10.5.4: Model, satellite and ground based colocation service (CNRS, NILU)
Links to satellite data will be prioritized through ICARE, and a satellite-ground based colocation service will be provided combining ACTRIS data from ground with satellite data and model outputs, including CMIP5. For example, users will be able to use this interface to combine ground-based aerosol observations with coincident remote sensing retrieval from satellites, such as aerosol optical depth, Ångström exponent, etc., or consolidate data analysis with model outputs such as the MACC aerosol analyses. Also, users can use this service to get contextual cloud and aerosol satellite observations in the vicinity of a ground-based station to support data analysis. ICARE will work with NILU to make this colocation service directly available through the ACTRIS portal.

Users often need a work environment with easy access to both data archives and computational resources to develop and test new algorithms, or to perform validation activities. CNRS-ICARE provides this service in the frame of other projects (e.g., Aerosol-CCI) and proposes to provide such a work environment also to ACTRIS partners, with online access to the full ICARE's satellite and ground-based data archive.

Outreach to new users:

An important goal is to facilitate the use of ACTRIS data and products for the scientific community, as well as other user communities. In ACTRIS-2, we plan to take further advantage of the specificity of each partner data centre that constitutes the ACTRIS Data Centre to optimally serve specific user communities and expand data dissemination overall. One strategy in order to strengthen and attract new users is involvement ICARE, as a new installation of the data centre. ICARE contributes in particular, with the link between the ACTRIS ground-based community, and the satellite community and opens a new approach to a well-established user community. Furthermore, the addition of ECMWF as a new partner in ACTRIS-2 and the close collaboration defined between JRA3 and VA1 will put emphasis on the interaction with new model users, in particular, the use of observational data in operational model prediction and data assimilation. Through the collaboration with JRA3, more products (e.g. regular products for trend assessment reports) will be offered. This is of particular relevance for users working on trend assessment reports (e.g. IPCC, EMEP), and for authorities, stakeholders and decision makers working on mitigation strategies. These products will be offered through the data centre. Finally, partners of VA1 will not only be elements of the ACTRIS data centre but also have an active role in the outreach activity in NA5.

Review procedure under this proposal:

The data centre will be reviewed regularly by an external board of international experts (ACTRIS DC-EB)

following the procedures given in section 3.2. The board will assess the development and use of the facility by reviewing the core services, and a set of deliverables (D10.1-3, D10.7-9, andD10.12-13) are defined as valuable input for both the ACTRIS DC-EB, but also important summaries for all involved in VA1 and the whole consortium. These will document the number of new ACTRIS data sets included in the data centre, the access and download of the date from the data centre, assess the implementation of new tools and products, document number of unique users etc. A set of evaluation criteria will be defined by the consortia together with the ACTRIS DC-EB.

Deliverables

D10.1: Definition of the ACTRIS Data Management Plan (M6) [Task10.1]
D10.2: First summary of the ACTRIS data offered by the ACTRIS Data Centre (M16) [Task10.1]
D10.3: First summary of the monitoring of access to ACTRIS data and user statistics (M16) [Task10.1]
D10.4: First assessment report of the services offered by the ACTRIS Data Centre (M18) [Task10.1]
D10.5: Documentation and release of new ACTRIS data portal versions with implementation of new functionalities and tools (M20) [Task10.1]
D10.6: Provision and documentation of interactive in situ and profile data submission tools (M20) [Task10.2]
D10.7: Second summary of the ACTRIS data offered by the ACTRIS Data Centre (M28) [Task10.1]
D10.8: Second summary of the monitoring of access to ACTRIS data and user statistics (M28) [Task10.1]
D10.9: Review of the ACTRIS Data Management Plan (M30) [Task10.1]
D10.10: Provision of collocation service combining ground-based data and satellite and model data (M30) [Task 10.5]
D10.11: Provision of QC tools for ground-based aerosol and trace gas in situ data and aerosol profiles (M32) [Task10.3]
D10.12: Third summary of the ACTRIS data offered by the ACTRIS Data Centre (M40) [Task10.1]
D10.13: Third summary of the monitoring of access to ACTRIS data and user statistics (M40) [Task10.1]
D10.14: Second assessment report of the services offered by the ACTRIS Data Centre (M40) [Task10.1]
D10.15: Final description document of GARRLiC products (M42) [Task10.4]

Work package number	11	**Start Date or Starting Event**		Month 1					
Work package title	**JRA1: Improving the accuracy of aerosol light absorption determinations**								
Participant number	7	1	2	3	4	14	16	18	21	24
Short name of participant	**PSI**	CNR	CNRS	TROPOS	NOA	JRC	UGR	KNMI	Cyl	UNIVLEEDS
Person-months per participant	16	10	11	10	21	2.8	13	7.1	12	2.4

Objectives

This research activity focuses on reducing the uncertainty in the determination of the aerosol light absorption by optimizing the advanced remote sensing and in-situ methods adapted to the RI. The specific objectives are:

- To test novel in-situ instrumentation for reducing uncertainty in the retrieval of the multi-wavelength light absorption and to assess the relationship between absorption and black carbon concentration.
- To optimize the inversion of remote sensing observations for the derivation of vertically-resolved absorption coefficient and single-scattering albedo (SSA), utilizing the synergy of daytime and night-

time photometry and lidar techniques.

- To evaluate the accuracy of absorption coefficient profiles retrieved by the inversion of remote sensing observations using collocated vertically-resolved in-situ measurements (deploying tethered balloons and UAVs).
- To utilize all the above in order to reduce the uncertainties associated with the SSA parameter (currently of the order of 0.05), which is one of the most important uncertainties of the aerosol radiative impact.

To establish potential relationships between aerosol sources and light absorption in order to provide trustworthy absorption characteristics for predominant aerosol light absorbers of anthropogenic and natural origin, targeting the needs of the model and satellite communities.

Description of work

Absorption is a key climate-relevant aerosol property of particular importance for aerosol-radiation and aerosol-cloud interactions (IPCC, 2013). Specifically, aerosol absorption can (i) directly modify the global radiation budget, (ii) indirectly modify cloud properties and abundance (e.g. Bond et al., 2013) and (iii) modify the atmospheric stability in the boundary layer and free troposphere (e.g. Babu et al., 2011). However, the magnitude of absorption on the global scale is subject to considerable uncertainties for aerosol particles of both anthropogenic and natural origin (IPCC, 2013). While the AOD and aerosol particle size distribution are relatively well-constrained from measurements, uncertainties in the SSA (e.g. Loeb and Su, 2010), and especially the vertical profile of the black carbon (BC) concentration (e.g. Zarzycki and Bond, 2010), contribute significantly to the overall uncertainties of the aerosol radiative effect. More specifically, the light absorption of BC, which is the predominant anthropogenic absorber, is most probably poorly represented in atmospheric models due to the variability of the BC mass absorption cross section (MAC), which depends on a wide variety of additional variables such as the size, morphology and mixing state of the particles, amount of scattering material, and relative humidity. Furthermore, the absorption of natural aerosols such as mineral dust, is subject to considerable uncertainties as well since the imaginary part of the refractive index depends crucially on the dust mineralogical phase (e.g. Petzold et al., 2009), affecting the variability of dust absorption globally and resulting in diverse assumptions in atmospheric models and satellite retrievals.

The novel instrumentation operated in the RI can serve for a comprehensive absorption characterization for anthropogenic and natural aerosols, utilizing urban and remote stations of the network. In-situ instrumentation and methods can be used to assess the relationship between absorption and BC concentration at representative sites. The vertical distribution of the absorption coefficient and the SSA, crucial for climatic applications, can be retrieved by both in-situ airborne methods and remote sensing techniques. Closure studies between remote sensing retrievals and in-situ measurements can lead to a better aerosol absorption characterization with respect to the aerosol type and contribute to reducing the related uncertainties. Finally, multi-wavelength absorption in-situ reference methods as well as retrievals can significantly add to improving aerosol characterization, speciation, and source apportionment.

This research activity will therefore utilize the RI potential to perform further developments towards (1) improving in-situ absorption coefficient measurement and reference techniques related to BC, (2) optimizing inversion schemes for the derivation of the absorption coefficient and SSA from remote sensing observations, (3) combining remote sensing with in-situ aerosol profiling to harmonize and validate the different methodologies and reduce absorption uncertainties and (4) consolidating the aforementioned outcomes to provide typical absorption values for different aerosol types/components, targeting the needs of the model and satellite communities which require more accurate absorption and SSA estimates.

Task 11.1: In-situ determination of absorption (PSI, CNRS, NOA, CyI, UGR, TROPOS, CNR, KNMI, JRC)

Evaluation of new instruments for in-situ absorption measurements including reference methods: The CAPS-PM_{ssa} monitor is a new promising online instrument simultaneously measuring the extinction and the scattering coefficient by combining cavity attenuated phase shift spectroscopy with an integrating sphere. From this the absorption coefficient can be calculated, which measurement does not suffer from the artefacts that filter-based methods have. It’s potential for suitability as a new absorption reference method for calibration centres as well as for long-term measurements will therefore be evaluated by TROPOS and PSI. Moreover, a prototype of a new light-weight aethalometer for airborne measurements of the light absorption coefficient at several wavelengths has recently been developed. CyI will compare and validate the instrument against existing methods that provide the absorption coefficient. If tests are successful this instrument will then be used in Task 3 for in-situ measurements of vertical profiles deploying tethered balloons or UAVs. Otherwise, the existing miniature BC aethalometer will be used.

Closure between BC mass and light absorption, and determination of mass absorption cross section (MAC): While measurements often focus on the absorption coefficient, models build on the BC mass concentration (as this is the variable that is provided by the emission inventories). However, the MAC value required to link BC mass and light absorption depends on a wide variety of additional variables, such as the size, morphology and mixing state of the particles, amount of scattering material, and relative humidity (Petzold et al., 2013). In addition, it has been suggested in the literature that filter-based light absorption measurements may suffer from condensation of semi-volatile organic compounds. While there are a number of studies reporting MAC values, a comprehensive closure between absorption coefficient and BC concentration and an assessment of the reasons for the variability of the MAC value at different sites are still missing. To close this gap, simultaneous measurements of the BC concentration, size, mixing state and chemical composition will be performed, deploying at least the following instruments: SP2 (single particle soot photometer), CAPS (cavity attenuated phase shift), aethalometer, nephelometer, OC/EC instrument (off-line determination of organic and elemental carbon from filters), size distribution by mobility particle size spectrometers and chemical composition by an AMS (aerosol mass spectrometer) or ACSM (aerosol chemical speciation monitor). The SP2 will be provided either by PSI or CNRS and the CAPS either by PSI or TROPOS and all other measurements are operational at all sites. In addition, where available, these measurements may be complemented by any of the following instruments: PAS (photoacoustic spectrometer), MAAP (multi-angle absorption photometer), PSAP (particle soot absorption photometer), or SP-AMS (soot particle aerosol mass spectrometer). Comparability between sites will be achieved by the fact that absorption coefficient instruments from all sites will be intercompared to each other at TROPOS, and all OC/EC measurements will be performed by the same group (JRC).

These measurements will be performed at the following representative sites: Melpitz (TROPOS), Bologna (CNR), Cabauw (KNMI/TNO), Athens (NOA), Finokalia (NOA) and Granada (UGR). These sites have been selected for their different aerosol typologies (three sites close to the sea and three more continental sites, with two sites in Northern and four sites in Southern Europe). The availability of the mandatory instrumentation as listed above was used as an additional criterion. This data will provide a better understanding of the links between BC and absorption coefficient, along with an improved characterization of the MAC and its atmospheric variability. The variability of the MAC values will also be discussed on the basis of available source apportionment data for BC at these sites (e.g. through the wavelength dependence of the absorption coefficient (Sandradewi et al., 2008)).

Task 11.2: 24-hour absorption coefficient profiling through inversion of remote sensing observations (<u>UGR</u>, CNR, CNRS, UNIVLEEDS)

In the frame of ACTRIS, LOA has developed the well-known GARRLiC algorithm (Generalized Aerosol Retrieval from Radiometer and Lidar Combined, Lopatin et al., 2013) for daytime microphysical retrievals combining sunphotometer and lidar remote sensing observations. This task will focus on implementing the lidar stand-alone night-time retrievals (Müller et al., 1999) using as a constraint night-time measurements from lunar/star photometers (Barreto et al., 2013) and adapting the GARRLiC algorithm for night-time retrievals, aiming at a 24-hour aerosol absorption characterization.

GARRLiC combines the sunphotometer measurements of the sky radiance and optical thickness with the multi-wavelength elastic lidar measurements, for the retrieval of multi-spectral absorption profiles, along with an extended product suite of aerosol microphysical properties. Based on the GARRLiC approach, LOA will develop a new algorithm for the night-time retrievals of the aerosol absorption coefficient and SSA profiles, combining the AODs from the lunar/star photometers with the elastic lidar measurements. The night-time retrievals can be augmented further from the nearest daytime retrievals from the original GARRLiC, which can be used as a-priori constraints limiting the aerosol variability in time.

Hertfordshire will combine the stand-alone lidar retrievals with lunar/star photometer AODs: the night-time measurements of the extinction and backscatter coefficients at multiple wavelengths from Raman lidar measurements will be utilized together with multi-wavelength lunar/star AOD constraints to provide an estimation of the main particle microphysical parameters with few a-priori assumptions. Furthermore, although this technique is more successful with the so-called 3+2 Raman lidar systems (named after the 3+2 available wavelengths for backscatter and extinction), the inclusion of lunar/star photometric AODs can potentially result in acceptable retrievals for Raman lidar systems employing less operating channels (i.e., 2+1 or 1+1, 3+0) at less advanced lidar sites.

The advanced night-time inversions will be initially applied utilizing the lunar/star photometer synergy with multi-wavelength Raman lidars at the ACTRIS sites in Potenza (CNR) and Granada (UGR). Special focus will be given to lunar/star photometry and related instrumentation/methods. Different methodologies applied for lunar photometry will be tested for accurately determining the night-time AOD through system intercomparisons which will be performed in Potenza (CNR). Star-photometry solutions will be tested and characterized in Granada. The different technical solutions will be compared and integrated with EARLINET multi-wavelength Raman lidars sited in Potenza and Granada.

The task also aims at extending the 24-hour aerosol absorption profile methodology to a large number of ACTRIS stations. For this purpose, the lunar photometer of Potenza will be transported to Melpitz, Athens and Finokalia to participate in the validation campaigns of Task 3.

Task 11.3: Closure studies between remote sensing and in-situ absorption retrievals for establishing an absorption model for characteristic aerosol types (NOA, CyI, CNRS, UGR, TROPOS, PSI)

This task aims at integrating the in-situ techniques employed in Task 1 (Lead PSI) with the remote sensing retrievals of the aerosol absorption profiles of Task 2 (Lead UGR), in order to produce a representative aerosol absorption model for climate studies.

First, the aerosol absorption coefficient and SSA profile retrievals from combined lidar and sun/lunar/star photometer measurements will be compared to a number of different in-situ techniques for the ACTRIS sites in Melpitz (TROPOS), Athens (NOA), Finokalia (NOA), and Granada (UGR): Tethered balloons will be employed at Melpitz and Athens, measuring the absorption and scattering coefficients, BC concentration and particle size with multi-wavelength aethalometers, nephelometers, and particle sizers. The tethered balloons will be launched to 1-1.5 km above ground level (agl), high enough to cover lidar height ranges. The unmanned aerial vehicles (UAVs) of CyI will be deployed above Athens, Finokalia and Granada. These UAVs are capable of reaching up to 3 km in altitude depending on the payload. They will carry two miniature BC aethalometers, an eight channel optical particle counter (OPC) with a particle size range of 0.3 μm to 10 μm (or larger after customization) and a condensation particle counter (CPC) for particles larger than 10 nm. Moreover, the new light-weight aethalometer for airborne measurements will be installed on the UAVs for multi-wavelength absorption retrievals if successfully validated in Task 1. TROPOS will deploy UAVs (developed by the Technical University of Braunschweig) above Melpitz. These UAVs are equipped with an OPC (six channels > 300 nm), a CPC (>10 nm), and a mini-aethalometer (1 wavelength). They are capable of carrying a payload of 2.8 kg and perform measurements from ground to 1000 m agl above the measurement site. Finally, the station of the Sierra Nevada mountains providing in-situ measurements at 2.5 km asl will be used for evaluating inversions over the Granada lidar/photometric station.

The sites used for the comparison of the aerosol absorption profiles from remote sensing and in-situ measurements have been selected based on the following criteria: (i) different aerosol typologies, (ii) availability of state of the art remote sensing instruments (i.e., Raman lidars and lunar/star photometers) and (iii) capacity and possibility to fly UAVs or deploy tethered balloons.

The dataset that will be collected will be analysed to assess the uncertainty of the inversion retrievals of the absorption coefficient and the SSA. These optimization schemes will be studied by LOA and NOA for their consistency with the in-situ retrievals. Differences between the in-situ and remote sensing methods regarding the characteristics of the measured aerosol samples will be considered and minimized in the frame of the closure experiments (e.g. dry in-situ measurements against ambient remote sensing retrievals).

The data on the detailed vertical profiles will be offered to modellers worldwide, for validation of model results.

Deliverables D11.1: Report on validity tests of new light-weight aethalometer for airborne measurements of the light absorption coefficient at several wavelengths (M8) [Task11.1] D11.2: Optimized inversion algorithms for the determination of absorption coefficient and SSA vertical profiles suited for day and night operation, (to be tested in Task 3) (M24) [Task11.2] D11.3: Intermediate report on the validity assessment of vertical absorption coefficient and SSA profiles by remote sensing, with recommendations for improvements (M24) [Task11.2] D11.4: Report on closure results between the measurements of absorption coefficient and black carbon concentration (M42) [Task11.1] D11.5: Final report on the validity assessment of vertical absorption coefficient and SSA profiles by remote sensing, with Preparation of Standard Operating Procedures (M46) [Task11.3] D11.6: Report on source-specific light absorption characteristics of different anthropogenic and natural aerosol types (M48) [Task11.3]

Work package number	WP12	**Start Date or Starting Event**				Month 1	
Work package title	**JRA2: The surface exchange and vertical transport of aerosols**						
Participant number	8	19	18	3	6	16	25	
Short name of participant	**UHEL**	CHMI	KNMI	TROPOS	FMI	UGR	NERC	
Person-months per participant:	24	14	12.8	3	8.8	13	5.6	

Objectives

The aim is to standardize vertical exchange measurements of aerosol particles in the planetary boundary layer using a combination of state-of-the-art in-situ and remote-sensing techniques. There are three main objectives:

- To standardise the retrieval and analysis of in-situ measurements of aerosol particle surface fluxes,
- To develop, evaluate, and implement suitable methodologies for obtaining the vertical profile of aerosol particle fluxes from ground-based active remote sensing,
- To combine both in-situ and remote-sensing observations of aerosol particle fluxes, to understand the horizontal scales over which each observation type is representative, and provide recommendations for measuring aerosol fluxes at an ecosystem level within a European infrastructure network.

Description of work and role of partners

The exchange of aerosol particles between the atmosphere and the underlying surface plays a significant role in determining the mass and number distribution of atmospheric aerosol particles. However, it is still unclear how different ecosystems emit particles of different sizes to the atmosphere, and more important, how different surfaces remove particles from the atmosphere via dry deposition. Measurements of particle surface-atmosphere exchange have been made in various ecosystems with different methods and different variables (Pryor et al. 2008), but to date there is no systematization of instrumentation, data analysis and representativeness of the measurements. Only recently, laser spectrometers (HR-ToF-AMS and TD-PTR-MS)to measure the aerosol composition with temporal resolution suitable for flux measurements have become available. These new and innovative methods will further improve our understanding and quantification of aerosol emission sources as well as dry deposition from the atmosphere.

Vertical aerosol transport within the planetary boundary layer (PBL) must also be monitored to fully understand the local and background dispersion mechanisms. The importance of such measurements is twofold: 1) They allow the quantification of the surface emission of aerosol particles relevant for haze/smog formation and atmospheric composition; 2) the vertical transport and mixing of aerosol is integral to understanding the relative impact of local sources when attempting to quantify the link between aerosol and cloud droplet formation. Up until now, aerosol fluxes have only been possible to measure in expensive aircraft campaigns, but recent advances in the capabilities of ground-based remote-sensing techniques such as lidar allow the routine measurements and yield vertical profiles of many atmospheric parameters. Not only can lidar be used to retrieve aerosol size parameters from backscatter profiles (Raman, UV, VIS), the techniques to measure wind speeds with Doppler lidar have recently reached maturity. The combination of backscatter and Doppler lidar can thus be applied to measure vertical aerosol fluxes throughout the PBL (Engelmann et al. 2008). These techniques can be complemented with radar profilers to extend investigations towards aerosol-cloud interaction.

Task 12.1: Surface flux measurements of particles and in-situ method standardisation (UHEL, NERC, KNMI, CHMI, FMI, UGR)

Measurements of tower-based particle fluxes will be made at six sites above different land surface types. Building on previous long-term and campaign-based measurements at these sites, ACTRIS-2 will support long-term routine particle flux measurements at Hyytiälä, (UHEL, Finland), Cabauw (KNMI, the Netherlands) and AUC (NERC, UK). In addition, measurements in Kosetice (CHMI, Czech Rebublic), AGORA (UGR, Spain) and Pallas (FMI, Finland) will be started during the ACTRIS-2 project. Since these sites are all also ICOS sites, there is a mutual benefit between the two infrastructures. Different instruments and methods to calculate the particle fluxes are used at each site. These differences cover measurement techniques from direct eddy covariance to disjunct eddy and relaxed eddy accumulation techniques, differences in instrumentation measuring either total particle (by mass or by number) or size-segregated number concentrations, and differences in particle flux post-processing tools including instrument-dependent applied corrections. At present, many corrections routinely applied to other scalar fluxes, such as those monitored in the context of ICOS, are estimated or even ignored in particle flux studies due to limited understanding.

The following will be conducted to tackle the disparity in the different methods and to obtain uncertainty estimates for tower-based particle flux measurements (UHEL, NERC, KNMI, CHMI, FMI, UGR):

a) Inter-comparison campaign in Hyytiälä, where the instruments from the six sites are run side-by-side, and particle fluxes calculated and compared,
b) Assessment of the post-processing tools used to calculate the final flux values from comparing multi-month periods of particle fluxes from different measurements,
c) Improve the poor theoretical understanding of particle fluxes, examine the impact of potential corrections, their correct utility, including those for temperature and water vapour fluctuations.

The particle flux in-situ measurements will be complemented with chemically resolved flux measurements of submicron non-refractory aerosol components. Such observations, using the eddy covariance and disjunct eddy covariance techniques, will be made during campaigns at Hyytiälä (UHEL), AUC (NERC) and Cabauw (KNMI) to provide more detailed information on deposition/emission rates by compounds, and to help provide information on the effect of thermodynamic partitioning/aerosol evaporation as a crucial element in the interpretation of the particle number fluxes.

The tower-based measurements are representative for local scale, but in Hyytiälä (UHEL) and in Cabauw (KNMI) the regional scale fluxes will be calculated based on radon observations in the boundary layer combined with atmospheric transport models such as FLEXPART.

Task 12.2: Boundary-layer measurements of aerosol fluxes by ground-based remote sensing (FMI, UHEL, KNMI, TROPOS, UGR, CHMI)

Vertical profiles of PBL particle fluxes can be determined from co-located Doppler and aerosol lidars by combining the turbulent vertical-wind component derived from the first instrument with aerosol variance and microphysical properties obtained from the second (Engelmann et al. 2008). There have only been a few studies concerning this method. To ascertain whether we can provide vertical profiles of aerosol fluxes routinely, with sufficient accuracy, we will evaluate the following challenges of the technique (FMI, KNMI, TROPOS, UGR):

a) Are the measurement volumes of the two lidars sufficiently matched?
b) Is similarity theory (i.e. isentropic assumption) applicable under different atmospheric conditions?

Other issues to be evaluated are:

c) Retrieval of uncertainties in turbulent and aerosol properties, their mutual correlations and uncertainties in retrieving the impact of aerosol modification during transport within the PBL (hygroscopic growth, thermodynamic gas-aerosol partitioning),

d) Instrument sensitivity,

e) Appropriate and relevant measurement scales (temporal and spatial).

Turbulent properties and their associated uncertainties can be derived from measurements of the vertical air motion with commercially available Doppler lidars (O'Connor et al., 2010). Obtaining the relevant aerosol properties from the same atmospheric volume and timescale is more difficult. High-quality aerosol volume and mass concentrations are usually determined by inversion from long (1 hour) time averages of multi-wavelength Raman lidar data. But, the turbulent fluctuations of the microphysical properties should be determined from lidar data with high temporal resolution (< 1minute).To achieve this, existing aerosol lidars (such as PollyXT from TROPOS and FMI) must first be modified by installing fast acquisition channels and deploying to zenith (current pointing angles are typically 5° off zenith).

A series of co-located measurements with aerosol and Doppler lidar will be performed in terms of field campaigns at Pallas (FMI) and in KOS (CHMI) and extended to other sites with appropriate instrumentation where the strong requirement of horizontal homogeneity for flux measurements is met and comparisons with in-situ methods are possible (AGORA, Cabauw, Hyytiälä).

The remote-sensing measurements will cover a vast range of turbulent scales with the vertical profile. What volumes in time and space are appropriate for deriving the fluxes, how does this vary in the vertical and with atmospheric conditions, and how do they relate to measurements at the surface? These questions will be answered using large-eddy simulations (KNMI) to estimate the footprint and spatio-temporal scales of fluxes relevant to each measurement event. The potential for implementing standardized flux measurements at sites operating profiling instruments will be assessed at combined Cloudnet-EARLINET stations. Many sites operate a co-located Doppler lidar and a ceilometer. Can scaling parameters for the turbulent flux within the boundary layer be derived so that only aerosol gradients and the dissipation rate of turbulent kinetic energy are required (gradient method)? How well does this agree with the more sophisticated eddy-covariance techniques? This knowledge will address whether such methods can be implemented in an operational sense, with an obvious benefit for ICOS in enabling the capability of generating mixing-layer heights and other turbulent characteristics.

Task 12.3: Integration of the in-situ and remote-sensing particle fluxes (UHEL, FMI, KNMI, CHMI, UGR)

The aerosol particle fluxes measured both with in-situ and remote-sensing methods will be compared and integrated to obtain ecosystem-scale aerosol particle fluxes. The in-situ measurements are more widely used, in contrast to the remote-sensing technique. Here the objectives and sub-tasks are:

a) Comparison of the various retrievals from measurement systems providing different moments (number, surface area, mass) of the same size distribution,
b) Comparison of the in-situ and ground-based remote-sensing techniques at overlapping altitudes,
c) Calculation of dry deposition using both tower-based and remote-sensing methods,
d) Defining and providing recommendations for appropriate combinations of the different techniques suitable for understanding the vertical transport and surface-atmosphere exchange of aerosol particles.

Within ACTRIS-2 the applicability and performance of the two techniques will be evaluated in measurement campaigns at five sites, which are Hyytiälä (UHEL), Pallas (FMI), Cabauw (KNMI), AGORA (UGR) and KOS (CHMI). These sites cover different canopies allowing us to examine also the impact of different surfaces to the performance of the methods and their mutual behavior.

Deliverables

D12.1: Documentation of variables saved to the database (M6) [Task12.3]
D12.2: Documentation of the inter-comparison campaign of the instruments used in tower-based measurements (M28) [Task12.1]
D12.3: Documentation of tower-based particle flux measurements (M30) [Task12.1]
D12.4: Documentation on the ground-based remote-sensing particle flux measurements (M36) [Task12.2]
D12.5: Delivery on in-situ and ground-based remote-sensing data to the database (M42) [Task12.3]
D12.6: Final report on the comparison and suitability of the different techniques to measure the aerosol particle fluxes at the ACTRIS-2 sites (M48) [Task12.3]

Work package number	13	Start Date or Starting Event				Month 6	
Work package title	JRA3: Model evaluation, assimilation and trend studies						
Participant number	10	11	5	1	16	22	24	2
Short name of participant	ECMWF	MetNorway	NILU	CNR	UGR	RIUUK	UNIVLEEDS	CNRS
Person/months per participant:	21	12	3	4	16	12	4.9	0.6

Objectives

- Identify specific ACTRIS-2 Level 1, 2 and 3 data products for: 1) near-real-time data provision and interface with operational prediction models for verification, bias correction anchoring and data assimilation; 2) climate monitoring and evaluation of atmospheric composition re-analyses; 3) climate model error quantification; 4) trend assessments
- Use ACTRIS-2 quality-checked data for yearly model assessment
- Establish a routine verification stream of selected ACTRIS-2 variables with daily updates
- Explore the potential of ACTRIS-2 data for assimilation and satellite bias correction by setting up pilot studies
- Explore the use of ACTRIS-2 data for calibration of global aerosol-climate model processes
- Quantify the value of measurements for the reduction of climate model uncertainty
- Develop combined trend products based on climate models and ACTRIS-2 observations

Description of work

This joint research activity aims at connecting the wealth of data which will be collected, archived and made available through VA1 in ACTRIS-2 with current state-of-the-art aerosol/cloud models with assimilation and prediction capabilities on one hand, and climate models on the other.

Available NRT data (level 1) will be used for the routine evaluation of operational models, while quality-checked (QC) and added-value (level 2&3) products generated in NA2 and NA3 will be used for the retrospective assessments of the model simulations (reanalysis/reforecasts). Outreach and user-oriented data dissemination tools developed in NA5will be applied to the outputs of this WP. Feedback will be provided to users and data providers through online plots of time-series of model and observations, and relevant statistics at the measuring sites.

Another important application of the ACTRIS-2 data will be regional data assimilation. The potential of ground-based measurements of ACTRIS-2 aerosol parameters for improvements in the aerosol regional prediction will be explored through pilot studies for extreme events of public relevance, like volcanic eruptions, mineral dust storms and biomass burning events. Building on the growing interest by the global NWP community in using high accuracy data from ground-based networks to constrain satellite data biases, this joint research activity will also test the use of ground-based lidar data to anchor the bias correction for satellite lidar data, using a variational bias correction scheme.

Another priority for this activity will be to demonstrate the value of continuous high-quality measurements for the reduction in uncertainty of global aerosol-climate models. The ACTRIS-2 data are uniquely useful because of the well characterized uncertainties and representativeness.

Finally, several papers published in 2013 (Collaud-Coen et al. and Asmi et al.) showed the value of high quality GAW data to understand trends in atmospheric composition. The potential of long-term QC ACTRIS-2 data for trend assessment will be further exploited here.

Task 13.1:Model evaluation and online verification (<u>ECMWF</u>, UGR, MetNorway, NILU, CNR)

The goal of this task is to use ACTRIS-2 observations, with focus on lidar extinction profiles, and surface absorption/extinction coefficients to assess the relevant aerosols fields from the models. Specifically, ACTRIS-2 ground-based and profiling data with NRT delivery will be used to establish a routine verification of the ECMWF's Composition-Integrated Forecasting System (C-IFS) system for aerosol optical properties (extinction, scattering and absorption). Currently, an online verification system is in place for the MACC-II aerosol system using observations of Aerosol Optical Depth (AOD) from AERONET. This system has been extended to include verification of reactive gases from the surface-based GAW stations. Developments will be made here to extend this verification system to ACTRIS-2 data. An advanced aerosol microphysics model with modal structure (GLOMAP) is also being implemented in C-IFS. Observations of aerosol number concentrations provided by ACTRIS-2 will be needed to evaluate its performance. Cloud-related fields from the ECMWF model will also continue to be monitored in NRT and improvements will be made based on experience accrued with the Cloudnet component of ACTRIS-2.

Further extension to the ACTRIS-2 data evaluation infrastructure will be established in this task, with the goal to create a prototype system in anticipation of the future evolution of the research infrastructure. Among the benefits of daily updates of model-data comparisons, through ad hoc plots to be displayed on the Data Centre website, there will also be the direct and immediate feedback to the data providers. Also, the monitoring and prediction system is envisaged to be of use to support intensive measurement campaigns according to the needs emerging from the NA2 and NA3 activities.

ACTRIS-2 ground-based in situ and remote sensing QC data will also be used to evaluate the models on annual basis. The reanalysis produced with the C-IFS/ECMWF system will be assessed using daily-aggregated data of aerosol size and composition, and aerosol optical properties. Daily and monthly means of relevant statistics (bias, standard deviation, correlations, mean normalized bias, fractional gross errors, etc.) for selected variables will be produced. Scatter plots and Taylor diagrams will be used to assess the various configurations of the models. Upgraded model versions will also be evaluated. Plots will be displayed on the Data Centre website. A similar analysis will be done for the cloud variables. This assessment will be repeated after the release of the QC data on a yearly basis, depending on the data availability.

BSC-CNS/UGR will contribute to establish a NRT model monitoring/evaluation system as well as a delayed evaluation system using ACTRIS-2 data for the models contributing to the WMO Sand and Dust Sort-Warning and Assessment System (SDS-WAS) Northern Africa-Middle East-Europe (NA-ME-E) Regional Centre. This is managed by BSC-CNS and AEMET and includes 10 dust prediction models (BSC-DREAM8b, MACC-ECMWF, DREAM-NMME-MACC, NMMB/BSC-Dust, MetUM, GEOS-5, NGAC, EMA RegCM4, DREAMABOL). Modelled and observed data will be interpolated to a reference standard vertical profile for comparisons. This definition will also allow generation of multi-model products. The model evaluation will focus on two main features: the description of the aerosol layering (peak altitude and shape of the profile) and the aerosol concentrations for all the models. A set of selected statistics adequate for the model evaluation will be applied.

Task 13.2:Potential of ACTRIS-2 data for assimilation and satellite bias correction (<u>ECMWF</u>, UGR, RIUUK, NILU, CNR, UNIVLEEDS, CNRS)

Selected case studies will be chosen to demonstrate the feasibility of assimilating ACTRIS-2 data into state-of-the-art analysis and prediction systems both at the global and the regional scale. The case studies will include high-impact events for European citizens, such as dust volcanic eruptions, biomass burning events, dust outbreaks, and high pollution episodes in Europe.

Surface in-situ observations of aerosol optical properties and profiles of lidar backscatter will be assimilated in the 4D-VAR atmospheric composition analysis and prediction system (C-IFS/ECMWF) for the selected cases. The analysed fields will be fed to the regional models to assess whether the inclusion of ground-based data over Europe has the potential to improve the boundary conditions for the regional models, and hence the subsequent prediction for the European region.

The value of assimilating ACTRIS-2 data in a dust multi-scale prediction system (NMMB/BSC-CTM) will be investigated with focus on ground-based backscatter profiles, together with an indication of dust aerosol type, additionally, or complementary, to the assimilation of space-borne backscatter profiles, with a data assimilation scheme based on an ensemble Kalman filter approach (the LETKF assimilation system). The analysis of relevant dust outbreak cases is expected to show whether the assimilation of ground-based backscatter profiles can improve the model three-dimensional structure of dust outflows from sources.

The regional model EURAD-IM with its 4D-var technique with adjoint aerosol modules (ensemble Kalman smoother) will be used to assess aerosol source strengths estimation of volcanic eruptions including error assessments, ash dispersion reanalyses across Europe, including air traffic related threshold values, and mineral dust load and transport, including error estimates. This will be done for specific test cases using the ACTRIS-2lidar backscatter profiles. In addition CALIPSO, SEVIRI and other space-borne sensor data will be used as source of operational background information. The additional information content of the ACTRIS-2profiling observations will be quantitatively assessed.

The ECMWF system will be used to explore a new application of ground-based aerosol observations: the anchoring of satellite data bias correction. Satellite data may present biases, which can be assessed either a priori or a posteriori as a result of the assimilation procedure. Currently, at ECMWF the estimation of the bias parameters for most ingested data is performed as part of the 4D-VAR minimization. A bias model based on regression coefficients is assumed, and the regression variables are selected depending on the datasets. The regression coefficients are obtained from the assimilation. This procedure is most successful if there are observations of the same type, which do not require a bias correction and can serve as anchoring points. In this task, we will use the ACTRIS-2 aerosol lidar backscatter data to anchor the vertical profile of the bias correction needed for space-borne lidar data from the CALIPSO satellite. The results of the experiments with and without bias correction will be assessed with independent ground-based measurements.

Task 13.3: Climate model uncertainty and trend assessment (MetNorway, UNIVLEEDS, NILU, CNR)

Data will also be used to assess how ACTRIS-2 can help to constrain uncertain model processes in global aerosol-climate models. The approach will be to use “history matching” to constrain a global perturbed parameter ensemble against the measurements. History matching is used to eliminate parts of model parameter space that are implausible when output variables are constrained by measurements. This approach generates a reduced (plausible) parameter range and hence reduced forward model uncertainty. For example, in the Global Aerosol Synthesis and Science Project (GASSP), global in situ aerosol measurements from surface, ship and aircraft platforms are being used to calibrate the GLOMAP aerosol model. In this task we will assess which model processes in the GLOMAP model can be constrained by the ACTRIS-2 measurements and whether long-term evaluation can be used to identify missing processes or model structural weaknesses. The procedure will be repeated every ~12 months as the model processes are refined (through other ongoing projects). This task will deliver a global model with observationally constrained processes, with an estimate of how data from individual sites contributes to the uncertainty reduction.

The potential of long-term high quality ACTRIS-2 data for understanding of trends in atmospheric composition shall be further developed. A methodology shall be put in place to analyse, to produce and to regularly update, e.g. annually or biennially, site-specific and regional trends. Suitable QC ACTRIS-2 variables could be aerosol size, composition, surface aerosol optical properties, and optical property profiles.

An updated-combined aerosol trend assessment will be developed and distributed to both scientific community, and authorities/stakeholders. The data sets and new products will be made available through the ACTRIS-2 DC. A web interface shall be put in place to visualise for ACTRIS-2 sites both hindcast reanalysis model data (MACC, EMEP, AeroCom) and corresponding observations for long time series. The observations themselves will be complemented with output from a “history matched” global model to see whether the uncertainty in the observations and model mask any trends. The purpose is manifold: detect and make periods apparent where observations deviate significantly from models, either due to atmospheric anomalies or instrument problems (feedback to data providers). A training workshop is planned to explain trend assessment report and long term data visualisation tools.

Deliverables

D13.1: Initial report on evaluation/verification activities (M21) [Task13.1]
D13.2: Demonstration of online evaluation capabilities (M21) [Task13.1]
D13.3: Initial report on bias correction activities (M23) [Task13.2]
D13.4: Initial report on assimilation activities (M23) [Task13.2]
D13.5: Report on value of measurements in the reduction in global model (M36) [Task13.2]
D13.6: Biennial Updates of ACTRIS-2 Trend Report on trend assessment (M36) [Task13.3]
D13.7: Final report on combined measurement/model activities (M40) [Task13.3]

Table 3.1b: List of work packages

Work package No	Work Package Title	Lead Participant No	Lead Participant Short Name	Person-Months	Start Month	End month
1	ACTRIS-2 Coordination and management	1	CNR	74.5	1	48
2	Profiling of aerosols and clouds	3	TROPOS	184	1	48
3	Near-surface observations of aerosols, clouds and trace gases	4	NOA	195.1	1	48
4	ACTRIS Innovation Platform	1	CNR	28	1	48
5	ACTRIS-2 training, outreach and sustainability actions	2	CNRS	25.1	1	48
6	Lidar Calibration Centre (LiCal)	12	INOE	0	1	48
7	AERONET-EUROPE Calibration Centre	2	CNRS	0	1	48
8	European Centre for Aerosol Calibration (ECAC)	3	TROPOS	7.3	1	48
9	Physical access to advanced ACTRIS stations	2	CNRS	43.8	1	48
10	ACTRIS Data Centre	5	NILU	107.5	1	48
11	Improving the accuracy of aerosol light absorption determinations	7	PSI	105.3	1	48
12	The surface exchange and vertical transport of aerosols	8	UHEL	81.2	1	48
13	Model evaluation, assimilation and trend studies	10	ECMWF	73.5	6	48
				Total 925.2		

Table 3.1c: List of Deliverables

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date
D1.1	ACTRIS web portal	1	CNRS	O	PU	1
D1.2	Minutes of the project Kickoff meeting	1	CNR	R	PU	4
D1.3	Minutes of the first official project meeting	1	CNR	R	PU	14
D1.4	Minutes of the second official project meeting	1	CNR	R	PU	26
D1.5	Minutes of the third official project meeting	1	CNR	R	PU	38
D1.6	Minutes of the final official project meeting	1	CNR	R	PU	48
D2.1	Documentation on the structure of the level-based EARLINET data processing chain	2	CNR	R	PU	6
D2.2	Documentation on the structure and upgrade strategy of the Cloudnet processing chain	2	UNIVLEEDS	R	PU	6
D2.3	Documentation on radar calibration and standardization concepts	2	KNMI	R	PU	6
D2.4	Minutes of the first NA2 annual workshop	2	UGR	R	PU	10
D2.5	First report on technical upgrades and QA activities at EARLINET and Cloudnet stations	2	TROPOS	R	PU	12
D2.6	Minutes of the second NA2 annual workshop	2	UGR	R	PU	22
D2.7	Second report on technical upgrades and QA activities at EARLINET and Cloudnet stations	2	TROPOS	R	PU	24
D2.8	Implementation of the lidar quicklook database	2	CNR	R	PU	26
D2.9	First report on NA2 user support activities	2	UGR	R	PU	30
D2.10	Minutes of the third NA2 annual workshop	2	UGR	R	PU	34
D2.11	Third report on technical upgrades and QA activities at EARLINET and Cloudnet stations	2	TROPOS	R	PU	36
D2.12	Recommendations on radar calibration and standardization at Cloudnet stations	2	KNMI	R	PU	42
D2.13	Implementation of EARLINET Level 3 products	2	CNR	R	PU	46
D2.14	Implementation of common EARLINET/Cloudnet algorithms and products	2	TROPOS	R	PU	46
D2.15	Minutes of the fourth NA2 annual workshop	2	UGR	R	PU	46

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date
D2.16	Second report on NA2 user support activities	2	UGR	R	PU	46
D2.17	Fourth report on technical upgrades and QA activities at EARLINET and Cloudnet stations	2	TROPOS	R	PU	48
D3.1	An expert workshop to determine the targeted set of OA tracers	3	TROPOS	R	PU	6
D3.2	Minutes of the first NA3 annual workshop	3	NOA	R	PU	10
D3.3	Standardization and data submission protocol for aerosol particle mass spectroscopy measurements	3	CNRS	R	PU	12
D3.4	Standardization and data submission protocol for coarse mode particle number size distribution measurements	3	TROPOS	R	PU	12
D3.5	Report on NO_2 side-by-side intercomparison	3	DWD	R	CO	18
D3.6	First version of QC tools for NA3 data submission available	3	NILU	R	CO	18
D3.7	Implementation of closure studies for total particle number concentration	3	TROPOS	R	PU	18
D3.8	Report on procedure for QC of reactive trace gases	3	EMPA	R	PU	18
D3.9	Minutes of the second NA3 annual workshop	3	NOA	R	PU	22
D3.10	Inter-laboratory comparison (ILC) studies for the targeted set of OA tracers	3	CNRS	R	CO	24
D3.11	Reference instruments for multi-wavelength absorption measurements	3	TROPOS	R	CO	28
D3.12	Standardization and data submission protocol for PVM measurements	3	CNRS	R	PU	28
D3.13	Implementation of closure studies for particle light scattering coefficient	3	TROPOS	R	PU	28
D3.14	Minutes of the third NA3 annual workshop	3	NOA	R	PU	34
D3.15	Standard Operating Procedures (SOPs) for the targeted set of OA tracers.	3	ULund	R	PU	36
D3.16	Implementation report on increasing number of NA3 stations and instruments providing data in near-real-time	3	NILU	R	PU	40
D3.17	Updated Measurement Guideline for NO_x and VOCs	3	EMPA	R	PU	42
D3.18	Minutes of the fourth NA3 annual workshop	3	NOA	R	PU	46
D4.1	Progress report on standard-making process.	4	INOE	R	PU	22
D4.2	Progress report on the use of ACTRIS facilities and calibration centres for testing novel instruments.	4	CNRS	R	PU	22
D4.3	Progress report on innovation	4	CNR	R	PU	24
D4.4	Final report on Innovation	4	CNR	R	PU	48
D5.1	ACTRIS roadmap report for the next 5 to 10 years	5	FMI	R	PU	12
D5.2	Flyers and other needed materials on ACTRIS roadmap provided for	5	FMI	DEC	PU	16

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date
	ACTRIS national, regional, European and international actor					
D5.3	Online ACTRIS MOOC on observing technologies	5	UHEL	DEC	PU	24
D5.4	Report on data interoperability	5	NILU	R	PU	36
D5.5	Final report on ACTRIS training and education programme	5	UHEL	R	PU	46
D5.6	Final report on cooperation between ACTRIS and other European and international RIs, networks and programmes	5	CNRS	R	PU	48
D6.1	Intermediate Report on Access to LiCal	6	INOE	R	PU	24
D6.2	Final report on access to LiCal	6	INOE	R	PU	48
D7.1	Intermediate Report on Access to AERONET-EUROPE Calibration Centre	7	CNRS	R	PU	24
D7.2	Final Report on Access to AERONET-EUROPE Calibration Centre	7	CNRS	R	PU	48
D8.1	Intermediate Report on Access to the ECAC infrastructure	8	TROPOS	R	PU	24
D8.2	Final report on Access to the ECAC infrastructure	8	TROPOS	R	PU	48
D9.1	Intermediate report on access to advanced ACTRIS stations	9	CNRS	R	PU	24
D9.2	Final report on access to advanced ACTRIS stations	9	CNRS	R	PU	48
D10.1	Definition of the ACTRIS Data Management Plan	10	NILU	R	PU	6
D10.2	First summary of the ACTRIS data offered by the ACTRIS Data Centre	10	NILU	R	PU	16
D10.3	First summary of the monitoring of access to ACTRIS data and user statistics	10	NILU	R	PU	16
D10.4	First assessment report of the services offered by the ACTRIS Data Centre	10	NILU	R	PU	18
D10.5	Documentation and release of new ACTRIS data portal versions with implementation of new functionalities and tools	10	NILU	R	PU	20
D10.6	Provision and documentation of interactive in situ and profile data submission tools	10	NILU	DEC, R	PU	20
D10.7	Second summary of the ACTRIS data offered by the ACTRIS Data Centre	10	NILU	R	PU	28
D10.8	Second summary of the monitoring of access to ACTRIS data and user statistics	10	NILU	R	PU	28
D10.9	Review of the ACTRIS Data Management Plan	10	NILU	R	PU	30
D10.10	Provision of collocation service combining ground-based data and satellite and model data	10	CNRS	DEC	PU	30
D10.11	Provision of QC tools for ground-based aerosol and trace gas in situ data and aerosol profiles	10	CNR	DEC	PU	32
D10.12	Third summary of the ACTRIS data offered by the ACTRIS Data Centre	10	NILU	R	PU	40

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date
D10.13	Third summary of the monitoring of access to ACTRIS data and user statistics	10	NILU	R	PU	40
D10.14	Second assessment report of the services offered by the ACTRIS Data Centre	10	NILU	R	PU	40
D10.15	Final description document of GARRLiC products	10	CNRS	R	PU	42
D11.1	Report on validity tests of new light-weight aethalometer for airborne measurements of the light absorption coefficient at several wavelengths	11	CyI	R	CO	8
D11.2	Optimized inversion algorithms for the determination of absorption coefficient and SSA vertical profiles suited for day and night operation, (to be tested in Task 3)	11	UGR	OTHER	CO	24
D11.3	Intermediate report on the validity assessment of vertical absorption coefficient and SSA profiles by remote sensing, with recommendations for improvements	11	NOA	R	CO	24
D11.4	Report on closure results between the measurements of absorption coefficient and black carbon concentration	11	PSI	R	PU	42
D11.5	Final report on the validity assessment of vertical absorption coefficient and SSA profiles by remote sensing, with Preparation of Standard Operating Procedures	11	NOA	R	CO	46
D11.6	Report on source-specific light absorption characteristics of different anthropogenic and natural aerosol types	11	CNRS	R	CO	48
D12.1	Documentation of variables saved to the database	12	UHEL	R	PU	6
D12.2	Documentation of the inter-comparison campaign of the instruments used in tower-based measurements	12	UHEL	R	PU	28
D12.3	Documentation of tower-based particle flux measurements	12	UHEL	R	PU	30
D12.4	Documentation on the ground-based remote-sensing particle flux measurements	12	FMI	R	PU	36
D12.5	Delivery on in-situ and ground-based remote-sensing data to the database	12	UHEL	OTHER	PU	42
D12.6	Final report on the comparison and suitability of the different techniques to measure the aerosol particle fluxes at the ACTRIS-2 sites	12	UHEL	R	PU	48
D13.1	Initial report on evaluation/verification activities	13	ECMWF	R	PU	21
D13.2	Demonstration of online evaluation capabilities	13	ECMWF	DEC	PU	21
D13.3	Initial report on bias correction activities	13	ECMWF	R	PU	23

Deliverable (number)	Deliverable name	Work package number	Short name of lead participant	Type	Dissemination level	Delivery date
D13.4	Initial report on assimilation activities	13	ECMWF	R	PU	23
D13.5	Report on value of measurements in the reduction in global model	13	UNIVLEEDS	R	PU	36
D13.6	Biennial Updates of ACTRIS-2 Trend Report on trend assessment	13	MetNorway	R	PU	36
D13.7	Final report on combined measurement/model activities	13	ECMWF	R	PU	40

Figure 3.1 shows the major interactions between the WPs (PERT diagram) with associated direct benefits for the RIs.

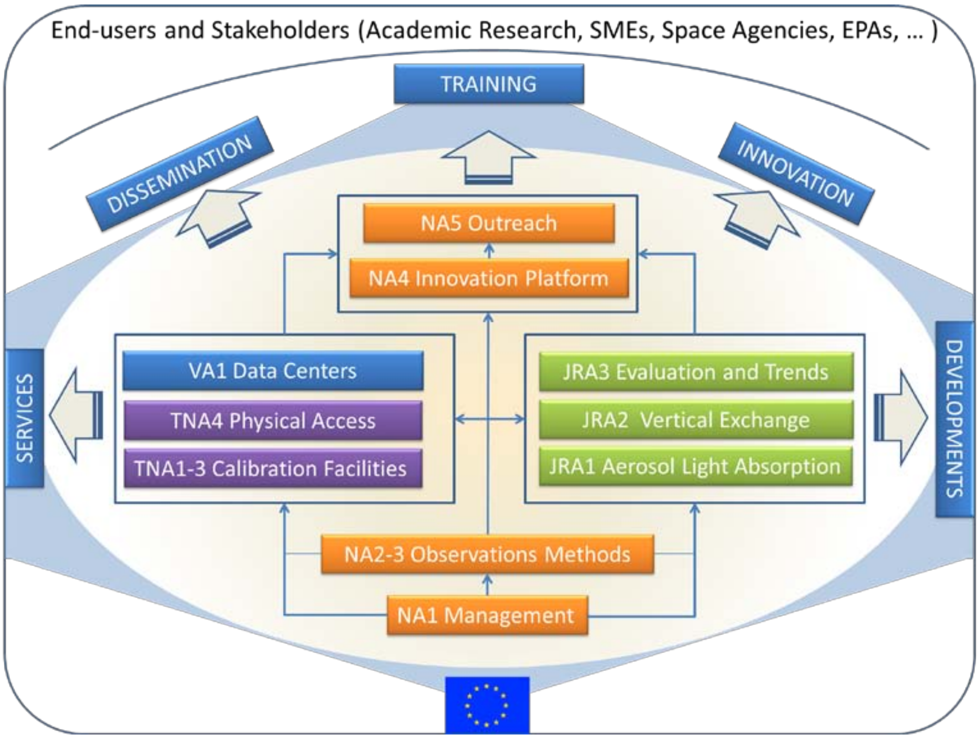


Figure 3.1: Overall structure of ACTRIS-2. The structure provides multi-entries to end-users through Physical and Virtual Access, through JRAs and through NA4 and NA5. All WPs are closely interconnected.

3.2 Management structure and procedures

3.2.1. Project organizational structure

The overall management structure and procedures are outlined below, and are closely based on the organization of ACTRIS which was very positively reviewed by an independent evaluator appointed by the EC during the project mid-term-review. The structure complies with DESCA Horizon 2020 Model Consortium Agreement "Governance structure for Medium and Large Projects" and can be described as follows (Figure 3.2):

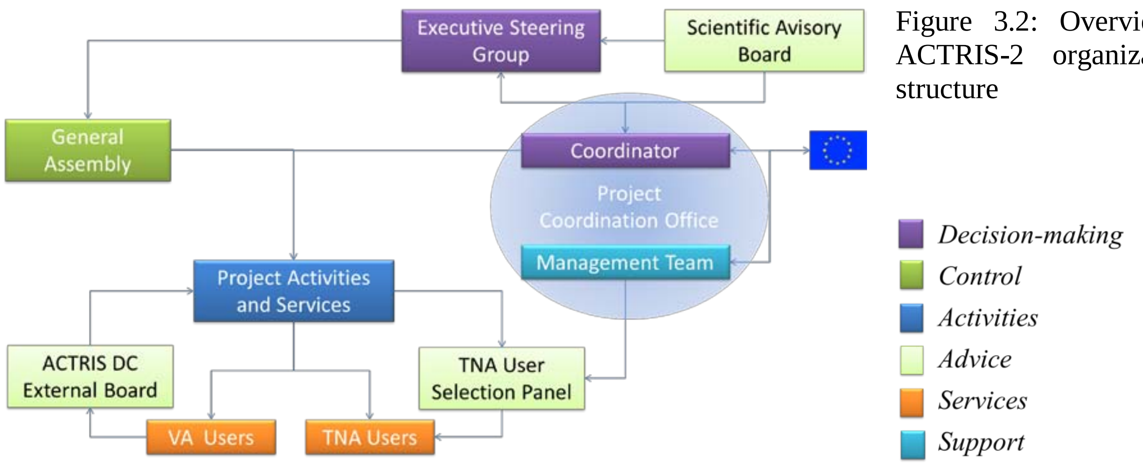


Figure 3.2: Overview of ACTRIS-2 organizational structure

3.2.1.1 Official Consortium bodies

General Assembly: the General Assembly (GA) is the ultimate decision-making body of the consortium. It consists of one authorized representative of each beneficiary. The GA meetings are chaired by the Coordinator. The GA will meet at least once per calendar year, co-incident with the project annual meeting. Details of the meeting preparation, agenda, and minutes will be detailed in the Consortium Agreement. The first GA meeting will be organized during project kick-off. The GA will be responsible for

- *content, finances and intellectual property rights;*
- *evolution of the consortium;*
- *appointment of Executive Steering Group Members (and if necessary the replacements for co-coordinator and WP leaders), and of members of additional project bodies (Scientific Advisory Board, TNA User Selection Panel, ACTRIS Data Centre External Board);*
- *preparing and amending the Consortium Agreement.*

Executive Steering Group (ESG): The Executive Steering Group is composed of both scientific coordinators and the work package leaders of the project's networking activities WP2-5, service activities WP6-10, and joint research activities WP11-13. The ESG will meet at least on a bi-annual basis and remotely (telecon) on a bi-monthly basis. It will have the following responsibilities:

- *collect information on the progress of the project, assess the compliance of the project with its objectives and, if necessary, propose modifications to the GA;*
- *support the Coordinator in preparing meetings with the Funding Authority and in preparing related data and deliverables;*
- *prepare the content and timing of press releases and joint publications by the consortium or proposed by the Funding Authority;*
- *any other tasks specified in the Consortium Agreement or required by the GA.*

Project Coordination: **Partner 1 (CNR) provides the overall coordination of ACTRIS-2,** represents the consortium towards the European Commission, and is in charge of the administrative, legal, and financial management of the project. The **Project Coordinator** is Gelsomina Pappalardo, chief scientist of the CNR-IMAA lidar laboratory and coordinator of the current ACTRIS I3 project. She will act as the intermediary between the Parties and the European Commission. Scientific coordination is shared between the coordinator and project **co-coordinator,** Dr. Paolo Laj, senior scientist at the CNRS-LGGE laboratory and co-coordinator of ACTRIS. Project coordination is supported by the **project coordination office,** which is represented by the project co-coordinator and the project manager. **Project Manager** is Dr. Sabine Philippin, current project manager of ACTRIS and research engineer at CNRS-LaMP. The project manager heads the **Project Management Team** (PMT) of two administrative persons, appointed by the coordination at CNRS and/or CNR, and approved by the ESG. The coordinator and coordination office are responsible for:

- *monitoring compliance by the Parties with their obligations;*
- *monitoring execution of the decisions of the GA;*
- *representing the intermediary for communication between the EC and the consortium;*
- *collecting, reviewing and submitting reports, other deliverables (including financial statements and related certifications) and specific requested documents to the EC;*
- *administering the financial contribution of the EC and financial tasks as described in the Consortium Agreement;*
- *implementing an efficient project management, provide management in all administrative, legal, financial, and scientific matters, and ensuring the day-to-day project management;*
- *ensuring the joint management of the transnational access provision via PMT;*
- *chairing and organizing the GA and ESG meetings and drafting the minutes;*
- *ensuring the dissemination of information and outreach beyond the Consortium with the larger scientific community, international networks, stakeholders, and SMEs and implementing and updating the ACTRIS-2 web portal.*

3.2.1.2 Additional project bodies

ACTRIS-2 Scientific Advisory Board (SAB): The Scientific Advisory Board is an independent panel of leading international experts (international scientific community, observational networks, end-users, companies, etc.) established to give advice and assess the progress, performance, and achievements of ACTRIS-2 and to bring experience, ideas and links related to the project's activities from outside the consortium. Members of the Scientific Advisory Board can also participate as member of the user selection panel for TNA activities. The members of the SAB will be nominated by the GA and will be invited to attend the meetings of the GA and ESG. A number of preeminent scientists have already accepted to participate in the ACTRIS-2 SAB, representing space agencies, WMO, EEA, and academic research.

The ACTRIS-2 TNA User Selection Panel (TNA-USP): The TNA User Selection Panel consists of separate subpanels for each of the TNA activities WP6-9. Each TNA panel is composed of one or both of the scientific ACTRIS co-coordinators, and an equal number of reputable scientists from different fields of atmospheric research both from within and outside the project (at least half of the TNA-USP members are independent from the consortium), possibly including members of the SAB. The members of the TNA-USP will be proposed by the ESG and appointed by the GA. The TNA-USP will:

- *review and select research projects submitted to TNA and propose funding to the coordination office; they will base their selection on scientific merit, with priority given to new users and users working in countries where no equivalent research infrastructure exist; they will apply the principles of transparency, fairness and impartiality;*
- *review the project reports for final approval.*

The ACTRIS Data Centre External Board (ACTRIS DC-EB): An external board of international experts will constitute the ACTRIS DC-EB, and the board will review the services offered by ACTRIS Data Centre periodically, at least two times during the project. This will be documented in two assessment reports defined as deliverables (see D10.4, D10.14 First, Second assessment report of the services offered by the ACTRIS Data Centre). The expert members of the external board will consist of at least 2 independent scientists outside the project (e.g. external data users), who will collaborate with at least 3 scientists from the project who are not partners of ACTRIS Data Centre. The leader of the ACTRIS Data Centre (WP10) will act as secretary for the ACTRIS DC-EB. The members of the external board should reflect the anticipated user community and will be proposed by the ESG, and appointed at the first ACTRIS-2 GA.

Table 3.2a: List of milestones

Milestone number	Milestone name	Related work package(s)	Estimated date	Means of verification
MS1.1	Project Kickoff meeting	1	2	Meeting held
MS1.2	Launch of call for TNA (TNA1-4)	1	3	Call available on the web portal
MS1.3	First official project meeting	1	12	Meeting held
MS1.4	Second official project meeting	1	24	Meeting held
MS1.5	Third official project meeting	1	36	Meeting held
MS1.6	Final official project meeting	1	48	Meeting held
MS2.1	First NA2 workshop	2	8	Workshop held
MS2.2	First internal hardware quality check performed	2	10	Report available on Internet
MS2.3	First radar calibration field study performed	2	18	Report available on Internet
MS2.4	Second NA2 workshop	2	20	Workshop held
MS2.5	Second internal hardware quality check performed	2	22	Report available on Internet
MS2.6	Lidar quicklook database implemented	2	24	First quicklook images available
MS2.7	Third NA2 workshop	2	32	Workshop held
MS2.8	Third internal hardware quality check performed	2	34	Report available on Internet
MS2.9	Second radar calibration field study performed	2	36	Report available on Internet
MS2.10	EARLINET Level 3 products implemented	2	44	EARLINET Level3 products available
MS2.11	Common EARLINET/Cloudnet algorithms and products implemented	2	44	Algorithms validated by user groups and products available
MS2.12	Fourth NA2 workshop	2	44	Workshop held
MS2.13	Fourth internal hardware quality check performed	2	46	Report available on Internet
MS3.1	First NA3 annual workshop	3	8	Workshop held
MS3.2	Expert workshop on cloud microphysical measurements	3	12	Workshop held
MS3.3	Expert workshop on “Development and implementation of QC tools for data submission”	3	12	Workshop held
MS3.4	NO2 side-by-side intercomparison performed	3	15	Report available on Internet
MS3.5	First QA/QC workshop performed and 1st year VOC/NOx data submitted	3	18	Workshop held
MS3.6	Second NA3 annual workshop	3	20	Workshop held
MS3.7	OVOC/terpenes side-by-side intercomparison performed	3	27	Report available on Internet
MS3.8	Second QA/QC workshop performed and 2nd year VOC/NOx data submitted	3	30	Workshop held

Milestone number	Milestone name	Related work package(s)	Estimated date	Means of verification
MS3.9	Third NA3 annual workshop	3	32	Workshop held
MS3.10	Released Measurement Guideline for VOCs and NOx.	3	42	Report available on Internet
MS3.11	Third QA/QC workshop performed and 3rd year VOC/NOx data submitted	3	42	Workshop held
MS3.12	Fourth NA3 annual workshop	3	44	Workshop held
MS4.1	Guidelines and info-package for standardization process for ACTRIS-2 partners and associated	4	6	Report available on Internet
MS4.2	Technical workshop with SMEs for exchange of expertise	4	12	Workshop held
MS4.3	Protocol for the exchange of expertise and information with the private sector	4	18	Protocol available on internet
MS4.4	Final report on standard-making process	4	44	Report available on Internet
MS4.5	Final report on the use of ACTRIS facilities and calibration centres for testing novel instruments.	4	46	Report available on Internet
MS5.1	Basic training course on aerosol and trace gases measurement techniques and data management	5	12	Training course held
MS5.2	Advanced training course on aerosol, cloud and trace gases	5	22	Training course held
MS5.3	Progress report on cooperation between ACTRIS and other European and international RIs, networks and programmes	5	24	Report available on Internet
MS5.4	Basic training course on aerosol and trace gases measurement techniques and data management	5	36	Training course held
MS5.5	Advanced training course on aerosol, cloud and trace gases	5	44	Training course held
MS6.1	Definition of application and selection procedure for TNA to LiCal	6	2	Nomination of selection Panel and forms available on internet
MS6.2	Advertisement of LiCal TNA opportunities and launch of continuous call for LiCal TNA	6	3	Call launched
MS6.3	Intermediate assessment of LiCal access provision and outreach	6	22	Assessment done and to be reported in D6.1
MS6.4	Final assessment of LiCal access provision and outreach	6	46	Assessment done and to be reported in D6.2
MS7.1	Definition of application and selection procedure TNA to AERONET-EUROPE Calibration Centre	7	2	Nomination of selection Panel and forms available on internet
MS7.2	AERONET-EUROPE Calibration Centre - Advertisement of TNA opportunities and launch of continuous call for TNA	7	3	Call launched
MS7.3	Intermediate assessment of AERONET-EUROPE Calibration Centre access provision and outreach	7	22	Assessment done and to be reported in D7.1
MS7.4	Final assessment of AERONET-EUROPE Calibration Centre access provision	7	46	Assessment done and to be

Milestone number	Milestone name	Related work package(s)	Estimated date	Means of verification
	and outreach			reported in D7.2
MS8.1	Definition of application and selection procedure for TNA to ECAC infrastructure	8	2	Nomination of selection Panel and forms available on internet
MS8.2	ECAC infrastructure : Advertisement of TNA opportunities and launch of continuous call for TNA	8	3	Call launched
MS8.3	Intermediate assessment of ECAC infrastructure access provision and outreach	8	22	Assessment done and to be reported in D8.1
MS8.4	Final assessment of ECAC infrastructure access provision and outreach	8	46	Assessment done and to be reported in D8.2
MS9.1	Definition of application and selection procedure for TNA to advanced ACTRIS stations	9	2	Nomination of selection Panel and forms available on internet
MS9.2	Advertisement of opportunities and launch of continuous call for TNA to advanced ACTRIS stations	9	3	Call launched
MS9.3	Intermediate assessment of advanced ACTRIS stations access provision and outreach	9	22	Assessment done and to be reported in D9.1
MS9.4	Final assessment of advanced ACTRIS stations access provision and outreach	9	46	Assessment done and to be reported in D9.2
MS10.1	Workshop to outline the ACTRIS Data Management Plan, and harmonise relevant measures for the periodical review reports	10	3	Workshop held
MS10.2	Extend web analytical tools for statistical analysis of ACTRIS data provision and use	10	6	Tools released and tested by a user group
MS10.3	Define the data flow and interactions between the ACTRIS data bases and ICARE	10	6	Report available on Internet
MS10.4	Define the interface for ACTRIS NRT data to operational models	10	12	Short note available on intranet
MS10.5	Concept and definition of the QC interactive tools	10	12	Report available on Internet
MS10.6	First yearly provision of complete overview of all reported ground-based in situ data to NA3 task leaders	10	15	Short note available on intranet
MS10.7	Transfer of Cloudnet DB to FMI	10	18	Data available from FMI datacentre
MS10.8	Production of GARRLiC sample products	10	18	Data checked and validated by a user group
MS10.9	Description of the ACTRIS Level1, Level2 and Level3 aerosol profile data	10	20	Report available on Internet
MS10.10	Define the data specifications required for submission of model datasets for evaluation	10	24	Report available on Internet

Milestone number	Milestone name	Related work package(s)	Estimated date	Means of verification
MS10.11	Second yearly provision of complete overview of all reported ground-based in situ data to NA3 task leaders	10	27	Short note available on intranet
MS10.12	Description of the new ACTRIS Level2 aerosol profile data	10	38	Report available on Internet
MS10.13	Third yearly provision of complete overview of all reported ground-based in situ data to NA3 task leaders	10	39	Short note available on intranet
MS11.1	New light-weight aethalometer for airborne measurements of the light absorption coefficient at several wavelengths validated against other methods.	11	6	Report available on Internet
MS11.2	First inversion algorithms for the determination of absorption coefficient and SSA vertical profiles available	11	12	Algorithm validated a a user group
MS11.3	First closure study between remote sensing and in-situ absorption retrievals performed	11	18	Report available on Internet
MS11.4	First closure of in situ measurements of black carbon completed.	11	18	Report available on Internet
MS11.5	Field experiments for closure between vertical profiles of in situ and remote sensing measurements for absorption coefficient and SSA completed.	11	42	field survey complete and data quality validated
MS12.1	Start of the tower-based flux measurements at six sites	12	14	Measurements started
MS12.2	Start of the inter-comparison campaign of tower-based instrumentation	12	24	Measurements started
MS12.3	Start of the comparisons of in-situ and ground-based remote-sensing techniques	12	30	Measurements started
MS13.1	Prototype of web-based model evaluation	13	24	Evaluation tool up and running for a user group
MS13.2	First Biennial Updates of ACTRIS-2 Trend Report on trend assessment	13	24	Report available on Internet
MS13.3	First release of Trend assessment products available in the Data Centre	13	24	Products available and validated
MS13.4	Reanalysis Visualization Web Interface	13	30	Interface up and running
MS13.5	Second Biennial Updates of ACTRIS-2 Trend Report on trend assessment	13	48	Report available on Internet
MS13.6	Second release of Trend assessment products available in the Data Centre	13	48	Products available and validated

Table 3.2b: Critical risks for implementation

Description of risk	Work package(s) involved	Proposed risk-mitigation measures
Unavailability of key staff	all	Contingency plan
Lack of commitment of monitoring infrastructure/data providers	WP2, WP3	Main stakeholders involved in the project
Lack of support for long-term strategy	WP5	Relevant stakeholders invited to the project meetings
Lack of coordination with Copernicus Atmosphere Service	WP2, WP3, WP5, WP10, WP13	ECMWF directly involved in the project
Lack of coordination with other RIs	WP5, WP10	Key partners from other RIs invited to attend project meetings and mainly belonging to same Institutions
Lack of coordination with Space Agencies	WP3, WP4, WP5, WP10, WP13	Main stakeholders involved in the Scientific Advisory Board
Lack of coordination with operational networks	WP2, WP3, WP5, WP10	Stakeholders partners of the project
Lack of users for TNAs	WP6-WP9	TNA sites and calibration centres already have a demand of access. Adequate promotion/ and shift of TNA resources if necessary according to user demand
Lack of users for VA	WP10	Continuous dialogue with stakeholders and users
Lack of international cooperation	WP5, WP10	International stakeholders members of the Scientific Advisory Board
Lack of interest from SMEs	WP2, WP3, WP4, WP11, WP12	Regular information exchange in the framework of ACTRIS-2 Innovation Platform WP4
Services do not comply with user expectations	WP6-WP10	Structured dialogue with users in WP2, WP3, WP5 and WP10

Table 3.2c: Summary of trans-national/virtual access provision

Access provider short name	*Short name of infrastructure*	*Installation*		*Installation Country code*	*Type of acces*	*Unit of access*	*Unit cost (UC) (€*	*Min. quantity of access to be provided*	*Access costs*		*Estimated number of users*	*Estimated number of user projects*
		Nr	*Short name*						*On the basis of UC*	*As actual costs*		
INOE	LiCal	1	LiCalTrain	RO	TA-uc	1 rwd	523.08	200	104 616.00	0.00	40	20
INOE	LiCal	2	LiCoTest	RO	TA-uc	1 rwd	472.33	100	47 233.00	0.00	20	20
LMU	LiCal	3	POLIS	DE	TA-cb	1 rwd	615.25	112	68 908.00	15 500.00	8	4
CNR	LiCal	4	MUSA	IT	TA-uc	1 rwd	447.78	42	18 806.76	0.00	6	3
CNR	LiCal	5	MUSAmobile	IT	TA-cb	1 rwd	435.24	84	36 560.16	38 925.00	6	3
LMU	LiCal	6	LiReQA	DE	TA-uc	1 rwd	494.16	160	79 065.60	0.00	80	20
LMU	LiCal	7	LiCheckUnit	DE	TA-cb	1 rwd	225.24	112	25 226.88	18 125.00	16	8
CNRS	AERONET-EUROPE	8	AE-LOA	FR	TA-uc	1 cal	1350.00	165	222 750.00	0.00	165	165
UVA	AERONET-EUROPE	9	AE-GOA	ES	TA-uc	1 cal	1200.00	100	120 000.00	0.00	100	100
AEMET	AERONET-EUROPE	10	AE-IZA	ES	TA-uc	1 cal	1830.00	70	128 100.00	0.00	70	70
TROPOS	ECAC	11	ECAC-WCCAP	DE	TA-cb	1 rwd	495.05	605	299 505.25	27 500.00	300	300
JRC	ECAC	12	ECAC-ERLAP	BE	TA-ac	1 rwd			0.00	92 054.00	15	15
CNRS	ECAC	13	ECAC-ACMCC	FR	TA-uc	1 rwd	1440.88	60	86 452.80	0.00	30	20
CNR	CIAO	14	CIAO	IT	TA-uc	1 rwd	405.58	144	58 403.52	0.00	16	8
CNR	CMN	15	CMN	IT	TA-uc	1 rwd	705.43	100	70 543.00	0.00	8	4
CNRS	SIR	16	SIR	FR	TA-uc	1 rwd	387.19	200	77 438.00	0.00	24	8
CNRS	PUY	17	PUY	FR	TA-ac	1 rwd		0	0.00	81 282.50	12	6
CNRS	MAIDO-OPAR	18	MAIDO-OPAR	FR	TA-uc	1 rwd	600.00	140	84 000.00	0.00	24	12

UHEL	SMR	19	SMR	FI	TA-uc	1 rwd	809.16	120	97 099.20	0.00	20	10
FMI	PAL	20	PAL	FI	TA-uc	1 rwd	500.89	84	42 074.76	0.00	12	4
PSI	JFJ	21	JFJ	CH	TA-uc	1 rwd	800.00	130	104 000.00	0.00	20	10
KNMI	CESAR	22	CESAR	NL	TA-uc	1 rwd	514.65	180	92 637.00	0.00	16	8
TROPOS	MEL	23	MEL	DE	TA-uc	1 rwd	572.45	100	57 245.00	0.00	14	4
NOA	FKL	24	FKL	GR	TA-uc	1 rwd	449.70	180	80 946.00	0.00	20	8
CHMI	KOS	25	KOS	CZ	TA-uc	1 rwd	664.32	100	66 432.00	0.00	16	8
UVA	ISAF	26	ISAF	ES	TA-uc	1 rwd	353.44	100	35 344.00	0.00	10	5
UGR	GRA	27	GRA	ES	TA-uc	1 rwd	391.84	100	39 184.00	0.00	12	6
CSIC	MSY	28	MSY	ES	TA-uc	1 rwd	326.13	100	32 613.00	0.00	10	5
ULUND	HYM	29	HYM	SE	TA-ac	1 rwd			0.00	40 606.25	6	4
CYI	CAO	30	CAO	CY	TA-ac	1 rwd			0.00	62 588.19	16	8
NUIG	MHD	31	MHD	IE	TA-uc	1 rwd	335.97	149	50 059.53	0.00	16	8
NILU	ACTRIS DATA CENTRE	32	EBAS	NO	VA					373 700.00		
CNR	ACTRIS DATA CENTRE	33	EARLINET	IT	VA					261 000.00		
CNRS	ACTRIS DATA CENTRE	34	ICARE	FR	VA					108 000.00		
FMI	ACTRIS DATA CENTRE	35	CLOUDNET	FI	VA					138 000.00		

3.3 Consortium as a whole

The ACTRIS-2 consortium is organized on the basis of ACTRIS with 22 identical beneficiaries and 4 newly formed Joint Research Units (JRU) reflecting growing importance of ACTRIS in the last 4 years in some EU countries. Five partners are new to the consortium: ECMWF, UNIVLEEDS, RIUUK, FMI, and CyI. The first three reflects the ACTRIS-2 strategy to include stronger expertise in atmospheric modelling, data assimilation and use of satellite products in the consortium and work together to elaborate data-product most suited to modelling needs. Participation of FMI adds expertise for database management and development within the ACTRIS Data Centre and a long-term measurement station in the Arctic. Participation of CyI reflects the strong investments made by Cyprus to equip and operate an observing station and the strong expertise in aerosol science the team has built in recent years. Overall, the consortium brings complementary expertise in all fields relevant to observation, from data provision to data usage and can now address challenges with the holistic approach needed to propose services suited to the user community. The ACTRIS-2 consortium is already comprehensive with more than 60 associated partners. Figure 3.3 reports the distribution of all the measurement sites contributing to ACTRIS-2.

Clearly, ACTRIS-2 brings together communities on the pan-European scale to create the critical mass required to impact on the European observation strategy. The project consortium is strengthened by the inclusion of institutes from most European countries, linking to their national strategies. Many participants in ACTRIS are also involved in other existing research initiatives at EU and member-state levels. Capitalizing on ACTRIS, the consortium brings complementary expertise in many different domains and has, for some of its partners, a long history of collaboration in INFRA and RTD projects. This ensures very minimal risk of problems in the partnership.

While no commercial company is partner to the project, innovation and links with SMEs are central in ACTRIS-2. Industrial involvement in the project comes from participation of SMEs in NA and JRA activities and use of services, in particular calibration services. It is clearly expected that developments that reached sufficient technology readiness level (TRL) may rapidly be included in prototypes as part of joint agreements between a specific ACTRIS-2 partner and a specific private partner. Organization of NA4 to coordinate links with industries favors establishment of these joint ventures.

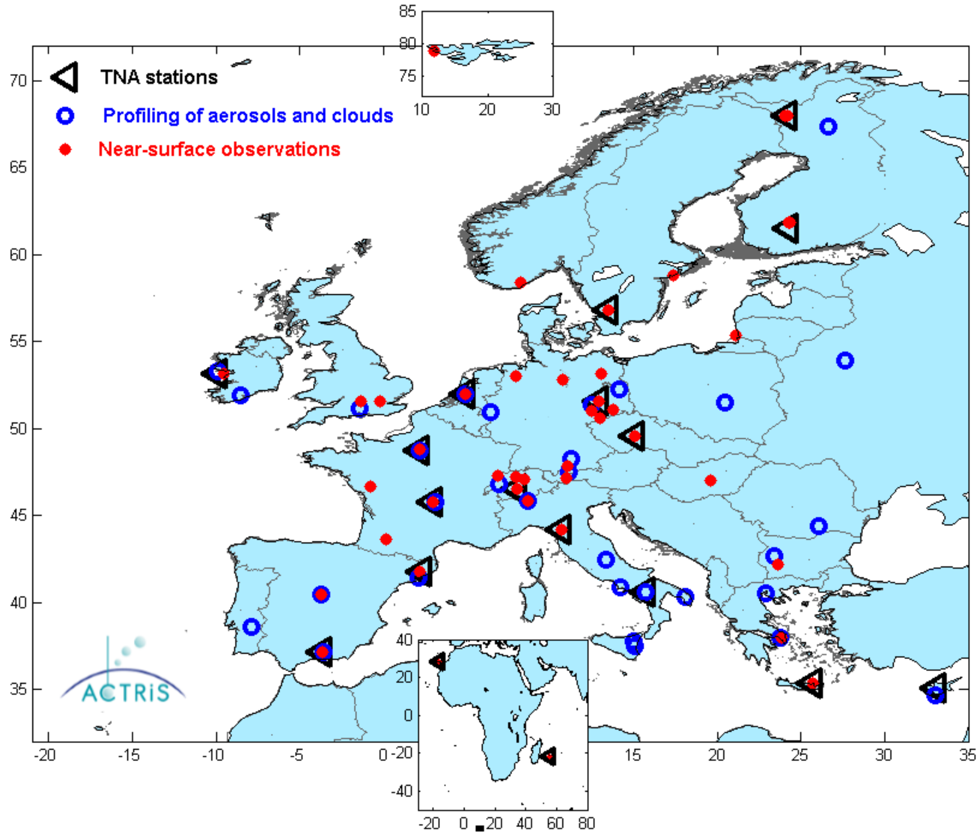


Figure 3.3: Map of measurement sites contributing to ACTRIS.

3.4 Resources to be committed

The overall requested budget of ACTRIS-2 is 9 541 215 € (it excludes the funds for the contribution to Swiss Partners PSI and EMPA which will be paid directly to researchers in Switzerland, according to Art. 9 of the H2020 Grant Agreement). The total resources are shared in a coherent way between activities with 34 % for NAs (excluding NA1), 30% for TNAs, 10% for VA and 20% for JRAs (Table 3.4.1).

	PM	Max grant /€	Requested grant /€	Requested (in % of total)
Management	74.5	569000	569000	5.96%
NA	432.2	3532693	3217999	33.7%
TNA	51.1	3037640	2913015	30.5%
VA	107.5	941200	941200	9.9%
JRA	259.9	2045969	1900000	19.9%
Total	925.2	10126502	9541215	100%

Table 3.4.1: Breakdown of human effort, maximum and requested grant, and percent allocation per type of activity

The cost for managing the project (including management of TNA) has been kept below 6% of the total budget. Overall, 40% of the budget (corresponding to more than 2.2 M€ special unit costs) will be used for providing trans-national and virtual access to the benefits of both partners and associated partners. This is substantially higher than in ACTRIS, reflecting the maturity of the RI.

A large fraction (47%) of resources going into the project is directed towards direct personnel costs (Table 3.4.2). A few partners will use a significant share of their allocation for T&S expenditures, reflecting the need for participation in many meetings and workshops. Networking activities and overall implementation of work will require a substantial number of technical workshops and working meetings to discuss methods, data, and progress for which a travel budget is required. The subcontracting costs (0.6%) are limited to one partner (NOA) for performing standardization procedures in NAs. A fraction of costs are also kept at WP level for invitation of external experts and associated research partners to meetings and workshops. Clearly, because ACTRIS is building on existing infrastructures operated by the partners in Europe (see consortium as whole), substantial personnel effort is directly provided on each partner's national budget. The investments made already in the basic requirements of this project, as outlined above, ensure a considerable complement to the financial contribution applied for here from the EU. In summary the project ensures that very substantial investments pay off in results that are of potentially very large indirect or direct value to the society.

Costs /€	Manage ment	NA	TNA	VA	JRA	Total	Total (in % of estimated)
Direct personnel	421600	2060383	205421	680960	1430500	4798865	47%
Other direct	33600	717772	444495	72000	206275	1474142	15%
Sub-contracting	0	60000	0	0	0	60000	0,6%
Indirect Costs	113800	694539	162479	188240	409194	1568252	15%
Special unit costs	0	0	2225243	0	0	2225243	22%
Total estimated eligible costs	569000	3532693	3037640	941200	2045969	10126502	100%
Requested grant	569000	3217999	2913015	941200	1900000	9541215	
Requested (in % of total)	5.96%	33.7%	30.5%	9.9%	19.9%	100,0%	

Table 3.4.2: Distribution of eligible costs per type of costs and activity.

Table 3.4a: Summary of staff effort

Participant Number/Short Name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	WP10	WP11	WP12	WP13	Total Person-Months per Participants
	NA1	NA2	NA3	NA4	NA5	TNA1	TNA2	TNA3	TNA4	VA1	JRA1	JRA2	JRA3	
1/CNR	**26**	18	6	**6**	4	0	0	0	0	38	10	0	4	**112**
2/CNRS	48.5	23.5	29.5	3	**7**	0	**0**	0	**16**	15.5	11	0	0.6	**154.6**
3/TROPOS	0	**26**	12	4	0.5	0	0	**0**	0	0	10	3	0	**55.5**
4/NOA	0	13	**16**	5	0	0	0	0	0	0	21	0	0	**55**
5/NILU	0	0	5	0	1	0	0	0	0	**34**	0	0	3	**43**
6/FMI	0	6	2.5	0	3.1	0	0	0	0	20	0	8.8	0	**40.4**
7/PSI	0	0	6	4	0	0	0	0	0	0	**16**	0	0	**26**
8/UHEL	0	0	8	2	9	0	0	0	0	0	0	**24**	0	**43**
9/EMPA	0	0	12	0	0	0	0	0	0	0	0	0	0	**12**
10/ECMWF	0	0	0	0	0	0	0	0	0	0	0	0	**21**	**21**
11/MET Norway	0	0	0	0	0	0	0	0	0	0	0	0	12	**12**
12/INOE	0	4	0	4	0	**0**	0	0	0	0	0	0	0	**8**
13/LMU	0	3	0	0	0	0	0	0	0	0	0	0	0	**3**
14/JRC	0	1.6	3.9	0	0	0	0	7.3	0	0	2.8	0	0	**15.6**
15/UVA	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
16/UGR	0	13	3	0	0	0	0	0	0	0	13	13	16	**58**
17/CSIC	0	0	13	0	0	0	0	0	0	0	0	0	0	**13**
18/KNMI	0	5.9	4.7	0	0	0	0	0	0	0	7.1	12.8	0	**30.4**
19/CHMI	0	0	5	0	0	0	0	0	0	0	0	14	0	**19**
20/ULUND	0	0	7	0	0	0	0	0	5	0	0	0	0	**12**
21/CYI	0	4.5	5.5	0	0	0	0	0	22.8	0	12	0	0	**44.8**
22/RIUUK	0	7	0	0	0	0	0	0	0	0	0	0	12	**19**
23/DWD	0	6	16	0	0.5	0	0	0	0	0	0	0	0	**22.5**
24/UNIVLEEDS	0	17.5	2.9	0	0	0	0	0	0	0	2.4	0	4.9	**27.7**
25/NERC	0	0	1	0	0	0	0	0	0	0	0	5.6	0	**6.6**
26/UPAC	0	0	12	0	0	0	0	0	0	0	0	0	0	**12**

Participant Number/Short Name	WP1 NA1	WP2 NA2	WP3 NA3	WP4 NA4	WP5 NA5	WP6 TNA1	WP7 TNA2	WP8 TNA3	WP9 TNA4	WP10 VA1	WP11 JRA1	WP12 JRA2	WP13 JRA3	Total Person-Months per Participants
27/IPNASB	0	9	0	0	0	0	0	0	0	0	0	0	0	**9**
28/CNISM	0	13	2.5	0	0	0	0	0	0	0	0	0	0	**15.5**
29/INRNE	0	8	10.6	0	0	0	0	0	0	0	0	0	0	**18.6**
30/NUIG	0	1	1	0	0	0	0	0	0	0	0	0	0	**2**
31/IGF PAS	0	4	10	0	0	0	0	0	0	0	0	0	0	**14**
Total Person months	74.5	184	195.1	28	25.1	0	0	7.3	43.8	107.5	105.3	81.2	73.5	**925.2**

Table 3.4b: ‘Other direct cost’ items (travel, equipment, other goods and services, access costs)

1/CNR	**Cost (€)**	**Justification**
Travel	61 400	GA meetings; MTR meeting; NA2-NA3 technical meetings; NA4-N5 meetings, JRA1 and JRA3 meetings. Participation in International Conferences for dissemination of results. Travel costs for Advisory Board members.
Other goods and services	14 200	Consumable costs for organization of meetings (NA1 and NA4). Publication costs including dissemination material (NA5).
Access cost	387 391	TNA1.4: Access costs for MUSA (total TA-uc cost: 18.807 €) TNA1.5: Access costs for MUSA-mobile (total TA-cb cost: 75.485 €) TNA4.1: Access cost for CIAO (total TA-uc cost: 58403€ = 144 UA x UC 405,58 €) TNA4.2: Access cost to CMN (total TA-uc cost: 70.543€ = 100 UA x UC 705,43 €) VA1.2: Access cost to EARLINET data base (total VA cost: 261.000 €)
Travel and subsistence for transnational access	48 920	TNA1.4: Support for users of MUSA: 15.000 € =T: 3.300€ (550€ x 6P) + S: 11.760€ (280€/d x 7d x 6P) TNA4.1: Support for users of CIAO: 17.920 € = T: 6.400€ (400€ x 4y x 2pr/y x 2P) + S: 11.520€ (80€/d x 144 access days) TNA4.2: Support for users of CMN: 16.000 € = T: 4.000€ (500€ x4y x 1pr/y x 2P) + S: 12.000€ (120€/d x 100 access days)
Total	**511 911**	
2/CNRS	**Cost (€)**	**Justification**
Travel	103 150	Travel of 7 CNRS institutes (LGGE, LOA, ICARE, LAMP, IPSL, LSCE, OSU-R) and 6 JRUs (UJF, Lille 1, MD, UPB, CEA, UR) in all NAs (incl. NA1, coordination of NA5, lead of NA2.1), VA1, JRA1,3: this requires considerable travel to meetings, workshops and conferences for 2 researchers per group.

Other	13 800	Instrument consumables NA2 and NA3, publication costs, office consumables
Access cost	527 939	TNA2.1: Access costs for LOA (total TA-uc cost: 222.750 €, 165 UA x UC 1350,00 €) TNA3.3: Access costs for ECAC-ACMCC: ACSM calibration (total TA-uc cost: 86.453 €, 60 UA x UC 1.440,88 €) TNA4.3: Access costs for SIR (total TA-uc cost: 77.438 €= 200 UA x UC 387,19 €) TNA4.4: Access costs for PUY (total TA-ac cost: 81.283 €) TNA4.5: Access costs to MAIDO (total TA-uc cost: 84.000 € = 140 UA x UC 600,00 €) VA1.3: Access cost to ICARE (total VA cost: 108.000 €)
T&S for TNA	94 540	TNA2.1: Support for users of LOA: 7.500 € = T: 2.500€ (250€ x 10P) + S: 5.000€ (100€/d x 5d x 10P) TNA4.3: Support for users of SIR: 24.000 € = T+S: 3.000 €/pr-3P x 4y x 2 pr/y TNA4.4: Support for users of PUY: 17.040 € = T: 6.000 € (500 € x 4y x 1.5pr/y x 2P) + S: 11.040 € (80€/d x 138 access days) TNA4.5: Support for users of MAIDO: 46.000 € = T: 24.000€ (1.000€ x 4y x 3pr x 2P) + S: 14.000€ (100€/d x 140 access days) + other: 8.000 € (360€ shipping, insurance for user equipment + 440€ for temporary exportation of equipment to French oversea x 10 shipments)
Total	**739 429**	
3/TROPOS	**Cost (€)**	**Justification**
Travel	31 600	Travel to GA meetings, WP meetings, conferences
Access cost	307 400	TNA3.1: Access costs for ECAC-WCCAP (total TA-cb cost: 327.005 €) TNA4.10: Access costs to MEL (total TA-uc cost: 57.245 € = 100 UA x UC 572,45€)
T&S for TNA	14 000	TNA4.10: Support for users of MEL: 14.000 € = T: 6.000€ (500€ x 4pr x 3P) + S: 8.000€ (80€/d x 100 access days)
Total	**353 000**	
4/NOA	**Cost (€)**	**Justification**
Travel	99 000	Travel to GA meetings, WP meetings, conferences incl travel of responsible researchers at 3 Greek stations (Lidars, 3 aerosol + trace gases) to technical meetings. 52000€ is for travel of NA3 associated partners to technical meetings.
Other	40 000	Spare parts for 3 Lidar and 3 aerosol and trace gases surface stations as well as publication costs
Access cost	64 757	TNA4.11: Access costs for FKL (total TA-uc cost: 80.946 € = 180UA x UC 449,70 €)
T&S for TNA	20 600	TNA4.11: Support for users of FKL: 20.600 € = T: 8.000€ (500€ x 4y x 2pr x 2P) + S: 12.600€ (70€/d x 180 access days)
Total	**224 357**	

5/NILU	Cost (€)	Justification
Travel	56 800	Travel to GA meetings, WP meetings, conferences (10K) Costs related to assessment board meetings and review procedure within VA1 (46.8K)
Other	1 600	Consumable costs related to assessment board meetings and review procedure within VA1
Access cost	298 960	VA1.1: Access to EBAS data base (total VA cost: 373.700 €)
Total	**357 360**	
6/FMI	**Cost (€)**	**Justification**
Travel	19 000	Travel to GA meetings, WP meetings, conferences
Access cost	144 060	TNA4.7: Access costs for PAL (total TA-uc cost: 42.075 € = 84 UA x UC 500,89 €) VA1.4: Access cost to Cloudnet data base (total VA cost: 138.000 €)
T&S for TNA	11 192	TNA4.7: Support for users of PAL: 11.192 € = T: 8.000€ (1.000€ x 4y x 1pr x 2P) + S: 3.192€ (38€/d x 84 access days)
Total	**174 252**	
7/PSI	**Cost (€)**	**Justification**
Travel	15 600	Travel to GA meetings, WP meetings, conferences
Access cost	83 200	TNA4.8: Access costs for JFJ (total TA-uc cost: 104.000 € = 84 UA x UC 500,89 €)
T&S for TNA	16 500	TNA4.8: Support for users of JFJ: 16.500 € = T: 10.000€ (500€ x 10pr x 2P) + S: 6.500€ (50€/d x 130 access days)
Total	**115 300**	
8/UHEL	**Cost (€)**	**Justification**
Travel	24 138	Travel to GA meetings, WP meetings, conferences
Access cost	77 679	TNA4.6: Access costs for SMR (total TA-uc cost: 97.099 € = 120 UA x UC 809,16 €)
T&S for TNA	23 400	TNA4.8: Support for users of SMR: 23.400 € = T: 15.000€ (750€ x 4y x 2.5pr/y x 2P) + S: 8.400 € (70€/d x 120 access days)
Total	**125 217**	
12/INOE	**Cost (€)**	**Justification**
Travel	19 500	4 GA meetings, 1 MTR, 4 WP2 + 4 WP4 technical meetings, average cost per travel (5 days, Europe: 1.500 €)
Other	1 950	Office consumables

Access cost	121 479	TNA1.1: Access cost for LiCalTrain (total TA-uc cost: 104.616 €) TNA1.2: Access cost for LiCoTest (total TA-uc cost: 47.233 €)
T&S for TNA	30 000	TNA1.1: Support for users of LiCalTrain: 30.000 € =T: 16.000€ (400€ x 40P) + S: 14.000€ (70€/d x 5d x 40P)
Total	**172 929**	
13/LMU	**Cost (€)**	**Justification**
Travel	7 000	Participation in technical workshops, conferences
Access cost	165 460	TNA1.3: Access costs for POLIS (total TA-cb cost: 84.408 €) TNA1.6: Access costs for LiReQA (total TA-uc cost: 79.066 €) TNA1.7: Access costs for LiCheckUnit (total TA-cb cost: 43.352 €)
Total	**172 460**	
14/JRC	**Cost (€)**	**Justification**
Travel	22 000	General Meetings (1/year), technical NA2 and NA3 workshops, scientific JRA1 meetings (1 /year for each), for 1 to 2 participants.
Other	2 000	Instrument shipment for participation in NA2 and NA3 technical workshops
Access cost	73 643	TNA3.1: Access costs for ECAC-ERLAP (total TA-ac cost: 92.054 €)
Total	**97 643**	
15/UVA	**Cost (€)**	**Justification**
Access cost	226 755	TNA2.2: Access costs for GOA (total TA-uc cost: 120.000 €, 100 UA x UC 120 €) TNA2.3: Access costs for IZANA (total TA-uc cost: 128.100 €, 70 UA x UC 1830 €) TNA4.13: Access costs for ISAF (total TA-uc cost: 35.344 € = 100 UA x UC 353,4 €)
T&S for TNA	15 000	TNA2.2: Support for users of GOA: 7.500 € = T: 2.500€ (250 € x 10P) + S: 5.000€ (100€/d x 5d x 10P) TNA4.13: Support for users of ISAF: 7.500 € = T: 2.500 € (500€ x 5pr x 2P; requested 50%) + S: 5.000€ (100€/d x 100 access days; requested 50%)
Total	**241 755**	
16/UGR	**Cost (€)**	**Justification**

Travel	125 200	Project meetings, attendance at workshops, conferences and congress and measurement campaign Associated partners travel costs within NA2
Other	2 565	costs of dissemination actions, publications expenses, express courier costs, consumables, etc.
Access cost	31 347	TNA4.14: Access costs for GRA (total TA-uc cost: 39.184 € = 100 UA x UC 391,84 €)
T&S for TNA	9 800	TNA4.14: Support for users of GRA: 9.800 € = T: 4.800€ (400€ x 1.5pr/y x 4y x 2P) + S: 5.000€ (100€/d x 100 access daxs, requested 50%)
Total	**168 912**	
17/CSIC	**Cost (€)**	**Justification**
Travel	3 000	Travel to GA meetings, WP meetings, conferences
Access cost	26 090	TNA4.15: Access costs for MSY (total TA-uc cost: 32.613 € = 100 UA x UC 326,13 €)
T&S for TNA	5 000	TNA4.15: Support for users of MSY: 5.000 € = T: 2.500€ (500 € x 5pr x 2P; requested 50%) + S: 2.500€ (50€/d x 100 access days; requested 50%)
Total	**34 090**	
18/KNMI	**Cost (€)**	**Justification**
Travel	33 300	Travel to GA meetings, WP meetings, conferences
Access cost	74 110	TNA4.15: Access costs for CESAR (total TA-uc cost: 92.637 €= 180 UA x UC 514,65 €)
T&S for TNA	24 200	TNA4.15: Support for users of CESAR: 24.200 € = T: 8.000€ (500€ x 8pr x 2P) + S: 16.200€ (90€/d x 180 access days)
Total	**131 610**	
19/CHMI	**Cost (€)**	**Justification**
Travel	34 138	Travel to project meetings, intercomparison workshops, training courses and measurement campaigns, conferences
Other	18 382	Shipment of equipment to intercomparison workshops and campaigns, publications costs, consumables
Access cost	53 146	TNA4.12: Access costs for KOS (total TA-uc cost: 66.432 € = 100 UA x UC 664,32 €)
T&S for TNA	18 000	TNA4.12: Support for users of KOS: 18.000 € = T: 8.000€ (500€ x 4y x 2pr x 2P) + S: 10.000€ (100€/d x 100 access days)
Total	**123 666**	
20/ULUND	**Cost (€)**	**Justification**

Travel	8 910	Travel to GA meetings, WP meetings, conferences
Access cost	32 485	TNA4.16: Access costs for HYM (total TA-ac cost: 40.606 €)
T&S for TNA	7 500	TNA4.16: Support for users of HYM: 7.500 € (150€/d x 50 access days)
Total	**48 895**	
21/CYI	**Cost (€)**	**Justification**
Travel	7 094	Participation in the NA2, NA3, JRA technical/scientific meetings
Other	13 753	Transportations and maintenance of UAVs during the field campaigns planned (JRA)
Access cost	50 071	TNA4.17: Access costs for CAO (total TA-ac cost: 62.588 €)
T&S for TNA	10 000	TNA4.17: Support for users of CAO: 10.000 € (100€/d x 100 access days)
Total	**80 918**	
23/DWD	**Cost (€)**	**Justification**
Travel	22 100	NA2+NA3+NA5 : General Meetings (1/year), scientifc + technical + meetings (2/year), data workshops (1/year) and conferences (1/year) for 1-2 scientists at DWD-MOL and 1-3 scientists at DWD-HPB.
Other	7 000	NA3 (Tasks 1 and 4): Consumables: Contribution to selection of test/target gases, analyses of test/target gases; intercomparison experiments at MOHP. Shipping costs for travel standards (WP3).
Total	**29 100**	
24/UNIVLEEDS	**Cost (€)**	**Justification**
Travel	34 200	participation of Univleeds and 4 JRUs (UREAD, U York, U Herts, Chilbolton) in GA meetings, WP meetings, conferences
Total	**34 200**	
25/NERC	**Cost (€)**	**Justification**
Travel	10 003	Travel to GA meetings, WP meetings, conferences NA3, JRA3. Costs related to travel in JRA2 to experimental sites.
Other	11 308	Instrument consumables and servicing /repair within JRA2.
Total	**21 311**	
26/UPAC	**Cost (€)**	**Justification**

Travel	8 000	Travel to NA3 workshops, General Assembly and K-puszta station
Other	8 000	standards and consumables necessary for the ILC of organic tracers in NA3, transportation of instruments for intercomparison
Total	**16 000**	
27/IPNASB	**Cost (€)**	**Justification**
Travel	15 600	Travel to ACTRIS-2 meetings, training, exchange of experience, 3 persons per year
Other	1 000	Consumables for optimization of instruments for long-lasting operation (Task 2.1.1)
Total	**16 600**	
28/CNISM	**Cost (€)**	**Justification**
Travel	13 000	Participation in the meetings 1 or 2 persons × 2 meetings × 4 years
Total	**13 000**	
29/INRNE	**Cost (€)**	**Justification**
Travel	15 700	Participation in the project meetings, travel expenses to the station BEO
Other	6 850	Optical & electron components, maintenance, technical assistance, software, etc.
Total	**22 550**	
30/NUIG	**Cost (€)**	**Justification**
Travel	8 000	4 NA2+4 NA3 meetings (1000€ each)
Other	13 166	Instrument service (2500€ * 4), Consumables 916€ *4 years
Access cost	40 048	TNA4.18: Access costs for MHD (total TA-uc cost: 50.060 € = 149 UA x UC 335,97 €)
Total	**61 214**	
31/IGF PAS	**Cost (€)**	**Justification**
Travel	19 500	Technical meetings NA2 meetings (2P/year) + NA3 (1P/year), General assembly (1/P/year)
Total	**19 500**	

Section 4: Members of the consortium

4.1. Participants (applicants)

4.1.1 Consiglio Nazionale delle Ricerche (CNR)

The National Research Council of Italy is one of the most important public research performing organization in Italy, reporting directly to the Ministry of the Education, University and Research. Its duty is to carry out, promote, spread, transfer and improve research activities in the main sectors of knowledge growth and of its applications for the scientific, technological, economic and social development. It is organized in 7 Departments coordinating the activities of more than 100 Institutes in the main fields of knowledge, from life sciences to engineering, from earth system science to humanities, and managing the research infrastructures.

The CNR Department of Earth System Science and Environmental Technologies (CNR-DTA, www.dta.cnr.it) in one of them. Its mission is to support and coordinate the research activities carried out by its 13 associated Institutes dealing with environmental sciences, including climate change, and the development of innovative monitoring technologies. The activities of the Department of Earth System Science and Environmental Technologies (DTA) are carried out by a staff of approximately 1100 people supported by approximately other 800 collaborators in the research area.

In the consortium two institutes of CNR - DTA are involved: IMAA and ISAC.

The **Institute of Methodologies for Environmental Analysis (IMAA)** research activities involve more than 100 researchers and make use of laboratories and facilities of international relevance in the field of the Earth Observation. The IMAA scientific mission is the study of the atmosphere and of the Earth’s surface by using remote sensing techniques, environmental and geophysical monitoring, the evaluation of the impacts of the anthropogenic activities system and the implementation of optimising models to assess the best resources allocation.

The **Institute of Atmospheric Sciences and Climate (ISAC)** employs over 200 staff members to conduct pure and applied research on atmospheric sciences and the climate system and to produce results directly transferable to the society also beyond the national borders. The headquarters is located in Bologna, and other five sections and units are located around the country: Roma, Lecce, Cagliari, Padova and Torino. The ISAC is organized into four divisions: Dynamic Meteorology, Climate Change, Earth Observations, Atmospheric Processes and a technical service structure that are integrated by seven atmospheric and climate Observatories.

Role in the project

CNR will coordinate and manage the project (WP1) and it will actively contribute to other WPs. CNR will strongly contribute to NA2 with a leading role for the task 2.1 “Optimization of aerosol profiling”. CNR will also contribute to NA3 and NA5 and will lead NA4 on “Innovation”. It will provide TNA to two observatories: CIAO (CNR-IMAA Atmospheric Observatory) and Monte Cimone (CNR-ISAC) (WP9). CNR will also contribute to the Lidar Calibration Center (LiCal) [WP7] providing the reference lidar MUSA as both mobile and fixed systems. CNR will contribute to VA hosting the EARLINET data base for the lidar profiling data (WP10) and it will contribute to JRA1 and JRA3.

Principal personnel involved

Dr. Gelsomina Pappalardo (**female**) is the chief scientist of the Head of Lidar Group and of the CNR-IMAA Atmospheric Observatory (CIAO). She has over 20 years research experience in the field of atmospheric studies with lidar techniques. She has authored or co-authored more than 50 papers in the peer-reviewed literature. Dr. Gelsomina Pappalardo participated as PI in several national and international projects. She is the coordinator of the FPVII ACTRIS Project. Dr. Gelsomina Pappalardo is co-chair of GALION and member of the Scientific Advisory Group for Aerosols of the Global Atmosphere Watch (GAW) aerosol program of WMO. Dr. Pappalardo is the Chair of the ESFRI Strategy Working Group for Environmental Science.

Dr. Lucia Mona (female): is a researcher at CNR-IMAA. Dr Mona has a researcher profile that combines expertise on developments of lidar systems, instruments integration/combination, analysis methodologies, exploitation of state-of-the-art measurements for different application fields and integrated studies with models. She is working on exploitation of EARLINET (European Aerosol Research Lidar NETwork) database for comparison/integration with other ground-based and satellite measurements and models and model evaluation/integration studies for peculiar long-range transport cases and for multi-year observation. She is leading the AEROSAT (International Satellite Aerosol Science Network) Working Group on Aerosol Typing. She is member of the Regional Steering Group of the SDS-WAS (Sand and Dust Storm Warning Advisory and Assessment System) of the WMO.

Dr. Giuseppe D'Amico (male) is researcher at the CNR-IMAA since the 2006 in the field of atmospheric aerosol and water vapour study and characterization by Lidar techniques. He worked on the designing and on the development of advanced multiwavelength Raman Lidars as well as on the development and implementation of optimised algorithms for the analysis of Lidar data. He is responsible for the development and the implementation of the EARLINET Single Calculus Chain (SCC) a fully automatic and quality assured tool to retrieve standardized aerosol optical products within EARLINET (European Aerosol Research LIdar NETwork).

Dr. Paolo Bonasoni (male): Senior Research at the CNR-ISAC, is head of the research infrastructures: Climate Observatory "O. Vittori" at Mount Cimone and Nepal Climate Observatory-Pyramid (two GAW-WMO global stations). Main scientific interests: physical and chemical processes of ozone and other atmospheric compounds in remote mountain regions and in background conditions; climate change in mountain regions; environmental technologies for climate observations in mountain and remote areas. Principal investigator in several international projects (VOTALP I & II, MINATROC, STACCATO, EUSAAR, ACCENT, POLPO, SHARE...). Paolo Bonasoni is chair of the PON I-AMICA and author or co-author more than 80 papers in the peer-reviewed literature.

Dr. Angela Marinoni (female) has degree and PhD in Environmental Science, with experience on chemistry and photochemistry of aerosol, cloud and precipitations in different environments. She is working since 2005 at CNR-ISAC, where she gained experience on integration of observations concerning chemical, physical and optical aerosol properties, especially in mountain and remote areas. She is responsible for the measures of atmospheric aerosol at the GAW global stations of Monte Cimone (Northern Apennines, 2165 m), Nepal Climate Observatory-Pyramid (Himalayas, 5079 m asl) and in the framework of EUSAAR and ACTRIS projects. She is author or co-author of about 50 papers in ISI journals.

Relevant publications

- Pappalardo, G., Amodeo, A., Apituley, A., Comeron, A., Freudenthaler, V., Linné, H., Ansmann, A., Bösenberg, J., D'Amico, G., Mattis, I., Mona, L., Wandinger, U., Amiridis, V., Alados-Arboledas, L., Nicolae, D., and Wiegner, M.: EARLINET: towards an advanced sustainable European aerosol lidar network, Atmos. Meas. Tech., 7, 2389-2409, doi:10.5194/amt-7-2389-2014, 2014.
- Mona, L., Papagiannopoulos, N., Basart, S., Baldasano, J., Binietoglou, I., Cornacchia, C., and Pappalardo, G.: EARLINET dust observations vs. BSC-DREAM8b modeled profiles: 12-year-long systematic comparison at Potenza, Italy, Atmos. Chem. Phys., 14, 8781-8793, doi:10.5194/acp-14-8781-2014, 2014.
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- Cristofanelli P., F. Fierli, A. Marinoni, F. Calzolari, R. Duchi, J. Burkhart, A. Stohl, M. Maione, J. Arduini, and P. Bonasoni. Influence of biomass burning and anthropogenic emissions on ozone, carbon monoxide and black carbon at the Mt. Cimone GAW-WMO global station (Italy, 2165ma.s.l.) in Atmos. Chem. Phys., 13, 10.5194/acp-13-15-2013. (2013)
- Beddows, D. C. S., Dall'Osto, M., Harrison, Roy M., Kulmala, M., Asmi, A., Wiedensohler, A., Laj, P., Fjaeraa, A. M., Sellegri, K., Birmili, W., Bukowiecki, N., Weingartner, E., Baltensperger, U., Zdimal, V., Zikova, N., Putaud, J.-P., Marinoni, A., Tunved, P., Hansson, H.-C., Fiebig, M., Kivekäs, N., Swietlicki, E., Lihavainen, H., Asmi, E., Ulevicius, V., Aalto, P. P., Mihalopoulos, N., Kalivitis, N., Kalapov, I., Kiss, G., de Leeuw, G., Henzing, B., O'Dowd, C., Jennings, S. G., Flentje, H., Meinhardt, F., Ries, L., Denier van der Gon, H. A. C., and Visschedijk, A. J. H.: Variations in tropospheric submicron particle size distributions across the European continent 2008–2009, Atmos. Chem. Phys. Discuss., 13, 31197-31249, doi:10.5194/acpd-13-31197-2013, 2013.

Relevant projects

- EU FP7 project ACTRIS (Aerosol, Clouds, and Trace gases Research Infrastructure network). Contract n. 262254.
- EU FP7 project ITaRS (Initial Training for Atmospheric Remote Sensing). Contract n. 289923.
- EU FP7 project WEZARD (Weather hazards for aeronautics). Contract n. 285050.
- EU FP7 project PEGASOS (Pan-European Gas-Aerosol-Climate Interaction Study). Contract n. 265148.
- EU FP6 project EARLINET-ASOS (European Aerosol Research Lidar network – Advanced Sustainable Observation System). Contract n. 025991.

4.1.2 Centre National de Recherche Scientifique (CNRS)

The **French National Centre for Scientific Research (CNRS)** is a government- funded research organization, under the administrative authority of France’s Ministry of Research. With more than 34.000 staff (researchers, engineers, technicians and administrative staff), a 2010 budget of 3.204 billion euros and an implementation on all national territory, the CNRS is active in all fields of knowledge, drawing on more than 1200 research groups. CNRS conducts research in all scientific, technological and societal like mathematics, physics, communications, nuclear physics, chemistry, social sciences, environmental sciences or engineering. The CNRS is present in all major disciplines grouped within ten institutes.

CNRS is represented in the project by seven institutes: Laboratoire de Glaciologie et Géophysique de l'Environnement (LGGE), Laboratoire d'Optique Atmospherique (LOA), Centre de Données et de Services ICARE (ICARE), Laboratoire de Météorologie Physique (LAMP), Institut Pierre Simon Laplace (IPSL), Laboratoire des Sciences du Climate et de L'Environnement (LSCE), Unité Mixte de Service de l'OSU Réunion (OSUR). Furthermore involved in the project are six joint research units: Joseph Fourier Grenoble 1 (UJF), Université Lille 1, Ecole des Mines de Douai (MD), Université Blaise Pascal Clermont-Ferrand 2 (UBP) Commissariat à l'énergie atomique (CEA), and the Université de la Réunion (UR).

The **Laboratoire de Glaciologie et Géophysique de l'Environnement (LGGE)** LGGE is a Joint Research Unit (JRU) between University Joseph Fourier and the Centre National de la Recherche Scientifique (CNRS). It is one of the leading laboratories in “cold region science”, covering a broad range of research topics related to glaciology (both theoretical and experimental), ice cores (with leading participation in large successful projects such as Vostok, GRIP, EPICA and NEEM), climate research (modelling and field work) and atmospheric chemistry research in polar and mountain regions. LGGE has a staff of approximately 70 permanent researchers for a total staff of approximately 140 people. LGGE has been participating to observation studies with both the observations from high altitude observatories related to GAW and the expertise in source apportionment studies.

The **Laboratoire d'Optique Atmosphérique (LOA)**, http://www-loa.univ-lille1.fr/, is a Joint Research Unit between CNRS and University of Lille 1 (Third party)**.** LOA, located in Lille, has a well known expertise in remote sensing and study of tropospheric and stratospheric aerosols, clouds and their links with shortwave, longwave radiations and climate. LOA is one of the key laboratories in the world operating the AERONET network (Service National d'Observation PHOTONS) and developing retrieval algorithms for ground-based networks (sun-photometer and LIDAR) and space-borne missions (POLDER, MODIS, PARASOL and the future 3-MI in 2020). LOA is also one of the key CNRS French laboratories that created the ICARE satellite database and processing center.

The **ICARE Data and Services Center (ICARE)** at the University of Lille is a facility jointly administrated by CNRS, CNES and the University of Lille. It is the main component of the ICARE (Cloud-Aerosol-Water-Radiation Interactions) Thematic Centre that was created in 2003 by CNES, CNRS, the Nord-Pas-De-Calais Regional Council, and the University of Lille. ICARE provides various services to support the research community in fields related to atmospheric physics, such as aerosols, clouds, radiation, water cycle, and their interactions. ICARE's initial emphasis is the production and distribution of remote sensing data derived from Earth observation missions from CNES, NASA, EUMETSAT, ESA, and various other space agencies. The ICARE Data and Services Center develops science algorithms and production codes, building on the expertise from a number of partner Science Computing Facilities, and distributes products to the user community. ICARE has a lot of experience with the processing and analysis of large amounts of EO data in support of research activities such as climate change monitoring. ICARE contributes to many collaborative projects to provide custom data services, including visualization, subsetting, reprojection, colocation, reformatting, and satellite vs. ground-based observations comparisons.

The **Laboratoire de Météorologie Physique (LAMP),** Clermont-Ferrand, has a long-standing experience in the experimental and modelling studies of clouds and their interactions with solar radiation and atmospheric gaseous and particulate compounds. The main research activities deal with the formation of new particles, the role of aerosols in the formation of iced and mixed-phase clouds and their impact on the Earth's radiation budget. It implements the gaz, aerosol and cloud observation site of Puy-de-Dôme, labelled global GAW station, where some of the aerosol chemical, physical and optical properties are monitored since 1996. LaMP has co-ordinated a number of EU projects within FP4 to FP6 and is present in the steering committees of several national and international programmes.

The **Institut Pierre-Simon Laplace (IPSL)** is a CNRS research institute in environmental and climate sciences that federates six national research laboratories of which 3 are ACTRIS participants: Laboratoire de Météorologie Dynamique (LMD), Laboratoire des Sciences du CLimat et de l'Environnement (LSCE) and Laboratoire Atmosphère, Milieux, Observations Spatiales (LATMOS). IPSL coordinates 1000 researchers and technical staff involved in both Earth observation from space and from the ground and in atmospheric modelling (mesoscale and climate).

The **"Laboratoire des Sciences du Climat et de l'Environnement" (LSCE**) is a joined research unit of CNRS and the Commissariat à l'Energie Atomique (CEA). LSCE, located at Gif/Yvette in the region of Paris, France covers numerous fields of research related to climate and environment and, in particular, atmospheric composition monitoring, Earth System modelling and modelling of biogeochemical cycles, geochronology and analysis of environmental geomarkers climate variability and dynamics. LSCE has a staff of approximately 150 permanent researchers for a total staff of approximately 300 people. LSCE is currently involved in a large number of international (GAW related) atmospheric networks and is playing a major role in the ICOS European infrastructure.s

The **Observatoire des Sciences de l'Univers - la Réunion (OSU-R)** is a is a mixed research unit (CNRS and Université de la Réunion) located at Saint Denis in La Réunion (Indian Ocean), France.

Role in the project

The CNRS institutions and its joint research units are involved in many aspects of the project from Co-Coordination and management in NA1 to participation in networking activities NA2-5, transnational access activities TNA2-4, virtual activity VA1, and joint research activities JRA1+3. It will lead NA5 for training, international cooperation, and outreach, activities. CNRS operates three ground-based ACTRIS stations (SIRTA, Puy de Dôme, Maido in Réunion Island) which all offer TNA. It also provides TNA to two calibration facilities: the AERONET-Europe calibration centre and the Aerosol Chemical Monitor Calibration Center (ACMCC).

LGGE will be involved in the scientific coordination and management of ACTRIS-2, with leadership of NA5. LGGE will participate in NA3 for the aerosol component and to NA4, with responsibilities to link ACTRIS-2 to SMEs.

LOA will be leader of AERONET-EUROPE TNA (TNA2, WP7) and will contribute to aerosols profiling, including absorption (NA2 and JRA1) and to the joint LIDAR/sunphotometer joint inversion proposed to be operationally implemented in ICARE in VA1 (WP10).

ICARE will generate value-added products derived from lidar and sunphotometer measurements (VA5.4), and will make them available through the ACTRIS portal. CNRS-ICARE will provide a collocation service to help combining ACTRIS ground-based data with satellite observations and model outputs (VA5.5).

MD will be involved in several tasks of the NA3 (in-situ aerosols, clouds and traces gases) concerning reactive traces gases and especially in the task 2 aiming at establishing methodologies for high quality measurements.

LaMP will be involved in NA1 for management of ACTRIS, in NA3 for upgrading to the new European standards and providing in situ gas, aerosol and cloud properties monitored at the PUY station and NA2 for insuring quality controlled aerosol LIDAR profiles. It will lead the in situ cloud properties subtask NA3.2.2 and be responsible for TNA to the PUY station within TNA4.

IPSL is responsible for Transnational Access to the SIRTA atmospheric observatory on the Plateau de Saclay (TNA4 WP9.3) within ACTRIS-2. IPSL is also involved in several tasks of WP “NA2” (Profiling aerosols, clouds and trace gases).

LSCE is responsible for the ACMCC (Aerosol Chemical Monitor Calibration Center) which is one the 3 components of the WP8 “Calibration facility for in-situ aerosol characterization” (TNA3). It is also involved in several tasks of the WP “NA3” (in-situ aerosols, clouds and traces gases; leader of Task 2.1) and is currently hosting the in-situ gas/aerosol component of the French atmospheric station SIRTA (TNA Station).

OSUR/UR is involved in the WP “TNA” for access to the Maïdo Observatory (2160m asl, lat. 21°S, lon. 55°E).

Principal personnel involved

Paolo Laj (**male**, 48) is senior scientist at the Geophysical Observatory of Grenoble (OSUG) and LGGE, after 10 years at LaMP-CNRS in Clermont-Ferrand. He is the acting co-coordinator of ACTRIS. He has been involved in a number of EU projects since FP4 (ACCENT, EUCAARI, CIME, ACE2, EUSAAR, PEGASOS). He is author or co-author more than 110 research articles in the field of aerosols and clouds and their interactions. He is a member of WMO expert group on aerosols. He will be co-coordinating ACTRIS.

Jean-Luc Jaffrezo (**male,** 55) is senior scientist at CNRS-LGGE. He has 25 years of research experience in Atmospheric Chemistry, with a specific focus on North Polar Regions, and on Air quality in mid latitude regions. He specialized in physical and chemical characterization of particulate matter. He is author of more than 80 refereed publications. He participated to numerous European and international programs, including FP5-FP7 programs, and leaded numerous national programs on the links between particulate characterizations and sources.

Dr. Philippe Goloub (**male**, 47) is full professor at Lille University since 2003. In LOA, he focuses research activities on aerosols and clouds remote sensing from both space and ground-based measurements, with emphasis on polarization. He is in charge of the PHOTONS/AERONET sunphotometer network, national observatory devoted to aerosol characterization and monitoring since 2001 and leader of AERONET-EUROPE TNA during ACTRIS-1. Since 2013, he is leading the Aerosol Radiation Interaction group (30 persons) and the observation activities in the labex CaPPA project (Chemical and Physical Processes in the Atmosphere, http://labex-cappa.univ-lille1.fr/). Co-author of 90 publications in peer reviewed journal, he was/is involved is several bilateral collaborative projects with Spain, China, Belarus, Ukraine. In ACTRIS-2, Philippe Goloub will lead AERONET-EUROPE activity. As PI of Lille EARLINET station, he will contribute to VA1 and NA2.

Dr. Oleg Dubovik (**male**, 51) is CNRS Research Director at LOA since 2006. His major interests are in development and applications of aerosol retrievals by inversion of ground-based, satellite and airborne measurements, as well as, by applying chemical transport inverse modeling to satellite observations. He focuses on development of methodological aspects of improving retrieval by applying elaborated statistical optimization approach and using combined observations. At GSFC/NASA (USA), he was PI of AERONET inversion development (1997-2006) and co-investigator in several projects (AERONET, MODIS, MISR, CALIPSO). Since 2009, at LOA, he is continuously involved in EU-projects (EUMETSAT, ACTRIS, ESA (CCI-2, Sentinel-3/OLCI)). He is co-author of 150 publications in peer-reviewed journals, several book chapters and was elected Fellow of AGU in recognition of outstanding contributions to geophysical science. In ACTRIS-2, as main creator of joint LIDAR/sunphotometer inversion softwares, Oleg Dubovik will contribute to aerosol profiling activities (NA-2) and their implementation at ICARE center (VA1).

Dr. Jacques Descloitres (male) has been the Director of the ICARE Data and Services Center since 2005. He leads a team of a dozen developers and technicians who process satellite observations and develop tools to support data analysis. Dr. Jacques Descloitres holds a Ph.D. in Physics for Remote Sensing from the University of Paris 7. His field of expertise is radiative transfer in the atmosphere and land remote sensing. Prior to joining the ICARE project in 2005, he worked as a Quality Assurance lead scientist for the MODIS Land Science Team during 1997-2000. He led the MODIS Rapid Response System at NASA Goddard Space Flight Center during 2001-2004 and was a MODIS Science Team member.

Dr. Bernard Legras (male), expert in atmospheric transport asnd water processes, is Scientific Chair of the ICARE Thematic Center on aerosols and clouds. He received the Silver Medal of CNRS. He is a member of the Academia Europaea.

Dr. Anne Vermeulen (female) holds a Ph.D. in Atmospheric Physics from University of Lille. She has extensive experience in radiative transfer, atmospheric correction, and aerosol ground-based and spaceborne observations. She was responsible for the quality assurance of the MODIS surface reflectance product with the University of Maryland during 1996-1999. She worked with the AERONET group at NASA Goddard Space Flight Center during 1999-2005. She joined the ICARE Data and Services Center in 2006.

Dr. Stéphane Sauvage (male, 45**)** is lecturer and researcher in the Atmospheric Sciences and Environmental Engineering department of Mines Douai. He is an expert in trace gas measurements. His main research topic concerns VOC speciation and behavior in the atmosphere. He also coordinates the French EMEP measurement network named MERA including 13 background sites for long term aerosol and gas monitoring. He is (co-)author of 20 publications in peer-review journals

Dr. Karine Sellegri (female, 40**)**, CNRS researcher (LaMP), is specialized in aerosol formation and aerosol-cloud interactions. She is a group leader since 2012 (20 persons), and in charge of the aerosol characterization at the PUY station since 2008. She is author and co-author of 65 peer-reviewed articles, among which 2 in PNAS. She participated in 5 EU projects, and supervised 7 PhD theses.

Dr. Aurélie Colomb (female, 39**)**, ass. prof (LaMP), specialized in in situ gaz-phase measurements and in particular VOC compounds. She is in charge of the SO-PUY, co-director of the Observatoire de Physique du Globe (OPGC) observatory. She is author and co-author of over 20 publications in peer-reviewed journals.

Dr. Sabine Philippin (female, 47) is European project manager based at CNRS-LAMP since 2004 and involved in the management of FP6 EU projects ACCENT, EUSAAR, and FP7 EU project ACTRIS. She received a PhD in meteorology with experience in aerosol characterization and in situ measurements.

Dr. Martial Haeffelin (**male**) is a research scientist with 20-year experience in cloud radiative effects, initially with the NASA Langley Research Center (USA), and now with CNRS-IPSL (France) since 2002. He is the Director of the SIRTA atmospheric observatory, also Deputy Director of IPSL for Earth Observations, and PI for the BSRN station in Palaiseau. He is a member of the EU TO-PROF COST program management committee, and chair of the automatic Lidar and ceilometer working group. He is the author and co-author of 60 peer-reviewed articles.

Dr. Jean Sciare (**male**, 44) is Research Director at CNRS and is responsible for the ACMCC at LSCE. His main activities concern the experimental chemical characteriszation of aerosols and their impact on regional climate and air quality through long term observations in strategic areas (region of Paris, Mediterranean, Austral Ocean…). He is (co-)author of more than 80 publications in peer-review journals. CV for J. Sciare available at http://www.lsce.ipsl.fr/Phocea/Pisp/index.php?nom=jean.sciare.

Dr Jean-Pierre Cammas (**male**, 54) is Research Director at CNRS and develops research on atmospheric composition, dynamics and long range transport of pollutants, and stratosphere-troposphere exchanges. As the head of OSUR, he is in charge of managing infrstructures for long term observations in the strategic area of La Réunion (South West Indian Ocean). He is (co-) author of more than 80 publications in peer-review journals.

Dr Valentin Duflot (**male**, 32) is lecturer at the Université de La Réunion and is the principal investigator of several lidars devoted to tropospheric observations at the Maïdo Observatory (ozone, water vapor and aerosols). He is (co-)author of more than 10 publications in peer-review journals.

Relevant publications

- Lopatin A., O. Dubovik, A. Chaikovsky, P. Goloub, T. Lapyonok, D. Tanré, and P. Litvinov, Enhancement of aerosol characterization using synergy of lidar and sunphotometer coincident observations: the GARRLiC algorithm, *Atmos. Meas. Tech.* , 6, 2065-2088, 2013
- Sauvage, S. H. Plaisance, N. Locoge, A. Wroblewski, P. Coddeville, J.C. Galloo, Long term measurement and source apportionment of non methane hydrocarbons in three French rural areas, Atmospheric Environment, Vol 43, N°15, pp 2430-2441, 2009.
- Haeffelin, M., Dupont, J. C., Boyouk, N., Baumgardner, D., Gomes, L., Roberts, G., & Elias, T. (2013). A Comparative Study of Radiation Fog and Quasi-Fog Formation Processes during the ParisFog Field Experiment 2007. Pure and Applied Geophysics, 170(12), 2283-2303.
- Sciare, J., O. d'Argouges, R. Sarda-Estève, C. Gaimoz, C. Dolgorouky, N. Bonnaire, O. Favez, B. Bonsang, and V. Gros, Large contribution of water-insoluble secondary organic aerosols in the region of Paris (France) during wintertime, J. Geophys. Res., 116, D22203, doi:10.1029/2011JD015756, 2011
- Baray J.L., Y. Courcoux, P. Keckhut, T. Portafaix, P. Tulet, J.-P. Cammas, A. Hauchecorne, S. Godin Beekmann, M. De Mazière, C. Hermans, F. Desmet, K. Sellegri, A. Colomb, M. Ramonet, J. Sciare, C. Vuillemin, C. Hoareau, D. Dionisi, V. Duflot, H. Vérèmes, J. Porteneuve, F. Gabarrot, T. Gaudo, J.-M. Metzger, G. Payen, J. Leclair de Bellevue, C. Barthe, F. Posny, P. Ricaud, A. Abchiche, and R. Delmas, 2013, Maïdo observatory: a new high-altitude station facility at Reunion Island for long-term atmospheric remote sensing and in situ measurements. Atmos. Meas. Tech., 6, 2865–2877, doi:10.5194/amt-6-2865-2013

Relevant projects

- ACTRIS (EU FP7, 2011-2015): co-coordination and participation in networking activities
- PEGASOS (EU FP7, 2011-2015): analysis of deposition of Black Carbon in Europe, using high altitude ice cores
- MACC (EU FP6, 2008-2011), MACC-II (EU FP7, 2011-2014), MACC-III (EU, 2014-2015): Provision of NRT SEVIRI aerosol products
- Aerosol-CCI-I (2011-2014), Aerosol-CCI-II (2014-2017): Provision of PARASOL and MERIS aerosol products, provision of a validation environment for the project, development of match-up capabilities for validation against AERONET
- ES-1303 EU COST action “Towards Operational ground based PROFiling with ceilometers, Doppler lidars and microwave radiometers for improving weather forecasts”. Ceilometer working group chair: M. Haeffelin.

4.1.3 Leibniz Institut fuer Troposphaerenforschung e.V. (TROPOS)

The Leibniz Institute for Tropospheric Research (TROPOS, www.tropos.de) is an independent research institution with about 150 employees and is member of the Leibniz Association, one of the German non-university research organizations. The institute has a well-defined research profile with focus on aerosol and clouds. The expertise ranges from physical and chemical laboratory studies, large field experiments in which in-situ and remote-sensing techniques from ground and on aircraft are applied, to numerical modelling of cloud processes and aerosol transport. TROPOS has been an active or leading partner in many international projects related to atmospheric clouds and aerosols in the research fields of air pollution and climate. The TROPOS research station Melpitz is jointly operated by the Departments of Atmospheric Chemistry, Experimental Aerosol and Cloud Microphysics, and Remote Sensing of Atmospheric Processes, which all contribute to ACTRIS.

TROPOS is a world-leading center for aerosol and cloud in-situ and remote observations. Over the past two decades, it has contributed to the field with new and innovative technologies and methodologies, e.g. for in-situ measurements of particle size distribution, humidity-dependent and absorption properties, and mixing state of aerosols as well as for remote sensing of particle optical and microphysical properties with multiwavelength Raman and polarization lidars and of cloud-aerosol interactions with combined lidar and radar profiling techniques. The institute has been involved in a large number of international field studies and performs continuous observations at stations worldwide. TROPOS is an active member of EARLINET since 2000 and of Cloudnet since 2011 and contributes to the respective ACTRIS databases on the four-dimensional distribution of aerosols and clouds over Europe. Beside ACTRIS Melpitz, microphysical in-situ aerosol characterizations are conducted at GAW stations such as Cape Verde Observatory, Point Barrow and Danum Valley and within the German Ultrafine Aerosol Network (GUAN), which all deliver data to the World Data Center for Aerosols at NILU, Norway. Furthermore, TROPOS hosts the WMO-GAW World Calibration Center for Aerosol Physics (WCCAP), which is responsible for the quality assurance of microphysical aerosol parameters in the networks GAE, ACTRIS and GUAN.

Role in the project

TROPOS will be involved in all ACTRIS-2 activities related to aerosol and trace-gas in-situ measurements (WP3) and vertical profiling of aerosol and clouds (WP2). TROPOS will lead NA2 on Aerosol and Cloud Profiling and will operate the European Center for Aerosol Calibration (WP9). TROPOS will also contribute to NA4 and NA5. In addition, TNA to the research station Melpitz will be provided. Melpitz is also one of the core observational sites for JRA1, where in-situ and remote-sensing studies on absorption will perfomed. Furthermore, TROPOS will contribute to JRA2 with its expertise on aerosol flux profiling.

Principal personnel involved

Dr. **Ulla Wandinger** (female, PhD Physics in 1994) is senior research scientist in the Remote Sensing of Atmospheric Processes Department of TROPOS and has gained 25 years experience in aerosol and cloud remote observations. In ACTRIS she has been responsible for the JRA on “Lidar and Sunphotometer”. In ACTRIS-2 she will take the lead of NA2. Dr. Wandinger published >70 articles (h-factor 36). She is member of the ACTRIS Scientific Steering Committee, the EARLINET Council, and the ESA-JAXA EarthCARE Joint Mission Advisory Group.

Prof. Dr. **Alfred Wiedensohler** (male, PhD Electrical Engeneering in 1983) is head of the Department of Experimental Aerosol and Cloud Microphysics and head of the World Calibration Centre for Aerosol Physics of WMO-GAW. He has gained >30 years of experience in aerosol in-situ technology, atmospheric process studies and long-term observations. In ACTRIS he has been responsible for the NA on “In-situ chemical, physical and optical properties of aerosols”. In ACTRIS-2 he will lead the European Center for Aerosol Calibration (WP8). He published >300 articles (h-factor 53). Prof. Wiedensohler is member of the WMO-GAW Scientific Advisory Group and served in the Scientific Steering Committees of ACCENT, EUSAAR, EUCAARI, and ACTRIS.

Relevant publications

- Ansmann, A., M. Tesche, P. Seifert, S. Gross, V. Freudenthaler, A. Apituley, K. M. Wilson, I. Serikov, H. Linné, B. Heinold, A. Hiebsch, F. Schnell, J. Schmidt, I. Mattis, U. Wandinger, and M. Wiegner (2011): Ash and fine-mode particle mass profiles from EARLINET-AERONET observations over central Europe after the eruptions of the Eyjafjallajokull volcano in 2010. J. Geophys. Res., 116, D00U02, doi:10.1029/2010JD015567.
- Schmidt, J., A. Ansmann, J. Bühl, H. Baars, U. Wandinger, D. Müller, and A. V. Malinka (2014): Dual-FOV Raman and Doppler lidar studies of aerosol-cloud interactions: Simultaneous profiling of aerosols, warm-cloud properties, and vertical wind. J. Geophys. Res., 119, 5512–5527, doi:10.1002/2013JD020424.
- Wiedensohler, A., W. Birmili, A. Nowak, A. Sonntag, K. Weinhold, M. Merkel, B. Wehner, T. Tuch, S. Pfeifer, M. Fiebig, A. M. Fjäraa, E. Asmi, K. Sellegri, H. Venzac, P. Villani, P. Laj, P. Aalto, J. A. Ogren, E. Swietlicki, P. Roldin, P. Williams, P. Quincey, C. Hüglin, R. Fierz-Schmidhauser, M. Gysel, E. Weingartner, F. Riccobono, S.Santos, C. Grüning, K. Faloon, D. Beddows, R. Harrison, C. Monahan, S. G. Jennings, C.D.O'Dowd, A. Marioni, H.-G. Horn, L. Keck, J. Jiang, J. Scheckman, P. H. McMurry, Z. Deng, C. S. Zhao, M. Moerman, B. Henzing, G. d. Leeuw, G. Löschau, and S. Bastian (2012): Mobility particle size spectrometers: harmonization of technical standards and data structure to facilitate high quality long-term observations of atmospheric particle number size distributions. Atmos. Meas. Tech., 5, 657–685, doi:10.5194/amt-5-657-2012.
- Müller, T., M. Laborde, G. Kassell, and A. Wiedensohler (2011): Development and performance of a three-wavelength LED-based total scatter and backscatter integrating nephelometer. Atmos. Meas. Tech., 4, 1291–1303, doi:10.5194/amt-4-1291-2011.
- Spindler, G., A. Grüner, K. Müller, S. Schlimper, and H. Herrmann (2013): Long-time size-segregated particle (PM10, PM2.5, PM1) characterization study at Melpitz - Influence of air mass inflow, weather conditions and season. J. Atmos. Chem., 70, 165-195, doi:10.1007/s10874-013-9263-8.

Relevant projects

- Aerosols, Clouds, and Trace gases Research Infrastructure Network (ACTRIS), Contract 262254, 2011-2015, 7th Framework Programme.
- European Aerosol Research Lidar Network: Advanced Sustainable Observation System (EARLINET ASOS), Contract 025991, 2006-2011, 6th Framework Programme.
- European Supersites for Atmospheric Aerosol Research (EUSAAR) Contract 026140, 2006-2011, 6th Framework Programme.
- European Integrated project on Aerosol, Cloud, Climate, and Air Quality Interactions (EUCAARI), Contract 34684, 2006-2011, 6th Framework Programme.
- A European Aerosol Research Lidar Network to Establish an Aerosol Climatology: EARLINET, Contract EVR1-CT1999-40003 EARLINET, 2000-2003, 5th Framework Programme.

4.1.4 National Observatory of Athens (NOA)

The National Observatory of Athens (NOA) is the oldest Greek public research centre (founded in 1842). It hosts the UNESCO Chair for Natural Disasters and operates the Greek GEO Office (Group on Earth Observations). NOA's Institute for Environmental Research & Sustainable Development (IERSD) maintains the longest and most complete climatologic record in Greece of meteorological (>120yrs) and solar radiation (>60yrs) parameters. It was also the first organisation that started a systematic study of urban pollution in Athens, in 1980. The Institute's research orientation includes: meteorological monitoring (260 stations), experimental research on air quality, atmospheric chemistry, aerosols and solar radiation, climate change research, synoptic and mesoscale atmospheric modeling, applied research (buildings, indoor air pollution, energy conservation, consultant services, e.t.c.), environmental management, surface and underground hydrology.

Role in the Project: NOA will provide its infrastructure, know-how and training in the following research and technological fields: remote sensing of aerosols from ground based stations, in-situ physicochemical aerosol characterisation, trace gases measurements and a fully equipped atmospheric chemistry laboratory. NOA will also provide the facilities of Finokalia sampling station for Trans National Access (TNA). NOA will lead WP3 and it will contribute to NA4 and NA5. NOA will strongly contribute to JRA1, leading the task 3 on Closure studies between remote sensing and in-situ absorption retrievals.

Principal personnel involved

N. Mihalopoulos (male) (Professor and Director of IERSD) has more than 190 publications in peer reviewed journals devoted to atmospheric chemistry and physics (1 in nature and 1 in science; 6500 citations, h-index 44). His research activities focus on biogeochemical cycling of elements and aerosol physicochemical characterisation. He is responsible for the monitoring station of Finokalia and participated as PI or co-PI in several EU funded projects.

Dr. V. Amiridis (male) is a Senior Researcher at IAASARS/NOA. His main interests include research on the physical and optical properties of aerosols and their vertical distribution, with expertise in ground based lidar and satellite remote sensing techniques and methodologies. He has 65 publications in peer reviewed articles with 1360 citation (h-index 21), and has participated and/or co-ordinated as PI in national, ESA and EU projects.

Prof. D. Balis (male)**,** his main academic and professional qualifications include: remote sensing measurements of the atmospheric composition using the lidar technique and optical and microphysical properties of aerosols. He has participated in several national, European and international projects. He has more than 142 publications in peer-reviewed scientific journals and more than 3200 citations (h-index 34).

Dr. E. Gerasopoulos (male) is a Research Director at IERSD/NOA. His main interests include research on the physical, optical and chemical properties of aerosols with expertise in in-situ and remote sensing techniques and methodologies He has about 62 publications in peer reviewed articles concentrating about 1530 citation (h-index 23), has participated and/or co-ordinated as PI in several national and EU projects.

Dr. K. Eleftheriadis (Research Director) (male), has more than 66 publications in peer reviewed journals (780 citations, h-index 14) regarding atmospheric aerosol science, measurement methodology and applications. He is responsible for the DEM Research Aerosol Station of NCSR-D and he has participated in several national, European and international projects.

Dr. S. Kazadzis (male) is a Senior Researcher at IERSD/NOA. His main interests include research on solar radiation measurements and effects, the physical and optical properties of aerosols, with expertise in ground based and satellite remote sensing techniques and methodologies. He has 83 publications in peer reviewed articles concentrating about 1380 citation (h-index 22), has participated and/or co-ordinated as PI in national and EU projects.

Prof. Dr. A. Papayannis (male) has published more than 100 scientific papers in International Journals and has participated in more than 50 research projects in the EU or national level, he has more than 1960 scientific citations (h-index of 23). Dr. A. Papayannis has more than 25 years experience in the management and coordination of 30 research projects related to the lidar technique on national and European level.

Relevant publications:

- Karanasiou, A., Diapouli, E., Cavalli, F., Eleftheriadis, K., Viana, M., Alastuey, A., Querol, X., Reche, C, On the quantification of atmospheric carbonate carbon by thermal/optical analysis protocols **AMT**, *4, 11, 2409-2419,2011*
- Gerasopoulos, E., Kazadzis, S., Vrekoussis, M., Kouvarakis, G., Liakakou, E., Kouremeti, N., Giannadaki, D., Kanakidou, M., Bohn, B., Mihalopoulos, N., Factors affecting O3 and NO2 photolysis frequencies measured in the eastern Mediterranean during the five-year period 2002-2006, **J. Geoph. Res.„** *Volume 117, Issue 22, Article number D22305, 2012.*
- Amiridis, V., Wandinger, U., Marinou, E., Giannakaki, E., Tsekeri, A., Basart, S., Kazadzis, S., Gkikas, A., Taylor, M., Baldasano, J., Ansmann, A., Optimizing CALIPSO saharan dust retrievals, **ACP,** *13, 23, 13, 12089-12106, 2013.*

- Kokkalis, P., Papayannis, A. , Amiridis, V., Mamouri, R.E., Veselovskii, I., Kolgotin, A., Tsaknakis, G., Kristiansen, N.I., Stohl, A., Mona, L., Optical, microphysical, mass and geometrical properties of aged volcanic particles observed over Athens, Greece, during the Eyjafjallajökull eruption in April 2010 through synergy of Raman lidar and sunphotometer measurements, ACP, *13, 18, 9303-9320, 2013*.
- Bougiatioti, A. , Stavroulas, I., Kostenidou, E., Zarmpas, P., Theodosi, C., Kouvarakis, G., Canonaco, F., Prévôt, A.S., Nenes, A., Pandis, S.N., Mihalopoulos, N., Processing of biomass-burning aerosol in the eastern Mediterranean during summertime, **ACP**, *14, 4793-4807, 2014.*

Relevant projects:

- Development of Synergistic methodologies and tools for monitoring and forecasting environmental parameters (THESPIA, National Project 1MEU)
- Global mapping of aerosol properties using neural network inversions of ground and satellite based data (EU project AEROMAP)
- Lidar Climatology of Vertical Aerosol Structure for Space-Based Lidar Simulation Studies (ESA project, LIVAS)
- ACTRIS (Aerosols, Clouds, and Trace gases Research Infrastructure Network)

4.1.5 Norsk Institutt for Luftforskning (NILU)

NILU - Norwegian Institute for Air Research was founded in 1969 and is an independent institute specializing in climate and air pollution research. The institute has about 200 employees and NILU conducts approximately 250 projects every year for government, industry and national and international organizations. NILU has during the last few years been involved in more than 90 EU and ESA financed projects relevant to ACTRIS-2 (e.g. ACTRIS-1, InGOS, MACC2, GEOMON, EUCAARI, EUSAAR, ACCENT, EARLINET-ASOS, SCOUT-O3, MEGAPOLI) ESFRI initiatives (ICOS and SIOS) and ESA-CCIs. NILU has coordinated a number of them in addition to being present in the steering committees of several international programs (CLRTAP-EMEP, GAW). NILU serves as the EMEP Chemical Coordination Centre (EMEP-CCC). The EMEP program comprise more than 40 Parties and forms the basis for UNECE CLRTAP abatement policies, as well as for the EU policies on Air Quality. NILU is a member to the European Topic Centre for Air Pollution and Climate Change Mitigation (ETC/ACM). The institute is involved in developing INSPIRE guidelines, E-reporting and GEOMS (Generic Earth Observation Metadata Standard). NILU plays central roles in the WMO – GAW program, being represented in 3 of the Scientific Advisory Groups (on Aerosols, Reactive Gases and Precipitation Chemistry) as well as hosting the World Data Centre for Aerosols (WMO-WDCA). The database infrastructure is nominated as a DCPC in the WMO-WIS system, and we have been central in the WIGOS process. NILU is responsible for the EBAS infrastructure hosting observation data of atmospheric chemical composition and physical properties. NILU also hosts the Earth Observation Validation Data Centre (EVDC), a database developed and operated on contract by ESA. Furthermore, NILU operates state of the art *in situ* observation facilities. These includes the supersites Zeppelin at Svalbard, and Birkenes in southern Norway, and several sites on the Norwegian main land, and at the Troll station in Antarctica. Our portfolio includes nearly all relevant instrumentation, ranging from in situ manual methods to remote sensing.

Role in the project

NILU will be responsible for WP5: The ACTRIS Data Centre (leading the activity, overarching ACTRIS data portal, database for surface in situ data). Furthermore, NILU will participate in WP3 (Near-surface observations of aerosol, clouds and trace-gases; development of automated QA measures for surface in situ data), WP5 (NA5 Outreach - Towards a sustainable network, incl international activities, interoperabitoets), WP12 (JRA3 Model evaluation, assimilation, and trend studies; trend activities and provision of NRT data for future operational services).

Principal personnel involved

Dr. Cathrine Lund Myhre (female) is a senior scientist at NILU and will lead WP5, and contribute to WP3, WP4, and JRA3. She has a PhD in spectroscopy and about 15 years of experience in understanding of atmospheric compositional change, including data management and data quality requirements. Lund Myhre is author or co-author of more than 20 papers in peer reviewed literature (~ 1500 citations) more than 40 scientific reports including contributing author to IPCC 5thAR, WG I, Chapter 2 (*Observations: Atmosphere and Surface).* She is an experienced project leader (e.g. a number of Norwegian Research Council projects, the national monitoring of greenhouse gases, and also leading the ACTRIS Data Center in ACTRIS-1, amongst others). **Dr. Markus Fiebig** (male) will contribute to WP5, WP3, JRA3. Fiebig received his PhD in meteorology from the University of Munich, Germany in 2001. He is a senior researcher at NILU with background on direct and indirect atmospheric aerosol climate effects with ground- and aircraft based measurements of aerosol properties. Fiebig lea and manages the GAW World Data Centre for Aerosol, including the pilot project on near-real-time data dissemination. He has authored or co-authored 40 peer-reviewed publications and is and has been coordinating tasks and work packages in several international projects (ACTRIS-1, EUSAAR, IAGOS). **Dr. Thomas Hamburger** (male) and **Ann Mari Fjaeraa** (female) are scientists at NILU and they will both be involved in ACTRIS data managements and data quality assurance in WP5 and WP3**. Hamburger** received his PhD in meteorology from the University of Munich, Germany in 2011 . He is an expert in observations of aerosol microphysical properties, both, airborne and ground based. **Fjaeraa** is an expert in data management and QA, QC and has filled a leading position in this field for more than 8 years for numerous projects e.g. ACTRIS, InGOS (halocarbon data), GAW-WDCA, EUSAAR, CREATE, EMEP and SCOUT-O3. She is also the project leader for EVDC.

Relevant publications

- Tørseth, K., Aas, W., Breivik, K., Fjæraa, A. M., Fiebig, M., Hjellbrekke, A. G., Lund Myhre, C., Solberg, S., and Yttri, K. E.: Introduction to the European Monitoring and Evaluation Programme (EMEP) and observed atmospheric composition change during 1972–2009, Atmos. Chem. Phys., 12, 5447-5481, doi:10.5194/acp-12-5447-2012, 2012.
- Myhre, C. Lund and Baltensperger U. (ed.) “Recommendations for a Composite Surface-Based Aerosol Network”, Contributing authors: Barrie, L., Fiebig, M., Goloub, P., Gras, J., Holzer-Popp, Y., Jennings, G., Kinne, S., Klausen, J., Laj, P., de Leeuw, G., Li, S.-M., Müller, D., Ogren, J., Pappalardo, G., Schulz, M., Smirnov, A., Volz-Thomas, A., Wehrli, C., Wilson, J., Xiao-Ye,Z., A GAW report 207, (2013).
- Hartmann, D.L., A.M.G. Klein Tank, M. Rusticucci, L.V. Alexander, S. Brönnimann, Y. Charabi, F.J. Dentener, E.J. Dlugokencky, D.R. Easterling, A. Kaplan, B.J. Soden, P.W. Thorne, M. Wild and P.M. Zhai, 2013: Observations: Atmosphere and Surface. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Petzold, A., J.A. Ogren, M. Fiebig, P. Laj, S.-M. Li, U. Baltensperger, T. Holzer-Popp, S. Kinne, G. Pappalardo, N. Sugimoto, C. Wehrli, A. Wiedensohler, and X.-Y. Zhang, 2013: Recommendations for reporting "black carbon" measurements, Atmos. Chem. Phys., 13, 8365 – 8376, doi: 10.5194/acp-13-8365-2013.
- G. W. Mann, K. S. Carslaw, C. L. Reddington, K. J. Pringle, M. Schulz, A. Asmi, D. V. Spracklen, D. A. Ridley, M. T. Woodhouse, L. A. Lee, K. Zhang, S. J. Ghan, R. C. Easter, X. Liu, P. Stier, Y. H. Lee, P. J. Adams, H. Tost, J. Lelieveld, S. E. Bauer, K. Tsigaridis, T. P. C. van Noije, A. Strunk, E. Vignati, N. Bellouin, M. Dalvi, C. E. Johnson, T. Bergman, H. Kokkola, K. von Salzen, F. Yu, G. Luo, A. Petzold, J. Heintzenberg, A. Clarke, J. A. Ogren, J. Gras, U. Baltensperger, U. Kaminski, S. G. Jennings, C. D. O'Dowd, R. M. Harrison, D. C. S. Beddows, M. Kulmala, Y. Viisanen, V. Ulevicius, N. Mihalopoulos, V. Zdimal, M. Fiebig, H.-C. Hansson, E. Swietlicki, and J. S. Henzing, 2014: Intercomparison and evaluation of global aerosol microphysical properties among AeroCom models of a range of complexity, Atmos. Chem. Phys., 14, 4679 – 4713, doi:10.5194/acp-14-4679-2014.

Relevant projects and activities

- ACTRIS (Aerosols, Clouds, and Trace gases Research InfraStructure Network), EU FP7, 2011-2014 responsible for ACTRIS data centre,
- EMEP-CCC (Chemical Coordinating Centre) of the European Monitoring and Evaluation Programme under the Convention on Long Range Transboundary Air Pollution (UN-ECE)
- ECLIPSE (Evaluating the Climate and Air Quality Impact of Short-Lived Pollutants); EU FP7, 2011 – 2014; coordinator
- InGOS (Integrated non-CO2 greenhouse gas Observing System), EU FP7, 2011 – 2014, hosting all halocarbon data
- MACC-II (Monitoring Atmospheric Composition and Climate, Interim Implementation); FP7-SPACE, 2011-2014; partner (in situ data coordination)

Significant infrastructure, services and widely-used datasets and software

- EBAS (http://ebas.nilu.no),
- ACTRIS data portal (http://actris.nilu.no)
- EVDC (Earth Observation Validation Data Centre, http://evdc.nilu.no)
- FLEXPART (FLEXible PARTicle dispersion model, http://flexpart.eu)
- WMO-GAW WDCA (World Data Center of Aerosols, www.gaw-wdca.org)

4.1.6 Finnish Meteorological Institute, (Ilmatieteen Laitos) (FMI)

Ilmatieteen Laitos, the Finnish Meteorological Institute (FMI), is a research and service agency repoting to the Finnish Ministry of Transport and Communications. The main objective of FMI is to provide the Finnish nation with the best possible information about the atmosphere above and around Finland.

FMI produces high-quality observational data and research knowledge about the atmosphere, combining its know-how into services to the benefit of the populace and environment.

The Finnish Meteorological Institute

- produces information on past, present and future state of the atmosphere
- observes the physical state of the atmosphere, its chemical composition including aerosols and electromagnetic phenomena
- conducts research of high standard in the fields of meteorology, air quality, space physics, remote sensing and geomagnetism
- performs competitive commercial activities based on the provision of expert services both in Finland and abroad
- takes an active role in national and international cooperation
- actively disseminates information about matters related to the atmosphere
- forecasts and responds rapidly to changes in the environment

FMI hosts a station in Finnish Lapland above the Arctic Circle which is part of WMOs Global Atmosphere Watch (GAW) programme. The station is also a member of other networks (e.g. AMAP, EMEP, ICOS, ACTRIS). As part of its research remit, FMI performs world-leading experimental research on aerosols and their precursors and green house gases in Finland and key places around the globe (e.g. Antarctica, Marambio India). FMI is a member of EARLINET and operates national ceilometer and Doppler lidar networks.

Role in the project:

FMIs participation will bring extensive experience in utilising profiling data from recently developed active sensors: Doppler lidar, cloud radar, backscatter and depolarisation lidars. FMI has the expertise to exploit the information from these active sensors, independently and in combination with surface in situ instrumentation, to investigate the properties of aerosol, clouds, turbulence and surface-atmosphere exchange (WP2, WP3 and WP12). FMI also has significant expertise in managing large data volumes, and will contribute in ACTRIS-2 cloud database management and development (WP10). FMI operates a long-term measurement station in Finnish Arctic, containing in-situ and remote sensing instruments on aerosols, trace gases and clouds, and offers access to field campaigns as well as organizes inter-comparison campaigns at this station (WP9). In ACTRIS-2 FMI works also on tasks related to long-term sustainability plans for ACTRIS and on international strategic collaboration (WP5).

Principal personnel involved

Adjunct Prof. Heikki Lihavainen (male) is head of Atmospheric Composition Research unit. His fields of expertise are field and laboratory measurements related to aerosol properties. He has some 91 published research papers, two in Science. He has been and is supervising several Ph.D students, 3 (7). He has been part of several national and international research projects also as PI or WP leader. He is a member of expert group on short lived climate forcers in The Arctic Monitoring and Assessment Programme. He is a member of FCoE (Finnish Centre of Excellence) on From Molecular and Biological Processes to the Global Climate. *He is also responsible person for Finnish GAW station in Pallas.*

Ewan O'Connor (male) is Tenure-track Professor and develops and uses new radar and lidar techniques to retrieve cloud, aerosol and turbulent parameters to understand cloud processes, and for the evaluation and improvement of numerical forecast and climate models. He is responsible for the design and implementation of the Finnish Doppler lidar network, and the new ACTRIS/Cloudnet site at Sodankyla. He has been involved in several international research projects as WP leader, and is chair of the working group on Doppler lidar within EU COST Action TOPROF. He has published 34 papers, and is currently co-supervising two postgraduates.

Dr. Sanna Sorvari (female), Research Manager, has over 15 years experience in climate change research. She has experienced in coordinating, initiating and planning of international and national research activities in environmental science, especially in recent years she has worked to establish ESFRI Environmental Research Infrastructures at the national and European level (e.g in setting-up ICOS RI and ICOS ERIC, supporting ANAEE and ACTRIS to develop their RI strategies). She has also facilitate the collaborative work of Env. RIs at the European level (WP leader for ENVRI, Theme leader for ENVRI+ -projects) and at the international level (WP leader for COOPEUS-project, member of Belmont Forum's Env. data management action). She is also a member of H2020 Expert Advisory Board for RIs and e-RIs. In ACTRIS-2 she will work on tasks related to long-term sustainability plans for ACTRIS and on international strategic collaboration.

Dr. Eija Asmi (female) is the head of atmospheric aerosols group of FMI consisting of 15 PhD and PhD students working on aerosol physical and chemical characterization, with responsibility of the measurement networks in Finland and in several stations abroad, including aerosol profiling and airplane studies. Her main expertize are experimental studies of polar aerosols and aerosol-cloud interactions. She has >30 published peer-reviewed articles (h-index 14), and she is active in several national and international networks and programs, inc. Finnish Center of Excellence (FCoE), International Arctic Systems for Observing the Atmosphere (IASOA) and Association for polar early career scientists (APECS).

Relevant publications

- M. Collaud Coen, E. Andrews, A. Asmi, U. Baltensperger, N. Bukowiecki, D. Day, M. Fiebig, A.M.Fjaeraa, H. Flentje, A. Hyvärinen, A. Jefferson, S. G. Jennings, G. Kouvarakis, H. Lihavainen, C. Lund Myhre, W. C. Malm, N. Mihapopoulos, J. V. Molenar, C. O'Dowd, J. A. Ogren, B. A. Schichtel, P. Sheridan, A. Virkkula, E. Weingartner, R. Weller, and P. Laj Aerosol decadal trends – Part 1: In-situ optical measurements at GAW and IMPROVE stations Atmos. Chem. Phys., Atmos. Chem. Phys., 13, 869-894, 2013.
- Arneth A., S.P. Harrison, K. Tsigaridis, S. Menon, P.J. Bartlein, H. Feichter, A. Korhola, M. Kulmala, D. O'Donell, G. Schurgers, S. Sorvari, T. Vesala and S. Zaehle (2010). Terrestrial biogeochemical

feedbacks in the climate system: from past to future. Nature Geoscience 3, 525-532, doi: 10.1038/ngeo905.

- Lihavainen, H., V. Kerminen, P. Tunved, V. Aaltonen, A. Arola, J. Hatakka, A. Hyvärinen, and Y. Viisanen (2009), Observational signature of the direct radiative effect by natural boreal forest aerosols and its relation to the corresponding first indirect effect, J. Geophys. Res., 114, D20206, doi:10.1029/2009JD012078.2009
- P. Tunved, H-C. Hansson, V-M. Kerminen, J. Ström, M. Dal Maso, H. Lihavainen, Y. Viisanen, P.P. Aalto, M. Komppula and , M. Kulmala: High natural aerosol loading over boreal forests, Science, 14 April 2006: 261-263
- E. J. O'Connor, A. J. Illingworth, I. M. Brooks, C. D. Westbrook, R. J. Hogan, F. Davies, and B. J. Brooks, "A method for estimating the turbulent kinetic energy dissipation rate from a vertically-pointing Doppler lidar, and independent evaluation from balloon-borne in-situ measurements," J. Atmos. Ocean. Technol., vol. 27, pp. 1652–1664, 2010.

Relevant projects

- COOPEUS – Building a Framework for a Sustainable, Transatlantic Cooperation in the Field of Environmental Research Infrastructure, 2012 -2014
- ANAEE – Infrastructure for Analysis and Experimentation on Ecosystems, 2012 - 2014
- ENVRI – Common Operations for Environmental Research Infrastructures, 2011 –
- EUSAAR- European Supersites for Atmospheric Aerosol Research,2006-2011
- EUCAARI-European integrated project on aerosol cloud climate and air quality interactions, 2007-2012

4.1.7 Paul Scherrer Institut (PSI)

The Paul Scherrer Institut (PSI) in Switzerland is a centre for multi-disciplinary research and one of the world's leading user laboratories. With its 1200 employees it belongs as an autonomous institution to the Swiss ETH domain and concentrates its activities on solid-state research and material sciences, energy and environmental research as well as on biology and medicine. The Laboratory of Atmospheric Chemistry (LAC) at PSI consists of about 50 researchers. It has in-depth experience with the design of experiments to characterize physical and chemical properties of aerosols and has a strong interest in the impact of aerosols on climate. The laboratory operates a smog chamber facility for atmospheric chemistry simulation, as well as continuous aerosol measurements at the high Alpine research station Jungfraujoch (3580 m asl) which have been performed within the Global Atmosphere Watch (GAW) program of the World Meteorological Organization (WMO) since 1995.

The LAC is currently involved in 6 EC projects (ACTRIS, ACCENT-PLUS, BACCHUS, COFUND at PSI, PEGASOS, and the Marie Curie Initial Training Network CLOUD-TRAIN).

Role in the project

Within ACTRIS-2, PSI will lead WP11 (JRA1, Aerosol absorption and black carbon), will contribute to WP3 (NA3, Near-surface observations of aerosol, clouds and trace-gases) and WP4 (NA4, ACTRIS Innovation Platform), and will provide transnational access to the Jungfraujoch within WP9 (TNA, Access to ACTRIS ground-based stations).

Principal personnel involved

Prof. Dr. Urs Baltensperger (male) is head of the Laboratory of Atmospheric Chemistry at PSI, and professor at ETH Zürich. He was chairman of the Scientific Advisory Group (SAG) for Aerosols of the Global Atmosphere Watch (GAW) aerosol program of WMO from 1997 to 2009 and a regular member of the SAG until 2013. He is also a member of the research council of the Swiss National Science Foundation and chairman of the Specialized Committee for International Cooperation. He was coordinator of the FP-6 project POLYSOA and is in the steering group of 3 currently running EC projects. He is author and co-author of more than 300 peer-reviewed papers (including 5 in Nature and 4 in Science) and has an *h*-index of

61. He has supervised more than 30 PhD theses and is currently supervising 22 on-going PhD theses. He obtained a number of awards (including the Fellow of the American Geophysical Union in 2012, the Vilhelm Bjerknes Award of the European Geosciences Union in 2014, and the Fuchs Memorial Award (the premier international prize in aerosol science) in 2014).

Dr. Martin Gysel (male) is head of the Aerosol Physics Group in the Laboratory of Atmospheric Chemistry at PSI. He is president of the Gesellschaft for Aerosolforschung (GAeF). He was and is PI of several research projects funded by Swiss funding agencies and currently and successfully acquired an ERC consolidator grant (ERC-CoG, BLACARAT). He is author and co-author of 65 peer-reviewed papers and has an *h*-index of 28. He is, together with Urs Baltensperger and Ernest Weingartner, the recipient of the 18th Prof. Dr. Vilho Vaisala Award of the WMO.

Relevant publications

- Asmi, A., M. Collaud Coen, J.A. Ogren, E. Andrews, P. Sheridan, A. Jefferson, E. Weingartner, U. Baltensperger, N. Bukowiecki, H. Lihavainen, N. Kivekäs, E. Asmi, P.P. Aalto, M. Kulmala, A. Wiedensohler, W. Birmili, A. Hamed, C. O'Dowd, S. G Jennings, R. Weller, H. Flentje, A.M. Fjaeraa, M. Fiebig, C.L. Myhre, A.G. Hallar, E. Swietlicki, A. Kristensson, P. Laj, Aerosol decadal trends - Part 2: In-situ aerosol particle number concentrations at GAW and ACTRIS stations, Atmos. Chem. Phys., 13, 895-916, 2013.
- Collaud Coen, M., E. Andrews, A. Asmi, U. Baltensperger, N. Bukowiecki, D. Day, M. Fiebig, A.M. Fjaeraa, H. Flentje, A. Hyvärinen, A. Jefferson, S.G. Jennings, G. Kouvarakis, H. Lihavainen, C. Lund Myhre, W.C. Malm, N. Mihapopoulos, J.V. Molenar, C. O'Dowd, J.A. Ogren, B.A. Schichtel, P. Sheridan, A. Virkkula, E. Weingartner, R. Weller, P. Laj, Aerosol decadal trends Part 1: In-situ optical measurements at GAW and IMPROVE stations, Atmos. Chem. Phys. 13, 869-894, 2013.
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- Petzold, A., J. A. Ogren, M. Fiebig, P. Laj, S. M. Li, U. Baltensperger, T. Holzer-Popp, S. Kinne, G. Pappalardo, N. Sugimoto, C. Wehrli, A. Wiedensohler, X. Y. Zhang, Recommendations for reporting "black carbon" measurements, Atmos. Chem. Phys., 13, 8365-8379, 2013.
- Zieger, P., R. Fierz-Schmidhauser, L. Poulain, T. Müller, W. Birmili, G. Spindler, A. Wiedensohler, U. Baltensperger, E. Weingartner, Influence of water uptake on the aerosol particle light scattering coefficients of the Central European aerosol, Tellus B; 66, 22716, 2014.

Relevant projects

- Global Atmospere Watch (GAW): Swiss component funded by MeteoSwiss, running continuously since 1995
- ACTRIS: EU project, running
- BACCHUS: EU project, running
- ACCENT-PLUS: EU project, running
- CLACE campaigns: Cloud Aerosol Characterization Experiments, a series of international campaigns on aerosol – cloud interactions performed at the Jungfraujoch typically during about one month each since the year 2000; last campaign in January-February 2014.

4.1.8 Helsingin Yliopisto (UHEL)

The Division of Atmospheric Sciences, Department of Physics in University of Helsinki has over 25 year tradition in atmospheric research. Over one hundred scientists and doctoral students are currently engaged in this area. Main scientific aim has been to reduce scientific uncertainties concerning global climate change issues, particularly those related to aerosols and clouds. The work has aimed at creating a deep understanding of the dynamics of aerosol particles and ion and neutral clusters in the lower atmosphere. The emphasis has been on biogenic formation mechanisms of aerosol particles and their linkage to biosphere-atmosphere interaction processes, biogeochemical cycles and trace gases. To solve these interdisciplinary problems, the unit has created a research program including continuous long-term atmospheric observations, global modelling and deep theoretical and experimental understanding of atmospheric cluster and aerosol dynamics. The work is pioneering, wide-perspective research from the nano/molecular scale to the global scale. UHEL is a world leader in atmospheric aerosol science and one of the founders of "terrestrial ecosystem meteorology". The core facilities related to proposed research are the SMR field stations. SMR station in Hyytiälä is fully compatible with ACTRIS providing aerosol, trace gas, flux data, aerosol vertical profiling as well as cloud observations. SMR is part of Integrated Carbon Observation System (ICOS) and Experimentation in Ecosystem Research (EXPEER), extended instrumentation and instrument development for aerosol particle and atmospheric ion measurements including high-resolution mass spectrometry.

Role in the Project

UHEL contributes to the in-situ ground based observations and standardization in WP3, innovation and dialogue in WP4, and training and outreach activities in WP5 as well as provides transnational access to SMR (WP9). UHEL coordinates theJRA2 (WP12) "The surface exchange and vertical transport of aerosols".

Principal personnel involved

Prof. **Tuukka Petäjä** (male) is the head of aerosol laboratory and SMR field stations in University of Helsinki. He has published over 180 peer reviewed journal articles out of which 6 in Science, 5 in Nature (the highest amount in last 5 years in the field of atmospheric sciences) and 1 in Physical Review Lett, 1 in Nature Protocols, 1 in Nature Geosci. Total citations: >4700, h-index: 34, Vaisala Award, FAAR Award, member of International Eurasian Academy of Sciences, Coordinator of BAECC, PEEX science director, Participated in 12 EU projects, research income over 4 M€; supervised 8 PhD theses. Petäjä leads WP9.

ATM Director Academy Prof., ERC AdG holder, **Markku Kulmala** (male): is the world leading scientist in the area of atmospheric nucleation and related biosphere-atmosphere interactions. Prof. Kulmala leads Academy of Finland Center of Excellence in atmospheric sciences and coordinates Nordic Center of Excellence in cryosphere-atmospere interactions. Prof. Kulmala has published over 850 peer-review papers (11 in Nature, 13 in Science and 7 in Phys. Rev. Lett.). He is 1st in the Citation Rankings in Geosciences (ISI Web of Knowledge, since 1.5.2011), H-index is 76 (>25000 cit.). Prof. Kulmala is one of the founders of "terrestrial ecosystem meteorology". His works cover theoretical and experimental physics, atmospheric chemistry, observational chemical meteorology, biophysics and, in particular, biosphere-aerosol-cloud-climate interactions. He has received many international and national prizes and awards, Smoluchovski Award (1997); World Cultural Council Honorary Member (2003); Finnish Science Award (2003); International Aerosol Fellow Award (2004), Wilhelm Bjerkenes medal (EGU,2007), ERC AdG (2008), AGU fellow (2009); supervised >40 Ph.D. theses.

PhD (Ms) **Leena Järvi** (female) is the lerder of the urban meteorology group at the Division and is particularly and expert on micrometeorological flux measurements and data analysis. She is PI of the WP12 in ACTRIS-2. She has 23 peer reviewed publications (H-index: 9, >270 cit.), with 1 in Geophys. Res. Lett. She has been coordinating the activities of four Departments of UHEL in the EU project BRIDGE.

PhD (Ms) **Hanna K. Lappalainen** (female) is Research Coordinator at UHEL. She is Pan-Eurasian Experiment (PEEX) Executive Officer, and is the national code of contact for the ACTRIS-Finland project. She has a long-term experience of coordinating large-scale research projects and funding applications and has been working as a research coordinator and a science officer in the projects such as "European Integrated Project on Aerosol Could Climate and Air Quality Interaction" EU-FP7-EUCAARI (2007-2010) and "Finnish Center of Excellence in Physics, Chemistry, Biology and Meteorology of Atmospheric Composition and Climate Change" (2012-2013). Lappalainen has received NASA Goddard Team Award EOS-AURA satellite OMI-Team in 2005.

PhD (Ms) **Hanna Manninen** (female) has 10 years of experience in experimental aerosol physics. Currently she is a group leader in UHEL responsible for aerosol particle and ion instrumentation, measurement activities and training of the students. She has published 50 peer-reviewed research articles (H-index 22, citations 1289) including 2 in Science and 1 in Nature Protocols.

Relevant publications

- Petäjä, T. (2013) Science Plan Biogenic Aerosols – Effects on Clouds and Climate (BAECC), US Department of Energy, Office of Science, DOE/SC-ARM-13-024.
- Kulmala, M., Kontkanen, J., Junninen, H., Lehtipalo, K., Manninen, H.E., Nieminen, T., Petäjä, T., Sipilä, M., Schobesberger, S., Rantala, P., Franchin, A., Jokinen, T., Järvinen, E., Äijälä, M., Kangasluoma, J., Hakala, J., Aalto, P.P., Paasonen, P., Mikkilä, J., Vanhanen, J., Aalto, J., Hakola, H., Makkonen, U., Ruuskanen, T.M., Mauldin III, R.L., Duplissy, J., Vehkamäki, H., Bäck, J., Kortelainen, A., Riipinen, I., Kurtén, T., Johnston, M.V., Smith, J.N., Ehn, M., Mentel, T.F., Lehtinen, K.E.J., Laaksonen, A., Kerminen, V.-M. and Worsnop, D.R. (2013) Direct observations of atmospheric nucleation, Science 339, 943-946
- Ehn, M., Thornton, J.A., Kleist, E., Sipilä, M., Junninen, H., Pullinen, I., Springer, M., Rubach, F., Tillmann, R., Lee, B., Lopez-Hilfiker, F., Andres, S., Acir, I.-H., Rissanen, M., Jokinen, T., Schobesberger, S., Kontkanen, J., Nieminen, T., Kurtén, T., Nielsen, L.B., Jørgensen, S., Kjaergaard, H.G., Canagaratna, M., Dal Maso, M., Berndt, T., Petäjä, T., Wahner, A., Kerminen, V.-M., Kulmala, M., Worsnop, D.R., Wildt, J. and Mentel, T.F. (2013) A large source of low-volatility secondary organic aerosol, Nature 506, 476–479.
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- Kulmala, M., Petäjä, T., Nieminen, T., Sipilä, M., Manninen, H.E., Lehtipalo, K., Dal Maso, M., Aalto, P.P., Junninen, H., Paasonen, P., Riipinen, I., Lehtinen, K.E.J., Laaksonen, A. and Kerminen, V.-M. (2012) Measurement of the nucleation of atmospheric aerosol particles, Nature Protocols 7, 1651-1667.

Relevant projects

- Integrated Carbon Observation System (ICOS)
- Biogenic Aerosols: Effects of Clouds and Climate (BAECC)
- Bioactive peptides in fermented/ripened meats **(BACCHUS)**
- Cryosphere-atmosphere interactions in a changing Arctic climate (CRAICC)
- Finnish Centre of Excellence (FCOE)

4.1.9 Eidgenoessische Materialpruefungs- und Forschungsanstalt (EMPA)

Eidgenoessische Materialpruefungs- und Forschungsanstalt (EMPA) is a research institute with about 750 employees in the domain of the Swiss Federal Institute of Technology Zurich (ETHZ). The 35 employees of the Laboratory for Air Pollution/Environmental Technology are focussed on the measurement and modelling of atmospheric trace components. The laboratory contributes data to the networks of EMEP and GAW by operating 16 sites within the Swiss National Air Pollution Monitoring Network (NABEL).

Role in the project:

In ACTRIS-2 EMPA will be responsible for co-leading the NA3 (Near-surface observations of aerosol, clouds and trace-gases): EMPA will lead the task on improvement of instrumentation, standardization and quality assessment of essential climate and air quality variables. Furthermore, Empa will be leading together with partner DWD the quality assurance tasks within the NA3 for VOCs and NOx.

Principal personnel involved

Dr. Stefan Reimann (male) is a senior scientist and group leader at EMPA. He is responsible for the continuous measurements of VOCsa dn NOx at several sites in Switzerland, amongst which the Jungfraujoch is the highest site, where these measurements are permanently performed. He is co-author of the report on the WMO/GAW Expert Workshop on Global Long-Term Measurements of VOCs and the author of about 50 research papers.

Relevant publications

- Steinbacher et al., Nitrogen oxides measurements at rural swites in Switzerland: Bias of conventional measurement techniques, JGR, 112, D11307, 2007.
- Legreid et al., Measurements of organic trace gases including OVOCs at the high alpine site Jungfraujoch (Switzerland): Seasonal variation and source allocations, JGR, 113, D05307, 2008.
- Ruckstuhl et al., Robust extraction of baseline signal of atmospheric trace species using local regression, AMT., 5, 2613-2624, 2012.

Relevant projects

- FP7: ACTRIS (Aerosols, Clouds, and Trace gases Research InfraStructure Network)
- FP7: NORS (Network Of Remote Sensing ground-based observations in support of the Copernicus atmospheric service)
- FP6: GEOMON (Global Earth observation and monitoring)
- FP5/FP6: SOGE/SOGE-A (continuous measurement of halocarbons was installed in Europe and China)

4.1.10 European Centre for Medium-Range Weather Forecasts (ECMWF)

The European Centre for Medium-Range Weather Forecasts (ECMWF) is an international organisation supported by 34 European and Mediterranean States. ECMWF's longstanding principal objectives are the development of numerical methods for medium-range weather forecasting; the preparation, on a regular basis of medium-range and long-range weather forecasts for distribution to the meteorological services of the Member States; scientific and technical research directed to the improvement of these forecasts; collection and storage of appropriate meteorological data. ECMWF's computer facility includes supercomputers, archiving systems and networks. In 2010, an amendment to the Convention establishing ECMWF added the objective of contributing to the monitoring of relevant parts of the Earth-system including atmospheric composition. ECMWF coordinates the current pilot Copernicus Atmosphere Monitoring Service in the form of the MACC-III project and is within that project responsible for the global data assimilation and forecasting services.

The ground-based in situ and remote sensing observations of aerosols provided by ACTRIS/ACTRIS-2 will be an important input to the Copernicus Atmosphere Monitoring Service. In the MACC and MACC-II projects, extensive use of ground-based observations has been made for the routine verification of the NRT and reanalysis atmospheric composition runs. There is however scope to increase this activity, and investigate the use of un-tapped ground-based aerosol observations. Benefits are expected from constantly monitoring the model with independent observations. Developments in assimilation via direct use of the ground-based observations or indirect use for anchoring of the satellite data bias correction also has significant potential. Participation in the project allows ECMWF to work specifically on the data sets made available through ACTRIS-2.

Role in the project:

In ACTRIS-2 ECMWF will lead JRA3 (WP13) Model evaluation, assimilation and trend studies.

Principal personnel involved

Angela Benedetti (female), Ph.D. from Colorado State University, joined ECMWF in 2002 to work on assimilation of cloud and precipitation. In 2004, she obtained a new position at ECMWF as a scientist in the project GEMS to develop the aerosol assimilation system. She has been since involved in the follow-on projects MACC and MACC-II in similar roles. In recent years she has been promoted senior scientist and has contributed to numerous advisory groups (ACTRIS Advisory Board, Internal Cooperative on Aerosol Prediction, GAW Scientific Advisory Group on Aerosols, WMO-Sand and Dust Storm Warning and Assessment System Steering Committee). She also participated in several FP7 proposals (PANDA, DACCIWA).

Richard Engelen (male), Ph.D. from Utrecht University, undertook research at Colorado State University before joining ECMWF as a Research Consultant in 2002. He was responsible for the data assimilation of greenhouse gases within the EC-funded COCO and GEMS projects, and continued in this role in MACC. He was appointed Project Manager for MACC-II and he also currently manages overall ECMWF activities in the project. He is Head of the Chemical Aspects section, which hosts most of the staff working on atmospheric composition.

Relevant publications

- Benedetti, A. et al. 2014: Operational Dust Forecasting, in Mineral Dust: A key player. P. Knippertz and J.-B. Stuut, Editors. Springer. August 2014.
- Benedetti, A., Jones, L. T., Kaiser, J. W., Morcrette, J.-J. and Remy, S., 2014: [Global climate] Aerosols [in "State of the Climate in 2013"]. Bull. Amer. Meteor. Soc., 95 (7), S36-S38
- Benedetti, A., et al. 2009: Aerosol analysis and forecast in the European Centre for Medium-Range Weather Forecasts Integrated Forecast System: 2. Data assimilation, J. Geophys. Res., 114, D13205, doi:10.1029/2008JD011115.
- Inness, A., et al, 2013: The MACC reanalysis: an 8 yr data set of atmospheric composition, Atmos. Chem. Phys., 13, 4073-4109, doi: 10.5194/acp-13-4073-2013, 2013.
- Morcrette, J.-J., et al. 2009: Aerosol analysis and forecast in the European Centre for Medium-Range Weather Forecasts Integrated Forecast System: Forward modeling, J. Geophys. Res., 114, D06206, doi:10.1029/2008JD011235.
- Peuch V.-H. and R. Engelen, 2012: Towards an operational GMES Atmosphere Monitoring Service, ECMWF Newsletter No. 132, pp 20 - 25.

Relevant projects: MACC-II (FP7), MACC-III (Horizon2020), IGAS (FP7)

4.1.11 Meteorologisk Institutt (Met.No)

The Norwegian Meteorological Institute (Met.No) is a public agency, and is responsible for the public weather service in Norway. The institute is providing information that supports public authorities, businesses and the general public to secure life and property and in support of societal planning and environmental protection. R&D at Met.No is supported directly by the government by research councils, EU, ESA, EUMETSAT and others. Met.No R&D is related to operational numerical models of the atmospheric, oceanographic and sea-ice forecasting and environmental models that are developed and operated. The institute is the western modelling center in EMEP (European Monitoring and Evaluation Programme) under the Convention on Long Range Transport of Air Pollution (CLRTAP). The research work is carried out in collaboration with national and international research institutions. Met.No is representing Norway in many international conventions (WMO, ECMWF, EUMETSAT) and is involved in a multitude of partnerships both within the operational parts as well as in R&D. The institute educates PhD's and hosts postdocs on a regular basis thanks to its close collaboration with (and proximity to) the University of Oslo through the Oslo Centre for Interdisciplinary Environmental and Social Research (CIENS). MetNo hosts since 2011 the AeroCom aerosol model intercomparison database infrastructure.

Role in the project

In ACTRIS-2 Met.No will srongly contribute to JRA3 (WP13) Model evaluation, assimilation and trend studies.

Principal personnel involved

Dr. **Michael Schul**z (male) received his PhD at the University of Hamburg in 1993, continued as postdoc 1994-1999 and joined the Laboratoire des Sciences du Climate et de l'Environnement (LSCE) as post-doc in 1993/4 and then as senior 1999-2010, being the leader of the "Biogeochemical cycle modelling" research team 2003-2009 . He obtained his habilitaton in 2007 from the Université Pierre & Marie Curie, Paris VI on « Constraining Model Estimates of the Aerosol Radiative Forcing » Université Pierre & Marie Curie, Paris VI. He has taken up a deputy head of section position in 2010 at MetNo in the Climate and Air Pollution group. His research focuses on the understanding of the role of aerosols for climate change and air quality. He authored and co-authored 150 scientific papers in the field of experimental aerosol studies and global aerosol and chemistry modeling (h index 40). Supervising and acting as thesis committee member for ca. 30 master and PhD students. He worked as PI in numerous german, french, Norwegian, ESA and EU funded projects and was a lead/contributing author of the 4th&5th IPCC assessment report concerned with the aerosol radiative effects. He is coordinating since 2002 the international AEROCOM global aerosol model intercomparison initiative, which feeds into several recent assessment reports. He has been chair of the WMO Sand and dust storm warning Regional Steering Group for North Africa and Europe from 2008-2014.

Dr. **Svetlana Tsyro** (female) has a broad experience in modelling of long-range trans-boundary air pollution and deposition at EMEP/MSC-W and local pollution (Main Geophysical Observatory in St. Petersburg, 1983-99). Almost 18 years work on development of the EMEP/MSC-W model, particular expertise in modelling atmospheric aerosols. Among many aspects, implementation of PM10 and PM2.5 in the EMEP model for policy related air quality assessments, such as PM levels in Europe, source-receptor relationship, exceedances of PM critical levels and source allocations for present conditions, and also for the future, investigating the effects of emission reduction scenarios and different policy measures. Among the main working areas are regional and global assessments of PM chemical composition, implementation and calculations of sea salt and windblown dust, modelling of black carbon from anthropogenic sources and forest fires and uncertainty estimates due to emission uncertainties and process modelling. Development of the EMEP model for size-resolved multi-component aerosol. Most recently, modelling of aerosol optical properties (e.g. AOD, aerosol extinction profiles) and comparison with remote sensing measurements from satellites, sun-photometers and LIDARs.

Dr. **Hilde Fagerli** (female) has many years of experience in modelling the long-range atmospheric transport of air pollutants and has participated in numerous European projects. Since the beginning of 2009 she is head of Air Pollution section (since January 2011: Division of Climate Modelling and Air Pollution) at the Norwegian Meteorological Institute and leader for the Meteorological Synthesizing Centre –West of the EMEP. The work of EMEP/MSC-West supports the development of emission control Protocols under the Convention on Long-range transboundary air pollution and has also supported emission control development under the European Commission. In the EMEP project, Fagerli has the responsibility to deliver calculations of atmospheric pollution transport and source-receptor calculations from the most relevant version of the EMEP MSC-W model, providing recommendations on the best way to allow for meteorological variability and characterizing uncertainties in transport calculations for use in integrated assessment models. Dr. Hilde Fagerli has been working at the Norwegian Meteorological Institute (MET.NO) since 2000 on the development, validation and application of the EMEP Unified model. She has been working on various aspects of the model, mostly related to chemistry and dry deposition, but also trend studies and emission modeling.

Relevant publications

- Shindell, D. T., Lamarque, J.-F., Schulz, M., et al.: Radiative forcing in the ACCMIP historical and future climate simulations, Atmos. Chem. Phys., 13, 2939-2974, doi:10.5194/acp-13-2939-2013, 2013.
- Myhre, G., Samset, B. H., Schulz, M., et al.: Radiative forcing of the direct aerosol effect from AeroCom Phase II simulations, Atmos. Chem. Phys., 13, 1853-1877, doi:10.5194/acp-13-1853-2013, 2013.
- Schulz, M.; Prospero, J. M.; Baker, A. R.; et al., Atmospheric Transport and Deposition of Mineral Dust to the Ocean: Implications for Research Needs. Environmental Science & Technology, 46 (19), 10390-10404, 2012.

- Koffi, B., M. Schulz, F.-M. Bréon, et al., Application of the CALIOP layer product to evaluate the vertical distribution of aerosols estimated by global models: AeroCom phase I results, J. Geophys. Res., 117, D10201, doi:10.1029/2011JD016858, 2012.
- Bond T.C., S. J. Doherty, D. W. Fahey, …, M. Schulz, et al., Bounding the role of black carbon in the climate system: A scientific assessment, Vol 118, 11, pp 5380–5552, DOI:10.1002/jgrd.50171, 2013.

Relevant projects and activities connected to the proposal

- Coordination of the AeroCom inititiave (aerocom.zmaw.de)
- Coordination of the Norwegian Research Agency funded Project: "Mitigation of particles and black carbon: Problem or potential for future climate evolution. Assessment through an AeroCom phase III"; 2013-2015
- Partner responsible for MACC-II aerosol model evaluation through the MACC-VAL subproject. Provision of regular 3 monthly validation reports of the chemical forecast model.
- Partner responsible for the evaluation of satellite retrievals of aerosol optical properties in the cci-aerosol ESA project (http://www.esa-aerosol-cci.org). ATSR, MERIS, Parasol retrievals using Aeronet/Photons data, providing evaluation reports and a climate assessment report.
- Operational chemical weather forecasting with EMEP model on daily basis for MACC regional model ensemble and Norwegian Volcanic Ash Advisories.

4.1.12 National Institute of Research and Development for Optoelectronics (INOE)

National Institute of R&D for Optoelectronics - INOE (http://www.inoe.ro/en/) was established in 1996 and is involved in fundamental and applicative research in optoelectronics, analytical chemistry, and high pressure physics. INOE is a non-profit, independent research institute, under the coordination of the Romanian Ministry for Education. The Remote Sensing Dept. (http://environment.inoe.ro/) in INOE has a state-of-the-art research infrastructure for atmospheric studies, which coordinates the Romanian Atmospheric 3D research Observatory (http://rado.inoe.ro) and is part of international research networks (EARLINET, AERONET, MWRNET) contributing to the joint European climatological database. The lidar laboratory operates aerosol, ozone and fluorescence lidars, as well as passive remote sensors (NA2, WP6 and JRA1). Aerosol chemistry and trace gases analysis is covered by the in situ laboratory, which operates state-of-the art aerosol mass spectrometers, particle sizers and gas analysers (NA3). The engineering laboratory (http://engineering.inoe.ro) includes a wide range of instruments to test and characterize optical and electronic components (WP6). Research topics cover technological improvement of remote sensing instruments, air and water quality, and climatology of short-lived atmospheric species. The combination of lidar observations with in situ measurements and models provides a unique opportunity to conduct long-term inter-calibrations and monitoring of various atmospheric parameters over various space-time scales.

Role in the project:

INOE leads the Lidar Calibration Centre (WP6), hosting the laboratory for components testing and the training installations, and participates in NA2 (lidar activities, development of new QA tools), NA3 (aerosol chemistry), NA4 and JRA1 (microphysical inversion).

Principal personnel involved

Dr. **Doina Nicolae** (female) is a senior scientist at the National Institute of R&D for Optoelectronics. She is the head of the Remote Sensing Dept., Principal Investigator of the EARLINET, ACTRIS and AERONET Bucharest station, member of the ICLAS management committee, member of the EARLINET management committee, expert evaluator for FP7, and an expert to ISO and COST actions. Her expertise refers to ground-based remote sensing of the atmosphere, atmospheric physics and optics, physical, chemical and optical characterization of aerosols, development of algorithms, software and procedures for automatic data collection, processing and analysis. She (co)authorshiped 4 books/book chapters, over 26 ISI papers (28 citations), and 21 papers in peer review journals. Besides the scientific accomplishments and coordination of / participation in national and international research projects (FP7-REGPOT-2008-1, no. 229907; FP7-INFRASTRUCTURES-2010-1, no. 262254; FP7-AAT-2008-RTD-1, no. ACP8-GA-2009-233801; FP7-

PEOPLE-2011-ITN, no. 289923; ESA-STAR Program, ctr. 55/2013), her main achievements include the development of an atmospheric research super site and its integration into relevant European and global networks (EARLINET, AERONET, MWRNET, ACTRIS, GALION), as well as the setup of the Romanian Atmospheric 3D research Observatory (RADO).

Relevant publications

- Nicolae D., Nemuc A., Müller D., Talianu C., Vasilescu J., Belegante L., Kolgotin A., Characterization of fresh and aged biomass burning events using multiwavelength Raman lidar and mass spectrometry, J GEOPHYS RES-ATMOS, vol. 118, no. 7, pp. 2956-2965, 10.1002/jgrd.50324, 2013.
- D. Nicolae, C. Talianu, author of Chapter 1: Atmospheric lidar and retrieval of aerosol optical characteristics in Recent Advances in Atmospheric Lidars, *INOE Publishing House*, Series: Optoelectronic Materials and Devices, ISSN 1584-5508, Bucharest, 2010Nemuc A., Vasilescu J., Talianu C., Belegante L., Nicolae D., Assessment of aerosol's mass concentrations from measured linear particle depolarization ratio (vertically resolved) and simulations, Atmos. Meas. Tech., 6, 3243-3255, doi: 10.5194/amt-6-3243-2013, 2013
- Nemuc A., Stachlewska I. S., Vasilescu J., Górska J. A., Nicolae D., Talianu C., Optical properties of long-range transported volcanic ash over Romania and Poland during Eyjafjallajökull eruption in 2010, Acta Geophys, accepted 2013
- G. Pappalardo, D. Nicolae, L. Mona et al., Four-dimensional distribution of the 2010 Eyjafjallajökull volcanic cloud over Europe observed by EARLINET, ATMOS CHEM PHYS, vol. 13, pp. 4429-4450, 10.5194/acp-13-4429-2013, 2013.

Relevant projects

- FP7-REGPOT-2008-1, no. 229907, DELICE - Developing The Emerging Research Potential Of Romanian Lidar Centre
- FP7-INFRASTRUCTURES-2010-1, no. 262254, ACTRIS - Aerosols, Clouds, and Trace gases Research Infrastructure Network
- FP7-AAT-2008-RTD-1, no. ACP8-GA-2009-233801, DELICAT - Demonstration of LIDAR based Clear Air Turbulence detection
- FP7-PEOPLE-2011-ITN, no. 289923, ItaRS - Initial training for atmospheric remote sensing
- ESA-ESRIN, ctr. 40000110671/14/I-LG, NATALI - Neural network Aerosol Typing Algorithm based on LIdar data

4.1.13 Ludwig-Maximilians-Universitaet Muenchen (LMU)

The Meteorological Institute Munich (MIM) (http://www.meteo.physik.uni-muenchen.de/) of the Ludwig Maximilians University (LMU) has a strong expertise in radiative transfer model development, lidar remote sensing of aerosol, and passive remote sensing of clouds from ground and space. The MIM has an over 20-year experience with development and characterisation of lidar systems as well as sun and sky photometers. MIM has developed and operates two lidar systems: a sophisticated mobile, scanning, multi-wavelength lidar with Raman and depolarisation channels (MULIS), and a portable, dual wavelength, dual Raman, and dual depolarisation lidar (POLIS). The two lidar systems are reference systems for EARLINET. The MIM has continuously been entrusted with quality assurance duties in EARLINET since 2000, like remote quality assurance, lidar check-ups, and lidar intercomparisons.

Role in the project:

LMU contributes to the Lidar Calibration Centre (WP6), providing the Mobile reference lidar POLIS, the Lidar Remote Quality Assurance LiReQA and the Lidar Check-up Unit LiCheckUnit. LMU participates in NA2 (lidar activities, development of new QA tools).

Principal personnel involved

Dr. Volker Freudenthaler (male) is senior research scientist of the Lidar Group at the Meteorological Institute of LMU Munich. His scientific focus is lidar-based remote sensing of aerosols, with emphasis on the improvement of the quality of lidar measurements. In this context, he designed several lidar systems, some of which are regarded as reference systems for EARLINET, and gained experience regarding the comparison and synergy of lidar and other remote sensing instruments during several international field campaigns since 1996 (recently SAMUM 1 and 2, EARLI09, SALTRACE). He was and is responsible for the quality assurance during EARLINET-ASOS and ACTRIS. He (co)authorshipped more than 30 papers in peer reviewed journals.

Relevant publications

- Pappalardo, G., Amodeo, A., Apituley, A., Comeron, A., Freudenthaler, V., Linné, H., Ansmann, A., Bösenberg, J., D'Amico, G., Mattis, I., Mona, L., Wandinger, U., Amiridis, V., Alados-Arboledas, L., Nicolae, D., and Wiegner, M.: *EARLINET: towards an advanced sustainable European aerosol lidar network*, Atmos. Meas. Tech., 7, 2389-2409, doi:10.5194/amt-7-2389-2014, 2014.
- Groß, S., V. Freudenthaler, et al.,, 2011, *Dual-wavelength linear depolarisation ratio of volcanic aerosols: lidar measurements of the Eyjafjallajökull plume over Maisach, Germany*, Atmos. Environment, doi: 10.1016/ j.atmosenv.2011.06.017.
- Ansmann, A., M. Tesche, S. Gross, V. Freudenthaler, et al., 2010, *The 16 April 2010 major volcanic ash plume over central Europe: EARLINET lidar and AERONET photometer observations at Leipzig and Munich, Germany*, Geophys. Res. Lett., 37, L13810, doi:10.1029/2010GL043809.
- Freudenthaler, V., et al., 2010, *EARLI09 - direct intercomparison of eleven EARLINET lidar systems*, Proc. 25th International Laser Radar Conference, St.-Petersburg, Russia, 5-9 July 2010, 891-894.
- Freudenthaler, V., et al., 2009, *Depolarization ratio profiling at several wavelengths in pure Saharan dust during SAMUM 2006*, Tellus B, 61, 165-179, DOI: 10.1111/j.1600-0889.2008.00396.x.

Relevant projects

- EC FP7 project ACTRIS (Aerosol, Clouds, and Trace gases Research Infrastructure network). Contract n. 262254.
- EC FP6 project EARLINET-ASOS (European Aerosol Research Lidar network – Advanced Sustainable Observation System). Contract n. 025991.
- ESA-CALIPSO EARLINET's Spaceborne-lidar-related Activity During the CALIPSO Mission" ESA-ESTEC Contract No. 21487/08/NL/HE (2008-2011).
- EC FP5 project EARLINET (A European Aerosol Research Lidar Network to Establish an Aerosol Climatology). Contrcat no. EVR1-CT-1999-40003

4.1.14 Commission of the European Communities - Directorate General Joint Research Centre – JRC

JRC-IES, the Institute for Environment and Sustainability, is one of the seven institutes that constitute the Joint Research Centre (JRC) of the European Commission. The mission of IES is to provide scientific and technical support to EU strategies for the protection of the environment and sustainable development. Over the past 20 years, the research focus of the IES has been to investigate the level and fate of contaminants in the air, water and soil; assess the effects of these contaminants upon the environment and individuals and promote a sustainable energy supply. The IES has an interdisciplinary, integrated philosophy, which combines expertise in experimental sciences, modelling, geomatics and remote sensing. The IES is one of the leading European centers for research on environment and sustainability. The IES encompasses eight units, of which the Air and Climate Unit provides scientific support for the development and monitoring of European policies in the area of urban, regional and global air pollution and climate change. The Air and Climate Unit is currently involved in monitorning air pollution and greenhouse gases, in activities dedicated to harmonization of monitoring and modeling techniques, modelling air pollution from emissions to impacts from urban to global scale.

Role in the project:

JRC will contribute to NA2 (Profiling of aerosols and clouds) and NA3 (Near-surface observations of aerosol, clouds and trace-gases) and it will contribute to the European Center for Aerosol Calibration (ECAC) in WP9 providing the European Laboratory for Air Pollution (ERLAP).

Principal personnel involved

Dr. **J.P. Putaud** (JRC-IES) (male) is leading the team operating the JRC-IES station for atmospheric research in Ispra (IT). He has more than 20 years of experience in aerosol chemistry and physics, especially on field sampling and analysis of gaseous and particulate species at low concentrations. He is a member of the EMEP Task Force on Measurements and Modelling. He (co-) authored more than 60 peer-reviewed papers in atmospheric chemistry and physics published in international journals, and he is Associate Editor of AMT. He participated in 9 EC funded projects.

Relevant publications

- Chiappini, L., Verlhac, S., Aujay, R., Maenhaut, W., Putaud, J. P., Sciare, J., Jaffrezo, J. L., Liousse, C., Galy-Lacaux, C., Alleman, L. Y., Panteliadis, P., Leoz, E., and Favez, O.: Clues for a standardised thermal-optical protocol for the assessment of organic and elemental carbon within ambient air particulate matter, Atmos. Meas. Tech., 7, 1649-1661, doi:10.5194/amt-7-1649-2014, 2014.
- Alföldy, B., Lööv, J. B., Lagler, F., Mellqvist, J., Berg, N., Beecken, J., Weststrate, H., Duyzer, J., Bencs, L., Horemans, B., Cavalli, F., Putaud, J.-P., Janssens-Maenhout, G., Csordás, A. P., Van Grieken, R., Borowiak, A., and Hjorth, J.: Measurements of air pollution emission factors for marine transportation in SECA, Atmos. Meas. Tech., 6, 1777-1791, doi:10.5194/amt-6-1777-2013, 2013.
- Adam, M., Putaud, J. P., Martins dos Santos, S., Dell'Acqua, A., and Gruening, C.: Aerosol hygroscopicity at a regional background site (Ispra) in Northern Italy, Atmos. Chem. Phys., 12, 5703-5717, doi:10.5194/acp-12-5703-2012, 2012.
- Baumgardner, D., Popovicheva, O., Allan, J., Bernardoni, V., Cao, J., Cavalli, F., Cozic, J., Diapouli, E., Eleftheriadis, K., Genberg, P. J., Gonzalez, C., Gysel, M., John, A., Kirchstetter, T. W., Kuhlbusch, T. A. J., Laborde, M., Lack, D., Müller, T., Niessner, R., Petzold, A., Piazzalunga, A., Putaud, J. P., Schwarz, J., Sheridan, P., Subramanian, R., Swietlicki, E., Valli, G., Vecchi, R., and Viana, M.: Soot reference materials for instrument calibration and intercomparisons: a workshop summary with recommendations, Atmos. Meas. Tech., 5, 1869-1887, doi:10.5194/amt-5-1869-2012, 2012.
- Cavalli, F., Viana, M., Yttri, K. E., Genberg, J., and Putaud, J.-P.: Toward a standardised thermal-optical protocol for measuring atmospheric organic and elemental carbon: the EUSAAR protocol, Atmos. Meas. Tech., 3, 79-89, doi:10.5194/amt-3-79-2010, 2010.

Relevant projects

EU FP6 **EUSAAR**, EU FP7 **ACTRIS**, EU FP7 **PEGASOS**

4.1.15 Universidad de Valladolid (UVA)

The University of Valladolid (UVA) was funded in the XIII century and is one of the oldest universities in Europe. It comprises 25 faculties with 30.000 students and 2.000 teachers and researchers in all fields. The Group of Atmospheric Optics (GOA-UVA) belongs to the Optics Department of the Science Faculty, and has a long record in atmospheric research by optical methods for more than 20 years (http://goa.uva.es). Since 2006 the GOA-UVA group operates an AERONET calibration facility, in close collaboration with AERONET headquarters in NASA, the Laboratory of Atmospheric Optics in Lille and the Izaña Atmospheric Research Center (IARC), in Tenerife, belonging to the Meteorological State Agency of Spain (AEMET). This calibration facility has participated in the ACTRIS project.

The **UVA and the Izaña observatory form a Joint Research Unit**, with extensive collaboration in the fields of solar radiation and column aerosol properties, with the umbrella of 2 official agreements (2007-2010 and 2010-2014) that have supported the AERONET calibrations, 2 PhD theses and a number of publications. The unique location of the Izaña Atmospheric Research Center, allows the absolute calibration of the master photometer instruments, necessary for the calibration of AERONET field photometers. Izaña has been declared in July 2014 as Testbed station for Aerosols and Water Vapor Remote Sensing Instruments by the Commission for Instruments and Methods of Observations of the World Meteorological Organization (http://www.wmo.int/pages/prog/www/IMOP/Testbeds-and-LC.html).

Role in the project:

The **UVA** expertise in sun photometer measurements, calibration and quality assurance will play a key role in the Access to AERONET-Europe calibration center (WP7), devoted to the calibration of AERONET sun photometers and on-site data monitoring and quality assurance. The operation of the GOA-UVA calibration facility since 2006 as well as the successful results in ACTRIS-1 project, make it reliable that the proposed calibration work in the present proposal will be consistently and effectively carried out. Furthermore, Izaña observatory hosts the Izaña Subtropical Access Facility (WP9, TNA4), where users can investigate the chemical composition and related physical characteristics of the atmosphere and their trends, mostly under free troposphere conditions, and within the Saharan Air Layer in summer. Long term monitoring of in-situ greenhouse gases and reactive gases is carried out at Izaña since 1984. The experience in this measurements and the unique location of the facility make this TNA access of clear interest for the community.

Principal personnel involved

Dr. Carlos Toledano (male), principal investigator for ACTRIS-2 at GOA-UVA, graduated in Physics at Complutense University in Madrid (1999) and received his PhD at University of Valladolid in 2005. For 2 years he was postdoctoral fellow at the Meteorological Institute, University of Munich (Germany). He is researcher at University of Valladolid since 2008. His research is focused on the investigation of the atmospheric components, mainly aerosol, by optical methods, regarding aerosol characterization, data quality assurance and field campaigns. He has more than 50 peer-reviewed publications in SCI journals and received the 3M Foundation Award 2008 for Environmental Science. Currently he is in charge of the operations, calibration and quality assurance of the GOA calibration facility that is part of AERONET, and participates in the European infrastructure project ACTRIS.

Prof. Dr. Victoria Cachorro (female), is the scientific director of the Group of Atmospheric Optics (GOA-UVA). She graduated in Physics at Valladolid University in 1978 and received her Phd at University of Valladolid in 1985. She is University Professor since 2002. Her research experience includes both experimental work and modelling of spectral solar radiation and its application to atmospheric aerosol research by remote sensing techniques. She is leader of the Iberian Network for Aerosol Measurements (RIMA), federated to AERONET and the GOA calibration facility. She has supervised 12 PhD theses and has more than 100 peer-reviewed publications, and has been principal investigator in more than 20 national and European projects. She has been member of the Internacional Radiation Comission (IAMAS) in 2009-2012.

Dr. Emilio Cuevas-Agulló (male), joined the Meteorological State Agency of Spain (AEMET) in 1987. He is the Director of the Izaña Atmospheric Research Center (IARC), a WMO (World Meteorological Organization) GAW (Global Atmospheric Watch) station of global importance. His research background covers meteorology (Master Degree in Atmospheric Physics) tropospheric ozone, atmospheric dynamics and stratosphere-troposphere exchange (PhD in 1996), tropospheric and stratospheric ozone, UV radiation, and dust/aerosols. His activities are within the GAW Program umbrella and other international monitoring and research networks such as: NDACC (Network for the Detection of Atmospheric Composition Change), AERONET (AErosol RObotic NETwork) and MPL-NET (MicroPulse Lidar NETwork). He has participated in 24 projects financed by European Commission (EC) and the National R+D Plan. He has been Principal Investigator (PI) in five EC contracts. He is co-author of over 80 papers in peer-reviewed literature.

Relevant publications

- B. Torres, O. Dubovik, C. Toledano, A. Berjon, V. E. Cachorro, T. Lapyonok, P. Litvinov, P. Goloub, Sensitivity of aerosol retrieval to geometrical configuration of ground-based sun/sky radiometer observations. Atmospheric Chemistry and Physics, 14, 847-875, (2014)
- B. Torres, C. Toledano, A. Berjón, D. Fuertes, V. Molina, R. Gonzalez, M. Canini, V. E. Cachorro, P. Goloub, T. Podvin, L. Blarel, O. Dubovik, Y. Bennouna, A. M. de Frutos, Measurements on pointing error and field of view of Cimel-318 Sun photometers in the scope of AERONET. Atmospheric Measurement Techniques, 6, 2207–2220, (2013)
- García, R.D., O.E, García, E. Cuevas, V.E. Cachorro, P.M. Romero-Campos, R. Ramos and A.M. de Frutos, Solar radiation measurements compared to simulations at the BSRN Izaña station. Mineral dust radiative forcing and efficiency study, JGR-Atmospheres, Vol 119, 1-16, DOI: 10.1002/2013JD020301, 2014
- Guirado, c., E. Cuevas, V. E. Cachorro, C. Toledano, S. Alonso-Pérez, J. J. Bustos, S. Basart, P. M. Romero, C. Camino, M. Mimouni, L. Zeudmi, P. Goloub, J. M. Baldasano, and A. M. de Frutos, Aerosol characterization at the Saharan AERONET site Tamanrasset, Atmos. Chem. Phys. Discuss., 14, 16641-16690, 2014.
- Barreto, A., Cuevas, E., Damiri, B., Guirado, C., Berkoff, T., Berjón, A. J., Hernández, Y., Almansa, F., and Gil, M.: A new method for nocturnal aerosol measurements with a lunar photometer prototype , Atmos. Meas. Tech., 6, 585-598, doi:10.5194/amt-6-585-2013, 2013.

Relevant projects

- Project title: development, technical and scientific application in the RIMA-AERONET network (DATEC-RIMA). Financial entity: Spanish Research Council (CICYT)
- Project title: Aerosols, Clouds, and Trace gases Research Infrastructure Network (ACTRIS). Financial entity: EC, Infrastructures, VII FP
- Project title: Specific collaboration agreement between the Spanish Meterological Agency and the University of Valladolid regarding the radiometry, ozone and aerosol programs carried out at Izaña Atmospheric Research Center, as well as the adaptation and integration of AEMET Cimel network within AERONET. Financial entity: Spanish Met. Agency (AEMET)
- Project title: Sand and Dust Strom Early Warning System in the Magreb Region (SDS-Africa). Financial entity: AECID (Agencia Española de Cooperación Internacional para el Desarrollo)
- Project title: Global Atmospheric Watch in the Magreb-Sahara Region (GAW-Sahara). Financial entity: AECID (Agencia Española de Cooperación Internacional para el Desarrollo)

4.1.16 Universidad de Granada (UGR)

The University of Granada (Universidad de Granada, UGR, Granada, Spain) is a public institution, one of the largest universities in Spain, devoted to the higher education and research in the fields of architecture, humanities, health sciences, law, experimental sciences and engineering. The Atmospheric Physics Group (GFAT) of the Andalusian Institute for Earth System Research (IISTA-CEAMA) develops its research activity on the different components of the Earth energy balance. Along the last two decades the group gained a good experience in the study of aerosol, clouds and their interaction with the atmospheric radiation field, using in-situ and remote sensing, passive and active, tools combined with the use of retrieval algorithms of microphysical properties for non-spherical aerosols, based on T-matrix kernels.The group has also a good skill on the use of eddy covariance techniques applied to the study of turbulent exchanges between surface and atmosphere, with special focus on green house gases. UGR is part of EARLINET and AERONET networks. In the 7th Framework Programme Project "Aerosol, Cloud, and Trace Gases Research Infrastructure Network (ACTRIS)", UGR participated actively in work packages WP 2 and WP 7, with a relevant contribution in the testing and evaluation of the microphysical retrieval algorithms that use the synergetic combination of elastic multiwavelength lidars an and sunphotometers.

The University of Granada leads the Spanish Join Research Unit that includes five relevant Spanish research institutions: University of Granada (UGR), Technical University of Catalonia (UPC), Barcelona supercomputing Center (BSC), Research Center on Energy, Environment and Technology (CIEMAT) and National Institute for Aerospace Technology (INTA). These institutions have a long record of collaboration in the field of atmospheric studies during the last decade reflected in the development of different cooperative projects with results published in different research journals.

Role in the project

The JRU strongly contribute to NA2 leading in particular the task 2.4. The JRU also contributed to NA3. The JRU participates in WP 11 “JRA1: Aerosol absorption and black carbon”, leading in particular task 10.2. The JRU also contributes to WP 12 “JRA2: The surface-atmosphere exchange of aerosols”. The JRU will be involved in WP13: JRA3: Model evaluation, assimilation and trend studies. In addition, the JRU will provide access (TNA) to the GRANADA Atmospheric Observatory (GRA).

UGR is in particular responsible for task 11.2 “24-hour absorption coefficient profiling through inversion of remote sensing observations” in JRA1, contributing also to tasks 11.1 and 11.3 and will contribute to the different tasks in JRA2. UGR contributes to tasks 2.1 and 2.3 of the work package 2 “NA2: Profiling of aerosols and clouds”. UGR is responsible of the GRANADA Atmospheric Observatory (GRA) providing access in the TNA4.

Principal personnel involved

Dr. **Lucas Alados-Arboledas** (male) is Professor of Applied Physics and Principal Investigator of the Atmospheric Physics Group at the University of Granada. He has leaded different projects focus on the study of atmospheric aerosol and their role in the Earth energy balance, using multiwavelength lidar with depolarization and sun/star radiometers. He has been PI of UGR in the FP/ project ACTRIS.

Professor **Adolfo Comerón** (male). His current research fields are lidar systems for atmospheric remote sensing and free-space optical communications. He has been PI of UPC in the FP5 project EARLINET, in the FP6 project EARLINET-ASOS, and in the FP7 project ACTRIS.

Dr. **José M. Baldasano** (male) is Full Professor in Environmental Engineering in the Technical University of Catalonia (UPC) and head of the Earth Sciences Dpt. in the BSC-CNS. He is member of the SSC of PRACE HPC European Initiative; and member of the IPCC. Has been member of "Steering Group of National Experts on Ambient Air Quality, European Union, Commission DG XI".

Dr. **Manuel Pujadas** (male). Senior researcher. Main responsible of the lidar station. He has been IP for CIEMAT in the FP6 project EARLINET-ASOS, and in the FP7 project ACTRIS.

Manuel Gil-Ojeda (male), PhD in Atmospheric Physics, he is heading the Atmospheric Research Branch at INTA. He has participated in 35 National and European funded projects (11 European FWP as IP) and contributed in more than 85 peer reviewed papers in his field of research.

Relevant publications

- Comerón, A., M. Sicard, and F. Rocadenbosch (2013), Wavelet Correlation Transform Method and Gradient Method to Determine Aerosol Layering from Lidar Returns: Some Comments, J. Atmos. Ocean. Technol., 30(6), 1189–1193, doi:10.1175/JTECH-D-12-00233.1.
- Granados-Muñoz, M. J., J. L. Guerrero-Rascado, J. A. Bravo-Aranda, F. Navas-Guzmán, A. Valenzuela, H. Lyamani, A. Chaikovsky, U. Wandinger, A. Ansmann, O. Dubovik, J. O. Grudo, and L. Alados-Arboledas. (2014), Retrieving aerosol microphysical properties by Lidar-Radiometer Inversion Code (LIRIC) for different aerosol types, J. Geophys. Res. Atmos., 119, 4836–4858, doi:10.1002/2013JD021116.
- Pérez C.; K. Haustein; Z. Janjic; O. Jorba; N. Huneeus; J. M. Baldasano; T. Black; S. Basart; S. Nickovic; R. L. Miller; J. P. Perlwitz; M. Schulz; M. Thomson (2011) Atmospheric dust modeling from meso to global scales with the online NMMB/BSC-Dust model–Part 1: Model description, annual simulations and evaluation. Atmospheric Chemistry and Physics, 11: 13001–13027, www.atmos-chem-phys.net/11/13001/2011/ doi:10.5194/acp-11-13001-2011

- Molero F., Andrey F. J., Fernández A. J., Parrondo M. C., Pujadas M., Córdoba-Jabonero C., Revuelta M. A., Gómez-Moreno F. J. 2014. Study of vertically resolved aerosol properties over an urban background site in Madrid (Spain). International Journal of Remote Sensing, 35:6, 2311-2326.
- Córdoba-Jabonero, C. M. Sorribas, J. L. Guerrero-Rascado, J. A. Adame, Y. Hernández, H. Lyamani, V. Cachorro, M. Gil-Ojeda, L. Alados-Arboledas, E. Cuevas, and B. de la Morena, Synergetic monitoring of Saharan dust plumes and potential impact on surface: a case study of dust transport from Canary Islands to Iberian Peninsula, Atmos. Chem. Phys., 11, 3067-3091, 2011.

Relevant projects

- 7th FP Project "Aerosol, Cloud, and Trace Gases Research Infrastructure Network (ACTRIS)" (Grant Agreement nº 262254). 1 April 2011 – 31 March 2015. PI: Gelsomina Pappalardo (CNR-IMAA, Potenza, Italy), Paolo Laj (Université Joseph Fourier Grenoble 1, France).
- 6th FP Project "EARLINET-ASOS: European Aerosol Research Lidar Network: - Advanced Sustainable Observation System" (Contract nº 025991 (RICA)). PI: Gelsomina Pappalardo (CNR-IMAA, Potenza, Italy), PI at UPC: Adolfo Comerón
- 7th FP Project HEREPLUS (HEalth Risk from Environmental Pollution Levels in Urban Systems (Environment, FP7-ENV-2007-1 Project number. 212854) 1 October 2008-30 September 2011. PI: S.Trueman (CSI) IT, PI at CIEMAT: B. Artíñano.
- 7th FWP Project "Network of Remote Sensing Ground-Based Observations for the GMES Atmospheric Service (NORS). 1.1.2011-31.10.2014. Coord. Martine De Maziere (IASB, Belgium). INTA IP. Manuel Gil-Ojeda.
- Project from the Spanish Ministry of Economy and Competitiveness: "Vertical Profiling of microphysical properties of the atmospheric aerosol. Application to hygroscopicity studies. (AEROMICROPRO)" (Ref CGL2010-18782) 01/2011-12/2013, PI: Lucas Alados Arboledas (UGR).

4.1.17 Agencia Estatal Consejo Superior De Investigaciones Cientificas (CSIC)

The Spanish National Research Council (CSIC, www.csic.es)) is the largest public institution dedicated to research in Spain and the third largest in Europe, covering from basic research to advanced technological developmen Its research is driven by its centres and institutes (more than 100), which are spread across all the autonomous regions, and its more than 15,000 staff, of whom ore than 3,000 are staff researchers and the same number again are graduates and postgraduates. The CSIC team belongs to the Institute of Environmental Assessment and Water Studies (IDÆA). This group is specialist in atmospheric aerosol monitoring, sampling, characterization and source apportionment. These activities provide scientific knowledge on which assessment of air pollutant effects on different aspects of the environment, from human health to climate, can be based. The team operates several ground based stations in urban (Barcelona), rural (Montseny) and remote (Montsec) areas. The research team provides external expert support to Spanish environmental authorities and participates in the workgroup on particulate matter of the Clean Air For Europe (CAFE) program of the DG Environment for the evaluation of the EU air quality directives.

Role in the project:

CSIC will participate in the networking activity NA3 related to near-surface observations of aerosol, clouds and trace-gases, optimization and standardization. Also, it will provide access (TNA4) to the GIGA infrastructure for atmospheric research in three environments in the Western Mediterranean, connecting Air Quality and climate.

Principal personnel involved

Dr. Andrés Alastuey (male) (IDAEA-CSIC): he is a research Professor with more than 20 years of experience on environmental geochemistry, namely on atmospheric pollution. He is Assessor of the Spanish Ministry of the Environment for PM and air quality, Co-author of around 240 papers in SCI journals. He has participated/coordinated around 60 research projects sponsored by the EU, other Spanish or international research bodies, the Ministry of the Environment and other private companies. He is supervisor/co-supervisor of 10 PhDs. He is included in the Essential Science Indicators of the ISI Web of knowledge in the fields of Geosciences and Environment/Ecology (total number of quotations is 6970). Hirsch index = 49. Research ID: E-1706-2014.

Relevant publications

- Cusack, M., Pérez, N., Pey, J., Wiedensohler, A., Alastuey, A., & Querol, X. (2013). Variability of sub-micrometer particle number size distributions and concentrations in the Western Mediterranean regional background, 1, 1–19.
- Cusack, M., Pérez, N., Pey, J., Alastuey, A., & Querol, X. (2013). Source apportionment of fine PM and sub-micron particle number concentrations at a regional background site in the western Mediterranean: a 2.5 year study. *Atmospheric Chemistry and Physics*, *13*(10), 5173–5187. doi:10.5194/acp-13-5173-2013
- Pandolfi, M., Cusack, M., Alastuey, A., & Querol, X. (2011). Variability of aerosol optical properties in the Western Mediterranean Basin. *Atmospheric Chemistry and Physics*, *11*(15), 8189–8203. doi:10.5194/acp-11-8189-2011
- Pey, J., Querol, X., Alastuey, a., Forastiere, F., & Stafoggia, M. (2013). African dust outbreaks over the Mediterranean Basin during 2001–2011: PM_{10} concentrations, phenomenology and trends, and its relation with synoptic and mesoscale meteorology. *Atmospheric Chemistry and Physics*, *13*(3), 1395–1410. doi:10.5194/acp-13-1395-2013
- Ripoll, A., Pey, J., Minguillón, M. C., Pérez, N., Pandolfi, M., Querol, X., & Alastuey, A. (2014). Three years of aerosol mass, black carbon and particle number concentrations at Montsec (southern Pyrenees, 1570 m a.s.l.). *Atmospheric Chemistry and Physics*, *14*(8), 4279–4295. doi:10.5194/acp-14-4279-2014

Relevant projects

– AirMonTech—Air Quality Monitoring Technologies for Urban Areas. Project number 265116. Funding scheme Coordination and support action, FP7-ENV-2010. 1st December 2010 - 1st June 2013. 997,552.16 Euros. Coordinator: Dr. Thomas Kuhlbusch Institute of Energy and Environmental Technology – IUTA, Germany; CSIC PI: Mar Viana (IDAEA-CSIC)
– ACTRIS Aerosols, Clouds, and Trace gases Research Infrastructure Network. Propuesta: 262254. FP7-INFRASTRUCTURES-2010-1. Funding scheme Combination of CP & CSA. 01/04/2011 -31/03/2015. 7.8 M Euros. Coordinator: Gelsomina Papalardo Consiglio Nazionale delle Ricerche (CNR); CSIC PI: Andrés Alastuey (IDAEA-CSIC)
– BREATHE (BRain dEvelopment and Air polluTion ultrafine particles in scHool ChildrEn). Advanced Grand ERC FP7. 2011 – 2015. 2.5 M Euros. PI: Dr. Jordi Sunyer, (CREAL); CSIC IP: Xavier Querol (IDAEA-CSIC)
– AIRUSE LIFE+. Testing and Development of air quality mitigation measures in Southern Europe. LIFE11 ENV/ES/000584. 2012- 2016. 2.368.719 Euros. PI: Xavier Querol (IDAEA-CSIC)
– PRISMA: Optical properties and radiative forcing of atmsoperhic aerosols in the western Mediterranes as a functionof sources and chemcial composition. CGL2012-39623-C02-0, Spansih Ministry of Scinece and Education, 2012-2015, 366.210 euros. Coordiantor Andrés Alastuey (IDAEA-CSIC)

4.1.18 Koninklijk Nederlands Meteorologisch Instituut (KNMI)

KNMI is the Dutch national weather service and centre for climate research. The institute combines in house operational as well as strategic research tasks. As an integral part of the Ministry of Infrastructure and Environment KNMI provides on a day-to-day basis advice on weather and climate to national, regional and local authorities. KNMI is participating in many European projects on both climate and space research and keeps close ties with many of its stakeholders.

KNMI hosts the Cabauw Experimental Site for Atmospheric Research (CESAR), which is the national focal point for atmospheric research and monitoring. CESAR is one of the so-called supersites for climate monitoring in Europe and is an ACTRIS main site where key parameters of the atmospheric state and air quality are measured, including radiation and vertical profiles. CESAR data is used for long-term records, process studies as well as test beds for model evaluation and satellite validation. Advanced techniques for atmospheric profiling are used and are continuously developed. Quality controlled observations are part of several networks, such as BSRN, Aeronet, EARLINET, CloudNet and ACTRIS. CESAR is also a candidate site for GRUAN. The KNMI space research division has a long-standing experience and expertise with satellite missions observing atmospheric composition including GOME, SCIAMACHY and GOME-2. Moreover KNMI plays a leading role in OMI, the Sentinel-5 Precursor/TROPOMI, and the active atmospheric sounders Aeolus and EarthCare. KNMI is currently coordinating different EU projects, including QA4ECV and EURO4M. In the context of the Copernicus Atmosphere Core Service KNMI coordinates the validation sub-group in the MACC project.

Role in the project

KNMI leads the Joint Research Unit for CESAR in which TU-Delft, ECN, University Utrecht and TNO are third parties. The consortium has a role in NA2: Profiling of aerosols and clouds an NA3: near-surface observations of aerosol, clouds and trace-gases, as well as in JRA1 and JRA2. Moreover, transnational access (TNA4) is provided to the Cabauw site. KNMI and JRU partners will work in the TNA to assist external users with access to CESAR.

Principal personnel involved

Arnoud Apituley (male) is senior scientist at KNMI. He has research experience in ground based and space borne remote sensing applications including tropospheric ozone, clouds, aerosols and water vapour. His main interest is in integrating in-situ and ground based and space borne remote sensing techniques, for the study of air quality and climate change at the Cabauw Experimental Site for Atmospheric Research (CESAR). He contributed to experimental campaigns for air quality and climate related effects of aerosols and clouds and to several satellite validation studies. He contributed to studies using synergies between different remote sensing techniques and studies linking satellite remote sensing data to ground based observations. He contributed to observations and new product development for volcanic ash retrievals using ground based lidars. He is coordinator of the Sentinel-5p/TROPOMI Level 2 working group and the TROPOMI Level 2 CAL/VAL team. He has served on the different international committees for LIDAR applications, including the EARLINET council, and as expert on an ISO working group for ground based laser remote sensing, and is vice chair of the WMO CIMO working group on new technologies and testbeds. He is member of the GRUAN working group and site representative of the candidate GRUAN site Cabauw/De Bilt. He is an active participant in ACTRIS.

Henk Klein Baltink (male) is employed by KNMI since 1993. His main interest and expertise is in the field of remote sensing of the atmospheric boundary layer and clouds. Before joining KNMI he worked on remote sensing applications, instrument development, and related research at Ministery of Public Works and Transport. He participated in a COST project on windprofiler measurements and was manager of one of the first projects on GPS water vapour measurements for operational meteorology and climate research executed in the Netherlands. Since 2001 his work is focussed on cloud observations with the KNMI 35 GHz cloudradar. From 2008 till 2011 he was a member f the WMO CIMO Expert Team on upper-air observations which mainly dealt with radiosonde intercomparison. He is also strongly involved in the development and content management of the CESAR database and CloudNet products.

Dr. Wouter Knap (male) is senior scientist within the Regional Climate Department of KNMI and is the site scientist of the BSRN site in Cabauw. He has over 15 years of experience with radiative transfer in the earth's atmosphere, in particular with the interaction of shortwave radiation with (ice and liquid) water clouds and aerosols. His background covers both the theoretical aspects of radiative transfer (use and development of radiative transfer models) and the measurement of radiative fluxes on the ground. Furthermore he has significant experience with the development of retrieval algorithms designed for the retrieval of cloud microphysical properties from satellite measurements.

Prof. dr. Herman Russchenberg (male) is Director of Director TU Delft Climate Institute. He has extensive experience in remote sensing of clouds and precipitation with ground-based radar, lidar and microwave radiometry. He is one of the initiators of this work in The Netherlands in the frame of the CLARA-project. Dr. Russchenberg is experienced in theoretical as well experimental research of the scattering process and the retrieval of geo-physical parameters from radar and lidar measurements. He has performed several studies for the European Space Agency, dealing with radar observations of clouds and precipitation. He plays a key role in the Dutch Cesar-consortium. He participated in the Cloudnet program, and in the COST 720 project on integration of atmospheric sensors.

Dr. Bas Henzing (male) has a PhD in physics and is over 10 years active in atmospheric aerosol research. His main expertise concerns the effect of aerosol on solar radiation distribution, including both radiation transfer modeling and aerosol physical and optical properties measurement. This latter expertise was used during FP6 project EUSAAR where he co-coordinated the harmonization process of aerosol optical properties measurements in Europe. In FP7 project ACTRIS, he is the CESAR-responsible person for aerosol physical and optical properties. As an expert on particle number size distribution, he is assigned as member of the European CEN working group that developes the standard for particle number size distribution measurements. At TNO his scientific experience on particle size distribution and optical properties is used for health/impact related studies for (local) governments.

Dr. Rupert Holzinger (male) is leading specialist in development and application of techniques to measure reactive organic species in both, the gas phase and in aerosols. Recently he developed a thermal-desorption proton-transfer-reaction mass-spectrometer (TD-PTR-MS) with which the organic composition of aerosols can be measured in unprecedented detail. His scientific focus is on fundamental processes that lead to the formation of new particles and secondary organic aerosol. R Holzinger participated in many international field campaigns such as CalNex-La (2010), EUCAARI-IOP (2008), ICARTT (2004), MINOS (2002). PhD from Innsbruck University, Austria,1998; 1999-2002 Postdoc at the Max Planck Institute for Chemistry, Mainz, Germany; 2003-2005 Associate Specialist at the University of California, Berkeley, USA; 2006-present Assistant Professor at Institute for Matine and Atmospheric Research, Utrecht University (IMAU), The Netherlands.

Ernie P. Weijers (PhD) (male) is a senior scientist at the Department of Air Quality and Climate Change, the Energy research Centre of the Netherlands (ECN). He studied Physics and Mathematics at the Vrije Universiteit (VU) in Amsterdam and successfully finished a PhD study at the Department of Meteorology entitled 'kinematic properties of thermal structures in the atmospheric surface layer'. He has more than 20 years of experience working for research organisations (VU, TNO, ECN) and the municipality of Amsterdam. Has a broad research experience in the fields of micrometeorology, multivariate statistics, and measurements and modelling of atmospheric pollution. Currently he coordinates the research on particulate matter in relation to health effects and policy in the urban environment at ECN. He participated in many research projects and national research programmes (NAP, BOP) and is now involved in the EU AirMonTech project dealing with future PM measurement methods.

Relevant publications

- Boers, R., M. J. de Haij, W. M. F. Wauben, H. K. Baltink, L. H. van Ulft, M. Savenije, and C. N. Long (2010), Optimized fractional cloudiness determination from five ground-based remote sensing techniques, J. Geophys. Res., 115, D24116, doi:10.1029/2010JD014661.
- Dominique Bouniol, Alain Protat, Julien Delanoë, Jacques Pelon, Jean-Marcel Piriou, François Bouyssel, Adrian M. Tompkins, Damian R. Wilson, Yohann Morille, Martial Haeffelin, Ewan J. O'Connor, Robin J. Hogan, Anthony J. Illingworth, David P. Donovan, and Henk-Klein Baltink, 2010: Using Continuous Ground-Based Radar and Lidar Measurements for Evaluating the Representation of Clouds in Four Operational Models. J. Appl. Meteor. Climatol., 49, 1971–1991. doi: http://dx.doi.org/10.1175/2010JAMC2333.1
- Piters, A. J. M., Boersma, K. F., Kroon, M., Hains, J. C., Van Roozendael, M., Wittrock, F., Abuhassan, N., Adams, C., Akrami, M., Allaart, M. A. F., Apituley, A., Beirle, S., Bergwerff, J. B., Berkhout, A. J. C., Brunner, D., Cede, A., Chong, J., Clémer, K., Fayt, C., Frieß, U., Gast, L. F. L., Gil-Ojeda, M., Goutail, F., Graves, R., Griesfeller, A., Großmann, K., Hemerijckx, G., Hendrick, F., Henzing, B., Herman, J., Hermans, C., Hoexum, M., van der Hoff, G. R., Irie, H., Johnston, P. V., Kanaya, Y., Kim, Y. J., Klein Baltink, H., Kreher, K., de Leeuw, G., Leigh, R., Merlaud, A., Moerman, M. M., Monks, P. S., Mount, G. H., Navarro-Comas, M., Oetjen, H., Pazmino, A., Perez-Camacho, M., Peters, E., du Piesanie, A., Pinardi, G., Puentedura, O., Richter, A., Roscoe, H. K., Schönhardt, A., Schwarzenbach, B., Shaiganfar, R., Sluis, W., Spinei, E., Stolk, A. P., Strong, K., Swart, D. P. J., Takashima, H., Vlemmix, T., Vrekoussis, M., Wagner, T., Whyte, C., Wilson, K. M., Yela, M., Yilmaz, S., Zieger, P., and Zhou, Y.: The Cabauw Intercomparison campaign for Nitrogen

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- Vermeulen, A. T., Hensen, A., Popa, M. E., van den Bulk, W. C. M., and Jongejan, P. A. C.: Greenhouse gas observations from Cabauw Tall Tower (1992–2010), Atmos. Meas. Tech., 4, 617-644, doi:10.5194/amt-4-617-2011, 2011.

Relevant projects: FP5-CloudNet; FP5-EARLINET-ASOS; FP6-ACTRIS; FP6-EUCAARI; FP6-EUSAAR

4.1.19 Czech Hydrometeorological Intitute (Cesky Hydrometeorologicky Ustav) (CHMI)

The task of **Czech Hydrometeorological Institute (CHMI)** is to carry out the function of the Czech Republic’s central governmental institution for the fields of air quality, hydrology, water quality, climatology and meteorology. The institute is structured into 3 main divisions (meteorology, hydrology and air quality protection) and 5 regional branch offices. The activities of the CHMI are carried out by a staff of approximately 800 people. One department of CHMI is involved in the ACTRIS consortium: **Košetice Observatory**.

Košetice Observatory was established as a station specializing in the long-term air quality monitoring and assessment at the background scale of the Czech Republic in 1988. The observatory has been involved in EUSAAR (2006-2011) and ACTRIS (2011-2015) projects and is now proposed as a part of ACTRIS 2. Moreover, Košetice Observatory represents the Czech Republic in long-term monitoring programmes under CLRTAP (EMEP - LEVEL 2 station nad ICP-IM and WMO (GAW regional station). The observatory is a part the infrastructure Košetice – Křešín u Pacova (the latter operated by CVGZ)

Role in the project

In ACTRIS 2 the collocated station Košetice – Křešín u Pacova is offered as a TNA infrastructure (TNA4). Regular monitoring and research of atmospheric aerosols and trace gases will continue within NA3. The ICOS tall tower will be used for the participation in JRA 2. Measurements of aerosol vertical profile will be implemented using CPC. Moreover, the measurement campaigns with doppler and research lidar will be organized at the station. The close cooperation with ICOS is an advantage for future improvement of the infrastructure.

Principal personnel involved

Dr. Milan Vána (male)**,** Ph.D.: Education: 1996 - Ph.D. Degree - Physical geography and geo-ecology, specialization climatology, (Charles University, Faculty of Science, Prague). **Position**: CHMI, Head of Košetice Observatory since 1994, Global Change Research Centre AS CR, senior researcher, since 2011. **International activities:** Contact person for the Czech Republic in GAW (Global Atmosphere Watch) programme, National Focal Point for the Czech Republic in EMEP (TFMM and HTAP) and in ICP-IM. He participated in a number of research projects related to atmospheric monitoring and research including EUSAAR and ACTRIS. Main fields of interest: Monitoring and assessment of air quality at the regional scale, long-range transport of air pollution, atmospheric aerosols, global climate change, tropospheric ozone

Relevant publications

- W. Aas, S. Tsyro, E. Bieber, R. Bergstrom, D. Ceburnis, T. Ellermann, H. Fagerli, M. Frolich, R. Gehrig, U. Makkonen, E. Nemitz, R. Otjes, N. Perez, C. Perrino, A. S. H. Prevot, J.-P. Putaud, D.

Simpson, G. Spindler, M. Vana, And K. E. Yttri. 2012. Lessons learnt from the first EMEP Intensive Measurement Periods. Atmos. Chem. Phys., 12, 8073–8094, 2012

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- Beddows, D.C.S., Dall'osto, M., Harrison, R.M., Kulmala, M., Asmi, A., Wiedensohler, A., Laj, P., Fjaeraa, A.M., Sellegri, K., Birmili, W., Ždímal, V., Zíková, N., 2014. Variations in tropospheric submicron particle size distributions across the European continent 2008–2009. (Eng) *Atmos. Chem. Phys.* **14** (8), 4327-4348.
- Dvorská, A., Lammel, G., Klánová, J., 2011. Use of diagnostic ratios for studying source apportionment and reactivity of ambient polycyclic aromatic hydrocarbons over Central Europe. *Atmospheric Environment.* **45**, 2, 420-427.
- Světlík, I. , Povinec, P., Molnár, M., Váňa, M., Šivo, A., Bujtás, T. 2010. Radiocarbon in the air of Central Europe: long-term investigation. Radiocarbon, Vol. 52, Nr 2-3, 2010, P.

Relevant projects

- **EUSAAR** (European Supersites for Atmospheric Aerosol Research, EU-funded I3 - Integrated Infrastructures Initiatives) project carried out in the framework of the specific research and technological development programme "Structuring the European Research Area – Support for Research Infrastructures", investigation period: 2006-2011, associated partner
- **ACTRIS (**Aerosols, Clouds, and Trace Gases Research Infrastructure Network, INFRA-2010-1.1.16: Research Infrastructures for Atmospheric Research), investigation period: 2011-2015, contractor for the Czech Republic.
- **ACCENT** (Atmospheric Composition Change – The European Network of Excellence)
- **CzechGlobe** - Center for Global Climate Change Impacts Studies, ED1.1.00/02.0073 - (2010-2014, MSM/ED)
- Advanced study of physical and chemical properties of atmospheric aerosols in high time resolution" CSF, P209/11/1342

4.1.20 Lunds Unviersitet (ULUND)

ULUND is the strongest research university in Sweden and is consistently ranked among the top 100 universities in the world. The Aerosol Group at the Division of Nuclear Physics, Physics Department, Lund University has conducted climate and health-related aerosol research for more than 30 years. Relevant areas of interest are aerosol measurement technology, aerosol-cloud interactions and source-apportionment studies. The core facilities related to ACTRIS-2 are a) the ACTRIS field station Vavihill that is now being moved 18.5 km to collocate with ICOS and the new Hyltemossa (HYM) tall tower site, and b) extensive instrumentation for aerosol particle measurements and analysis.

Role in the project

ULUND contributes to NA3 (Near-surface observations of aerosol, clouds and trace-gases) and offers TNA to the ACTRIS-ICOS site at Hyltemossa in southern Sweden.

Principal personnel involved

Prof Dr Erik Swietlicki (male). Professor in Aerosol Physics and Leader of the Aerosol Group at the Division of Nuclear Physics with more than 30 years of experience in atmospheric aerosol science. His research is motivated by the effects of atmospheric aerosols on climate, environment and human health. Deputy coordinator for MERGE. Participated in 9 EU projects, including EUSAAR and ACTRIS, also as WP and Task Leader. Acted as President of the European Aerosol Assembly and the Nordic Society for Aerosol Research. Awarded (and current) doctorates as main supervisor: 8(3). Faculty Opponent (PhD thesis): 9. Co-editor for the journal "Atmospheric Chemistry and Physics". Co-author of 145 peer reviewed scientific publications. Citations: 5129, h-index: 39.

Dr Birgitta Svenningsson (female). Senior researcher appointed by the Swedish Research Council. Her main research interests are in the fields of aerosol particle-water interactions and cloud droplet formation as well as in atmospheric formation of aerosol particles from anthropogenic and biogenic precursors. Active in CRAICC. Main supervisor for 2 PhD students and assisting supervisor for 2 current and 4 graduated PhD students. Main supervisor for 3 Post Docs. Author and co-author of 48 peer reviewed scientific publications. Citations: 1771, h-index: 23.

Dr Adam Kristensson (male). Senior researcher whose current main research interests are in the fields of ship emissions and new particle formation. Responsible for the daily operation of the ULUND ACTRIS site at Vavihill. Active in CRAICC and main supervisor for a CRAICC Post Doc. Assistant supervisor for 1 PhD student and and several Master students. Co-author of 21 peer reviewed scientific publications. Citations: 654, h-index: 12.

Relevant publications

- Genberg, J., et al. Light absorbing carbon in Europe – measurement and modelling, with a focus on residential wood combustion emissions. *Atmos. Chem. Phys*., 13(2013)8719-8738.
- Sporre, M., et al., 2014. A long-term satellite study of aerosol effects on convective clouds in Nordic background air. *Atmos. Chem. Phys.*, 14, 2203-2217.
- Paasonen, P., et al. Warming-induced increase in aerosol number concentration likely to moderate climate change. *Nature Geoscience*, DOI: 10.1038/NGEO1800, 2013.
- Fors, E.O., E. Swietlicki, B. Svenningsson, A. Kristensson, G. P. Frank, and M. Sporre. Hygroscopic properties of the ambient aerosol in southern Sweden – a two year study. *Atmos. Chem. Phys*., 11, 8343-8361, 2011.
- Roldin, P., E. Swietlicki, G. Schurgers, A. Arneth, K. E. J. Lehtinen, M. Boy, and M. Kulmala. Development and evaluation of the aerosol dynamics and gas phase chemistry model ADCHEM. *Atmos. Chem. Phys*., 11, 5867-5896, 2011.

Relevant projects

EU FP6 **EUSAAR**, EU FP7 **ACTRIS**, EU FP7 **PEGASOS**, the Nordic Top-level Research Initiative and Centre of Excellence **CRAICC** (Cryosphere-Atmosphere Interactions in a Changing Arctic Climate), the Swedish Strategic Research Area **MERGE** (ModElling the Regional and Global Earth system).

4.1.21 Cyprus Institute (CyI)

The Cyprus Institute (CyI**,** see www.cyi.ac.cy**)** is a non-profit research and educational institution with a strong scientific and technological orientation, created in 2005. It is an issue-orientated institution, emphasizing international collaborations and cross-disciplinary research and education. The CyI is being developed by establishing research centers which are developed in partnership with leading institutions in the respective thematic areas such as the Massachusetts Institute of Technology, the Centre de recherche et de restauration des musées de France (C2RMF), headquartered in the Louvre and the University of Illinois. Since its foundation CyI actively participated in several EU projects (including an ERC) and it is ranked as the first Institute in Cyprus (normalized by its personnel) in EU grants.

The Energy, Environment and Water Research Center (EEWRC) was established in December 2007 as the first Research Center of The Cyprus Institute. Research at EEWRC deals with societally relevant issues related to energy, environment, climate and water persued by with, among others, researchers and faculty members that are experts in atmospheric chemistry and physics with a strong record of studies relevant to atmospheric monitoring and unmanned aerial vehicles observations. EEWRC's overarching mission is the understanding of and preparing for the major challenges and changes in the environment, socio-economic structures and societies in the Eastern Mediterranean in the 21st century. Problems of national and regional importance and global significance are addressed with an emphasis on their specific regional, Eastern Mediterranean manifestations.

Role in the project

The Cyprus Institute will provide its infrastructure and the exchange of expertise for in situ trace gases measurements and in situ physicochemical properties of aerosols (NA3) and it will contribute to NA2. It will provide TNA access at the CyI installation: Cyprus Atmospheric Observatory (TNA4) and it will contribute to JRA1.

Principal personnel involved

Dr. Mihalis Vrekoussis (MV, male) received his Ph.D. degrees in environmental and analytical chemistry from the University of Crete in 2005. His interests lie in laboratory and field observations of trace gases and aerosols and their interpretation based on in situ observations and remote sensing observation (both ground and space-based). Mihalis was awarded the A.v.Humboldt and Marie Curie fellowships to work in IUP Bremen and the Academy of Athens and since 2012 he joined the EEWRC Center of the Cyprus Institute as a Senior Research Scientist. MV is an author of more than 37 peer reviewed publications and 120 presentation in international conferences.

Prof. George Biskos (GB, male) will be joining the EEWRC Centre of the Cyprus Institute in fall 2014. He has been a faculty member at the University of the Aegean in Greece since 2008, and at Delft University of Technology in the Netherlands since 2010. Before that he was a Research Associate at Harvard University (2004-2007). GB holds a PhD degree in Engineering from Cambridge University (2004) and an MSc in Environmental Engineering from Imperial College (2000) in the UK. His research interests are in the broader area of aerosol science and technology, ranging from instrument development for airborne particle measurements, to atmospheric aerosols and aerosol-based nanotechnology. He leads a group of 3 postdocs and 7 PhD (4 at the University of the Aegean and 3 at TU Delft) and has supervised more than 20 MSc students so far. He participates in 5 national (4 in Greece and 1 in the Netherlands) and 2 international programs. He has authored/co-authored more than 25 peer reviewd publications and 100 conference papers.

Dr. Christos Keleshis (CK, male) received a BSc degree in Electrical Engineering, an MSc in Telecommunication Systems and a PhD in Electrical Engineering from the State University of New York at Buffalo (2009). His doctoral dissertation was on Automated High Resolution, Micro-Angiographic Fluoroscopy Medical Systems. Christos worked for the Toshiba Stroke Research Center where he developed hardware and software for x-ray medical systems. At the EEWRC he is involved in designing and developing Autonomous Flying Platforms for Atmospheric and Earth Surface Observations.

Dr. Stelios Ioannou (SI, male) is an associare research scientist at the Energy, Environment, and Water Resources (EEWRC) where he is involved with the design and development of Autonomous Flying Platforms for Atmospheric and Earth Surface Observations. He received a BSEE, MSEE and PhD in Electrical Engineering and a minor in Engineering Management from the University of South Florida (USF), USA. His interests lie in Energy and power systems, modeling and simulation, characterization and evaluation of fuel cells, lithium and super-capacitor technologies, optimization for power sources of mobile systems, improved endurance and operation range of unmanned ground and aerial systems (UGV and UAS), lightning protection, insulation and thermal analysis of electronic equipment via a high current impulse generator.

Prof. Leonard Barrie (LB, male), is the author of more than 160 peer-reviewed journal publications and has received an ICSI Highly Cited Scientist Award. His interests lie in multi-disciplinary Earth system research, environmental change and prediction; mitigating/ adapting to climate change; and atmospheric science research. He acted as Director of Research at the World Meteorological Organization (WMO) and he has been a member of many editorial boards of scientific journals, scientific associations and scientific advisory boards.

Prof. Zev Levin (ZL, male), Professor Emeritus, Department of Geophysics and Planetary Science, Tel Aviv University, ISRAEL and the Cyprus Institute, Cyprus. His interest are in the areas of effects of pollution on precipitation, Weather modification, Cloud and rain physics, Cloud Chemistry, Atmospheric aerosol and nucleation, and lightning generation. ZL is a Fellow of the American Meteorological Society and of the Israel Meteorological society. He received many awards including the Helholtz International Science

Award. He served on several international committees and was the President of the International Commission on Clouds and Precipitation (President 2004-2012). He is author of more than 160 publications including the chief editor of an award winning book on Aerosol Pollution Impact on Precipitation.

Relevant publications

- Vrekoussis, M., Richter, A., Hilboll, A., Burrows, J.P., Gerasopoulos, E., Lelieveld, J., Barrie, L, Zerefos, C, and Mihalopoulos, N (2013): "Economic crisis detected from space: Air quality observations over Athens/Greece", GRL, DOI: 10.1002/grl.50118.
- Kleanthous, S., Vrekoussis, M., Mihalopoulos, N., Kalabokas, P., Lelieveld, J (2013): On the temporal and spatial variation of ozone in Cyprus", Science of the Total Environment 476–477 (2014) 677–687.
- Vrekoussis, M., Liakakou, E., Kocak, M., Kubilay, N., Oikonomou, K., Sciare, J. and Mihalopoulos, N. (2005): "Seasonal variability of optical properties of aerosols in the Eastern Mediterranean." Atmospheric Environment 39(37): 7083-7094.
- Keleshis, C., Vrekoussis, M., Bingemer, H., Levin, Z., Ioannou, S., Argyrides, M., Reicher, N., Schrod, J., Rudich, Y., Mihalopoulos, N., Barrie, L., Lange, M. A. (2014): *Ice-Nuclei Measurements using Unmanned Aerial Vehicles (UAV), Second International Conference on Remote Sensing and Geoinformation 2014, 7-10 April 2014, Paphos, Cyprus*
- Bezantakos, S., K. Barmpounis, M. Giamarelou, E. Bossioli, M. Tombrou, N. Mihalopoulos, K. Eleftheriadis, et al. "Chemical Composition and Hygroscopic Properties of Aerosol Particles over the Aegean Sea." *Atmospheric Chemistry and Physics* 13, no. 22 (2013): 11595–608. doi:10.5194/acp-13-11595-2013.

Relevant projects

- C8: Consistent computation of the chemistry-cloud continuum and climate change in Cyprus
- BACCHUS: Impact of Biogenic versus Anthropogenic emissions on Clouds and Climate: towards a Holistic UnderStanding
- APAESO: Autonomous Flying Platforms for Atmospheric and Earth Surface Observations
- CHARADM: Characterization of Aerosol mixtures of Dust And Marine origin. CyI participated to this project with its UAV fleet used to conduct novel atmospheric observations.

4.1.22 Rheinisches Institut für Umweltforschung an der Universitaet zu Koeln e.V. (RIUUK)

The "Rhenish Institute for Environmental Research at the University of Cologne" (RIUUK) is a non-profit research body following the University Act (HG, art. 29 § 5) of the German state of North-Rhine-Westphalia. It is founded to support and perform environmental research in close collaboration with but not as part of the University of Cologne, while pursuing both objectives, advancement of related sciences and participation in scientific education. Scientific activities are financed by public and private funding, ranging from the German science foundation (DFG) to state environmental agencies. RIUUK is divided into three divisions: (i) Atmospheric Research, (ii) Material Sciences, (iii) Planetary Research. Scientists of the Atmospheric Research division are partner in this proposal with its working group "Data Assimilation". While being a non-profit research association, RIUUK is acknowledged as SME following EC rules.

The institute has now more than 25 years of experience regarding the development and application of chemistry-transport modelling (EURopean Air pollution Dispersion-Inverse Model, EURAD-IM). The development of the aerosol modules MADE (Modular Aerosol Dynamics for EURAD/Europe) and SORGAM (Secondary ORGanic Aerosol Module) at RIUUK advanced aerosol dynamics and chemistry features were introduced to multiscale chemistry transport modelling with anthropogenic and biogenic emissions. Most importantly for this proposal, with the development of the adjoint EURAD-IM model and associated system components, EURAD-IM is still one of the very few research groups with chemical four-dimensional variational data assimilation system for the troposphere worldwide, which could prove its beneficial effects for ozone and other constituent forecasts in case studies. Further, RIUUK closely collaborates with the Institute for Geophysics and Meteorology (IGM) at the University of Cologne, where a research focus is clouds in the climate system (Prof. S. Crewell, Prof. R. Neggers). IGM is operating the

Jülich Observatory for Cloud Evolution (JOYCE) at Forschungszentrum Jülich, which is part of CLOUDNET and AERONET. Here, state-of-the-art remote sensing observations are used to investigate and simultaneously simulate cloud evolution as a function of the meteorological conditions and aerosols. Within ACTRIS, long-term JOYCE observations will contribute to a network of diverse quality-controlled atmospheric parameters, which only in synergetic analysis can guarantee progress in climate prediction.

Role in the project

RIUUK will contribute to NA2 with its expertise on synergetic retrieval developmenz and ground-based network development. RIUUK will also contribute to JRA3.

Principal personnel involved

Dr. Hendrik Elbern (male) received this PhD in meteorology in 1990. In 2001 he received his habilitation. He is currently a senior scientist in the Rhenish Institute for Environmental Research at the Univ. of Cologne (and also affiliated with the research centre Jülich). His special research areas are chemical data assimilation and inverse problems in the atmosphere and soils, parallel computing and numerical solution of atmospheric transport- diffusions- reaction equations, dynamics of stratospheric-tropospheric exchange. He has acted as PI for several national, ESA and EC funded projects (starting with FP 4 ongoing), mostly in the realm of data assimilation for COPERNICUS activities. He has coordinated the consortium of the national funded project SACADA, introducing novel techniques to stratospheric data assimilation. He is also engaged in scientific education at the University of Cologne, by lecturing and supervising PhD students.

Prof. Dr. Susanne Crewell (female) received her PhD in physics in 1993 at the University of Bremen and is now a Professor for Meteorology at the University at Cologne. Since 1996 she works on various aspects of the atmospheric hydrological cycle by using the synergy of various remote sensors and mesoscale modelling. She coordinated several projects funded by the EU, ESA/ESTEC, the German science foundation and other agencies. Her working group on “Integrated remote sensing” works on the optimization of ground-based microwave radiometers, synergetic retrieval algorithms for ground-based supersites and the new German high-flying aircraft HALO, verification and improvement of mesoscale models in terms of land-surface exchange and cloud microphysics.

Dr. Ulrich Löhnert (male) received his PhD in meteorology in 2002 at the University of Bonn. Since 2006 he is a senior scientist at the University of Cologne and coordinates the Jülich Observatory for Cloud Evolution (JOYCE). He is an expert in synergetic retrievals and a member of the management committee in the COST actions “ EG-CLIMET: European Ground-Based Observations of Essential Variables for Climate and Operational Meteorology“ and TOPROF (Towards operational ground based profiling with ceilometers, Doppler lidars and microwave radiometers for improving weather forecasts).

Relevant publications

- Li, Y.P., H. Elbern, K. D. Lu, E. Friese, A. Kiendler-Scharr, Th. F. Mentel, X. S. Wang, A. Wahner, and Y. H. Zhang, Updated aerosol module and its application to simulate secondary organic aerosols during IMPACT campaign May 2008, accepted for publication in ACP, Atmos. Chem. Phys. Discuss., 13, 5961-6005, 2013, www.atmos-chem-phys-discuss.net/13/5961/2013/ doi:10.5194/acpd-13-5961-2013.
- Goris, N., and H. Elbern Singular vector decomposition for sensitivity analyses of tropospheric chemical scenarios Atmos. Chem. Phys., 13, 5063-5087, 2013.
- Strunk, A., A. Ebel, H. Elbern, A nested application of four-dimensional variational assimilation of tropospheric chemical data. Int. J. Environment and Pollution, 46, pp. 43{60, 2011.
- Elbern, H., J. Schwinger, and R. Botchorishvili (2010), Chemical state estimation for the middle atmosphere by four-dimensional variational data assimilation: System configuration, J. Geophys. Res., 115, D06302, doi:10.1029/2009JD011953.
- Ebell, K., E. Orlandi, A. Hünerbein, U. Löhnert, S. Crewell, 2013: Combining ground and satellite based measurements in the atmospheric state retrieval: Assessment of the information content, J. Geophys. Res. 18, 6940–6956, doi:10.1002/jgrd.50548.
- Löhnert, U., J. H. Schween, C. Acquistapace, K. Ebell, M. Maahn, M. Barrera-Verdejo, A. Hirsikko, B. Bohn, A. Knaps, E. O'Connor, C. Simmer, A. Wahner, S. Crewell, JOYCE: Jülich Observatory for Cloud Evolution *Bulletin of the American Meteorological Society*, 2014, under review.

Relevant projects

- MACC-II (Monitoring Atmospheric Composition and Climate, Interim Implementation); FP7-SPACE, #283576; 2011-2014; partner.
- PASODOBLE (Promote Air Quality Services integrating Observations – Development Of Basic Localised Information for Europe), FP7-SPACE-2009-1, 2010-2013; partner.
- PEGASOS (Pan-European Gas-Aerosol-Climate Interaction Study), FP7 Large Scale Integrating Project, 2011-2015, partner (via FZ Jülich).
- MACC (Monitoring Atmospheric Composition and Climate); FP7-SPACE, #218793; 2009-2011; partner.
- Initial Training Network on Atmospheric Remote Sensing (ITaRS). FP7-PEOPLE, .#289923, 2012-2016; coordinator University of Cologne.

4.1.23 Deutscher Wetterdienst (DWD)

The Deutscher Wetterdienst (DWD) is as National Meteorological Service of the Federal Republic of Germany responsible for providing services for the protection of life and property in the form of weather and climate information. The DWD records, analyses and monitors the physical and chemical processes in our atmosphere. Within the business area research and development, DWD operates two observatories devoted to long-term monitoring and research related to chemical (HPB) and physical processes (MOL) of the atmosphere. Based on comprehensive observations, both observatories contribute in international programmes by EU and WMO (World Meteorological Organisation) to a better process understanding related to climate change issues. The observation range is from molecular dimensions, e.g. radical photochemistry (HPB) and micrometeorology in surface exchange processes (MOL), to global scales via cooperations in global observation programs by WMO and satellite validation (e.g. CM-SAF, O3M-SAF). In the ACTRIS consortium the two observatories of DWD (HPB and MOL) are involved:

HPB - The Meteorological Observatory Hohenpeissenberg (HPB) contributes to the Global Atmosphere Watch (GAW) programme by WMO since 1995 with a large variety of aerosol (physical, optical and chemical) and reactive trace gas observations and recently, ground based remote sensing of aerosol and selected trace gases by Lidar, Ceilometer and MAXDOAS. HPB coordinates the aerosol profile information of the German Ceilometer network of some 60 ceilometers. Furthermore, it has long-term history in stratospheric ozone research (since 1966), German atmospheric climate gases network (ICOS since 2012), radar and in weather observations (since 1781). Research at HPB has focused on particle nucleation, photochemistry, aerosol layer detection, and quality assurance for longterm monitoring.

MOL - The mission of the Meteorologisches Observatorium Lindenberg - Richard-Aßmann- Observatorium – (MOL) is to provide the most accurate observations of meteorological/physical parameters in the atmospheric column with high temporal and vertical resolution. The observatory is part of the international networks GRUAN, GSN, and BSRN in GCOS and contributes to projects like CEOP, BALTEX, and GVaP within WCRP. For this purpose, MOL uses a variety of in-situ and remote sensing instruments to measure a broad spectrum of physical parameters.

Role in the project

HPB will contribute with long-term aerosol monitoring, VOC (including OVOCs and terpenes) and NOxy monitoring, and lead with Empa the VOC/NOx tasks towards better quality, standardized procedures and quality controlled data (NA3). Within NA2, HPB will bring in contributions to the aerosol liedar network (EARLINET), ceilometer networks and operate sun photometers, furthermore MAXDOAS instruments. It will associate to JRA-1. MOL will contribute to NA2 by using its 36 GHz polarized Doppler radar to further develop CLOUDNET products and its 355 nm Raman lidar to provide observations of water vapour and aerosol. DWD will also contribute to NA5 as a link to operational lidar and ceilometers networks.

Principal personnel involved

Dr. **Christian Plass-Duelmer** (male): Senior scientist and head of the Hohen¬peissenberg Observatory (HPB), German national contact for GAW, member of GAW Scientific Advisory Group (SAG) on Reactive Gases. He has been working in atmospheric chemistry since 1987 at Research Centre Juelich, Germany, and since 1995 at DWD. He has contributed in several international projects and field studies and more than 50 peer reviewed scientific papers.

Dr. **Volker Lehmann** (male): Senior scientist and head of the remote sensing group at Lindenberg Observatory. He has been working in ground based remote sensing at DWD for more than 20 years.

Relevant publications

- R. Steinbrecher, C. Plass-Dülmer, B. Rappenglück, and L. Barrie, *Quality assurance of VOC*, in: A WMO/GAW Expert Workshop on Global Long-Term Measurements of Volatile Organic Compounds (VOCs), (Geneva, Switzerland, 30 January to 1 February 2006), GAW Report No. 171, WMO TD No. 1373, 13-17, 2007.
- Helmig, D., J. Bottenheim, I. E. Galbally, A. Lewis, M. J. T. Milton, S. Penkett, C. Plass-Duelmer, S. Reimann, P. Tans, and S. Thiel (2009), *Volatile organic compounds in the global atmosphere*, Eos Trans. AGU, 90(52), 513–514.
- von Schneidemesser, E., P.S. Monks, and C. Plass-Duelmer (2010), *Global Comparison of VOC and CO Observations in Urban Areas*, Atmosph. Environ. 44, 5053-5064.
- Gilge, S., Plass-Duelmer, C., Fricke, W., Kaiser, A., Ries, L., Buchmann, B., and Steinbacher, M.: Ozone, carbon monoxide and nitrogen oxides time series at four alpine GAW mountain stations in central Europe, Atmos. Chem. Phys., 10, 12295-12316, doi:10.5194/acp-10-12295-2010, 2010.
- Flentje, H; Claude, H; Elste, T; Gilge, S; Kohler, U; Plass-Dulmer, C; Steinbrecht, W; Thomas, W; Werner, A; Fricke, W, (2010) The Eyjafjallajokull eruption in April 2010-detection of volcanic plume using in-situ measurements, ozone sondes and lidar-ceilometer profiles, Atmos. Chem. Phys., 10, 10085-10092, doi: 10.5194/acp-10-10085-2010.

Relevant projects

- ICOS (Integrated Carbon Observation System)
- Key-VOC (EURAMET, ERMP ENV56-REG1)
- GRUAN
- ACTRIS
- MACC/COPERNICUS

4.1.24 University of Leeds (UnivLeeds)

The University of Leeds, is a world-leading research intensive university. The Institute for Climate and Atmospheric Science within the School of Earth and Environment has 30 academic staff and about 50 postdoctoral scientists and 50 PhD students. The institute is one of the UK’s most diverse atmospheric research institutes, making fundamental advances in climate change, weather, atmospheric composition, palaeo-climates, and impacts on our planet and society. Researchers develop advanced computer models, lead major field campaigns, analyse satellite data, and perform innovative laboratory experiments. Leeds hosts the NCAS Directorate and the Director of NCAS-Weather. Several NCAS staff are employed by Leeds to develop national capability models and to perform aircraft and field measurements in meteorology, cloud physics and aerosols.

The University of Leeds lead the **NCAS JRU** which is comprised of five institutions (University of Leeds, University of York, the Chibolton Observatory, the University of Reading and the University of Hertfordshire) with complementary expertise on measurements and modelling of aerosols, clouds and associated chemical processes. These institutions work together within NCAS to deliver a strategically important national research programme in atmospheric science.

Role in the project

Leeds will contribute to JRA3 in ACTRIS-2 by combining past and new measurements from the network to quantify how uncertainty in regional and global aerosol models can be constrained by long-term high quality measurements. Measurements will be combined with analyses of model uncertainty to understand how measurements in existing and new locations contribute to parameter constraint in models.

Principal personnel involved

Prof **Ken Carslaw** (male). He has around 140 publications related to aerosol and cloud processes in the atmosphere from the troposphere to the stratosphere. Carslaw specializes in the development of advanced numerical models of aerosol and cloud processes, notably the Global Model of Aerosol Processes (GLOMAP), which is now incorporated in the UK climate model (HadGEM) and the ECMWF Integrated Forecasting System. Carslaw has been an investigator in several major EU projects, including EUCAARI, PEGASOS and MACC. The Leeds aerosol team has a long track record of integrating measurements with models, leading to the creation of the NERC-funded Global Aerosol Synthesis and Science Project, which has brought together so far about 15 aerosol observation groups to build a global dataset for model evaluation. Carslaw's team has pioneered the development of new emulator-based statistical techniques (Lee et al., 2013) to quantify the sources of uncertainty in global models. Carslaw's research achievements have been recognized by the Leverhulme Prize in 2001, the Royal Society Wolfson Merit Award in 2011 and the AGU Ascent Award in 2014. In 2014 Carslaw achieved ISI Highly Cited status.

Prof **Alastair Lewis** (male). He has around 200 publications relating to atmospheric chemistry research, specifically the development of technologies for the measurement of organic compounds in troposphere and the impact of these species on urban and regional air quality. Lewis is currently a member of the WMO GAW science advisory group and the UK Department for the Environment Food and Rural Affairs Air Quality Expert Group. Past research work has been recognized by awards including the Royal Society of Chemistry John Jeyes Award, SAC Silver Medal, a Philip Leverhulme Prize, and the Desty Memorial Prize. The research led by Lewis at York focuses on fundamental atmospheric processes, but with emphasis on translation of basic research to policy and practice.

Dr. **Chris Walden** (male): Chris's background is in mathematical modelling of the melting-layer and its effects on radiowave propagation. He has worked extensively with data-sets from microwave and millimetre-wave propagation experiments (both terrestrial and earth-space), and is expert in the interpretation of polarimetric-Doppler radar measurements to diagnose propagation effects. He has been responsible for radar calibrations and data quality assurance for Chilbolton's 3, 35 and 94 GHz radars. Most recently, Chris has led the work of the Chilbolton Facility for Atmospheric and Radio Research and has management responsibility for coordinating Chilbolton's work with the scientific requirements of researchers in NERC and NCAS. He is active in national committees on atmospheric research using radar and on hydrological applications of radar.

Prof **Anthony Illingworth** (male). Professor of Atmospheric Physics, since 2002, now emeritus, has been involved in observing clouds and precipitation from the ground at Chilbolton for over 25 years and over the past 15 years in the development of spaceborne missions for observing cloud, aerosol and precipitation properties on a global scale. He has published over 100 refereed papers on these topics.

Dr. **Detlef Müller** (male). He has around peer-reviewed 120 publications relating to active and passive remote sensing of atmospheric air pollution, the development of lidar instrumentation and mathematical algorithms for the characterization of aerosol pollution and its impacts on climate. He was awarded the Royal Society Wolfson Research Merit Award for developing lidar instrumentation for vertical profiling of chemical properties of aerosol properties. He works on algorithm development for the European Aerosol Research Lidar Network (EARLINET). He is Chief Research Science Advisor in support of the Science Directorate at NASA Langley Research Center, USA. Dr. Müller holds a position as Adjunct Professor at the Gwangju Institute of Science and Technology (South Korea) where he operates an advanced Raman lidar for investigations of East Asian pollution and its impact on regional air quality and climate. Past research work has been recognized by awards and research grants of the Spanish Ministry of Education and Science, the Marie Curie program, the Japan Society for the Promotion of Science, the National Centre for Atmospheric Research, USA, and the Centre National de la Recherche Scientifique (France).

Relevant publications

- A.C Lewis, M.J Evans, J.R Hopkins, S Punjabi, K.A. Read, S.J Andrews, R.M Purvis, S.J. Moller, L.J Carpenter, A.R Rickard, P.I Palmer and M Parrington. The Influence Of Forest Fires On The Global Distribution Of Selected Non-Methane Organic Compounds. *Atmospheric Chemistry and Physics*. **13**, 851-867, 2013.
- L. A. Lee, K. J. Pringle, C.L. Reddington, G.W. Mann, D.V. Spracklen, K.S. Carslaw, P. Stier and J.R. Pierce. The magnitude and causes of uncertainty in global model simulations of cloud condensation nuclei. *Atmospheric Chemistry and Physics*, **13**, 8879-8914, 2013.
- J. Illingworth, R. J. Hogan, E. J. O'Connor, D. Bouniol, M. E. Brooks, J. Delanoe, D. P. Donovan, J. D. Eastment, N. Gaussiat, J. W. F. Goddard, M. Haeffelin, H. Klein Baltink, O. A. Krasnov, J. Pelon, J.-M. Piriou, A. Protat, H. W. J. Russchenberg, A. Seifert, A. M. Tompkins, G.-J. van Zadelhoff, F. Vinit, U. Willen, D. R. Wilson and C. L. Wrench. CLOUDNET – continuous evaluation of cloud profiles in seven operational models using ground-based observations'. Bulletin of the American Meteorological Society, Vol. 88, No. 6. June, 2007. pp 883-898. DOI: 10.1175/BAMS-88-6-883.
- Gourley, J J, A J Illingworth and P Tabary: Absolute calibration of radar reflectivity using redundancy of the polarization observations and implied constraints on drop shapes. J Atmos Oceanic Technol, 689-703, 26, 2009.
- D. Müller, I. Veselovskii, A. Kolgotin, M. Tesche, A. Ansmann and O. Dubovik. Vertical profiles of pure dust and mixed smoke-dust plumes inferred from inversion of multiwavelength Raman/polarization lidar data and comparison to AERONET retrievals and in situ observations. Applied Optics, 52, 3178-3202, 2013.

Relevant projects

- The Global Aerosol Synthesis and Science Project (GASSP). Funded by the *Natural Environment Research Council* (2012-2015), £730,000. PI: K Carslaw Leeds. GASSP combines model statistical analysis with extensive in situ aerosol measurements to reduce the uncertainty in global simulations of aerosol microphysical properties.
- CLOUDNET: The Chilbolton Observatory was centrally involved in the CLOUDMET project, providing long-term climatological measurements and characterisation of the vertical distribution of cloud occurrence over the site. Chilbolton's 94 GHz radar was a key instrument contributing data to CLOUDNET in its early years, and was followed by 35 GHz radar measurements which continue to the present day. Data from the site were of key importance in developing the CLOUDNET data processing methodologies and the data products.
- Cutting Edge Approaches for Pollution Assessment in Cities (CAPACITIE). Funded by the European Commission (2013-2017), £2,652,676. PIs A Boxall, J Timmis, A Lewis, York. CAPACITIE will develop new experimental approaches for the assessment of pollutant distribution and transformation in cities, including new sensors and devices for the detection of key air pollutants.
- Aerosols, Clouds, and Trace gases Research InfraStructure network (ACTRIS). Funded by the European Commission (2011 - 2015), €7.80 million. Dr. Müller joined ACTRIS as Associated Partner. In this role he is involved in methodology development for remote sensing of the vertical aerosol distribution and the retrieval of advanced aerosol microphysical products from lidar and sunphotometer.

4.1.25 Natural Environment Research Council (NERC)

The Natural Environment Research Council (NERC)'s purpose is to promote and support high-quality basic, strategic and applied research, survey, long-term environmental observation and monitoring in environmental and related sciences to advance knowledge and technology. NERC's Centre for Ecology and Hydrology at Edinburgh leads the Biosphere-Atmosphere Interactions (BAI) Science Area. CEH is the UK's Centre of Excellence for integrated research in terrestrial and freshwater ecosystems and their interaction with the atmosphere. We provide National Capability based on innovative, independent and interdisciplinary science and long-term environmental monitoring, forming an integral part of NERC's vision and strategy.

NERC undertake world-class research to underpins evidence-based decisions and innovation by policy-makers and businesses, and engages with people, supporting sustainable development and improving society's environmental legacy. BAI scientists specialize both concentriaon and flux measurements of trace atmospheric gases and aerosols. In Atmopsheric Composition group both for research and long-term monitoring is undertaken, operating the Auchencorth Moss WMO-GAW and EMEP level II/II atmospheric observatory. The Reactive Gases and Aerosol groups are leaders in trace gas and aerosol flux measurements from remote to urban environments.

Role in the project

NERC will participate in NA3 and will strongly contribute to JRA2 (WP12) "The surface exchange and vertical transport of aerosols.

Principal personnel involved

Dr **Christine Braban** (female), h-index: 10, publications: 22. Dr Braban is an environmental scientist who leads the Atmospheric Composition group in the Biosphere-Atmosphere Interactions science area at NERC CEH in Edinburgh. Dr Braban is an experienced project manager and coordinates the UK Eutrophying and Acidifying Atmospheric Pollutants monitoring project for the UK Department of Environmenta Farming and Rural affairs (Defra). She has a background in laboratory and field measurements relevant to atmospheric chemistry, recently with a focus on atmospheric ammonia and reactive oxidized nitrogen. Dr Braban is PI of the NERC contribution to a new EMRP ammonia metrology research project starting in September 2014 (EMRP project ENV55). Dr Braban has experience of aerosol flow tube kinetics and trace gas detection methodologies. Dr Braban was involved in both the field measurements and modelling components of the NitroEurope project and the Defra funded Agroforestry systems for ammonia abatement. She helped analyse data from the large ammonia measurement technique intercomparison undertaken in 2008 and has made or managed ammonia measurements at background, agricultural and remote locations.

Dr **Eiko Nemitz** (male), h-index: 33; publications: 131. Dr Nemitz is an Environmental Physicist, leading the Reactive gases and Aerosol Group in the Biosphere-Atmosphere Interactions science area at NERC CEH in Edinburgh. His work encompasses the measurement of surface / atmosphere exchange fluxes of a wide range of trace gases and aerosols, using micrometeorological flux measurement approaches. This includes fluxes of reactive nitrogen compounds (NH_3, HNO_3, NO, NO_2, HONO), greenhouse gases (CO_2, N_2O, CH_4), volatile organic compounds (VOCs), ozone, sulphur dioxide and aerosols (total number, size-segregated and chemically resolved for NH_4^+, NO_3^-, SO_4^{2-}, Cl^- and organic aerosol). The data are analysed to provide dry deposition inputs and parametrisations of emissions and dry deposition for the application in numerical models, ranging from the local scale to the global scale, e.g. with the EMEP and the QUEST Earth System Model. A particular interest of his is the use of flux measurement approaches to study aerosol dynamics, such as aerosol formation and evaporation of the NH_3-HNO_3-NH_4NO_3. His group's work underpins UK and European policy on nitrogen and particles also through monitoring activities, generating a unique detailed time-series of inorganic gases and aerosols at the UK EMEP Supersite at Auchencorth (now with WMO-GAW regional status) using state-of-the-art instrumentation

Dr **Ben Langford** (male), h-index:12, publications: 21. Dr Langford is an atmospheric chemist with significant experience of flux measurements of VOCs and their interactions with ecosystems. His research has focused on developing new micrometeorological techniques for the measurement of volatile organic compound fluxes and developing be-spoke software for the analysis of micrometeorological data, particularly from mass spectrometers. Recent focus has been on eecondary aerosol formation from biogenic and agricultural precursor gases and translation of process studies into atmospheric chemistry models.

Dr **Marsailidh Twigg** (female) h indoex:5; publications: 5. Dr Twigg has experience of operating a wide range of instruments both in the laboratory and in the field used to measure trace gases and aerosols including - TDLAS, AMANDA, GRAEGOR, Nitrolux, Licor, MARGA and EGM, as well as a number of micrometeorlogy instruments. Dr Twigg has a particular interest in reactive nitrogen speciation in the atmosphere and the development of flux measurement and surface exchange. She also have experience of working with HPLC and GC-FID in a UKAS accredited lab in the extraction and analysis of PAHs and aliphatic compounds from sediments.

Relevant publications

- O. Peltola, A. Hensen, C. Helfter, L. Belelli Marchesini, F. C. Bosveld, W. C. M. van den Bulk, J. A. Elbers, S. Haapanala, J. Holst, T. Laurila, A. Lindroth, E. Nemitz, T. Röckmann, A. T. Vermeulen, and I. Mammarella; Evaluating the performance of commonly used gas analysers for methane eddy covariance flux measurements: the InGOS inter-comparison field experiment, Biogeosciences Discuss., 11, 797-852, doi:10.5194/bgd-11-797-2014, 2014
- Aas, W., Tsyro, S., Bieber, E., Bergstrom, R., Ceburnis, D., Ellermann, T., Fagerli, H., Frolich, M., Gehrig, R., Makkonen, U., Nemitz, E., Otjes, R., Perez, N., Perrino, C., Prevot, A.S.H., Putaud, J.P., Simpson, D., Spindler, G., Vana, M., and Yttri, K.E., 2012. Lessons learnt from the first EMEP intensive measurement periods. Atmospheric Chemistry and Physics 12, 8073-8094.
- Cape, J.N., Coyle, M., and Dumitrean, P., 2012. The atmospheric lifetime of black carbon. Atmospheric Environment 59, 256-263.
- Hewitt, C.N., Ashworth, K., Langford, B., Misztal, P.K., MacKenzie, A.R., Nemitz, E., Owen, S. M., Ryan. A., Wild, O.: Ground-level ozone influenced by circadian control of isoprene emissions Nature Geoscience, 4, 671–674, 2011. doi:10.1038/ngeo1271.
- Auchencorth Moss awarded WMO-GAW regional status and since 2007 EMEP Level II site contributing to data from UKair quality monitoring (>50 ISI citations using Auchencorth Moss 2004-2014).

Relevant projects

- 2010-2014 EU FP7 grant The Pan-European Gas-Aerosols Climate Interaction Study (PEGASOS) Eiko Nemitz *Co-I - with Prof Spyros Pandis, Univ. Patra, Greece*
- 2011-2015 EU FP7 grant *Effects of Climate Change on Air Pollution and Response Strategies for European Ecosystems* (ECLAIRE) *Co-I s: Eiko Nemitz and Prof Mark Sutton, CEH Edinburgh*
- 2011-2015 EU FP7 Infrastructure Network Integrated non-CO_2 greenhouse gas observing system (InGOS) *Eiko Nemitz co-I with Alex van Moelen, ECN Netherlands*
- 2012-2015 NERC Standard Research Grant Trace gas emissions from Amazonia influence secondary organic aerosol (CLAIRE-UK) Eiko Nemtiz *PI with Prof. Nick Hewitt, Lancaster*
- 2012-2016 Defra UK Eutrophying and Acidifying Atmospheric Pollutants (AQ0647) Operation of UK rural air quality monitoring networks and UK EMEP Supersites; *Christine Braban Project coordinator and CEH PI (with Ricardo-AEA co-contractors)*

4.1.26 Pannon Egyetem (UPAC)

Pannon Egyetem (University of Pannonia) is the knowledge centre of the Central Transdanubian Region in Hungary which offers education and research in wide spectrum of natural sciences, arts, social sciences, technology, informatics, agricultural sciences and economics. The MTA-PE Air Chemistry Reserach Group and its predecessor have long been involved in aerosol research, in-situ measurement of aerosol properties and method development for the characterization of atmospheric aerosol. The primary focus of their research is currently on the source, formation and characterization of organic aerosol, its aqueous phase chemistry and urban air pollution. In cooperation with the Hungarian Meteorological Service the MTA-PE Air Chemistry Reserach Group is running an established EMEP and GAW sampling station in K-puszta, a rural site on the Great Hungarian Plain. In course of the last twenty years with its experience and research infrastructure at University of Pannonia and K-puszta the MTA-PE Air Chemistry Reserach Group participated in several EC funded projects in the field of atmospheric science (SOAP, ACCENT, CARBOSOL, OOMPH, EUCAARI, EUSAAR, ACTRIS) and can efficiently contribute to NA3 of ACTRIS-2 as well.

Role in the project

UPAC will contribute to NA3, in particular to: Task 1 in the inter-laboratory comparison (ILC) studies of selected organic aerosol (OA) tracers used for OA source apportionment by offering its experience in and infrastructure for organic analytical chemistry; Task 2.5 in the development of reference instruments for multi-wavelength absorption measurements with its continuous light absorption photometer (CLAP); Task 3.1 in the closure studies for total particle number concentration with participation in the comparison of the “reference” CPC and the DMPS deployed at K-puszta station.

Principal personnel involved

Dr. **Gyula Kiss** (male) is scientific adviser in the MTA-PE Air Chemistry Reserach Group with more than 20 years of experience in atmospheric science and organic analytical chemistry. His main field of interest is the study of organic species in atmospheric aerosol as well as their role in cloud formation. He was the PI for the research group in ACCENT, EUSAAR, EUCAARI and ACTRIS.

Dr. **András Hoffer** (male) is a senior research fellow in the MTA-PE Air Chemistry Reserach Group with considerable experience in the sampling, in-situ characterization and analysis of aerosol as well as running the instrumentation at K-puszta station. He actively participated in the work of the research group in the EUSAAR, EUCAARI and ACTRIS projects.

Relevant publications

- D. C. S. Beddows, M. Dall'Osto, R. M. Harrison et al.: Variations in tropospheric submicron particle size distributions across the European continent 2008–2009Atmos. Chem. Phys., 14, 4327-4348, 2014 www.atmos-chem-phys.net/14/4327/2014/doi:10.5194/acp-14-4327-2014.
- Alves C, Vicente A, Pio C, et al.: Organic compounds in aerosols from selected European sites - Biogenic versus anthropogenic sources Atmospheric Environment 59: pp. 243-255., 2012.
- Asmi, A. Wiedensohler, P. Laj et al.: Number size distributions and seasonality of submicron particles in Europe 2008–2009 Atmos. Chem. Phys., 2011, 11, 5505-5538.
- M. Frosch, N. L. Prisle, M. Bilde, Z. Varga, and G. Kiss: Joint effect of organic acids and inorganic salts on cloud droplet activation Atmos. Chem. Phys., 2011, 11, 3895-3911.
- H. E. Manninen, T. Nieminen, E. Asmi et al.: EUCAARI ion spectrometer measurements at 12 European sites – analysis of new particle formation events. Atmos. Chem. Phys., 2010, 10, 7907–7927, doi:10.5194/acp-10-7907-2010.

Relevant projects

- Aerosols, Clouds, and Trace gases Research Infrastructure Network (ACTRIS, Grant agreement No:262254, 01.04.2011. - 31.03.2015.)
- European Super-sites for Atmospheric Aerosol Research (EUSAAR, Contract No. RII3-026140, 01.04.2006. -31.03.2011.)
- European Integrated project on Aerosol Cloud Climate and Air Quality interactions (EUCAARI, Contract No. 036833-2, 01.01.2007. - 31.12.2010.)
- Atmospheric Composition Change: an European Network (ACCENT, Contract No. GOCE-CT-2004-505337, 01.03.2004. - 28.02.2009.)
- Present and retrospective state of organic versus inorganic aerosol over europe : implication for climate (CARBOSOL, 01.12.2001-30.11.2003)

4.1.27 B.I. Stepanov Institute of Physics of The National Academy of Sciences of Belarus (IPNASB)

The State Scientific Institution "B.I. Stepanov Institute of Physics of the National Academy of Sciences of Belarus" (IPNASB) is the largest research and development institution of the physical and mathematical profile in Belarus, founded in 1955. More than 300 employers are on the staff of the Institute including 220 research workers, among which are five academicians, four members of the Academy of Sciences of Belarus, 41 doctors of sciences, and more than 100 candidates of sciences. IPNASB specialization areas are laser physics and non-linear optics, design of new specimens of lasers and laser equipment applied in different fields of science and technology. One of the main directions of IPNASB activities is the development of optical remote methods and equipment to monitor the atmosphere, water, and underlying surfaces. Laser applications for environmental monitoring in IPNASB were started in the sixties.

The IPNASB has an extensive multi-year experience in designing systems and modules of lidar equipment for organizations in CIS countries and abroad. The IPNASB was a leading Institute in the program of creating lidar network CIS-LiNet over CIS countries. The IPNASB team has wide experience in complex long-time monitoring of atmospheric aerosol and gazes by means of lidars, radiometers and local technique. Regular natural investigations of long range pollution transport to the East European regions are carried out by IPNASB in cooperation with EARLINET, AERONET and CIS-LiNet. Since 2008 IPNASB provides regular investigations of aerosol and clouds in Antarctic. Algorithms and software for processing data of combined lidar and radiometer aerosol sounding have been developed in the frame of ACTRIS-1 project.

Role in the project:

IPNASB will contribute to WP2. Optimization of the processing chain for standardizing input data of combined lidar and sun-photometer observations, for inversion of microphysical aerosol characteristics and estimation of uncertainties of the products, transform the software to operational version will be implemented in Task 2.1.2. Upgrade of IPNASB combined lidar and radiometer station for long-lasting operation, optimization of requirements for measurement procedure and quality check –up of combined lidar and radiometer stations aimed at providing high quality level of the product (Task 2.1.1), advisement and training for new users (Task 2.4) are planned.

Principal personnel involved

Dr. **Chaikovsky A.P.**, (male) a head of laboratory is a Winner of the Belarus State Prize. Under his leadership, multiwavelength lidar methods and equipment have been developed, field studies of aerosols parameters were performed in different regions of the earth and of the World Ocean by using stationary, mobile and airplane multiwavelength lidar equipment. He is the head of the project on creation of combined lidar and radiometer station for studying atmospheric aerosol in Antarctic. Dr. Chaikovsky A.P. is the author of over 200 scientific publications and a monograph in the area of atmospheric laser sounding. He was a Principal Investigator of the Projects of the 5th, 6th and 7th Framework Programs and an initiator of creation of the lidar network in CIS countries (CIS-LiNet).

Relevant publications

- A. Lopatin, O. Dubovik, A. Chaikovsky, P. Goloub, T. Lapyonok, D. Tanre, and P. Litvinov. Enhancement of aerosol characterization using synergy of lidar and sun-photometer coincident observations: the GARRLiC algorithm. *Atmos. Meas. Tech.*, 6, 2065–2088, 2013, www.atmos-meas-tech.net/6/2065/2013/, doi:10.5194/amt-6-2065-2013
- Granados-Muñoz, M. J., J. L. Guerrero-Rascado, J. A. Bravo-Aranda, F. Navas-Guzmán, A. Valenzuela, H. Lyamani, A. Chaikovsky, U. Wandinger, A. Ansmann, and O. Dubovik. Retrieving aerosol microphysical properties by Lidar-Radiometer Inversion Code (LIRIC) for different aerosol types, *Journal of Geophysical Research: Atmospheres*, *119*(8), 4836-4858, 2014\
- J.Wagner, A. Ansmann, U. Wandinger, P. Seifert, A. Schwarz, M. Tesche, A. Chaikovsky, and O. Dubovik. Evaluation of the Lidar/Radiometer Inversion Code (LIRIC) to determine microphysical properties of volcanic and desert dust. *Atmos. Meas. Tech.*, 6, 1707–1724, 2013, www.atmos-meas-tech.net/6/1707/2013/, doi:10.5194/amt-6-1707-2013
- Mortier, A., Goloub, P., Podvin, T., Deroo, C., Chaikovsky, A., Ajtai, N., Blarel, L., Tanre, D., and Derimian, Y., Detection and characterization of volcanic ash plumes over Lille during the Eyjafjallajôkull eruption, *Atmos. Chem. Phys.* 13, 3705-3720, 2013, doi:10.5194/acp-13-3705-2013.
- Software package LIRIC for retrieval of aerosol parameter profiles from combined lidar and radiometer data.

Relevant projects

- “Aerosol, Clouds, and trace gases Research Infrastructure Network” (ACTRIS), Contract 262254, 2011-2015, 7th Framework Programme.
- “European Aerosol Research Lidar Network: Advanced Sustainable Observation System” (EARLINET ASOS), Contract 025991, 2006-2011, 6th Framework Programme.

- “A European Aerosol Research Lidar Network to Establish an Aerosol Climatology: EARLINET”, Contract EVR1-CT1999-40003 EARLINET, 2000-2003, 5th Framework Programme.
- “Atmosphere aerosol and ozone monitoring in CIS regions through lidar network (CIS-LiNet), 2004 – 2007, International Science & Technology Center Project # B-1063

4.1.28 Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia (CNISM)

The National Interuniversity Consortium for the Physical Sciences of Matter (Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia, CNISM) started its activity on 2005. It is a non-profit organization comprising 39 Italian Universities and approximately 1300 scientists working in the field of condensed matter physics. CNISM promotes and coordinates research, scientific activities and related technologies in the field of condensed matter physics among the Universities of the Consortium and with the aim of better developing the activities that each University supports in condensed matter. CNISM supports activities aimed at collaborations with other research institutions at national and international level. CNISM develops and performs inter-disciplinary research in condensed matter and its technological application via the scientific network based on its units of operation and its regional laboratories. Among the different areas of activity of CNISM (http://www.cnism.it/web/en/node/122): Optics and Photonics - Development of optical techniques and innovative optical instruments for environmental diagnostic and Earth observation. The CNISM units of L’Aquila (Dipartimento di Scienze Fisiche e Chimiche dell’Università Degli Studi dell’Aquila), Lecce (Dipartimento di Fisica dell'Università del Salento), and Napoli (Dipartimento di Fisica, Università di Napoli “Federico II”) are directly involved in the activities of this project.

Role in the project:

CNISM will contribute to NA2, for atmospheric aerosol profiling, in peculiar sites and also for non-climatological studies, i.e., ultra high energy cosmic ray observatories that use the atmosphere as a calorimeter, or closer monitoring of volcanic plumes, etc.; characterization of the atmospheric particulate to discriminate between the anthropic and the natural aerosols; contributions to the upgrades of the Single Calculus Chain, and to the definition of additional (aerosol related) products into the main database. CNISM contributes also to NA3 for the near-surface observations of aerosol.

Principal personnel involved

Dr. **Vincenzo Rizi**, male, physicist, associate researcher of Dipartimento di Scienze Fisiche e Chimiche dell’Università Degli Studi dell’Aquila. His main interests: LIDAR remote sensing and its applications for atmospheric physics. He is co-author and/or author of: 93 papers published in peer reviewed Journals; few hundreds of referred conference proceedings (extended abstracts and/or conference papers); 21 reports, notes or contributions to book; 2 books. He has 20 years’ experience in participating to the management and coordination phases of national and international research projects; he was “science team member” or “principal investigator” in 35 projects and research contracts, evaluated, approved and funded by international and national institutions (i.e., NASA, ESA, CE, ASI, BRIT-China, and Italian Government). He is also engaged in editorial and reviewer activities. (more info in: http://cetemps.aquila.infn.it/osservatorio/pub/vrizi/).

Prof. **Maria Rita Perrone**, female, physicist, full professor of Dipartimento di Matematica e Fisica dell'Università del Salento. She is responsible of the Aerosol & Climate laboratory and of the Environment Physics Laboratory. She is member of the board of PhD program “Physics and Nanoscience” of Università del Salento.. She has been responsabile of national and international research projects. She is author and/or co-author of more than 190 papers on international peer-reviewed journals. Her main interests are: a) LIDAR systems and remote sensing techniques for the characterization of the aerosol optical properties and the water vapour concentration from the ground up to the top of the atmosphere; b) aerosol radiative effects; and c) climate models on regional scale.

Prof. **Nicola Spinelli** male, physicist, full professor of Dipartimento di Fisica, Università di Napoli “Federico II”. His activity field regards the atomic and molecular physics and the environmental applications of laser spectroscopy and remote sensing of the atmosphere by active optical methods. He was responsible of several national and international projects and of the development of several lidar apparatuses using different spectral regions (UV, NIR and VIS) and techniques (Elastic scattering, Raman scattering and Differential absorption).

Relevant publications, and/or products, services connected to the subject of this proposal

- EARLINET all observations (2000-2010), Adam, M. et al., The EARLINET publishing group 2000-2010, World Data Centre for Climate, DOI: http://dx.doi.org/10.1594/WDCC/EN_all_measurements_2000-2010, 2014.
- Four-dimensional distribution of the 2010 Eyjafjallajokull volcanic cloud over Europe observed by EARLINET, Pappalardo, G. et al., ATMOSPHERIC CHEMISTRY AND PHYSICS, 13, 8, 4429-4450, DOI: 10.5194/acp-13-4429-2013, 2013.
- Vertically resolved aerosol properties by multi-wavelength lidar measurements, Perrone, M.R. et al., ATMOSPHERIC CHEMISTRY AND PHYSICS, 14, 3, 1185-1204, DOI: 10.5194/acp-14-1185-2014, 2014.
- Integration of measurements and model simulations to characterize Eyjafjallajokull volcanic aerosols over south-eastern Italy, Perrone, M.R. et al., ATMOSPHERIC CHEMISTRY AND PHYSICS, 12, 20, 10001-10013, DOI: 10.5194/acp-12-10001-2012, 2012.
- Monitoring Etna volcanic plumes using a scanning LiDAR, Scollo, S. et al., BULLETIN OF VOLCANOLOGY, 74, 10, 2383-2395, DOI: 10.1007/s00445-012-0669-y, 2012.

Relevant projects

- EC FP7 project ACTRIS (Aerosol, Clouds, and Trace gases Research Infrastructure network). Contract n. 262254.
- EC FP6 project EARLINET-ASOS (European Aerosol Research Lidar network – Advanced Sustainable Observation System). Contract n. 025991.
- ESA-CALIPSO EARLINET's Spaceborne-lidar-related Activity During the CALIPSO Mission" ESA-ESTEC Contract No. 21487/08/NL/HE (2008-2011).
- EC FP5 project EARLINET (A European Aerosol Research Lidar Network to Establish an Aerosol Climatology). Contrcat no. EVR1-CT-1999-40003

4.1.29 Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences (INRNE)

The Institute for Nuclear Research and Nuclear Energy (INRNE) is the biggest Bulgarian academic complex center in the field of nuclear physics, nuclear energy and environmental science. The profile of the Institute in the scientific research of environment corresponds to the main tasks of the ACTRIS project in atmospheric chemistry and physics which are included in the research area of the Basic Environmental Observatory (BEO) Moussala. It is located at Rila Mountain and is the basic research center of INRNE in the field of aerosols, atmospheric pollutants and environmental science. It is a GAW regional station of WMO since 2010. The main fields of research at BEO Moussala are the aerospace and terrestrial environment. The interactions between cosmic rays and Earth atmosphere, global change parameters and climate research, natural hazards and technological risks are the objectives of the investigations. Since 2007 BEO "Moussala" team carries out measurements of physical and optical properties of aerosols using the instruments: Scaning Mobility Particle Sizer, Nephelometer, whole air sampler and Continuous Light Absorption Photometer. The quality of the measurements corresponds to the recommendations of the leading institutions – TROPOS, Leipzig, Germany; GMD NOAA, USA and NILU, Norway. BEO Moussala is certified by ISO 9001:2008 "Quality Management" (No3312/0) and ISO 14001:2004 "Environmental management" (No357/0). BEO Moussala was validated (July 2007) by EC and ESF survey as Research Infrastructure (# 563) of pan-European importance. The INRNE-BAS cooperates with the Institute of Electronics, BAS (IE-BAS) in this project under an internal agreement in the part of Lidar sensing of the atmosphere. The research will be conducted by the team of the Laser Radars Laboratory (LRL) of IE-BAS. Since 2002 this team is involved in the European Lidar Network, performing regular and synchronized lidar measurements within the 5th (EARLINET, 2002-2003), 6th (EARLINET–ASOS, 2006-2011) and 7th (ACTRIS, 2011-2015) FPs of EC.

The EARLINET Sofia Lidar Station of IE-BAS is equiped with 2 lidar systems (CuBr and Nd:YAG lasers), providing tropospheric and stratospheric lidar measurements on 5 wavelengths. Scientists of the LRL have recognized experience in developing lidar hardware and software products (incl. coherent Doppler lidars), in processing and analyzing lidar data, as well as in passive (radiometric) sensing of the atmosphere.

Role in the project:

The role in the project of the INRNE is to contribute to NA3 with its mountain station BEO "Moussala" and to NA2 with the IE-BAS Sofia EARLINET Lidar Station, mainly for the determination of the atmospheric aerosol optical and physical properties by improving the lidar software and hardware and other instrumentation, development of novel data processing and analysis approaches for characterization of the High Mountain and urban aerosol, intercomparison study of the remote sensing instruments, as well as in the dissemination of the results.

Principal personnel involved

Assoc. Prof. **DimitarTonev**, PhD (2001), Assoc.Prof. (2007), Director of the INRNE-BAS (2011), male. Field of research: nuclear physics, nuclear models, experimental methods in nuclear physics, including development of new ones, nuclear energy, neutron and reactor physics, mathematical process modeling in nuclear physics. Publications: Author and co-author of more than 75 papers in refereed journals with impact factor, quoted papers - more than 350 times, more than 60 oral presentations as invited lecturer at international conferences and schools, presently supervisor of 3 PhD students.

Prof. **Dimitar Stoyanov**, DrSc (2000), PhD (1977), Assoc.Prof. (1985), Prof. (2002). Head of LRL to IE-BAS (1991-June 2014), male, responsible for the team of LRL to IE-BAS. Field of research: Incoherent & coherent Lidars (hardware & software); Lidar sensing of the atmosphere (since 1980); Lidar diagnostics of fusion plasma; Optical & radio methods for receiving of signals, signal processing, optical & gamma tomography, based on lidar principle, deconvolution methods in lidar probing of atmosphere and plasma,etc. Publications: Total (~ 180); More than 50 papers in peer-reviewed international journals; ~ 30 papers in Bulgarian journals; ~ 30 full text papers in Proceedings of SPIE and Proceedings of International Conferences, Monographs – 3, Patents – 18, etc.

Relevant publications

- Yearly providing formatted SMPS, Nephelometer and CLAP data for NILU, Oslo; GMD NOAA database for optical and physical properties of aerosols according to ACTRIS data formats.
- Ch. Angelov, I. Angelov, T. Arsov, N.Archangelova, A.Boyukliiski, A.Damianova, L.Drenska, K.Georgiev, I. Kalapov, A.Nishev, N.Nikolova, I.Penev, I.Sivriev, J.Stamenov, A.Tchorbadjieff, S.Todorov, B.Vachev, "BEO Moussala – a new facility for complex environmental studies", © Springer ISBN 978-94-007-0130-4, pp.123-139, 2011.
- Nojarov, P., Kalapov, I., Stamenov, J., Arsov, T., "Some connections between aerosols, atmospheric transport, and relative humidity at peak Moussala", Theoretical and Applied Climatology, Volume 115, Issue 3-4, Pages 471-482, 2014
- Stoyanov D, Grigorov I, Kolarov G, Peshev Z, Dreischuh T, "LIDAR Atmospheric Sensing by Metal Vapor and Nd:YAG Lasers", Chapter 14 in "Advanced Photonic Sciences", M. Fadhali, Ed., Intech, ISBN: 978-953-51-0153-6 (2012) pp. 345-374.
- Meier J., I. Tegen, I. Mattis, R. Wolke, L. Alados Arboledas, A. Apituley, D. Balis, F. Barnaba, A. Chaikovsky, M. Sicard, G. Pappalardo, A. Pietruczuk, D. Stoyanov, F. Ravetta, and V. Rizi *"A regional model of European aerosol transport: Evaluation with sun photometer, lidar and air quality data*", Atmospheric Environment, 47, pp. 519-532 (2012). doi: 10.1016/j.atmosenv.2011.09.029.

Relevant projects

- ACTRIS (EU - FP7) "Aerosols, Clouds, and Trace gases Research InfraStructure Network", funded within the EC 7th Framework Programme under "Research Infrastructures for Atmospheric Research", grant agreement n° 262254, 2011-2015

- EUSAAR (EU-FP6) “European Supersites for Atmospheric Aerosol Research, EU-funded I3 (Integrated Infrastructures Initiatives) project carried out in the framework of the specific research and technological development gramme "Structuring the European Research Area - Support for Research Infrastructures", 2006-2011
- HIMONTONET (EU-FP5) “Joining of beo centre of exellence to european network of high mountain observatories”, 2002-2003
- BEOBAL (EU-FP6) “BEO Centre of Excellence Research Capacity Improvement for Sustainable Environment and Advanced Integration into ERA” INCO-CT-2005-016663, 2005-2007
- EARLINET-ASOS (EU - FP 6) - “European Aerosol Research Lidar Network: Advanced Sustainable Observation System”, 2006-2011. Contract Number 025991.

4.1.30 National University of Ireland, Galway (NUIG)

NUIG is a university engaged in third and fourth-level teaching and research. Through its Centre for Climate and Air Pollution Studies, it operates the Mace Head Atmospheric Research Station. The station is a designated EMEP supersite and a global station in the Global Atmosphere Watch network. It is uniquely positioned to quantify the changing background marine air entering into Europe from the Atlantic as well as quantifying Europe’s pollution export over the Atlantic. Continuous records of essential climate variables started in the latter 1980’s and new variables have been continuously added to the observational system since then. Aerosol microphysical parameters and radiative properties have been measured continuously since the mid ninties and since 2008 groundbased remote sensing instruments and aerosol mass spectrometry have been run operationally. The remote sensing suite comprises a cloud-radar, microwave radiometer atmospheric profiler and a ceilometer/Lidar which when used synergetically delivers realtime cloud microphysics. The infrastructure uniquely provides 24/7 data for the following parameters relevant to ACTRIS 2: in-situ aerosol microphysics, absorption, scattering, CCN, hygroscopic uptake, aerosol chemical composition via mass spectrometry, and reactive gases.

Role in the project

NUIG will contribute to NA2 and NA3 and it will provide TNA to the Mace Head Global GAW station (TNA4).

Principal personnel involved

Professsor **Colin O’Dowd** (male, 22 years since PhD completed) is the Director of the Centre and Chair of the Mace Head Management Committee and Professor of the School of Physics. He has published more than 230 papers (4 *Nature*/1 *Science*) with a h-index of 49 and was recently included in the ISI Reuters top cited scientists in the world. He is Member of the Royal Irish Academy, and Fellow of the Royal Meteorological Society and Institute of Physics. He was awarded the Smolucowski Award by the German Aerosol Society, The Appleton Medal and Award by the Institute of Physics, the Gold Medal in Geosciences by The Royal Irish Acedemy and a Doctorate of Science by the University of Manchester. He has procured and managed more than 18M€ in research funds; was Joint Editor en Chief of *Journal of Geophysical Research – Atmospheres* and is currently Editor of *Nature* Scientific Reports. Dr. **Jurgita Ovadnevaite** (female, 7 years since PhD completed) is Group Leader in Aerosol Mass Spectrometry with 20 publications. She has overseen the longest continuous high-resolution aerosol mass spectrometry dataset worldwide (6 years). Dr. **Jana Preissler** (female, 1.5 years since PhD completion) is Group Leader in remote sensing and oversees the Lidar and CLOUDNET suite of measurements at Mace Head. She recently developed the realtime SYRSOC cloudmicrophysics data product and has 7 publications**.** Dr. **Darius Ceburnis** (male, 12 years since PhD completion) is a Mace Head Research Fellow and Station Senior Scientist. He has 70 publications and h-index of 30. He has 12 years experience running observation programmes at Mace Head and as received the following awards:

Relevant publications

- Rosenfeld, D., U. Lohmann, G.B. Raga, C.D. O'Dowd, M. Kulmala, S. Fuzzi, A. Reissell, M. O. Andreae., Flood or drought: How do aerosols affect precipitation?, ***Science***, Vol 231, DOI: 10.1126/science.1160606, 2008.
- O'Dowd, C.D., J.L. Jimenez, R. Bahreini, R.C. Flagan J.H. Seinfeld, L. Pirjola, M. Kulmala, S.FG. Jennings and T. Hoffmann, Marine aerosols and iodine emissions, ***Nature***, DOI 10.1038/nature03373, 2005.
- O'Dowd, C.D., M.C. Facchini, F. Cavalli, D. Ceburnis, M. Mircea, S. Decesari, S. Fuzzi, Y.J. Yoon, and J.P. Putaud, Biogenically-driven organic contribution to marine aerosol, ***Nature***, doi:10.1038/nature02959,. 2004.
- O'Dowd, C.D., J.L. Jimenez, R. Bahreini, R.C. Flagan J.H. Seinfeld, L. Pirjola, M. Kulmala, S.FG. Jennings and T. Hoffmann, Marine particle formation from biogenic iodine emissions, ***Nature***, 417, 632-636, 2002.
- O'Dowd, C.D. P. Aalto, K. Hämeri, M. Kulmala, and Thorsten Hoffmann. Atmospheric particles from organic Vapours, ***Nature***, 416, 497-498, 2002.

Relevant projects

- FP7 ACTRIS: Aerosols, Clouds, Trace gases Research InfraStructure – Partner
- FP7 EUCAARI: European Clouds, Aerosol, and Radiation Integrated Project -Steering Group
- FP7 BAACHUS: Impact of Biogenic versus Anthropogenic emissions on Clouds and Climate: towards a Holistic UnderStanding – Partner
- FP6/FP MACC, I, II, & III, Monitoring Atmospheric Composition & Climate Partner
- FP6 Marine Aerosol Production - Coordinator

4.1.31 Institute of Geophysics, Polish Academy of Sciences, Belsk, Poland (IG PAS)

The Institute of Geophysics of Polish Academy of Sciences, founded in 1952, is a multidisciplinary organization engaged in advanced research, teaching and service provision in cutting-edge geophysical sciences. The staff of the Institute consist of almost two hundreds employers and PhD students. Its expertise spans from solid-earth through hydrosphere to atmosphere and polar researches and from Arctic to Antarctic.

Employers of the Institute are involved in field experiments, polar expeditions and monitoring of geophysical fields. The Institute has a network of seismic, geomagnetic and atmospheric observatories. Part of observations is taken within state environmental monitoring. The main observatory is located in Belsk. This is a GAW regional station for total ozone and ozone profile observations as well as aerosol profiling within EARLIENT – ACTRIS and aerosol optical properties observations as a part of AERNET. Belsk station performs also in situ trace gases observation for state environmental monitoring. The Institute is developing new atmospheric observatory in Racibórz, southern Poland which. The observatory will be equipped with Sun-photometer and ceilometer, it will collaborate with existing observatory of IEE PAS and IMWM-NRI.

Beside the projects funded at national level the Institute is involved in infrastructures projects like: Aerosols, Clouds, and Trace Research Infrastructure Network, ACTRIS (no. 262254), Svalbard Integrated Arctic Earth Observing System - Preparatory Phase (no. 261747), SIOS-PP and European Plate Observing System-Preparatory Phase, EPOS – PP (no. 262229).

Role in the project

Institute of Geophysics of Polish Academy of Sciences will be involved in aerosol profiling in NA2. IG-PAS will provide quality assurance and inter-comparison of LIDAR operated in Belsk. During the project the synergy of collocated LIDAR and Sun-photometer instruments will be used for better description of aerosol.

Principal personnel involved

Aleksander Pietruczuk (male) received PhD degree in Physics ins 2005, when he started to work in Geophysical Observatory of IGF of PAS in Belsk. He was a head of the observatory form 2008 to 2014, then he became a head of aerosol team in physics of the atmosphere department of IGF of PAS. His main research areas are: aerosol optical properties, especially aerosol profiling with LIDAR technique and influence of transport of aerosol on its optical properties. He is PI of EARLINET LIDAR station at Belsk as well as PI of AERONET station at Belsk.

Relevant publications

- Pietruczuk A. (2013); Short term variability of aerosol optical thickness at Belsk for the period 2002–2010, Atmospheric Environment 79, pp. 744-750.
- Pietruczuk A., A. Chaikovsky (2012); Variability of Aerosol Properties during the 2007-2010 Spring Seasons over Central Europe, Acta Geophysica 60 (5), 2012, pp. 1338-1358.
- Rogula-Kozłowska W., Klejnowski K., Rogula-Kopiec P., Ośródka L., Krajny E., Błaszczak B., Mathews B. (2013); Spatial and seasonal variability of the mass concentration and chemical composition of PM2.5 in Poland. Air Quality, Atmosphere and Health, An International Journal, December 2013, pp. 1-18, Springer
- W Rogula-Kozłowska, I Sówka, B Mathews, K Klejnowski, A Zwoździak, K Kwiecińska (2013); Size-Resolved Water-Soluble Ionic Composition of Ambient Particles in an Urban Area in Southern Poland. Journal of Environmental Protection 4, pp. 371-379
- Kowalska M., Osrodka L., Klejnowski K., Zejda J. E., Krajny E., Wojtylak M. (2009); Air Quality Index and its significance in environmental health risk communications, Archives of Environmental Protection 35 (1), pp.13-21

Relevant projects

- European Aerosol Research Lidar Network: Advanced Sustainable Observation System, EAELINET ASOS (no. 025991) - IGF PAS partner
- Aerosols, Clouds, and Trace Research Infrastructure Network, ACTRIS (no. 262254), IGF PAS and IEE PAS – associate partners
- COST ACTION 633 – Particulate Matter – properties related to health effects – PM 2,5 compositions in Silesia, K. Klejnowski (IEE PAS) – member
- ESSEM COST Action ES1303 - Towards operational ground based profiling with ceilometers, doppler lidars and microwave radiometers for improving weather forecasts TOPROF, IMGW-NRI – partner
- AIRSILESIA – INTERREG PL-CZ - aerosol compositions in Racibórz, IEE PAS and IMWM-NRI - partners

4.2. Third parties involved in the project (including use of third party resources)

4.2.1 Consiglio Nazionale delle Ricerche (CNR)

No third parties involved

4.2.2 Centre National de Recherche Scientifique (CNRS)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	N
Does the participant envisage that part of its work is performed by linked third parties1?	Y
Université Joseph Fourier Grenoble 1 (UJF) is located in the middle of the Rhône-Alpes region, 2nd French region in terms of research activities. It is a research intensive university in an international and high	

[1] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

tech environment with 20 000 full time students, of which 1 400 doctoral students which enhanced nearly 300 theses submitted each year. It comprises 1 400 lecturers and researchers and 1 300 administrative and technical staff, 70 laboratories and 8 doctoral studies organised in four core areas : Mathematics- Information sciences-Technologies-Communication ; Chemistry-Life sciences-Health-Biotechnologies ; Material sciences-Nanosciences-Engineering ; Earth-Universe-Environment-Humanities. The Grenoble University is a partner of major international and national research centres are located in the Grenoble area as ESRF, ILL, EMBL, CEA. UJF has a long-standing experience in European framework programmes (FP) with participation more than 100 projects under the FP6 and FP7. UJF will be involved in the scientific coordination and management of ACTRIS-2, with leadership of NA5. LGGE will participate to NA3 for the aerosol component and to NA4, with responsibilities to link ACTRIS-2 to SMEs.

Université Lille 1 (Lille 1) is one of the 3 public universities in the North of France. Located at Cité Scientifique in Villeneuve d'Ascq, south of Lille city, Lille 1 has more than 1600 lecturers and researchers, teaching to about 20 000 students and working in 39 Research Units mostly associated to CNRS. The main fields are mathematics, Physics, Chemistry, Earth and Environment Sciences, Computer, and Electronic sciences and Economy. Recently one Observatory dedicated to Universe Science (OSU-Nord) was created. In ACTRIS-2, Lille 1 University will provide the unique calibration, maintenance and training infrastructures, operated by LOA laboratory in the framework of AERONET. Additionally, ICARE UMS will manage the processing of ground-based data and distributes them to the ACTRIS-2 Data Center. The leader of AERONET-EUROPE is a permanent professor in this University, and a part of the technical staff involved in this TNA is from the University while other technical staff are CNRS members. Lille 1 will be involved in NA2 for aerosol profiling, NA4 for link to SMEs, VA1 for ICARE data base, and JRA3.

Ecole des Mines de Douai (MD) is one of the components of the Institut Mines-Télécom which is a public institution devoted to higher education, research and innovation in the fields of engineering and digital technology. The institution is under the authority of the Minister for Industry. The Atmospheric Sciences and Environmental Engineering (SAGE) department is one of 5 research units of MD. His research activity mainly focuses on air quality and atmospheric reactivity in order to better understand the impacts of human activities on the composition of the Earth's atmosphere. This consists in developing methodologies for aerosol and trace gas measurements, studying their origins and their behavior in the atmosphere. In particular, the SAGE research team has a long experience in VOC speciation and develops methods for key compound observations in industrial, urban or remote areas. Since 1990, the department has been in charge of the coordination and the quality assurance of the French EMEP program for the long term observation of the background air pollution in order to analyze trends and study the relationship between sources and receptor sites. MD will participate in NA3 for reactive trace gases.

Université Blaise Pascal Clermont-Ferrand 2 (UBP) is located in central France, in the region Auvergne. It comprises 1200 lecturers and 900 administrative and technical staff, for 16 000 students. It is partly covering the expenses of the PUY station for infrastructure and staff. UBP will be involved in NA3 for upgrading to the new European standards and providing in situ gas, aerosol and cloud properties monitored at the PUY station and NA2 for insuring quality controlled aerosol LIDAR profiles. It will be involved in the TNA to the PUY station within TNA4.s

Commissariat à l'énergie atomique (CEA) is a mixed research unit (UMR 8212) with CNRS. The LSCE/ACMCC is currently located on the CEA site "Orme des Merisiers" at Gif/Yvette, France. As a third party, CEA is currently covering a significant amount of expenses linked to this ACMCC infrastructure (electricity, heating, ...) and owes a part of the scientific equipment which is used for ACMCC activities in WP8 (TNA3).

Université de la Réunion (UR). The University of Reunion Island is a French public higher education and research institution, located in the heart of the Indian Ocean, one of Europe's outermost regions, off the east coast of Africa close to Madagascar. By virtue of its unique geostrategic position it is the only European university in the region. Twelve thousands students are admitted every year at six sites. Through its research, international influence, range of courses on offer and student living conditions, the University of Reunion Island has many advantages that enable it to play a key role as an interface between Europe and the Indian

Ocean. The University of Reunion Island's Faculty Observatoire des Sciences de l'Univers (OSU-R, Unité Mixte de Service 3365, CNRS & University will provided TNA to the MAIDO station within TNA4.	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	N

4.2.3 Leibniz Institut fuer Troposphaerenforschung e.V. (TROPOS)

No third parties involved

4.2.4 National Observatory of Athens (NOA)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	Y
If yes, please describe and justify the tasks to be subcontracted NOA will employ subcontractors to carry out specific activities mainly related to quality assurance within WP3. As WP3 is closely linked to the GAW programme there will be intensive cooperation with the World Calibration Centres for volatile organic compounds (WCC-VOC) and for oxides of nitrogen (WCC-NOx). The GAW-WCC is the body being responsible for quality assurance (QA) at GAW stations including transfer of scale from the Central Calibration Laboratories (CCL) to the monitoring stations, carrying out round robins and station audits, and advice and support stations in improving their quality. The subcontracts will cover: 1. Contributions to revisions of Measurement guidelines (MG): Participate in the workshops and contribute to the revised MG (Task 1) 2. Test and/or target gases for stations: Contribute to selection of test/target gases, analyses of test/target gases, data evaluation of results of the corresponding measurements (Task 1) 3. Station audits: Carry out station audits (exclusively by WCC), further develop audit procedures according to needs, e.g. of audit-questionaires, provide reports of the audit results (Task 1) 4. Contribute in annual workshops to ensure the compliance of station data with QA/QC procedures and intercomparability of the submitted data within ACTRIS-2 and provision of ACTRIS-quality labels (Task 3.2) Subcontractors will be selected accordingly the GAW-WCC standards and requirements. The subcontracting budget accounts for 30.000 € for WCC-VOC and 30.000 € for WCC-NOx.	
Does the participant envisage that part of its work is performed by linked third parties2?	N
If yes, please describe the third party, the link of the participant to the third party, and describe and justify the tasks to be performed by the third party	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	N
If yes, please describe the third party and their contributions	

[2] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

4.2.5 Norsk Institutt for Luftforskning (NILU)

No third parties involved

4.2.6 Finnish Meteorological Institute, (Ilmatieteen Laitos) (FMI)

No third parties involved

4.2.7 Paul Scherrer Institut (PSI)

No third parties involved

4.2.8 Helsingin Yliopisto (UHEL)

No third parties involved

4.2.9 Eidgenoessische Materialpruefungs- und Forschungsanstalt (EMPA)

No third parties involved

4.2.10 European Centre for Medium-Range Weather Forecasts (ECMWF)

No third parties involved

4.2.11 Meteorologisk Institutt (Met.No)

No third parties involved

4.2.12 National Institute of Research and Development for Optoelectronics (INOE)

No third parties involved

4.2.13 Ludwig-Maximilians-Universitaet Muenchen (LMU)

No third parties involved

4.2.14 Commission of the European Communities - Directorate General Joint Research Centre – JRC

No third parties involved

4.2.15 Universidad de Valladolid (UVA)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	No
Does the participant envisage that part of its work is performed by linked third parties3?	Yes
The Izaña Atmospheric Research Center (IARC), is formally a Third Party linked to GOA through a Joint Research Unit between UVA and AEMET. In the TNA activity AERONET-Europe calibration center (WP7, TNA2), the activity related to absolute calibration of reference instruments will be carried out at Izaña, although no sub-contracting or contribution in kind is included. With respect to the Izaña Subtropical Access	

[3] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

Facility (WP9, TNA4), users will be able to carry their instruments and investigate in situ atmospheric properties. Again, no sub-contracting or contribution in kind is considered. Note however, as described in the access cost calculation sheets, that AEMET is subcontracting a large amount of its direct costs for AE-IZA (AERONET-Europe TNA) and ISAF (Izaña Subtropical Access Facility, physical TNA), both hosted at the Izana Atmospheric Observatory. AEMET does not have specialized staff to carry out tasks which are out of the domain of the meteorological and atmospheric activities such as transportation, cleaning service, security service, technical assistance to maintain buildings and the equipment of the facilities (electrical installation, power generator, heating system, UPS, air conditioning) as well repairs and maintenance of scientific instruments. All these activities are subcontracted to different specialised companies. The scientific tasks are all performed by AEMET staff. As part of the Joint Research Unit, the Izaña Atmospheric Research Centerof the Spanish Meterological Agenc, as Testbed for column aerosol instruments, is in charge of the calibration of reference photometers used for AERONET calibrations within AERONET-Europe TNA proposal, same as it is accomplished in ACTRIS-1 project. Correspondingly, the hosting of users accessing Izaña within WP9, TNA4, will be carried out by AEMET staff at Izaña.	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	No

4.2.16 Universidad de Granada (UGR)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	N
If yes, please describe and justify the tasks to be subcontracted	
Does the participant envisage that part of its work is performed by linked third parties4?	Y
If yes, please describe the third party, the link of the participant to the third party, and describe and justify the tasks to be performed by the third party **Universitat Politècnica de Catalunya (UPC)** The Technical University of Catalonia (Universitat Politècnica de Catalunya-BarcelonaTech, UPC, Barcelona, Spain) is a public institution, one of the largest technical universities in Spain, devoted to higher education and research in the fields of architecture, science and engineering. The Remote Sensing Laboratory (RSLab) of the Department of Signal Theory and Communications addresses a wide range of research topics, including optical and microwave, active and passive remote sensing. Within RSLAB, the lidar group holds a 20 years experience in lidar system design, operation and data inversion algorithms. In particular it designed and built, and currently operates, the lidar system of the Barcelona EARLINET station. UPC has contributed to EARLINET since its inception and has participated in the 5th Framework Programme Project "A European Aerosol Research Lidar Network to Establish an Aerosol Climatology: EARLINET" (contract No. EVR1-CT-1999-40003), in the 6th Framework Programme Project "European Aerosol Research Lidar Network: Advanced Sustainable Observation System (EARLINET-ASOS)" (contract No. 025991 (RICA)), where it led network action 2 "Exchange of Expertise", and in the 7th Framework Programme Project "Aerosol, Cloud, and Trace Gases Research Infrastructure Network (ACTRIS)", where it leads work package 2 "NA2: Remote sensing of vertical aerosol distribution" and is responsible for task 2.1 "Exchange of Expertise".	

[4] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

Role in the project
UPC is responsible for task 2.4 “Exchange of expertise, support to campaigns and new users” in work package 2 “NA2: Profiling of aerosols and clouds”, and contributes to tasks 2.1 and 2.3 of this work package.

Barcelona supercomputing Center (BSC)
The BSC has the mission to research, develop and manage information technology in order to facilitate scientific progress. At the BSC, more than 350 people from 40 different countries perform and facilitate research into Computer Sciences, Life Sciences, Earth Sciences and Computational Applications in Science and Engineering. The BSC-CNS is one of the first eight Spanish “Severo Ochoa Centre of Excellence” awarded by the Spanish Government, as well as one of the four hosting members of the European PRACE Research Infrastructure FP7 project. The BSC hosts MareNostrum III, a Tier-0 PRACE. In cooperation with the UPC operates and maintains the AERONET station in Barcelona, and recently install a MPLlidar, which is at a preliminary stage of operation. It also develops, operates daily two models of mineral dust: BSC-DREAM8b and NMMB/BSC-Dust (http://www.bsc.es/earth-sciences/mineral-dust-forecast-system/bsc-dream8b-forecast/north-africa-europe-and-middle-ea-0), which is a world leader. In cooperation with AEMET is responable of the WMO SDS-WAS NAMEE RC (http://sds-was.aemet.es/) and the BDFC (Barcelona Dust Forecast Center, http://dust.aemet.es/): first official center of the WMO for make daily forecasting mineral dust."

The Earth Sciences Department of the BSC (ES-BSC) was established with the objective of carrying out research in Earth system modeling. The high performance capabilities of MareNostrum III allow increasing the spatial and temporal resolution of atmospheric models, in order to improve our knowledge on dynamic patterns of air pollutants in complex terrains and interactions and feedbacks of physico-chemical processes occurring in the atmosphere. Therefore it represents an excellent infrastructure to carry the Earth system simulations on which the ES-BSC is a worldwide reference. In cooperation with the UPC operates and maintains the AERONET station in Barcelona, and recently install a MPLlidar, which is at a preliminary stage of operation. It also develops, operates daily two models of mineral dust: BSC-DREAM8b and NMMB/BSC-Dust (http://www.bsc.es/earth-sciences/mineral-dust-forecast-system/bsc-dream8b-forecast/north-africa-europe-and-middle-ea-0), which is a world leader. In cooperation with AEMET is responsible of the WMO SDS-WAS NAMEE RC (http://sds-was.aemet.es/) and the BDFC (Barcelona Dust Forecast Center, http://dust.aemet.es/): first official center of the WMO for make daily forecasting mineral dust.

Role in the project
The BSC will be involved in WP5: JRA3: Model evaluation, assimilation and trend studies (Tasks 13.1 and 13.2).

Research Center on Energy, Environment and Technology (CIEMAT)
CIEMAT- Research Center on Energy, Environment and Technology, is a public research body with several centers in different Spanish regions. Its main activity is structured around technical Departments which form a bridge between R&D&I and social interest goals. Although the strategic lines of action of CIEMAT are focused on the study, development, promotion and optimisation of energy sources such as: renewable energies, nuclear fusion, nuclear fission and fossil fuels, the environmental issues and the research related activitities are the main goals of its Department of Environment. Within this, atmospheric pollution can be considered as one of its strongest fields of expertise, as measurement and characterization of atmospheric processes involving gaseous pollutants and aerosols have been the main focusses of interest for more than 25 years.

The Group involved in this proposal operates and maintains in CIEMAT site in Madrid a Lidar station, participating in EARLINET-ASOS (FP6) and ACTRIS (FP7) projects, and counts also with an important set of modern instruments for *in situ* measurements of ambient aerosol properties (optical, online chemical speciation, aerosol formation processes) to improve the understanding on physico-chemical processes related with atmospheric aerosols and the atmosphere.

Role in the project CIEMAT will contribute to tasks 2.1, 2.3 and 2.4 in the work package 2 “NA2: Profiling of aerosols and clouds”, tasks 1, tasks 2.1, 2.4, 2.5 , task 3 and task 4 in “NA3: near-surface observations of aerosol, clouds and trace-gases”. **Instituto Nacional De Técnica Aeroespacial (INTA)** INTA (Spanish acronym for National Institute for Aerospace Technology) is a public institution, specialized in aeronautic and aerospace research and development. The institute develops R+D and commercial activities. INTA has a total staff of about 1400, more than 1000 dedicated to R&D activities, testing and certification. The Atmospheric branch (AIIA), a part of the Earth Observation, Remote Sensing and Atmosphere Department, is devoted to the physic-chemistry experimental research and monitoring activities in the field of the terrestrial atmosphere. Both commercial and home made hi-tech multi-platform instrumentation is used for this purpose (including satellite, balloon-borne, aircraft and ground-based). Stratospheric ozone, Aerosols monitoring, Air quality and UV radiation, and their impacts on nature are main fields of interest. AIIA hold an Atmospheric Observational Station in South West Spain since 1974. AOD measurements started on 1999 whereas “in-situ” size distribution data base extends from 2004 to date. Other measurements are aerosols scattering, meteo data, O3, NOx, SO2, solar radiation, etc. Two micro-pulse single-wavelength aerosol lidars are routinely in operation at Tenerife (Canary Islands, MPLNET station, since 2005) and Antarctica. AIIA also holds a long experience on state-of-the-art DOAS activities since 1988 which has been extended to MAXDOAS in last years. Gases profiles are simultaneously retrieved in Subtropical and Antarctic stations in clean background. Aerosols inversion is under way. Role in the project INTA contributes to tasks 2 and 3 in “NA3: Near-surface observations of aerosol, clouds and trace-gases”.

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	N
If yes, please describe the third party and their contributions	

4.2.17 Agencia Estatal Consejo Superior De Investigaciones Cientificas (CSIC)

No third parties involved

4.2.18 Koninklijk Nederlands Meteorologisch Instituut (KNMI)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	N
If yes, please describe and justify the tasks to be subcontracted	
Does the participant envisage that part of its work is performed by linked third parties5?	Y
If yes, please describe the third party, the link of the participant to the third party, and describe and justify the tasks to be performed by the third party In the CESAR consortium, eight institutes based in the Netherlands collaborate in the research aeras of atmospheric processes and land atmosphere interactions. Each of these insitutes brings its own specific field of expertise to the site, with the result that a complehensive observational programme can be executed, offering many unique opportunities for ACTRIS related research. For ACTRIS-2, a joint research unit (JRU) has been formed that is represented by KNMI. The parties in the JRU are:	

[5] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

Delft University of Technology is one of the leading and largest technical universities in Europe. The TU Delft Climate Institute is a research institute of the university dedicated to pre-competitive research in the fields of radar and telecommunication. The work of this project fits in the research program of the remote sector, which aims to develop innovative measurement techniques, systems and methodologies for the observation of natural at large distances, to translate relevant research expertise into educational programs, and to educate students by involving them in cutting edge research programs. The key elements in the research program are: 1) Experimental research of clouds and precipitation with radar. 2) Theoretical research of the scattering process. 3) The inverse problem: how to retrieve geo-physical parameters from the radar data? 4) Sensor synergy: how to combine different sensors to optimize the retrieval of atmospheric parameters?

Role in the project:
TUDelft is very experienced in atmospheric remote sensing, most notably clouds and precipitation in relation to boundary layer process, applied to weather prediction and improved understanding of climate change. TUD is scientific leader of the Dutch CESAR atmospheric remote sensing contingent in the Climate changes Spatial Planning program that aims to pave the way to future climate adaptation and mitigation strategies. TUD will contribute to NA2 with cloud observations and radar calibration techniques. TUD will work in the TNA to assist external users with access to CESAR.

TNO is the largest fully independent Research, Development and Consultancy organization in the Netherlands, with a staff of over 5,000 and a total annual turnover of close to 600 million Euros. TNO's primary tasks are to assist and support trade and industry, including SME's, governments and others in technological innovation and solving problems by rendering services and transferring knowledge and expertise. TNO participates in many EU programmes aiming at technological development. The institute has a long history of Earth observation data integration (satellite, airborne and in-situ) for all the different types of geoscience areas, including: climate, air polution, water management, sedimentology, geohazards, flooding risks.

Role in the Project
TNO will contribute to NA3 and JRA1 and JRA2 with in situ aerosol observations. TNO is operating the AERONET sunphotometer at Cabauw.

Institute for Marine and Atmospheric research Utrecht - Universiteit Utrecht (UU) was established on 24 September 1991 as a University research institute of Utrecht University (UU). It is based in the Department of Physics and Astronomy of the Faculty of Natural Sciences, with a significant contribution from the Faculty of Geosciences. In the ACTRIS consortium the Atmospheric Physics and Chemistry group (APCG) is involved. Scientific focus of the group is obtaining fundamental insight into physical and chemical processes in the atmosphere using measurements and modelling. Topics range from the investigation of global trace gas budgets, aerosol formation and ageing processes, biosphere- atmosphere interaction, stratospheric chemistry and transport, the reconstruction of the paleo- atmosphere by measurements on air trapped in polar firn and ice, to modelling of aerosol-cloud interactions and remote sensing applications.

Role in the Project
UU will operate in-situ aerosol instrumentation that will play a role in NA3 and JRA1 and JRA2. Furthermore UU will work in the TNA to assist external users with access to the measurements for data evaluation, campaigns and intercomparisons.

Stichting Energieonderzoek Centrum Nederland (ECN) (Energy research Centre of the Netherlands) develops and brings to the market high-value knowledge and technology for sustainable energy management. ECN is recognized as a national energy institute and has the ambition to play a major international role in providing policy advice. ECN employs 636 fte and has an annual turnover of 122 M€. The department on Air Quality and Climate Change consists of 16 fte. ECN has been involved in many research projects on air pollution and biosphere-atmosphere exchange since the 1980's and on climate change since 1992. Main focus points in the current research are Climate Change, Nitrogen, Instrument Development and Aerosols.

Besides policy studies in support of the national government and the EU, we participate in and lead many national and international research projects and networks. *Role in the Project* ECN will contribute to the Cabauw continuous measurements and campaigns with CCN-counter observations with NOx gradient measurements along the tower using CLD equipment. ECN will contribute with continuous aerosol and gas phase chemical composition measurements for SIA and cations in two size classes using the Marga-2S instrument and work together with University Utrecht on the ACMS observations along with the Marga operation. Furthermore ECN will work in the TNA to assist external users with access to the measurements for data evaluation, campaigns and intercomparisons.

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	Y
If yes, please describe the third party and their contributions	

4.2.19 Czech Hydrometeorological Intitute (Cesky Hydrometeorologicky Ustav) (CHMI)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	No
If yes, please describe and justify the tasks to be subcontracted	
Does the participant envisage that part of its work is performed by linked third parties6?	Yes
If yes, please describe the third party, the link of the participant to the third party, and describe and justify the tasks to be performed by the third party **Institute of Chemical Process Fundamentals, Academy of Sciences of the Czech Republic, v.v.i. (ICPF)** ICPF serves as a centre for fundamental research in chemical, biochemical, catalytic, and environmental engineering. Besides these activities, ICPF acts as a graduate school for Ph.D. studies in the field of chemical, biochemical, environmental engineering and processes, physical chemistry, organic chemistry, industrial chemistry, and biotechnology. The Laboratory of Aerosol Chemistry and Physics (LACP) of the ICPF participating in the project is the leading aerosol research group in the Czech Republic. In the past decade, the group has participated in several EC funded projects, namely SUB-AERO, URBAN-AEROSOL, URBAN-EXPOSURE, EUSAAR, EUCAARI and ACTRIS. Starting in 2013, the laboratory is a partner in the Marie Curie International Training Network HEXACOMM. During the past 5 years, senior team members have served as PIs in several nationally funded projects in the field of aerosol research. In ACTRIS 2, LACP will cooperate mainly on measurement and data processing of chemical and physical aerosol properties (number concentration, number size distribution, aerosol optical properties, aerosol chemical composition), and also provides support for TNA access related to the field. There is a bilateral agreement of cooperation between CHMI and ICPF. **Global Change Research Centre, Academy of Sciences of the Czech Republic, v.v.i. (CVGZ)**: The CVGZ research focuses on the topics of global change, the carbon cycle, ecophysiology of production processes in plants and atmospheric long-range transport of greenhouse gases and air pollutants within the frameworks of Czech and international programmes and projects. The institute also participates in the education of undergraduate and graduate students of cooperating universities. CVGZ is a core partner in the ICOS project and operates the Atmospheric Station Křešín u Pacova consisting of a 250 m tall atmospheric tower. Further, CVGZ is an associated partner in InGOS and GMOS. In ACTRIS 2 CVGZ will cooperate on the measurements of aerosol optical properties and EC-OC. Within JRA2, the tall tower will be used for vertical exchange measurements of aerosol particles. There is a bilateral agreement of cooperation between CHMI and CVGZ as well as between CVGZ and ICPF.	

[6] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	No
If yes, please describe the third party and their contributions	

4.2.20 Lunds Unviersitet (ULUND)
No third parties involved

4.2.21 Cyprus Institute (CyI)
No third parties involved

4.2.22 Rheinisches Institut für Umweltforschung an der Universitaet zu Koeln e.V. (RIUUK)
No third parties involved

4.2.23 Deutscher Wetterdienst (DWD)
No third parties involved

4.2.24 University of Leeds (UnivLeeds)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	N
If yes, please describe and justify the tasks to be subcontracted	
Does the participant envisage that part of its work is performed by linked third parties7?	Y
Describe the third party, the link of the participant to the third party, and describe and justify the tasks to be performed by the third party There are four linked third parties in the JRU defined by the National Centre for Atmospheric Science (NCAS): Reading University, York University, Hertfordshire University, and Chilbolton (STFC). There is a legal agreement between NCAS and the four third parties (and many other UK institutions) to deliver NCAS science and facilities. , The NCAS Directorate and Operational Support Team are based at Leeds. The University of York has a world-leading research profile in atmospheric chemistry encompassing the science of global air pollution, stratospheric ozone depletion and climate change. The new £2M Wolfson Atmospheric Chemistry Laboratories were opened in 2013 bringing together around 40 researchers into a single dedicated building, the first of its kind in the UK. The laboratories host university staff (including three professorial appointments, two senior / lecturers and two senior fellows), researchers from the NERC National Centre for Atmospheric Science and seconded staff from Government organisations such as Defra. The research at York spans theory, laboratory studies, field measurements (including the operation an overseas WMO-GAW observatory) and computer modeling and prediction. The major contributions from the Wolfson Laboratories at York to ACTRIS-2 will be associated with measurement capabilities, methodologies and traceability for volatile organic compounds (both non-methane hydrocarbons and oxygenated organic compounds), nitrogen oxides, ozone and carbon monoxide. The Chilbolton Observatory is part of the Space Department at Rutherford Appleton Laboratory. RAL is itself part of the Science and Technology Facilities Council, one of the 7 UK Research Councils and a Non-Departmental Public Body. The Chilbolton Group consists of 10 staff, with 5 based at RAL and 5 at the Observatory. These include scientists, engineers and support staff (technicians and an administrator). The majority of funding for Chilbolton comes from the Natural Environment Research Council, NERC, while its	

[7] A third party that is an affiliated entity or has a legal link to a participant implying collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

scientific programme is conducted under the auspices of the National Centre for Atmospheric Sciences, NCAS. For over 30 years, Chilbolton has supported an experimental programme in radio science, radiowave propagation, atmospheric science and meteorology. It supports the research community in the Universities, government, and in other Research Councils by providing access to a portfolio of instruments including radars, lidars, radiometers, propagation measurement receivers, and a wide variety of in-situ meteorological sensors. Observatory staff operate the instruments to acquire detailed data on particular weather events of interest, as well as ongoing data collection to provide climatological data. The radars at Chilbolton include the 3 GHz system on the 25 m diameter dish antenna, which is capable of high-resolution (spatial and temporal) Doppler and polarimetric measurements of rain and clouds. In addition, zenith-pointing polarimetric-Doppler 35 GHz and 94 GHz cloud radars are routinely operated for detailed microphysical studies of cloud processes and cloud climatology. These facilities have supported numerous research campaigns over the years, including GPCP, HYREX, CLARE'98, CSIP, COPE, DIAMET and DYMECS. A new, transportable 35 GHz cloud radar system is currently being procured to further enhance the facilities. The combination of the 3, 35 and 94 GHz radars, together with their polarimetric-Doppler capabilities, combined with the other co-located instrumentation; make Chilbolton an excellent site for the development of standardized cloud radar calibration procedures in ACTRIS-2. The Department of Meteorology at the University of Reading is the largest of its kind in Europe with 50 academic staff, 20 senior research staff and fellowship holders, around 90 postdocs and around 70 PhD students. In the 2008 Research Assessment Exercise, 75% of our research was graded as world leading or internationally excellent. We received the highest rating of 5* in all previous Research Assessment Exercises. The Department hosts around 25 Met Office scientists and the Climate Division of the National Centre for Atmospheric Science (NCAS-Climate). Reading's involvement in the continued development of Cloudnet is to include more stations and aerosol properties and validation of their representation in NWP and climate models in NA2 (Task 2.2) and the data sets in VA1. New techniques to be developed for calibration and attenuation correction attenuation due to wet radomes in NA2 (Task 2.2) using experience with our colleagues at the Chilbolton observatory and the work developing calibration procedures that are now widely adopted within the community (see refs below). The University of Hertfordshire has world-leading expertise in investigations of air pollution and clouds. This work is carried out at the Centre for Atmospheric and Instrumentation Research (CAIR) within the university. CAIR comprises of 4 research laboratories undertaking research in atmospheric dynamics, air pollution, climate change, instrumentation development and diagnostics, radiative and aerosol processes and measurements. Recently CAIR opened a world-wide unique laboratory for remote sensing of air pollution on the basis of laser spectroscopy. CAIR has 16 academic and research staff, 7 visiting researchers and 8 PhD students Currently, CAIR is running 6.5 MEuro worth of research grants from Research Councils (NERC, EPSRC), UK Met.Office, EC, NCAR, NSF, NASA, DSTL, The Royal Society, Government (include DEFRA and the Environment Agency) and commercial organisations. The major contributions to ACTRIS-2 will be associated with algorithm development that will be used for aerosol characterization with remote sensing methods, and methodology development related to investigations of light absorbing pollution (black carbon) and mineral dust.	
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	N
If yes, please describe the third party and their contributions	

4.2.25 Natural Environment Research Council (NERC)

No third parties involved

4.2.26 Pannon Egyetem (UPAC)

No third parties involved

4.2.27 B.I. Stepanov Institute of Physics of The National Academy of Sciences of Belarus (IPNASB)

No third parties involved

4.2.28 Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia (CNISM)

No third parties involved

4.2.29 Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences (INRNE)

No third parties involved

4.2.30 National University of Ireland, Galway (NUIG)

No third parties involved

4.2.31 Institute of Geophysics, Polish Academy of Sciences, Belsk, Poland (IG PAS)

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)?	N
If yes, please describe and justify the tasks to be subcontracted	
Does the participant envisage that part of its work is performed by linked third parties8?	Y
If yes, please describe the third party, the link of the participant to the third party, and describe and justify the tasks to be performed by the third party	
Institute of Environmental Engineering Polish Academy of Sciences (IEE PAS) Executive director: Franciszek Pistelok. The Institute of Environmental Engineering of the Polish Academy of Sciences in Zabrze is active since 1954. The Institute is the oldest Polish scientific institution that treats the environmental problems integrally, where the natural environment is one, very complex, system - the human habitat. The Institute performs investigation of physicochemical composition of aerosols at background stations Racibórz in cooperation with Institute of Meteorology and Water Management – National Research Institute. They are focused on cross-border transport of pollutants. IEE PAS is also equipped with own laboratory for examination of chemical composition of aerosol in terms of OC/EC, determination of trace elements, anions, cations and molecular markers. Institute of Meteorology and Water Management - National Research Institute (IMWM-NRI) Director: Mieczysław S. Ostojski The Institute of Meteorology and Water Management - National Research Institute is supervised by the Ministry of the Environment. The Institute is National Weather Services in Poland and within its statutory targets provides the State Hydrological and Meteorological Service. The organization structure IMGW-PIB includes Main Centre in Warsaw and four branches: Gdynia, Krakow, Wroclaw and Dam Monitoring Centre in Katowice. The Institute performs monitoring of the physical processes occurring in the atmosphere and hydrosphere, issue forecasts and warnings. IMWM-NRI performs continuous, comprehensive R&D activities as well as educational one. Both institutes, IEE PAS and IMWM-NRI will be involved in aerosol in-situ measurements, NA3. They will apply quality assurance tests and intercompare instruments operated at joint observatory at Raciórz.	

[8] A third party that is an affiliated entity or has a legal link to a participant implying a collaboration not limited to the action. (Article 14 of the Model Grant Agreement).

Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)?	N

Section 5: Ethics and Security

5.1 Ethics

In compliance with the EU's ethical principles, it is confirmed that there are no ethical considerations relating to ACTRIS-2 or its activities.

5.2 Security[9]

Please indicate if your project will involve:

- activities or results raising security issues: (NO)
- 'EU-classified information' as background or results: (NO)

[9] Article 37.1 of Model Grant Agreement. *Before disclosing results of activities raising security issues to a third party (including affiliated entities), a beneficiary must inform the coordinator — which must request written approval from the Commission/Agency;* Article 37. *Activities related to 'classified deliverables' must comply with the 'security requirements' until they are declassified; Action tasks related to classified deliverables may not be subcontracted without prior explicit written approval from the Commission/Agency.; The beneficiaries must inform the coordinator — which must immediately inform the Commission/Agency — of any changes in the security context and — if necessary —request for Annex 1 to be amended (see Article 55)*

Participant number	12	Organisation short name	INOE	Short name of Infrastructure	LiCAL
Installation number	1	Short name of Installation	LiCalTrain	Unit of access	1 rwd

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Consumable and maintenance	21 755,13
	Energy power water and internet connection	36 773,81
	Total A	58 528,93
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Senior researcher	46,7	200 971,00
	Researcher	17,8	51 693,00
	Engineer	24,1	70 028,00
	Total B		322 692,00

C. Indirect eligible costs: 25% x ([A-A']+B)	95 305,23
D. Total access eligible costs over the last two years[3] = A+B+C	476 526,17
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	911
F. Unit cost =D/E	523,08
G. Unit cost charged to the project	523,08
H. Quantity of access offered under the project (over the whole duration of the project)	200
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 22%	104 616,00

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	12	Organisation short name	INOE	Short name of Infrastructure	LiCAL
Installation number	2	Short name of Installation	LiCoTest	Unit of access	1 rwd

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		Eligible Costs (€)
	Consumable and maintenance		109 406,64
	Energy power water and internet connection		18 591,18
	Total A		127 997,82
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Senior researcher	27,2	117 130,00
	Researcher	37,2	107 779,00
	Engineer	36,6	106 200,00
	Total B		331 109,00
C. Indirect eligible costs: 25% x ([A-A']+B)			114 776,71
D. Total access eligible costs over the last two years[3] = A+B+C			573 883,53
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]			1 215
F. Unit cost =D/E			472,33
G. Unit cost charged to the project			472,33
H. Quantity of access offered under the project (over the whole duration of the project)			100
I. **Access Cost on the basis of UC for the access offered under the project = G x H**		8%	**47 233,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	13	Organisation short name	LMU	Short name of Infrastructure	LiCAL
Installation number	3	Short name of Installation	POLIS	Unit of access	1 rwd

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:		01/01/2012	to: 31/12/2013
A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		Eligible Costs (€)
	Consumable and maintenance		7 000,00
	Total A		**7 000,00**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	Researcher	2,4	16 019,40
	Engineer	2,4	14 476,22
	Technician	2,4	10 739,70
	Total B		**41 235,32**
C. Indirect eligible costs: 25% x ([A-A']+B)			12 058,83
D. Total access eligible costs over the last two years[3] = A+B+C			60 294,15
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]			98
F. Unit cost =D/E			**615,25**
G. Unit cost charged to the project			**615,25**
H. Quantity of access offered under the project (over the whole duration of the project)			112
I. Access Cost on the basis of UC for the access offered under the project = G x H		**114%**	**68 908,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	13	Organisation short name	LMU	Short name of Infrastructure	LiCAL
Installation number	3	Short name of Installation	POLIS	Unit of access	1 rwd

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:** 01/04/2015	**to:**	31/03/2019
A. Direct eligible costs of providing access to the selected user groups, excluding personnel costs	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.		**Eligible Costs (€)**
	Travel cost for the operator		10 400,00
	Shipping cost for the instrument		2 000,00
	Total A		**12 400,00**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access to the selected user groups	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
	Total B		**0,00**
C. Indirect eligible costs: 25% x ([A-A']+B)			3 100,00
D. **Actual Access Cost for the access offered under the project** = A + B + C			**15 500,00**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	1	Organisation short name	CNR	Short name of Infrastructure	LiCAL
Installation number	4	Short name of Installation	MUSA	Unit of access	1 rwd

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Eenergy power water and internet connection	3 615,23
	Total A	**3 615,23**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Researcher	14	49 401,46
	Total B		**49 401,46**

C. Indirect eligible costs: 25% x ([A-A']+B)	13 254,17
D. Total access eligible costs over the last two years[3] = A+B+C	66 270,86
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	148
F. Unit cost =D/E	**447,78**
G. Unit cost charged to the project	**447,78**
H. Quantity of access offered under the project (over the whole duration of the project)	42
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 28%	**18 806,76**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	1	Organisation short name	CNR	Short name of Infrastructure	LiCAL
Installation number	5	Short name of Installation	MUSAmobile	Unit of access	1 rwd

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:		01/01/2012	to:	31/12/2013
A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.			Eligible Costs (€)
	Total A			0,00
	of which subcontracting (A')			
B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]		Person-Months	Personnel Costs (€)
	Researcher		2	8 048,48
	Technician		0,5	1 701,00
	Total B			9 749,48
C. Indirect eligible costs: 25% x ([A-A']+B)				2 437,37
D. Total access eligible costs over the last two years[3] = A+B+C				12 186,85
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]				28
F. Unit cost =D/E				435,24
G. Unit cost charged to the project				435,24
H. Quantity of access offered under the project (over the whole duration of the project)				84
I. **Access Cost on the basis of UC for the access offered under the project = G x H**			300%	**36 560,16**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	1	Organisation short name	CNR	Short name of Infrastructure	LiCAL
Installation number	5	Short name of Installation	MUSAmobile	Unit of access	1 rwd

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:**	01/04/2015	**to:**	31/03/2019

A. Direct eligible costs of providing access to the selected user groups, excluding personnel costs	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.	**Eligible Costs (€)**
	Shipping costs	10 500,00
	Travel cost for the operator	20 640,00
	Total A	**31 140,00**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access to the selected user groups	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
	Total B		**0,00**

C. Indirect eligible costs: 25% x ([A-A']+B)	7 785,00
D. **Actual Access Cost for the access offered under the project** = A + B + C	**38 925,00**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	13	Organisation short name	LMU	Short name of Infrastructure	LiCAL
Installation number	6	Short name of Installation	LiReQA	Unit of access	1 rwd

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:		01/01/2012	to:	31/12/2013
A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.			**Eligible Costs (€)**
	Consumable and maintenance			0,00
	Software licence			2 791,00
			Total A	**2 791,00**
			of which subcontracting (A')	
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**		**Person-Months**	**Personnel Costs (€)**
	Researcher		4,32	28 834,92
			Total B	**28 834,92**
C. Indirect eligible costs: 25% x ([A-A']+B)				7 906,48
D. Total access eligible costs over the last two years[3] = A+B+C				39 532,40
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]				80
F. Unit cost =D/E				**494,16**
G. Unit cost charged to the project				**494,16**
H. Quantity of access offered under the project (over the whole duration of the project)				160
I. **Access Cost on the basis of UC for the access offered under the project = G x H**			**200%**	**79 065,60**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	13	Organisation short name	LMU	Short name of Infrastructure	LiCAL
Installation number	7	Short name of Installation	LiCheckUnit	Unit of access	1 rwd

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Consumable and maintenance	1 000,00
	Total A	1 000,00
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Researcher	1,2	8 009,70
	Total B		8 009,70

C. Indirect eligible costs: 25% x ([A-A']+B)	2 252,43
D. Total access eligible costs over the last two years[3] = A+B+C	11 262,13
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	50
F. Unit cost =D/E	225,24
G. Unit cost charged to the project	225,24
H. Quantity of access offered under the project (over the whole duration of the project)	112
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 224%	**25 226,88**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	**13**	**Organisation short name**	**LMU**	**Short name of Infrastructure**	**LiCAL**
Installation number	**7**	**Short name of Installation**	**LiCheckUnit**	**Unit of access**	**1 rwd**

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:**	01/04/2015	**to:**	31/03/2019

A. **Direct eligible costs of providing access to the selected user groups, excluding personnel costs**	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.		**Eligible Costs (€)**
	Travel cost for the operator		14 500,00
	Total A		**14 500,00**
	of which subcontracting (A')		
B. **Personnel direct eligible costs needed to provide access to the selected user groups**	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
	Total B		**0,00**
C. Indirect eligible costs: 25% x ([A-A']+B)			3 625,00
D. **Actual Access Cost for the access offered under the project** = A + B + C			**18 125,00**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	2	Organisation short name	CNRS	Short name of Infrastructure	AERONET-EUROPE
Installation number	8	Short name of Installation	LOA	Unit of access	1 calibration

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/04/2011	to:	31/03/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Calibration cost	150 000,00
	Maintenance cost	250 000,00
	Consumable utilities	200 000,00
	Total A	600 000,00
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Engineer (full time)	48	163 104,00
	Engineer CNRS	15	77 040,00
	Engineer CNRS	10	64 700,00
	Administrative Staff	2,5	10 300,00
	Assistant ingineer CNRS	5	18 660,00
	Professor Lille1	6	59 030,00
	Technician Lille 1	10	44 460,00
	Total B		437 294,00

C. Indirect eligible costs: 25% x ([A-A']+B)	259 323,50
D. Total access eligible costs over the last two years[3] = A+B+C	1 296 617,50
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	90
F. Unit cost =D/E	14406,86
G. Unit cost charged to the project	1350
H. Quantity of access offered under the project (over the whole duration of the project)	165
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 17%	222 750,00

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	15	Organisation short name	UVA	Short name of Infrastructure	AERONET-EUROPE
Installation number	9	Short name of Installation	GOA	Unit of access	1 calibration

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		Eligible Costs (€)
	Calibration (sun, sky)		20 000,00
	Maintenance of sun/skyphotometer (standard version)		15 000,00
	Utilities & consumable		15 000,00
	Total A		**50 000,00**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	Professor (Ángel)	2,4	17 103,15
	Assistant professor (Victoria)	2,4	14 944,50
	Assistant professor (Carlos)	12	49 288,50
	Engineer (Ramiro)	24	64 395,00
	Technician (Santiago G.)	4,8	16 807,50
	Technician (Roberto)	12	26 750,25
	Total B		**189 288,90**

C. Indirect eligible costs: 25% x ([A-A']+B)	59 822,23
D. Total access eligible costs over the last two years[3] = A+B+C	299 111,13
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	80
F. Unit cost =D/E	**3738,89**
G. Unit cost charged to the project	**1200**
H. Quantity of access offered under the project (over the whole duration of the project)	100
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 40%	**120 000,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	15	Organisation short name	UVA	Short name of Infrastructure	AERONET-EUROPE
Installation number	10	Short name of Installation	IZANA	Unit of access	1 calibration

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/04/2012	to:	31/03/2014

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Utilities & consumable (water consumption, electricity supply)	12 000,00
	Transportation	15 000,00
	Maintenance of REFERENCE sun/sky-photometer and platform	87 000,00
	Cleaning service	22 000,00
	Security service	36 000,00
	Repairs	1 250,00
	Total A	**173 250,00**
	of which subcontracting (A')	***160 000,00***

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Engineer	0,23	35 000,00
	Technician	0,86	55 000,00
	Assistant Engineer	0,39	35 000,00
	Assistant Technician	0,75	50 000,00
	Total B		**175 000,00**

C. Indirect eligible costs: 25% x ([A-A']+B)	47 062,50
D. Total access eligible costs over the last two years[3] = A+B+C	395 312,50
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	65
F. Unit cost =D/E	**6081,73**
G. Unit cost charged to the project	**1830**
H. Quantity of access offered under the project (over the whole duration of the project)	70
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 32%	**128 100,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	3	Organisation short name	TROPOS	Short name of Infrastructure	ECAC
Installation number	11	Short name of Installation	WCCAP	Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Operation (electricity, heating etc. rooms 118, 121, 130)	16 683,00
	Consumables (fittings butanol, pipes, tubing etc)	59 974,34
	Total A	**76 657,34**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	WCCAP scientific staff; Person-1; Master level	20	95 808,95
	WCCAP scientific staff Person-1; Master level	20	95 909,22
	Experienced Researcher; Person-1; PhD level	12	66 430,36
	Experienced Researcher; Person-2; PhD level	12	73 422,20
	Technician; maintenance electronic parts of instruments	4	21 453,81
	Technician; maintenance mechanical parts of instruments	2	8 003,12
	Head of the WCCAP	2	15 382,83
	Total B		**376 410,47**

C. Indirect eligible costs: 25% x ([A-A']+B)		113 266,95
D. Total access eligible costs over the last two years[3] = A+B+C		566 334,76
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]		1 144
F. Unit cost =D/E		**495,05**
G. Unit cost charged to the project		**495,05**
H. Quantity of access offered under the project (over the whole duration of the project)		605
I. **Access Cost on the basis of UC for the access offered under the project = G x H**	**53%**	**299 505,25**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	3	Organisation short name	TROPOS	Short name of Infrastructure	ECAC
Installation number	11	Short name of Installation	WCCAP	Unit of access	1 RWD

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:** 01/04/2015	**to:**	31/03/2019
A. **Direct eligible costs of providing access to the selected user groups, excluding personnel costs**	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.		**Eligible Costs (€)**
	travel and shipping for on-site intercomparisons with reference instruments		22 000,00
		Total A	**22 000,00**
		of which subcontracting (A')	
B. **Personnel direct eligible costs needed to provide access to the selected user groups**	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
		Total B	**0,00**
C. Indirect eligible costs: 25% x ([A-A']+B)			5 500,00
D. **Actual Access Cost for the access offered under the project = A + B + C**			**27 500,00**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	14	Organisation short name	JRC	Short name of Infrastructure	ECAC
Installation number	12	Short name of Installation	ERLAP	Unit of access	1 RWD

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:**	01/04/2015	**to:**	31/03/2019

A. Direct eligible costs of providing access to the selected user groups, excluding personnel costs	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.		**Eligible Costs (€)**
	Maintenance		4 853,33
	Consumables (filters, chemicals)		550,00
	Total A		**5 403,33**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access to the selected user groups	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
	Technical staff	4,4	42 525,62
	Scientific staff	2,9	25 714,25
	Total B		**68 239,87**
C. Indirect eligible costs: 25% x ([A-A']+B)			18 410,80
D. **Actual Access Cost for the access offered under the project = A + B + C**			**92 054,00**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	2	Organisation short name	CNRS	Short name of Infrastructure	ECAC
Installation number	13	Short name of Installation	ACMCC	Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	**Eligible Costs (€)**
	Consumables, maintenance CNRS	3 757,16
	Consumables, maintenance CEA	33 249,30
	Total A	**37 006,46**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	Scientist - DR2 - CNRS	10	72 260,00
	Engineer - IE - CNRS	6	29 058,00
	Total B		**101 318,00**

C. Indirect eligible costs: 25% x ([A-A']+B)	34 581,12
D. Total access eligible costs over the last two years[3] = A+B+C	172 905,58
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	120
F. Unit cost =D/E	**1440,88**
G. Unit cost charged to the project	**1440,88**
H. Quantity of access offered under the project (over the whole duration of the project)	60
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 50%	**86 452,80**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	1	Organisation short name	CNR	Short name of Infrastructure	CIAO
Installation number	14	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Consumable and maintenance	24 232,08
	Operation of CAO research equipment	63 101,82
	Total A	**87 333,90**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Researcher	20,3	77 336,84
	Technician	14,5	49 799,35
	Total B		**127 136,19**

C. Indirect eligible costs: 25% x ([A-A']+B)		53 617,52
D. Total access eligible costs over the last two years[3] = A+B+C		268 087,61
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]		661
F. Unit cost =D/E		**405,58**
G. Unit cost charged to the project		**405,58**
H. Quantity of access offered under the project (over the whole duration of the project)		144
I. **Access Cost on the basis of UC for the access offered under the project = G x H**	22%	**58 403,52**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	1	Organisation short name	CNR	Short name of Infrastructure	CMN
Installation number	15	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:		01/01/2012	to:	31/12/2013
A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.			**Eligible Costs (€)**
	General Operation costs (electricity, phone, cleaning, security)			40 166,42
	travel to the station (car petrol, food and eventually hotel…)			6 696,90
	Total A			**46 863,32**
	of which subcontracting (A')			
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**		**Person-Months**	**Personnel Costs (€)**
	Senior researcher (Bonasoni)		4	22 183,40
	Researcher (Marinoni, Cristofanelli, Decesari, Rinaldi)		12	45 595,00
	Technical researcher (Pollini)		1	4 820,75
	Director of Research (Facchini)		3	22 265,50
	Technical staff (Calzolari, Roccato)		4	38 860,70
	Total B			**133 725,35**
C. Indirect eligible costs: 25% x ([A-A']+B)				45 147,17
D. Total access eligible costs over the last two years[3] = A+B+C				225 735,83
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]				208
F. Unit cost =D/E				**1085,27**
G. Unit cost charged to the project				**705,43**
H. Quantity of access offered under the project (over the whole duration of the project)				100
I. **Access Cost on the basis of UC for the access offered under the project = G x H**			**31%**	**70 543,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	**2**	**Organisation short name**	**CNRS**	**Short name of Infrastructure**	**SIR**
Installation number	**16**	**Short name of Installation**		**Unit of access**	**1 RWD**

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	**to:**	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		**Eligible Costs (€)**
	Maintenance Lidar-Radar		8 692,00
	Etalonnage Calibration Radiometre		7 878,71
	Meteo / insitu		7 246,91
	Divers		7 539,09
	Maintenance Infrastructure		5 336,50
	transport		6 531,52
	Total A		**43 224,73**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	Ingénieurs de recherche	22,94	195 566,74
	Ingénieurs d'études	13,35	73 273,20
	Assistants Ingénieurs	9,34	42 602,01
	Total PM	45,63	
	Total B		**311 441,95**
C. Indirect eligible costs: 25% x ([A-A']+B)			88 666,67
D. Total access eligible costs over the last two years[3] = A+B+C			443 333,35
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]			1 145
F. Unit cost =D/E			**387,19**
G. Unit cost charged to the project			**387,19**
H. Quantity of access offered under the project (over the whole duration of the project)			200
I. **Access Cost on the basis of UC for the access offered under the project = G x H**		17%	**77 438,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	2	Organisation short name	CNRS	Short name of Infrastructure	PUY
Installation number	17	Short name of Installation		Unit of access	1 RWD

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:**	01/04/2015	**to:**	31/03/2019

A. Direct eligible costs of providing access to the selected user groups, excluding personnel costs	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.	**Eligible Costs (€)**
	electricity and consummables	4 000,00
	maintenance and repair	3 100,00
	Total A	**7 100,00**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access to the selected user groups	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
	engineer	8	24 708,00
	scientist	8	33 218,00
	Total B		**57 926,00**

C. Indirect eligible costs: 25% x ([A-A']+B)	16 256,50
D. **Actual Access Cost for the access offered under the project** = A + B + C	**81 282,50**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	2	Organisation short name	CNRS	Short name of Infrastructure	MAIDO-OPAR
Installation number	18	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:		01/01/2013	to:	31/12/2013
A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.			Eligible Costs (€)
	CNRS: operating costs on information technology			2 670,95
	CNRS: Operating costs on in-situ instrumentation, photometer and radiosounding			17 512,32
	CNRS: operating costs on lidars			65 356,58
	UR: operating costs of the station itself			20 483,00
	UR: operating costs on information technology			2 666,89
	UR: Operating costs on in-situ instrumentation, photometer and radiosounding			5 020,35
	UR: operating costs on lidars			17 829,94
	UR: operating costs on FTIR spectrometers			11 970,84
	UR: electricity and internet access			34 935,95
	UR: telephone			7 170,92
	Total A			**185 617,74**
	of which subcontracting (A')			
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**		**Person-Months**	**Personnel Costs (€)**
	CNRS: Computer engineer		9	43 449,21
	CNRS: 1 technical manager engineer		10	69 125,42
	CNRS: 1 engineer assistant + 1 technician		12	131 422,92
	CNRS: administrative staff		6	32 466,96
	CNRS: research director (head of unit)		3	36 305,25
	UR: administrative staff		7,5	28 837,48
	UR: 1 building manager + 1 technician		12	102 606,60
	UR: engineer on in-situ instrumentation		4,5	32 297,45
	UR: research engineer on lidars		9	59 963,50
	UR: assistant-professor		2,5	15 801,80
	Total B			**552 276,59**
C. Indirect eligible costs: 25% x ([A-A']+B)				184 473,58
D. Total access eligible costs over the last two years[3] = A+B+C				922 367,91
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]				1 080
F. Unit cost =D/E				**854,04**
G. Unit cost charged to the project				**600**
H. Quantity of access offered under the project (over the whole duration of the project)				140
I. Access Cost on the basis of UC for the access offered under the project = G x H			9%	**84 000,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	8	Organisation short name	UHEL	Short name of Infrastructure	SMR
Installation number	19	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Consumables	450 000,00
	Electricity	56 000,00
	Utilities	650 000,00
	Calibration gases	13 500,00
	Maintence of gas measurements	97 500,00
	Other maintenance costs	450 000,00
	Communication	13 000,00
	Other	50 000,00
	Total A	**1 780 000,00**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Scientist: Haapanala, Keronen, Aalto	72	249 790,00
	Engineer: P.Aalto, Siivola	48	246 590,00
	Permanent staff: Hiltunen, Laakso, Loponen, Pohja	96	355 140,00
	Technician: Levula, Pilkottu	48	149 630,00
	Total B		**1 001 150,00**

C. Indirect eligible costs: 25% x ([A-A']+B)	695 287,50
D. Total access eligible costs over the last two years[3] = A+B+C	3 476 437,50
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	2 363
F. Unit cost =D/E	**1471,2**
G. Unit cost charged to the project	**809,16**
H. Quantity of access offered under the project (over the whole duration of the project)	120
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 3%	**97 099,20**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	6	Organisation short name	FMI	Short name of Infrastructure	PAL
Installation number	20	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Computing, phone, internet services	1 047,72
	Electricity, heating	43 320,51
	Other running costs (spare parts of field experiments, repair)	10 407,27
	Transport to field site	1 373,08
	Maintenance of environment and sustainability	12 559,88
	Consumables (chemicals, sounding material, calibration and operation gases, other)	8 067,36
	Total A	**76 775,82**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Station manager	8	59 000,00
	Technician	2	11 952,70
	Scientific staff, FMI researcher	7	50 622,00
	Total B		**121 574,70**

C. Indirect eligible costs: 25% x ([A-A']+B)	49 587,63
D. Total access eligible costs over the last two years[3] = A+B+C	247 938,15
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	495
F. Unit cost =D/E	**500,89**
G. Unit cost charged to the project	**500,89**
H. Quantity of access offered under the project (over the whole duration of the project)	84
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 17%	**42 074,76**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	**7**	**Organisation short name**	**PSI**	**Short name of Infrastructure**	**JFJ**
Installation number	**21**	**Short name of Installation**		**Unit of access**	**1 RWD**

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/04/2012	**to:**	31/03/2014

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	**Eligible Costs (€)**
	Total A	**0,00**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	Function level 12 (Laboratory head)	4,8	71 472,27
	Function level 10 (Senior group leader)	9,7	104 602,47
	Function level 9 (junior group leader)	4,4	37 388,80
	Function level 8 (scientific coworker)	6,7	59 822,07
	Function level 7 (engineer)	5	42 132,94
	PostDoc	11	78 288,33
	PhD student	57,2	204 898,25
	Total B		**598 605,13**

C. Indirect eligible costs: 25% x ([A-A']+B)		149 651,28
D. Total access eligible costs over the last two years[3] = A+B+C		748 256,41
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]		584
F. Unit cost =D/E		**1281,26**
G. Unit cost charged to the project		**800**
H. Quantity of access offered under the project (over the whole duration of the project)		130
I. **Access Cost on the basis of UC for the access offered under the project = G x H**	**14%**	**104 000,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	18	Organisation short name	KNMI	Short name of Infrastructure	CESAR
Installation number	22	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		Eligible Costs (€)
	electricity, water, maintenance costs		131 849,71
	BSRN, remote sensing, in-situ meteorology - maintenance, consumables		140 821,30
	Aerosol Mass Spectroscopy - maintenance, consumables		13 800,00
	In-situ Aerosol instruments - maintenance, consumables		32 000,00
	Trace gas instruments - maintenance, consumables		50 200,00
	Radar systems - maintenance, consumables		14 612,00
		Total A	**383 283,01**
		of which subcontracting (A')	
B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Site technician		322 723,04
	BSRN, remote sensing, in-situ meteorology		721 481,95
	Aerosol Mass Spectroscopy		61 600,00
	In-situ aerosol instruments		46 000,00
	Trace gas instruments		217 300,00
	Radar systems		197 860,00
		Total B	**1 566 964,99**
C. Indirect eligible costs: 25% x ([A-A']+B)			487 562,00
D. Total access eligible costs over the last two years[3] = A+B+C			2 437 810,00
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]			4 500
F. Unit cost =D/E			**541,74**
G. Unit cost charged to the project			**514,65**
H. Quantity of access offered under the project (over the whole duration of the project)			180
I. **Access Cost on the basis of UC for the access offered under the project = G x H**		4%	**92 637,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	**3**	**Organisation short name**	**TROPOS**	**Short name of Infrastructure**	**MEL**
Installation number	**23**	**Short name of Installation**		**Unit of access**	**1 RWD**

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	**to:**	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		**Eligible Costs (€)**
	electrical power		26 920,00
	consumables		43 342,00
	Total A		**70 262,00**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	Scientist	4,8	31 076,36
	engineer	12	63 286,14
	lab assistant	12	36 876,32
	Total B		**131 238,82**
C. Indirect eligible costs: 25% x ([A-A']+B)			50 375,21
D. Total access eligible costs over the last two years[3] = A+B+C			251 876,03
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]			440
F. Unit cost =D/E			**572,45**
G. Unit cost charged to the project			**572,45**
H. Quantity of access offered under the project (over the whole duration of the project)			100
I. Access Cost on the basis of UC for the access offered under the project = G x H		**23%**	**57 245,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	4	Organisation short name	NOA	Short name of Infrastructure	FKL
Installation number	24	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		Eligible Costs (€)
	Total A		0,00
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Professor N. Mihalopoulos (25% of his research time)	6	27 075,00
	Dr. E. Gerasopoulos (25% of his research time)	6	16 733,00
	Dr. S. Kazadzis (25% of his research time)	6	13 280,00
	Dr. V. Amiridis (25% of his research time)	6	13 003,00
	Technician 1 (full-time)	24	43 680,00
	Engineer (1 full time)	24	47 040,00
	Total B		160 811,00
C. Indirect eligible costs: 25% x ([A-A']+B)			40 202,75
D. Total access eligible costs over the last two years[3] = A+B+C			201 013,75
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]			447
F. Unit cost =D/E			449,7
G. Unit cost charged to the project			449,7
H. Quantity of access offered under the project (over the whole duration of the project)			180
I. **Access Cost on the basis of UC for the access offered under the project = G x H**		40%	80 946,00

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

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- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	19	Organisation short name	CHMI	Short name of Infrastructure	KOS
Installation number	25	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/01/2012	to:	31/12/2013

	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.		Eligible Costs (€)
A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	costs of energy power		23 987,00
	Maintenance and repair		15 160,00
	electronic services (internet connection, phones, other)		3 173,00
	Insurance+shipping		7 740,00
	Cost of general services		1 800,00
	costs of cleaning		6 841,00
	consumables for aerosol optical, SMPS+APS, EC/OC, container, vertical tube, thermodenuder		24 156,00
	consumables for c-TOF AMS		8 000,00
	consumables for HTDMPS+PM/CPC		6 000,00
	consumables for VOCs+NOx measurements and analyses		12 958,00
	Total A		**109 815,00**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	senior scientist	15	33 813,10
	junior scientist	14	24 903,00
	technical staff	22	33 501,00
	administrative staff	7	10 550,00
	Total B		**102 767,10**
C. Indirect eligible costs: 25% x ([A-A']+B)			53 145,52
D. Total access eligible costs over the last two years[3] = A+B+C			265 727,62
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]			400
F. Unit cost =D/E			**664,32**
G. Unit cost charged to the project			**664,32**
H. Quantity of access offered under the project (over the whole duration of the project)			100
I. Access Cost on the basis of UC for the access offered under the project = G x H		25%	**66 432,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

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- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	**15**	**Organisation short name**	**UVA**	**Short name of Infrastructure**	**ISAF**
Installation number	**26**	**Short name of Installation**		**Unit of access**	**1 RWD**

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/04/2012	**to:**	31/03/2014

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	**Eligible Costs (€)**
	Utilities & consumable (water consumption, electricity supply)	35 672,00
	Transportation	44 869,61
	Cleaning Service	63 943,48
	Security Service	105 609,77
	Repairs	3 709,83
	Maintenance Aerosols, Reactive Gases, Radiation, O3sondes and Meteo Programs	257 501,38
	Total A	**511 306,08**
	of which subcontracting (A')	***471 924,24***

B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	PhD Principal Investigator (Emilio Cuevas)	7,20	50 000,00
	PhD Principal Investigator (Sergio Rodríguez)	12,00	55 000,00
	Graduate Principal Investigator (Pedro M. Romero-Campos)	2,40	8 500,00
	Graduate Principal Investigator (Ramón Ramos)	4,80	20 000,00
	Observers working shifts (Concepción Bayo, Rubén del Campo, Virgilio Carreño,	8,40	23 000,00
	Total B		**156 500,00**

C. Indirect eligible costs: 25% x ([A-A']+B)		48 970,46
D. Total access eligible costs over the last two years[3] = A+B+C		716 776,53
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]		2 028
F. Unit cost =D/E		**353,44**
G. Unit cost charged to the project		**353,44**
H. Quantity of access offered under the project (over the whole duration of the project)		100
I. **Access Cost on the basis of UC for the access offered under the project = G x H**	5%	**35 344,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	16	Organisation short name	UGR	Short name of Infrastructure	GRA
Installation number	27	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:		01/01/2012	to:	31/12/2013
A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.			**Eligible Costs (€)**
	Costs of maintenance and cleaning for the funcioning of the installation			23 445,84
	Costs of security services			62 325,20
	Costs of energy power (electricity and gas) and water supplied for the installation			27 071,36
	Costs of consumables for the installation and research work			22 934,79
	Total A			**135 777,19**
	of which subcontracting (A')			
B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**		**Person-Months**	**Personnel Costs (€)**
	2 Senior Scientist (50% dedication to the station)		24	115 000,00
	Total B			**115 000,00**
C. Indirect eligible costs: 25% x ([A-A']+B)				62 694,30
D. Total access eligible costs over the last two years[3] = A+B+C				313 471,49
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]				800
F. Unit cost =D/E				**391,84**
G. Unit cost charged to the project				**391,84**
H. Quantity of access offered under the project (over the whole duration of the project)				100
I. **Access Cost on the basis of UC for the access offered under the project = G x H**			13%	**39 184,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	17	Organisation short name	CSIC	Short name of Infrastructure	MSY
Installation number	28	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/06/2012	to:	01/06/2014

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Energy power	9 242,05
	Insurance costs	3 409,13
	Radioactive supervision	6 359,82
	Internet and communications	3 600,00
	Consumalbes (gases, racords…..)	19 306,05
	Travels for maintenance, sampling and monitoring	4 139,84
	Total A	**46 056,89**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	**Category of staff [4]**	**Person-Months**	**Personnel Costs (€)**
	Researchers	2,88870641	15 777,85
	Technicians	5,57142857	14 693,27
	Administrative	0,78290214	1 743,40
	Total B		**32 214,52**

C. Indirect eligible costs: 25% x ([A-A']+B)	19 567,85
D. Total access eligible costs over the last two years[3] = A+B+C	97 839,27
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]	300
F. Unit cost =D/E	**326,13**
G. Unit cost charged to the project	**326,13**
H. Quantity of access offered under the project (over the whole duration of the project)	100
I. **Access Cost on the basis of UC for the access offered under the project = G x H** 33%	**32 613,00**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Participant number	**20**	**Organisation short name**	**ULUND**	**Short name of Infrastructure**	**HYM**
Installation number	**29**	**Short name of Installation**		**Unit of access**	**1 RWD**

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:**	01/04/2015	**to:**	31/03/2019

A. **Direct eligible costs of providing access to the selected user groups, excluding personnel costs**	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.	**Eligible Costs (€)**
	Travel (Lund-HYM) car hire	1 600,00
	Service and maintenance (instruments)	1 300,00
	Electricity (for user instrumentation)	50,00
	Consumables (for installation and operation of user instruments)	350,00
	Total A	**3 300,00**
	of which subcontracting (A')	

B. **Personnel direct eligible costs needed to provide access to the selected user groups**	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
	Technical staff (engineer)	5	29 185,00
	Total B		**29 185,00**

C. Indirect eligible costs: 25% x ([A-A']+B)	8 121,25
D. **Actual Access Cost for the access offered under the project = A + B + C**	**40 606,25**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	21	Organisation short name	Cyl	Short name of Infrastructure	CAO
Installation number	30	Short name of Installation		Unit of access	1 RWD

If access costs are declared on the basis of actual cost or on the basis of a combination[5] of unit cost and actual costs, please use the following table to estimate the actual costs.

Access provision period (usually the project life-time)	**from:**	01/04/2015	**to:**	31/03/2019

A. Direct eligible costs of providing access to the selected user groups, excluding personnel costs	Describe the costs actually and solely incurred for providing access to the user groups selected for support under the action. All contributions to capital investments of the installation are not eligible.		**Eligible Costs (€)**
	Total A		**0,00**
	of which subcontracting (A')		
B. Personnel direct eligible costs needed to provide access to the selected user groups	**Category of staff [6]**	**Person-Months**	**Personnel Costs (€)**
	Researcher	4,8	15 698,80
	Researcher	4,8	15 698,80
	Researcher	12	15 765,00
	Administrative Assistance	1,2	2 907,95
	Total B		**50 070,55**
C. Indirect eligible costs: 25% x ([A-A']+B)			12 517,64
D. **Actual Access Cost for the access offered under the project = A + B + C**			**62 588,19**

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

[6] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

Participant number	30	Organisation short name	NUIG	Short name of Infrastructure	MHD
Installation number	31	Short name of Installation		Unit of access	1 RWD

Calculation of the Unit Cost (UC) for Trans-national Access[1]

from:	01/04/2011	to:	31/03/2014

A. Direct eligible costs of providing access over the last two years[3] excluding personnel costs	Describe the direct eligible costs[2] for providing access to the installation over the reference period (usually the last two closed financial years[3] preceding the current one) . All contributions to capital investments of the installation are not eligible.	Eligible Costs (€)
	Note: costs calculated and verified over 3 years covering ACTRIS RP1 & RP2	
	Buildings, installations, utility services	108 000,00
	instrument maintenance, consumables, electronic services (data management)	183 119,00
	Total A	**291 119,00**
	of which subcontracting (A')	

B. Personnel direct eligible costs needed to provide access over the last two years[3]	Category of staff [4]	Person-Months	Personnel Costs (€)
	Senior Technical Officer	18	101 960,00
	Research Assistant	18	91 618,00
	Research Associates	77	474 963,00
	Total B		**668 541,00**

C. Indirect eligible costs: 25% x ([A-A']+B)		239 915,00
D. Total access eligible costs over the last two years[3] = A+B+C		1 199 575,00
E. Total quantity of access provided to all normal users of the installation (i.e. both internal and external) over the last two years[3]		3 056
F. Unit cost =D/E		**392,53**
G. Unit cost charged to the project		**335,97**
H. Quantity of access offered under the project (over the whole duration of the project)		149
I. **Access Cost on the basis of UC for the access offered under the project = G x H**	4%	**50 059,53**

[1] See Decision on unit cost C(2013) 8199. In case of combination of unit cost and actual costs, all the cost categories and cost items reimbursed on actual costs basis must be excluded from the calculation of the unit cost.

[2] Direct costs (other than personnel) for providing access can only include:
- Costs of contracts for maintenance and repair for the functioning of the installation (if not capitalised).
- Costs of consumables specifically used for the installation and the research work of the users.
- Costs of contracts for installation management, including security fees, insurance costs, quality control and certification, specifically incurred for the functioning of the installation.
- Costs of energy power and water supplied for the installation.
- Costs of general services when included in the provided access services (library costs, shipping costs).
- Costs of software licence, internet connection or other electronic services for data management and computing when they are needed to provide access services,
- Costs of specific scientific services included in the access provided or needed for the provision of access.

[3] In exceptional and duly justified cases, a different reference period can be agreed with the Commission

[4] Personnel costs for the provision of access can only include costs of administrative, technical and scientific staff directly assigned to the functioning of the installation and to the support of the users.

[5] In case of combination of unit cost and actual costs, only cost categories and cost items that have not been used in the unit cost calculation above may be reimbursed on an actual cost basis.

Estimation of the Access Costs for Virtual Access

Participant number	5	**Organisation short name**	NILU		
Short name of Infrastructure	ACTRIS Data centre	**Installation number**	32	**Short name of Installation**	EBAS

Access provision period (usually the project life-time) **from:**	01/04/2015		**to:**	31/03/2019

A. **Estimated direct eligible costs of providing virtual access during the project life-time excluding personnel costs**	Describe the direct eligible costs that will be charged to the grant for the provision of virtual access over the project life-time (e.g. maintenance, utilities, consumable costs). All contributions to capital investments of the infrastructure are not eligible.		**Eligible Costs (€)**
	Total A		**0,00**
	of which subcontracting (A')		
B. **Estimated personnel direct eligible costs needed to provide virtual access during the project life-time**	**Category of staff**[1]	**Person-Months**	**Personnel Costs (€)**
	Scientific management	2	21 320,00
	Scientist	22	207 480,00
	Engineer	10,0	70 160,00
	Total B		**298 960,00**
C. Indirect eligible costs 25% x ([A-A']+B)		**max**	74 740,00
D. Estimated eligible access costs = A+B+C			373 700,00

[1] Personnel costs for technical and scientific staff directly working for the provision of virtual access, including for the generic support of user (e.g. help desk). These costs will be charged to the grant as direct costs (declared hours must be identifiable and verifiable).

Estimation of the Access Costs for Virtual Access

Participant number	1	**Organisation short name**		CNR	
Short name of Infrastructure	ACTRIS Data Centre	**Installation number**	33	**Short name of Installation**	EARLINET

Access provision period (usually the project life-time) **from:**	01/04/2015	**to:**	31/03/2019

A. Estimated direct eligible costs of providing virtual access during the project life-time excluding personnel costs	Describe the direct eligible costs that will be charged to the grant for the provision of virtual access over the project life-time (e.g. maintenance, utilities, consumable costs). All contributions to capital investments of the infrastructure are not eligible.	**Eligible Costs (€)**
	Consumable/operation costs	18 800,00
	Total A	**18 800,00**
	of which subcontracting (A')	

B. Estimated personnel direct eligible costs needed to provide virtual access during the project life-time	**Category of staff[1]**	**Person-Months**	**Personnel Costs (€)**
	Researcher	38	190 000,00
	Total B		**190 000,00**

C. Indirect eligible costs 25% x ([A-A']+B)	max	52 200,00
D. Estimated eligible access costs = A+B+C		261 000,00

[1] Personnel costs for technical and scientific staff directly working for the provision of virtual access, including for the generic support of user (e.g. help desk). These costs will be charged to the grant as direct costs (declared hours must be identifiable and verifiable).

Estimation of the Access Costs for Virtual Access

Participant number	2	**Organisation short name**	CNRS		
Short name of Infrastructure	**ACTRIS Data Centre**	**Installation number**	**34**	**Short name of Installation**	**ICARE**

Access provision period (usually the project life-time)	**from:** 01/04/2015	**to:**	31/03/2019

A. Estimated direct eligible costs of providing virtual access during the project life-time excluding personnel costs	Describe the direct eligible costs that will be charged to the grant for the provision of virtual access over the project life-time (e.g. maintenance, utilities, consumable costs). All contributions to capital investments of the infrastructure are not eligible.		**Eligible Costs (€)**
	Total A		**0,00**
	of which subcontracting (A')		
B. Estimated personnel direct eligible costs needed to provide virtual access during the project life-time	**Category of staff**[1]	**Person-Months**	**Personnel Costs (€)**
	Scientific Management	4	29 200,00
	Senior Developer	6	27 500,00
	Senior System Engineer 1	3	17 100,00
	Senior System Engineer 2	3	12 600,00
	Total B		**86 400,00**
C. Indirect eligible costs 25% x ([A-A']+B)		**max**	21 600,00
D. Estimated eligible access costs = A+B+C			108 000,00

[1] Personnel costs for technical and scientific staff directly working for the provision of virtual access, including for the generic support of user (e.g. help desk). These costs will be charged to the grant as direct costs (declared hours must be identifiable and verifiable).

Estimation of the Access Costs for Virtual Access

Participant number	6	**Organisation short name**	FMI		
Short name of Infrastructure	**ACTRIS Data Centre**	**Installation number**	**35**	**Short name of Installation**	**Cloudnet**

Access provision period (usually the project life-time)	**from:**	01/04/2015	**to:**	31/03/2019

A. Estimated direct eligible costs of providing virtual access during the project life-time excluding personnel costs	Describe the direct eligible costs that will be charged to the grant for the provision of virtual access over the project life-time (e.g. maintenance, utilities, consumable costs). All contributions to capital investments of the infrastructure are not eligible.	**Eligible Costs (€)**
	Consumables (maintenance)	4 800,00
	Total A	**4 800,00**
	of which subcontracting (A')	

B. Estimated personnel direct eligible costs needed to provide virtual access during the project life-time	**Category of staff[1]**	**Person-Months**	**Personnel Costs (€)**
	Scientist	s	24 000,00
	Technician	16	81 600,00
	Total B		**105 600,00**

C. Indirect eligible costs 25% x ([A-A']+B)	**max**	27 600,00
D. Estimated eligible access costs = A+B+C		138 000,00

[1] Personnel costs for technical and scientific staff directly working for the provision of virtual access, including for the generic support of user (e.g. help desk). These costs will be charged to the grant as direct costs (declared hours must be identifiable and verifiable).

APPENDIX A: LIST OF ACRONYMS

Table A.1. List of acronyms in alphabetical order.

ACCENT-PLUS	EU FP7 Atmospheric Composition Change: the European Network-Policy Support and Science, Grant Agreement n° 265119 (2012-2014)
ACTRIS	EU FP7 Aerosols, Clouds, and Trace gases Research InfraStructure Network, Grant Agreement n. 262254 (2011-2015)
AEROCOM	Open international initiative of scientists for Aerosol Comparisons between Observations and Models
AERONET	Aerosol Robotic NETwork
AERO-SAT	International Satellite Aerosol Science Network
AMAP	Arctic Monitoring and Assessment Programme
AQUILA	Air Quality Reference Laboratories
ARM	Atmospheric Radiation Measurement Climate Research Facility
ATC	Atmospheric Thematic Centre
BACCHUS	EU FP7 Impact of Biogenic versus Anthropogenic emissions on Clouds and Climate: towards a Holistic UnderStanding, Grant Agreement n. 603445.
CALIPSO	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations
CARSNET	China Aerosol Remote Sensing NETwork
CCI	ESA Climate Change Initiative
CEN	European Committee for Standardization
CHARMEX	Chemistry-Aerosol Mediterranean Experiment
CLOUDNET	EU FP5 Development of a European pilot network of stations for observing cloud profiles (2001-2005)
CLRTAP	Convention of Long-range Transboundary Air Pollution - United Nations Economic Commission for Europe
COOPEUS	Connecting Research Infrastructures A program supported by the European Union in cooperation with the NSF
COST	European Cooperation in Science and Technology
EARLINET EARLINET-ASOS	EU FP5 European Aerosol Research Lidar NETwork to establish an aerosol climatology, EU FP6 European Aerosol Research Lidar Network - Advanced Sustainable Observation System
EarthCARE	Earth Clouds, Aerosols and Radiation Explorer
EBAS	Emep data BASe: observation database of atmospheric chemical composition and physical properties
ECGA	European Commission Grant Agreement
ECLAIRE	Effects of Climate Change on Air Pollution and Response

	Strategies for European Ecosystems (EU FP7 Collaborative Projec)
ECMWF	European Centre for Medium-Range Weather Forecasts
EEA	European Environment Agency
EGIDA	EU FP7 Coordinating Earth and Environmental Cross-disciplinary projects to promote GEOSS, Grant Agreement n° 265124.
EG-CLIMET	EU COST action Earth System Science and Environmental Management Domain (n° ES0702)
EMEP	Co-operative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe
ENVRI	EU FP7 Common Operations of Environmental Research infrastructures, Grant Agreement n° 283465 (2007-2013)
EPIC	European PID Consortium
ERIC	European Research Infrastructure Consortium
ESA ESA-CCI	European Space Agency ESA Climate Change Initiative
ESA-CEOS ESRIN	Contract No. 22202/09/I-EC CEOS Intercalibration of ground based spectrometers and Lidars (2009-2012)
ESA LIVAS	ESA Lidar Climatology of Vertical Aerosol Structure for Space-Based Lidar Simulation Studies (ESTEC Contract No.4000104106/11/NL/FF/fk 2011-2012)
ESFRI	European Strategy Forum on Research Infrastructures
EUCAARI	European Aerosol, Cloud, Climate, and Air Quality Interactions
EUCLIPSE	EU FP7 European Union Cloud Intercomparison, Process Study & Evaluation Project (EUCLIPSE), Grant Agreement n° 244067 (2010-2014)
EUFAR	EU FP5/FP6/FP7 European Facility for Airborne Research
EUMETNET	European METeorological services NETwork
EUSAAR	EU FP7 European Supersites for Atmospheric Aerosol Research Grant Agreement n°026140 (2006-2011)
GAIA-CLIM	EU H2020 Gap Analysis for Integrated Atmospheric ECV CLImate Monitoring (2015-2018)
GALION	GAW Aerosol Lidar Observations Network
GARRLiC	Generalized Aerosol Retrieval from Radiometer and Lidar Combined data
GAW-WDCA	GAW World Data Centre for Aerosols
GAW GAWSIS GAWTEC	WMO Global Atmosphere Watch Global Atmosphere Watch Station Information System Global Atmosphere Watch Training & Education Centre

GCOS	Global Climate Observing System. A joint undertaking of WMO, ICSU, IOC, UNEP, and UNESCO
GEO, GEOSS	Group on Earth Observations, The Global Earth Observation System of Systems
GISC	EU FP7 GMES In-Situ Coordination (2012-2012)
GMES, GAS	Global Monitoring for Environment and Security, GMES Atmospheric Service (Kopernicus)
GRASP	Generalized Retrieval of Aerosol & Surface Properties
GUAN	German Ultrafine Aerosol Network
HELCOM	Baltic Marine Environment Protection Commission - Helsinki Commission
HTAP	Hemispheric Transport of Air Pollution
IAGOS-ERI	European Research Infrastructure on In-service Aircraft for a Global Observing System
ICARE	Data and Services Centre on aerosols, clouds, and water cycle
ICOS	Integrated Carbon Observation System Research Infrastructure
ICPC	International Cooperation Partner Countries
IGAC	International Global Atmospheric Chemistry
IGBP	International Geosphere-Biosphere Programme
ILEAPS	Integrated Land Ecosystem-Atmosphere Process Study
IMPROVE	Interagency Monitoring of Protected Visual Environments
InGOS	EU FP7 Integrated non-CO2 Greenhouse gas Observation System, Grant Agreement n° 284274 (2011-2015);
INSPIRE	Infrastructure for Spatial Information in Europe
IPCC IPCC WGI	Intergovernmental Panel on Climate Change IPCC Working Group I
ITaRS	Initial Training for Atmospheric Remote Sensing (EU FP7 Marie Curie Initial Training Network (ITN))
LIRIC	Lidar-Radiometer Inversion Code
MACC-II MACC-III	EU FP7 Monitoring Atmospheric Composition & Climate - Interim Implementation, Grant Agreement n. 283576 (2011-2014) H2020, Monitoring Atmospheric Composition & Climate - Interim Implementation
MERIL	EU FP7 Mapping of the European Research Infrastructure Landscape, Grant Agreement n. 262159 (2010-2012)
MISTRALS	Mediterranean Integrated STudies at Regional And Local Scales
NASA	The National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
NDACC	International Network for the Detection of Atmospheric Composition Change

NORS	EU FP7 Demonstration Network Of ground-based Remote Sensing Observations in support of the Copernicus Atmospheric Service, Grant Agreement n°284421
OAI-PMH	Open Archives Initiative Protocol for Metadata Harvesting
OGC WFS	Open Geospatial Consortium Web Feature Service
OSPAR	Oslo and Paris Convention
PEGASOS	EU FP7 Pan-European Gas-Aerosol-Climate Interaction Study, Grant Agreement n° 265148 (2011-2014)
PEEX	PanEurasian Experiment
RDA	Resource Description and Access
SDS-WAS	WMO Sand and Dust Storm Warning Advisory and Assessment System
SEVIRI	Spinning Enhanced Visible and Infrared Imager
SIOS	Svalbard Integrated Earth Observing System
SOP	Standard Operating Procedure
SSC	Scientific Steering Committee
TFMM	EMEP Task Force on Measurements and Modelling
UFIREG	Ultrafine Particles – an evidence based contribution to the development of regional and European environmental and health policy
UNECE	United Nations Economic Commission for Europe
WCCAP	World Calibration Centre for Aerosol Physics, Leipzig, Germany
WEZARD	EU FP7 Weather hazards for aeronautics, Grant Agreement n° 285050 (2011-2013)
WIGOS	WMO Integrated Global Observing System (WIGOS)
WIS	WMO Information System
WMO WMO-GAW	World Meteorological Organization WMO Global Atmosphere Watch

APPENDIX B: REFERENCES

REFERENCES

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APPENDIX C: SUPPORTING LETTERS

UNITED NATIONS
ECONOMIC COMMISSION
FOR EUROPE

Geneva, 3 July 2014

Aerosols, Clouds, and Trace gases Research InfraStructure Network (ACTRIS-2) Project

The United Nations Economic Commission for Europe provides the secretariat to the Long-Range Transboundary Air Pollution) Convention (CLRTAP) and as such, we would like to express our support to the project ACTRIS-2, coordinated by Dr. Gelsomina Pappalardo at CNR, Italy.

The EMEP Protocol (Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe European Monitoring and Evaluation Programme), one of CLRTAP Protocols, address the funding of thematic centers to undertake technical work underpinning protocols for abating air pollution in Europe. The EMEP Protocol has led to the establishment of a Europe-wide network of sites measuring atmospheric composition. These efforts are coordinated by the EMEP Chemical Coordinating Centre (EMEP-CCC) at NILU, Norway. EMEP define through its Monitoring strategy[1] the obligations of CLRTAP Parties with respect to atmospheric measurements. As part of the EMEP Monitoring strategy, the involvement of research activities has been fundamental, and past projects like EUSAAR and ACTRIS have added significant value to the efforts of EMEP. For a more detailed description of the EMEP monitoring efforts, we kindly refer to the following paper: http://www.atmos-chem-phys.net/12/5447/2012/acp-12-5447-2012.pdf.

We would like to express our strong support towards a continuation of the EUSAAR/ACTRIS in the proposed project ACTRIS-II, as this will through the involvement of both national EMEP responsible institutions, as well as the EMEP-CCC, contribute to the best available basis for air pollution and climate change abatement in Europe.

Sincerely yours,

K. Olendrzyński

Mr. Krzysztof Olendrzynski

UN ECE Environmental Affairs Officer

[1] See www.unece.org/fileadmin/DAM/env/documents/2009/EB/ge1/ece.eb.air.ge.1.2009.15.e.pdf

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Our ref.: 5560-14/RES/AER

Dr Gelsomina Pappalardo
Istituto di Metodologie per l'Analisi Ambientale
(CNR-IMAA)
Contrada S. Loja, Tito Scalo zona industriale
85050 POTENZA
Italy

GENEVA, 29 August 2014

Subject: Support for the proposal for the second phase of the project ACTRIS ("Aerosol, Clouds, and Trace Gases Research Infrastructure")

Dear Dr Pappalardo,

I am pleased to express our support for the second phase of the infrastructure project proposal ACTRIS ("Aerosol, Clouds, and Trace Gases Research Infrastructure") within the European Commission call "Integrating and opening research infrastructures of European interest" under Horizon 2020. The proposed work will provide further valuable contribution to observations, quality assurance and capacity development within the Global Atmosphere Watch (GAW) Programme of the World Meteorological Organization (WMO).

WMO/GAW is the only existing long-term international global programme that coordinates observations and analysis of atmospheric composition changes. The GAW Programme is a collaboration of more than 100 countries and it relies fundamentally on contributions of its Members to help build a single coordinated global understanding of atmospheric composition and its change.

The GAW Programme has several important elements, including globally coordinated observations supported by comprehensive quality assurance and capacity development. The observations in GAW cover broad spectrum of parameters and include measurements of several aerosol parameters, greenhouse and reactive gases, ozone, precipitation chemistry and atmospheric UV radiation measurements. Many of GAW parameters are addressed in the ACTRIS project.

The GAW Programme has long and fruitful collaboration with ACTRIS and its predecessor project EUSAAR ("European Supersites for Atmospheric Aerosol Research") and it is an associated partner of ACTRIS.

1) ACTRIS contributes to the GAW Programme in several ways: ACTRIS supports GAW observations in particular through contribution of the EARLINET "European Aerosol Research Lidar Network") to the GAW Lidar Network (GALION). A number of GAW regional and global sites have been developed with strong support of ACTRIS with Chacaltaya in Bolivia being the most recent example.

2) ACTRIS support GAW Quality Assurance system through development of measurement guidelines (MGs) and standard operating procedures (SOPs) for aerosol observations and several reactive gases (Volatile Organic Compounds, VOCs, and nitrogen oxides). Those MGs and SOPs are adopted for global observations within GAW. Comparison exercises organized by ACTRIS are also helpful in harmonization of the observational protocols. ACTRIS provides a support to the World Calibration Center for Aerosol Physical Properties, which is one of the Central Facilities within the GAW Programme.

3) ACTRIS provides important contribution to capacity development trough organization of the dedicated training sessions on best practices for operation of instruments for atmospheric observations. A large majority of trainees are new users, young scientists and engineers involved at GAW stations. ACTRIS partners provide teaching at the GAW Training and Education Center (GAWTEC).

Several leading scientists involved in ACTRIS play leadership role in the GAW activities through participation in the GAW Scientific Advisory Groups.

As it has been mentioned above, the aim of the GAW Programme is to provide reliable and continuous observations of the chemical composition of the atmosphere. Considering the contribution of the ACTRIS in current GAW activities it would be highly desirable if the proposal for the phase II of the project is supported. This will insure continued valuable contribution of ACTRIS to this international Programme.

I look forward to our continued collaboration.

Yours sincerely,

(D. Terblanche)
Director
Atmospheric Research and Environment Branch
Research Department

September 1, 2014

To: Dr. Gelsomina Pappalardo
Consiglio Nazionale delle Ricerche - Istituto di Metodologie per l'Analisi Ambientale (CNR-IMAA)
Contrada S. Loja
Tito Scalo zona industriale (Potenza)
I-85050
Italy

RE: Opinion on Aerosols, Clouds, and Trace gases Research InfraStructure network (ACTRIS-2)

Dear Dr. Pappalardo,

We are writing today on behalf of the core members of the International Cooperative of Aerosol Prediction (ICAP). ICAP is a grassroots style organization to advance global aerosol prediction and analysis through the open exchange of best practices between developers for global aerosol forecasting systems (e.g., BSC, ECMWF, JMA, NASA GMAO, NCEP, NRL, UKMO, etc.). While we do not officially speak for our respective agencies, ICAP members are at the forefront of aerosol technology and are greatly concerned with the future of aerosol observation and prediction systems. In this letter, we offer our opinion as Earth scientists on the Aerosols, Clouds, and Trace gases Research InfraStructure network (ACTRIS-2) proposal, in response to the call “Integrating and opening existing national and regional research infrastructures of European interest” (H2020-INFRAIA-2014-2015), which we strongly believe is in the best interest of the international aerosol community. We offer this as an “Opinion” rather than a “Letter of Support” because our opinions on this proposed effort are related only to this proposal’s overall objectives, and we have not reviewed any other proposals the funding agency may receive that support similar topic areas.

The general premise of ACTRIS-2 is to coordinate a network of ground-based profiling and *in situ* observations for long-term observations of aerosols, clouds and short-lived gases. The information covered in ACTRIS-2 informs both climate and air quality research, and as such provides a backbone of knowledge and information absolutely crucial for evaluation of aerosol and air quality forecasting systems. A particular strength of ACTRIS-2 is the proposed timeliness of data delivery and its coordinated processing and distribution stream, which make some of the data collected particularly relevant to model forecast validation in near-real time in operational environments. The addition of this data stream to the network of data sources assimilated in operational aerosol forecasting systems additionally will provide detailed information on aerosol quantity and vertical structure with an observational density not otherwise available in Europe. The application of these data to improve initial conditions for model forecasts will improve situational awareness and enhance prediction for important air quality events.

If ACTRIS-2 is funded, ICAP members will gladly provide input to the ACTRIS-2 team to improve project efficacy. ACTRIS-2 representatives will be granted access to closed ICAP meetings on data usage and delivery. The ICAP community is excited by the possibility of maintaining this extensive data set. We wish the project well in its scientific endeavours, and look forward to its successes.

Very Best Regards,

Peter R. Colarco, NASA GSFC

Jeffrey S. Reid, NRL

Thomas Sekiyama, JMA

Taichu Y. Tanaka

Taichu Tanaka, JMA

European Commission

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