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Horizon 2020

Call: H2020-MSCA-ITN-2019

(Marie Skłodowska-Curie Innovative Training Networks)

Topic: MSCA-ITN-2019

Type of action: MSCA-ITN-ETN

Proposal number: 860743

Proposal acronym: DECIFER

Deadline Id: H2020-MSCA-ITN-2019

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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 steps in the submission wizard.

1 - General information

Topic	MSCA-ITN-2019	Type of Action	MSCA-ITN-ETN
Call Identifier	H2020-MSCA-ITN-2019	Deadline Id	H2020-MSCA-ITN-2019

Acronym	DECIFER
Proposal title	Distilling Ensemble Climate Information for Food sEcuRity

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

Duration in months	*36*
Panel	ENV - Environmental and Geosciences (ENV)
Descriptor1	Climatology and climate change
Descriptor2	Agriculture production systems (crops), including fertilisation and n
Descriptor3	Meteorology, atmospheric physics and dynamics
Free keywords	*Climate information distillation, impacts on cereal crop, bias correction, uncertainty, epistemic-ethical analysis, responsible information provision; values and perception*

Abstract

Zero hunger, or food security, is one of the most fundamental of the UN Sustainable Development Goals, and is intricately linked to climate change. But users of climate information are confronted with a plethora of often contradictory climate projections, resulting in a high adaptation risk. Thus, a call has emerged for climate information distillation: in a given user case, one has to understand (i) the limitations of climate projections, (ii) how to construct relevant climate information based on these projections, and (iii) how to optimally and responsibly communicate and use this information.

DECIFER wishes to establish interdisciplinary and intersectoral research and training standards to distil defensible and user-relevant information about agricultural impacts of climate change in the Mediterranean, Northern Africa and the Sahel, to reduce adaptation risks in these regions. Research will address observational uncertainties, agricultural modelling, climate model limitations, bias correction issues and responsible information provision, framed in a manner that is translatable and trustworthy across disciplines and sectors so as to facilitate distillation.

The research and training needed for climate information distillation is highly interdisciplinary and intersectoral, but training of climate researchers is traditionally rather disciplinary with little interaction across the range of involved disciplines. ITNs are thus ideal for training ESRs in climate information distillation.

DECIFER will bring together academic and non-academic participants from Europe, Africa and international organisations in a new and inspirational way. Participation will be from internationally renowned experts in global and regional climate modelling, statistical modelling, agricultural modelling and geography, academic and non-academic institutions involved in climate services and climate smart agriculture, as well as private companies in the climate and food sector.

Remaining characters 14

Has this proposal (or a very similar one) been submitted to a previous ITN call in the last two years? (•) Yes ( ) No

Please give the proposal reference or contract number	
813667	

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 http://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year. 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

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed 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 purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in 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 Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the Privacy statement for the EDES Database.

2 - Participants & contacts

#	Participant Legal Name	Country	Action
1	UNIVERSITAET GRAZ	AT	
2	BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION	ES	
3	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	FR	
4	PREDICTIA INTELLIGENT DATA SOLUTIONS SL	Spain	
5	Sandholt ApS	DK	
6	UNIVERSIDAD DE CANTABRIA	ES	
7	UNIVERSITY OF CAPE TOWN	ZA	
8	KOBENHAVNS UNIVERSITET	DK	
9	UNIVERSITY OF DURHAM	UK	
10	UNIVERSIDAD POLITECNICA DE MADRID	ES	
11	THE UNIVERSITY OF READING	UK	

Information on partner organisations

Partner Organisation number	PIC Search PIC	Organisation legal name	Country	Academic Sector	Role of associated		
					Provide training	Host secondmends	
1	998883012	AFRICAN CENTRE OF METEOROLOGICAL	Niger	Yes	Yes	Yes	
2	999509438	DANMARKS METEOROLOGISKE INSTITUT	Denmark	Yes	Yes	Yes	
3	999608281	FOOD AND AGRICULTURE ORGANIZATIO	Italy	No	Yes	Yes	
4	985480134	HORTA SRL	Italy	No	Yes	Yes	
5	996838058	INSTITUT NATIONAL DE LA RECHERCHE A	Tunisia	Yes	Yes	Yes	
6	997054077	isardSAT	Spain	No	No	Yes	
7	999992304	JRC -JOINT RESEARCH CENTRE- EUROPEA	Italy	Yes	Yes	Yes	

8	937914535	UNION DE PEQUENOS AGRICULTORES Y	Spain	No	No	Yes	
9	933427509	COMMUNAUTE D UNIVERSITES ET ETABL	France	Yes	Yes	No	
10	994857803	THE WORLD BANK GROUP	United States	No	Yes	Yes	

2 - Administrative data of participating organisations

Coordinator

PIC	***Legal name***
999873188	*UNIVERSITAET GRAZ*

Short name: UNI GRAZ

Address of the organisation

Street UNIVERSITATSPLATZ 3

Town GRAZ

Postcode 8010

Country Austria

Webpage http://www.uni-graz.at

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2014 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Wegener Center for Climate and Global Change ☐ not applicable

☐ Same as proposing organisation's address

Street: Brandhofgasse 5

Town: Graz

Postcode: 8010

Country: Austria

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof. Sex: (•) Male ( ) Female

First name: **Douglas** Last name: **MARAUN**

E-Mail: **douglas.maraun@uni-graz.at**

Position in org.: Research Group Leader

Department: Wegener Center for Climate and Global Change ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Brandhofgasse 5

Town: Graz Post code: 8010

Country: Austria

Website: www.wegcenter.at

Phone: +43 316 380 8448 Phone 2: *+xxx xxxxxxxxx* Fax: +43 316 380 9830

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Elisabeth	Mrvka	euportal@uni-graz.at	*+43 316 380 3991*
Karin	Eisner	karin.eisner@uni-graz.at	*+43 316 380 8439*

Participant

PIC	***Legal name***
999655520	*BARCELONA SUPERCOMPUTING CENTER - CENTRO NACIONAL DE SUPERCOMPUTACION*

Short name: BSC

Address of the organisation

Street Calle Jordi Girona 31

Town BARCELONA

Postcode 08034

Country Spain

Webpage www.bsc.es

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2011 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Earth Science Department ☐ not applicable

☐ Same as proposing organisation's address

Street: Jordi Girona 29

Town: Barcelona

Postcode: 08034

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof. Sex: (•) Male ( ) Female

First name: **Francisco** Last name: **Doblas-Reyes**

E-Mail: **francisco.doblas-reyes@bsc.es**

Position in org.: Director of Earth Science Department

Department: Earth Science Department ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: NEXUS II building, Jordi Girona 29

Town: Barcelona Post code: 08034

Country: Spain

Website: www.bsc.es

Phone: +34934137719 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Participant

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

Short name: CNRS

Address of the organisation

Street RUE MICHEL ANGE 3

Town PARIS

Postcode 75794

Country France

Webpage www.cnrs.fr

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2013 - no

SME self-assessment ..... unknown

SME validation sme.....2013 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Laboratoire des Sciences du Climat et de l'Environnement (LSCE) ☐ not applicable

☐ Same as proposing organisation's address

Street: Avenue de la terrasse

Town: GIF SUR YVETTE

Postcode: 91198

Country: France

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title | Sex ◯ Male ◯ Female

First name **Nathalie** Last name **de Noblet**

E-Mail **nathalie.de-noblet@lsce.ipsl.fr**

Position in org. *Please indicate the position of the Contact Point above in the organisation.*

Department *Name of the department/institute carrying out the work.* ☐ Same as organisation name

☐ Same as proposing organisation's address

Street *Please enter street name and number.*

Town *Please enter the name of the town.* Post code *Area code.*

Country *Please select a country*

Website

Phone *+xxx xxxxxxxxx* Phone 2 *+xxx xxxxxxxxx* Fax *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Laurence	Bayard	laurence.bayard@cea.fr	*+33169089657*
Marie-Hélène	Papillon	dr04spv-europe@cnrs.fr	*+33169823272*
Mathieu	Vrac	mathieu.vrac@lsce.ipsl.fr	*+xxx xxxxxxxxx*

Participant

PIC	***Legal name***
972502310	*PREDICTIA INTELLIGENT DATA SOLUTIONS SL*

Short name: PREDICTIA

Address of the organisation

Street AVDA LOS CASTROS S/N EDIFICIO LABORATORIO I D

Town SANTANDER

Postcode 39005

Country Spain

Webpage http://www.predictia.es

Specific Legal Statuses

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation ..... no

Legal person .....yes

Academic Sector .....no

Enterprise Data

SME self-declared status.....2014 - yes

SME self-assessment .....2013 - yes

SME validation sme.....2010 - yes

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Research and Development ☐ not applicable

☒ Same as proposing organisation's address

Street: AVDA LOS CASTROS S/N EDIFICIO LABORATORI

Town: SANTANDER

Postcode: 39005

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Mr. Sex: (•) Male ( ) Female

First name: **Daniel** Last name: **San Martín**

E-Mail: **daniel@predictia.es**

Position in org.: CEO

Department: Research and Development ☐ Same as organisation name

☒ Same as proposing organisation's address

Street: AVDA LOS CASTROS S/N EDIFICIO LABORATORIO I D OFICINA S345

Town: SANTANDER Post code: 39005

Country: Spain

Website: http://www.predictia.es

Phone: +34942764414 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Markel	García-Díez	garciam@predictia.es	*+34942764410*

Participant

PIC	***Legal name***
907543253	*Sandholt ApS*

Short name: Sandholt ApS

Address of the organisation

Street Sankt Nikolaj Vej 8, 2.

Town Frederiksberg C

Postcode 1953

Country Denmark

Webpage www.sandholt.eu

Specific Legal Statuses

Research and Innovation legal statuses

Public body .....no

Non-profit .....no

International organisation .....no

International organisation of European interest .....no

Secondary or Higher education establishment .....no

Research organisation ..... no

Legal person .....yes

Academic Sector .....no

Enterprise Data

SME self-declared status.....2017 - yes

SME self-assessment .....2017 - yes

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

No department involved

Department name: *Name of the department/institute carrying out the work.* ☒ not applicable

☐ Same as proposing organisation's address

Street: *Please enter street name and number.*

Town: *Please enter the name of the town.*

Postcode: *Area code.*

Country: *Please select a country*

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof.

Sex: ○ Male ◉ Female

First name **Inge** Last name **Sandholt**

E-Mail **inge@sandholt.eu**

Position in org.: Director

Department: Sandholt ApS ☒ Same as organisation name

☒ Same as proposing organisation's address

Street: Sankt Nikolaj Vej 8, 2.

Town: Frederiksberg C Post code: 1953

Country: Denmark

Website: www.sandholt.eu

Phone: +4561260814 Phone 2: +4561260814 Fax: +xxx xxxxxxxxx

Participant

PIC	***Legal name***
999880075	*UNIVERSIDAD DE CANTABRIA*

Short name: UC

Address of the organisation

Street AVENIDA DE LOS CASTROS S/N

Town SANTANDER

Postcode 39005

Country Spain

Webpage www.unican.es

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2007 - no

SME self-assessment ..... unknown

SME validation sme.....2007 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Dept. of Applied Mathematics ☐ not applicable

☐ Same as proposing organisation's address

Street: E.T.S.I. Caminos, Canales y Puertos

Town: Santander

Postcode: 39005

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof. Sex: (•) Male ( ) Female

First name: **Jose Manuel** Last name: **Gutierrez**

E-Mail: **manuel.gutierrez@unican.es**

Position in org.: Associate Professor Chair of the Dept. of Applied Mathematics

Department: Dept. of App. Mathematics; Artificial Intelligence and Applied Meteorology Group ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: E.T.S.I. Caminos, Canales y Puertos

Town: Santander Post code: 39005

Country: Spain

Website: https://web.unican.es/departamentos/Paginas/default.aspx

Phone: 34-942-201723 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Juan José	San Miguel	migueljj@gestion.unican.es	+xxx xxxxxxxxx
Jesús	Fernández	jesus.fernandez@unican.es	+xxx xxxxxxxxx

Participant

PIC	***Legal name***
999849229	*UNIVERSITY OF CAPE TOWN*

Short name: UCT

Address of the organisation

Street PRIVATE BAG X3

Town RONDEBOSCH

Postcode 7701

Country South Africa

Webpage www.uct.ac.za

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Environmental and Geographical Science ☐ not applicable

☐ Same as proposing organisation's address

Street: Private Bag X3

Town: Rondebosch

Postcode: 7701

Country: South Africa

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof.

Sex: (•) Male ( ) Female

First name: **Bruce**

Last name: **Hewitson**

E-Mail: **hewitson@csag.uct.ac.za**

Position in org.: Professor, Director of the Climate System Analysis Group

Department: Environmental and Geographical Science

☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Private Bag X3

Town: Rondebosch

Post code: 7701

Country: South Africa

Website: www.csag.uct.ac.za

Phone: +27216502784

Phone 2: +xxx xxxxxxxxx

Fax: +xxx xxxxxxxxx

Participant

PIC	***Legal name***
999991043	*KOBENHAVNS UNIVERSITET*

Short name: UCPH

Address of the organisation

Street NORREGADE 10

Town KOBENHAVN

Postcode 1165

Country Denmark

Webpage www.ku.dk

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2012 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Niels Bohr Institute ☐ not applicable

☐ Same as proposing organisation's address

Street: Blegdamsvej 17

Town: København

Postcode: 2100

Country: Denmark

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof. Sex: (•) Male ( ) Female

First name: **Jens Hesselbjerg** Last name: **Christensen**

E-Mail: **jhc@nbi.ku.dk**

Position in org.: Professor, Climate Physics

Department: Niels Bohr Institute ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Juliane Maries Vej 30

Town: København Post code: 2100

Country: Denmark

Website: http://www.nbi.ku.dk/ansatte/?pure=da/persons/74079

Phone: +45 2230 6664 Phone 2: *+xxx xxxxxxxxx* Fax: *+xxx xxxxxxxxx*

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
SCI-FI	research and innovation	sci-fi@science.ku.dk	*+4535324236*

Participant

PIC	***Legal name***
999866010	*UNIVERSITY OF DURHAM*

Short name: UNIVERSITY OF DURHAM

Address of the organisation

Street STOCKTON ROAD THE PALATINE CENTRE

Town DURHAM

Postcode DH1 3LE

Country United Kingdom

Webpage www.dur.ac.uk

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2013 - no

SME self-assessment ..... unknown

SME validation sme..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Department of Philosophy ☐ not applicable

☐ Same as proposing organisation's address

Street: 50 Old Elvet

Town: Durham

Postcode: DH1 3HN

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof. Sex: ○ Male ◉ Female

First name: **Wendy** Last name: **Parker**

E-Mail: **wendy.parker@durham.ac.uk**

Position in org.: Associate Professor in Philosophy

Department: Department of Philosophy ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: 50 Old Elvet

Town: Durham Post code: DH1 3HN

Country: United Kingdom

Website: https://www.dur.ac.uk/philosophy/staff/?id=11577

Phone: +441913346558 Phone 2: +xxx xxxxxxxxx Fax: +xxx xxxxxxxxx

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Anna	Hutchinson	a.k.hutchinson@durham.ac.uk	*+441913349224*
Sally	Hewlett	lear.admin@durham.ac.uk	*+441913349244*
Rowan	Stace	rowan.stace@durham.ac.uk	*+441913349106*

Participant

PIC	***Legal name***
999974844	*UNIVERSIDAD POLITECNICA DE MADRID*

Short name: UPM

Address of the organisation

Street CALLE RAMIRO DE MAEZTU 7 EDIFICIO RECTORADO

Town MADRID

Postcode 28040

Country Spain

Webpage www.upm.es

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2007 - no

SME self-assessment ..... unknown

SME validation sme.....2007 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Research Center Management of Agricultural & Environmental Risks ☐ not applicable

☐ Same as proposing organisation's address

Street: Calle Senda del Rey, 13

Town: Madrid

Postcode: 28040

Country: Spain

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Dr. Sex: ○ Male ◉ Female

First name: **Margarita** Last name: **Ruiz Ramos**

E-Mail: **margarita.ruiz.ramos@upm.es**

Position in org.: Associate Professor at UPM and Researcher at CEIGRAM

Department: CEIGRAM - Crop production ☐ Same as organisation name

☐ Same as proposing organisation's address

Street: Calle Senda del Rey, 13

Town: Madrid Post code: 28040

Country: Spain

Website: www.upm.es; www.ceigram.upm.es

Phone: +34914524815 Phone 2: +34650218941 Fax: +34914524818

Other contact persons

First Name	***Last Name***	***E-mail***	***Phone***
Esperanza	Luque	esperanza.luque@upm.es	*+34914524815*

Participant

PIC	***Legal name***
999984156	*THE UNIVERSITY OF READING*

Short name: THE UNIVERSITY OF READING

Address of the organisation

Street WHITEKNIGHTS CAMPUS WHITEKNIGHTS HOUSE

Town READING

Postcode RG6 6AH

Country United Kingdom

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

Specific Legal Statuses

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

Legal person .....yes

Academic Sector .....yes

Enterprise Data

SME self-declared status.....2011 - no

SME self-assessment ..... unknown

SME validation sme.....2011 - no

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Department of Meteorology ☐ not applicable

☐ Same as proposing organisation's address

Street: University of Reading

Town: Reading

Postcode: RG6 6BB

Country: United Kingdom

Dependencies with other proposal participants

Character of dependence	***Participant***	

Person in charge of the proposal

Title: Prof. Sex: (•) Male ( ) Female

First name: **Theodore** Last name: **Shepherd**

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Position in org.: Grantham Professor of Climate Science

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Other contact persons

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EU Unit	Readin	eu-unit@reading.ac.uk	*+xxx xxxxxxxxx*
Mischa	Phillips	m.phillips@reading.ac.uk	*+xxx xxxxxxxxx*

3 - Budget

Researcher Number	Recruiting Participant (short name)	Planned start month	Duration (months)
1	Sandholt ApS	6	36
2	UPM	6	36
3	CNRS	6	36
4	CNRS	6	36
5	BSC	6	36
6	THE UNIVERSITY OF READING	6	36
7	THE UNIVERSITY OF READING	6	36
8	UCPH	6	36
9	UNI GRAZ	6	36
10	PREDICTIA	6	36
11	CNRS	6	36
12	UNI GRAZ	6	36

Researcher Number	Recruiting Participant (short name)	Planned start month	Duration (months)
13	UC	6	36
14	UNIVERSITY OF DURHAM	6	36
15	UCT	6	36
Total			540

Participant Number	Organisation Short Name	Country	IOEI	No of researchers	Number of person.months	Researcher Unit Cost			Institutional Unit Cost		TOTAL
						Living allowance	Mobility Allowance	Family Allowance	Research, training and networking costs	Management and overheads	
1	UNI GRAZ	Austria	no	2	72	251214,48	43200,00	18000,00	129600,00	86400,00	528414,48
2	BSC	Spain	no	1	36	112304,88	21600,00	9000,00	64800,00	43200,00	250904,88
3	CNRS	France	no	3	108	408606,12	64800,00	27000,00	194400,00	129600,00	824406,12
4	PREDICTIA	Spain	no	1	36	112304,88	21600,00	9000,00	64800,00	43200,00	250904,88
5	Sandholt ApS	Denmark	no	1	36	158922,00	21600,00	9000,00	64800,00	43200,00	297522,00
6	UC	Spain	no	1	36	112304,88	21600,00	9000,00	64800,00	43200,00	250904,88
7	UCT	South Africa	no	1	36	59801,76	21600,00	9000,00	64800,00	43200,00	198401,76

Participant Number	Organisation Short Name	Country	IOEI	No of researchers	Number of person.months	Researcher Unit Cost			Institutional Unit Cost		TOTAL
						Living allowance	Mobility Allowance	Family Allowance	Research, training and networking costs	Management and overheads	
8	UCPH	Denmark	no	1	36	158922,00	21600,00	9000,00	64800,00	43200,00	297522,00
9	UNIVERSITY OF DURHAM	United Kingd	no	1	36	164572,56	21600,00	9000,00	64800,00	43200,00	303172,56
10	UPM	Spain	no	1	36	112304,88	21600,00	9000,00	64800,00	43200,00	250904,88
11	THE UNIVERSITY OF READING	United Kingd	no	2	72	329145,12	43200,00	18000,00	129600,00	86400,00	606345,12
Total				15	540	1980403,56	324000,00	135000,00	972000,00	648000,00	4059403,56

4 - Ethics

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	
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		**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		**Page**
Does your research involve animals?	○ Yes ◉ No	
6. THIRD COUNTRIES		**Page**
In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	○ 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.)?	○ Yes ◉ No	
Do you plan to import any material - including personal data - from non-EU countries into the EU?	○ Yes ◉ No	
Do you plan to export any material - including personal data - from the EU to non-EU countries?	○ Yes ◉ No	
In case your research involves low and/or lower middle income countries, are any benefits-sharing actions planned?	○ 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		**Page**

Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	◯ 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?	◯ Yes ◉ No	
8. DUAL USE		Page
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	◯ Yes ◉ No	
9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS		Page
Could your research raise concerns regarding the exclusive focus on civil applications?	◯ Yes ◉ No	
10. MISUSE		Page
Does your research have the potential for misuse of research results?	◯ Yes ◉ No	
11. 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. ☒

How to Complete your Ethics Self-Assessment

5 - Call-specific questions

Extended Open Research Data Pilot in Horizon 2020

If selected, applicants will by default 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.

However, participation in the Pilot is flexible in the sense that it does not mean that all research data needs to be open. After the action has started, participants will formulate a Data Management Plan (DMP), which should address the relevant aspects of making data FAIR – findable, accessible, interoperable and re-usable, including what data the project will generate, whether and how it will be made accessible for verification and re-use, and how it will be curated and preserved. Through this DMP projects can define certain datasets to remain closed according to the principle "as open as possible, as closed as necessary". A Data Management Plan does not have to be submitted at the proposal stage.

Furthermore, applicants also have the possibility to opt out of this Pilot completely at any stage (before or after the grant signature). In this case, applicants must indicate a reason for this choice (see options below).

Please note that participation in this Pilot does not constitute part of the evaluation process. Proposals will not be penalised for opting out.

We wish to opt out of the Pilot on Open Research Data in Horizon 2020.	○ Yes	◉ No

Further guidance on open access and research data management is available on the participant portal: http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-dissemination_en.htm and in general annex L of the Work Programme.

[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.*

START PAGE

MARIE Skłodowska-CURIE ACTIONS

Innovative Training Networks (ITN)
Call: H2020-MSCA-ITN-2019

Distilling Ensemble Climate Information for Food sEcuRity

PART B

This proposal is to be evaluated as:

[ETN]

Table of Content

LIST OF PARTICIPATING ORGANISATIONS

Consortium Member	Legal Entity Short Name	Academic (tick)	Non-academic (tick)	Awards Doctoral Degrees	Country	Dept./ Division / Laboratory	Scientist-in-Charge	Role of Partner Organisation
Beneficiaries								
University of Graz	UG	X		X	Austria	Wegener Center for Climate and Global Change	Prof. Dr. Douglas Maraun	
Barcelona Supercomputing Center	BSC	X		X with. UPC	Spain	Earth Sciences Department	Prof. Dr. Francisco Doblas-Reyes	
Universitat Politecnica de Catalunya	UPC	X		X	Spain	Doctoral School	Prof. Dr. Agustí Pérez Foguet, coord. of the school	
LSCE/CNRS	CNRS	X		X with U Paris-Saclay	France	Laboratoire des Sciences du Climat et de l'Environnement	Senior Scientists Dr. Nathalie de Noblet, Dr. Mathieu Vrac	
Predictia Intelligent Data Solutions SL	PRED		X	(with UCAN)	Spain	NA	Mr. Daniel San Martín Dr. Markel García	
Sandholt ApS	SAND		X	(with UCPH)	Denmark	NA	Dr. Inge Sandholt	
University of Cantabria	UCAN	X		X	Spain	Institute of Physics of Cantabria	Prof. Dr. Jose Gutierrez	
University of Cape Town	UCT	X		X	South Africa	Environmental and Geographical Science	Prof. Dr. Bruce Hewitson	
University of Copenhagen	UCPH	X		X	Denmark	Niels Bohr Institute	Prof. Dr. Jens Christensen	
University of Durham	UD	X		X	UK	Department of Philosophy	Prof. Dr. Wendy Parker	
Universidad Politecnica de Madrid	UPM	X		X	Spain	Research Centre for the Management of Agricultural and Environmental Risks	Senior Scientist Dr. Margarita Ruiz-Ramos	
University of Reading	UR	X		X	UK	Department of Meteorology	Prof. Dr. Ted Shepherd Prof. Dr. Andrew Turner	
Partner Organisations								
African Centre of Meteorological Applications for Development	ACMAD	X			Niger	Department of Research and Development	Dr. Benjamin L. Lamptey, Acting Director General Dr. Elijah Adefisan, Head of Research & Development	host secondments; training courses; dissemination
Danish Meteorological Institute	DMI	X			Denmark	Department of Research and Development	Senior Scientist Dr. Ole B. Christensen	co-supervision of UCPH-based ESR, hot secondments
United Nations Food and Agriculture Organisation	FAO		X		Italy	Climate, Biodiversity, Land and Water Management Regional Office for Asia and the Pacific	Dr. Hideki Kanamaru, Dr. Mariko Fujisawa	co-supervision, host secondments; keynote lectures; training courses; participate in career workshop
HORTA	HORTA		X		Italy	NA	Pierluigi Meriggi, President	co-supervision, host secondments; contribution to training; participate in career workshop

National Institute of Agronomic Research of Tunisia	INRAT	X			Tunisia	Agronomy and Physiology Laboratory	Prof. Dr. Leila Radhouane	host secondments; keynote lectures; training courses; disseminartion
IsardSAT	IsardSAT		X		Spain	NA	Laia Romero Dr. Maria J. Escorihuela Bernat Martinez	host one secondment (data and model evaluation)
European Commission, Joint Research Centre	JRC	X			Belgium/ Italy	Sustainable Resources Space, Security & Migration	Dr. Stefano Galmarini Dr. Andrea Toreti Dr. Alessandro Dosio	co-supervision; host secondments; contribution to training; participate in career workshop
Unión de Pequeños Agricultores y Ganaderos	UPA		X		Spain	Technical Department	Javier Alexandre, Farmer	host one secondment (citizen science)
Université Paris-Saclay	UPS	X		X	France	Doctoral College	Prof. Sylvie Prommier	awards doctoral degrees, provide training courses,
The World Bank	WB		X		USA	Climate Change Group	Dr. Ana E. Bucher	co-supervision, host secondments; keynote lectures; training courses; participate in career workshop

Data for non-academic beneficiaries:

Name	Location of research premises (city / country)	Type of R&D activities	No. of full-time employees	No. of employees in R&D	Web site	Annual turnover (in Euro)	Enterprise status (Yes/No)	SME status (Yes/No)
Sandholt ApS	Fredriksberg/ Denmark	Remote Sensing	2.5	2	www.sandholt.eu	Pending	Yes	Yes
Predictia Intelligent Data Solutions SL	Santander/ Spain	Meteorology, climatology	5	2	www.predictia.es	345,000	Yes	Yes

Declarations

Name (institution / individual)	Nature of inter-relationship
CNRS	CNRS is member of UPS: supervisory institution for joint research unit which will host doctorates
UPS	Delivery of the doctoral degrees for its members (CNRS)

1. Excellence

1.1 *Quality, innovative aspects and credibility of the research programme*

1.1.1 Introduction, objectives and overview of the research programme

"**Zero hunger**" (i.e. food security) is one of the most fundamental of the United Nations (UN) 17 **Sustainable Development Goals** (SDGs). European and African food security are interconnected: Europe exports substantial amounts of wheat to African countries, and food shortage in Africa increases migration pressure to Europe. The European Union (EU) thus developed a policy framework to assist developing countries in addressing food security challenges and initiated joint actions such as the PRIMA program on Food Security in the Mediterranean.

Climate change (CC) affects food security. The Mediterranean experienced water shortage and reduced crop yield in recent years, and Sub-Saharan Africa is often affected by drought and flooding. The Mediterranean is a CC hotspot and in many African countries, food production is projected to decline[1]. These impacts add to social drivers such as poverty and political conflicts. In response, the UN Framework Convention on Climate Change[2] and the 2015 Paris agreement of the 21st Conference of the Parties highlight the importance of food security and climate-smart agriculture.

Defensible climate information is therefore urgently needed to better serve climate service providers and decision makers: government agencies, international organisations (e.g. UN Food and Agriculture Organisation, FAO, World Bank), the disaster risk community (e.g. Red Cross/Red Crescent), city communities relying on peri-urban farming, and private companies. Food producers, e.g., need to strategically plan investments into specific growing regions, and breeding of new varieties takes a decade. International projects have been initiated to produce and analyse ensemble projections of CC and its impacts such as CMIP (global modelling), CORDEX (regional modelling), ISIMIP and AgMIP (impact modelling). The World Climate Research Programme (WCRP) has explicitly dedicated one of its **Grand Challenges** to **"Water for the Food Baskets of the World"**.

But Barsugli et al.[3] point out the **practitioner's dilemma**: web-based access to a proliferation of climate projections is available, but only little information about their credibility. Recently[4], **substantial uncertainties about regional CC** have been highlighted. Different data sources often provide contradictory results[5], and the often applied bias correction of climate models may introduce severe artefacts[6]. In particular for Africa, **observational data are often poor**. Adams et al.[7] raise **ethical-epistemic issues**: when should we provide uncertain climate information, if it affects the livelihoods of millions of people? As a result, **decision makers often ignore climate information**.

Thus, a call for **climate information distillation (CID)** has emerged[8]: in a given use case, we have to understand the limitations of and contradictions within our climate projections[9], how to construct relevant climate information based on these projections, and how to optimally and responsibly communicate and use this information. CID is particularly important in Africa: the continent is very vulnerable to CC, and at the same time cannot afford wasting money for maladaptation resulting from inadequate or incomplete climate information.

Research on CID is in its infancy, and **major research and training gaps impede successful CID**. The research and thus training needed for CID is highly **interdisciplinary and intersectoral**: it spans understanding of climate processes, statistical post-processing of model output, communicating climate information, and assessing ethical responsibilities. It needs to bring together atmospheric and climate dynamicists, global and regional climate modellers, applied statisticians, humanities scholars, geographers, climate service providers, (non-academic) public and private decision makers, and private companies. In the context of food security, **international collaboration** is essential. Thus, **ITNs are an ideal platform to train ESRs for CID**.

The aim of DECIFER is to establish interdisciplinary and intersectoral research and training standards for climate information distillation, and to distill defensible and user-relevant information about agricultural impacts of CC in the Mediterranean, Northern Africa and the Sahel (MENASA), to ultimately reduce adaptation risks in these regions.

1 Giorgi, F. and Bi, X. (2009), Time of emergence (TOE) of GHG-forced precipitation change hot-spots, Geophys. Res. Lett. 36, L06709; Müller, C., Cramer, W., Hare, W.L., and Lotze-Campen, H. (2011), Climate change risks for African agriculture, Proc. Nat. Acad. Sci. 108(11), 4313-4315.

2 UNFCCC, United Nations, 1992. FCCC/INFORMAL/84 GE.05-62220 (E) 200705. Available at www.unfccc.int.

3 Barsugli, J. J. et al. (2013), The practitioner's dilemma: How to assess the credibility of downscaled climate projections, EOS 94(46), 424–425.

4 Shepherd, T.G. (2014), Atmospheric circulation as a source of uncertainty in climate change projections, Nat. Geosci. 7, 703–708.

5 Hewitson, B. C. et al. (2014), Interrogating empirical-statistical downscaling, Clim. Change 122, 539–554.

6 Maraun, D. Shepherd, T. G., Widmann, M., Zappa, G., Walton, D., Gutierrez, J.M., et al. (2017), Towards process-informed bias correction of climate change simulations, Nat. Clim. Change 7, 764-773.

7 Adams, P., Eitland, E., Hewitson, B., Vaughan, C., Wilby, R. and Zebiak, S. (2015), Toward an ethical framework for climate services. A white paper of the climate services partnership working group on climate services ethics.

8 WCRP WGRC Expert Meeting on Climate Information "Distillation". 10/2014, Santander, Spain; IPCC Workshop on Regional Climate Projections and their Use in Impacts and Risk Analysis Studies, 9/2015, São José dos Campos, Brazil.

9 Eyring, V., et al. (2019), Taking climate model evaluation to the next level, Nat. Clim. Change, doi: 10.1038/s41558-018-0355-y

In a real world decision and adaptation context, climate is only one factor that needs to be considered, and interests of different stakeholders in favour of or against specific decisions are often competing. Thus, **climate information needs to be user-relevant and defensible** to be considered in the decision process. We characterise information as **defensible**[10] if it is based on **plausible** (not obviously contradicting our physical understanding) and **credible** (having passed a thorough process-based evaluation and expert assessment) climate model simulations, and if the associated projection uncertainties have been comprehensively characterised. In particular for extreme events, which may not be well represented by operational climate models, one has to consider ways of accounting for deep uncertainties beyond model spread.

CID is the research and process of creating and communicating defensible climate information. In this context, DECIFER will address the following **research objectives**:

RO1	Co-design the details of DECIFER research with our partner organisations and co-produce and co-explore defensible information about CC impacts on agriculture to reduce adaptation risks in MENASA (WP1).
RO2	Understand the sensitivity of agricultural projections to observational uncertainties and climate model biases; and understand the complementarity of statistical and process-based agricultural modelling approaches (WP2).
RO3	Assess the credibility of climate change simulations for agricultural impact studies in MENASA by understanding causes and consequences of climate model errors in a hierarchy of climate models (WP3).
RO4	Understand the statistical correctability of climate model biases for agricultural modelling, improving bias correction methods and developing process-informed bias correction methods (WP4).
RO5	Understand what defensible information we have about climate change impacts on agriculture in our target regions, what information we can and should responsibly provide given the substantial uncertainties in our understanding and modelling, and how research to provide this information can take account of the values and perceptions in the adoption of climate information (WP5).

Stakeholders and users relevant for DECIFER are, beyond the climate and climate impacts research communities: government agencies, international organisations involved in climate services, climate impacts adaptation and climate-smart agriculture, the disaster risk community, city communities relying on peri-urban farming, and private companies (e.g., food producers, insurance companies, seed companies). A close interaction with users will be ensured by our partner organisations, and by focussing on specific **target countries (Spain, France, Italy, Tunisia, Niger)** in addition to the broader assessments across the whole MENASA region.

Addressing food security in the MENASA region, we will consider **cereal crops such as sorghum, millet, maize and wheat**. DECIFER addresses the entire seasonal cycle from sowing to harvest and crop status throughout its life cycle, and the resulting yield. This will be achieved using both specific crop models and agro-climatic indicators (which describe meteorological stress per phenological stage of the crop).

In the Mediterranean (MED) and in particular in North Africa (NA) and the Sahel (SA), where agriculture is predominantly rainfed, yield is strongly impaired by heat- and water stress and their compound effect, by flooding, and by shifts away from favourable climatic conditions during the growing season. Thus, the meteorological phenomena relevant for DECIFER are **changes in mean temperature and precipitation (including frequency) and their seasonality, changes in the interannual variability, as well as changes in extremes, e.g. drought, heatwaves, and heavy precipitation**.

Drought and heatwaves are controlled by persistent patterns of the atmospheric circulation and are amplified by land-atmosphere feedbacks. In the MENASA, heavy precipitation is caused by deep, organised convection which is embedded in larger-scale systems such as Medicanes and the West African monsoon. Climate variability in Africa is strongly affected by teleconnections, such as remote influences of El Niño/Southern Oscillation (ENSO) and the Madden Julian oscillation (MJO). Changes in mean climate as well as climate variability and extremes will depend on the possible expansion and weakening of the Hadley circulation. DECIFER thus has to address the representation of these climate processes and their response to climate change in state-of-the-art global and regional climate models (GCMs/RCMs), and the statistical correctability of related biases.

In the spirit of the WCRP Grand Challenge on “Water for the Food Baskets of the World”, DECIFER focuses on medium- to long-term climatic changes from **decadal to centennial time-scales**. On these time-scales, the skill of current models in predicting surface climate changes over land stems essentially from anthropogenic forcings.

10 Maraun, D., & Widmann, M. (2018), Statistical Downscaling and Bias Correction for Climate Research. Cambridge University Press.

Thus DECIFER will explore non-initialised ensembles of climate change simulations (known as climate projections; additionally, we will employ decadal predictions, but interpreted as climate projections) and address - for a given case and lead time – the signal-to-noise ratio of climate trends and risk.

We are aware of the **limited quality of observational data** (meteorological variables, vegetation, and crop-specific parameters and thresholds) in particular in NA and SA. DECIFER will therefore (1) employ, improve and generate gridded data based on state-of-the-art satellite observations; (2) consider uncertainties across selected existing gridded data sets for the African continent, and (3) employ selected station data sets as well as expert knowledge from our regional partner organisations (e.g. INRAT). SAND and DMI have close links with ESA, GCOS and WIGOS and are aware of available and upcoming new products. See Table X1.1 for details. All data from non-participating institutions are freely available.

Table X1.1: Most Relevant Observational and Model Datasets Used and Created in DECIFER

Existing Meteorological Observations	variables, region, provider (if different from name); T: temperature, P: precipitation, S: soil moisture
Station observations	ECA-D (T,P, Europe, KNMI), AMMA-Catch (T,P,S, Sahel), INRAT (T, P, S, Tunisia), ACMAD (T, P, S, Africa), FLUXNET (S, Europe, 1 in Senegal)
Gridded station-based	E-OBS (T, P, Europe), CRU (T, P, global), ARC2 (P, Africa, NOAA), GPCC (P, global, DWD), CPC-UNI (P, NOAA)
Satellite-based	GPCP (P, UCAR), CMORPH (P, DWD), CCI (S, global, ESA)
Existing Agricultural and Land Observations	Y: yield, biomass L: land cover, V: vegetation indices/phenology
Station observations	All Y, L, V: UPM (Spain), CNRS (France), INRAT (Tunisia), AGRHYMET (Sahel, via ACMAD), L, V: AMMA-Catch (Sahel)
Satellite-based	AgMIP ACE (L, V, global), CCI (L, global, ESA), SENTINELS (L, V, global, ESA/Copernicus), Meteosat Second Generation (V,Land SAF/EUMETSAT), GIMMS NDVI (V, global, NASA)
Crop-specific data (param., thresholds)	UPM (Spain), CNRS (France), INRAT (Tunisia), AGRHYMET (Sahel, via ACMAD)
Existing Climate and Agricultural Model Simulations	all available from ESGF if not indicated otherwise
GCM simulations	CMIP5, CMIP6 (when avaliable), HighResMIP (and existing predecessor, PRIMAVERA), NMME/C3S seasonal forecasts, DCPP multi model and operational EC-Earth decadal forecasts
RCM simulations	CORDEX (EURO, MED, Africa, MENA), GLORIOUS
Agricult. model sim.	AgMIP (global, from AgMIP repository), MACSUR (Europe, Open Data Journal for Agricultural Research), GLORIOUS (IsardSAT)
DECIFER Products	To be made available via COPERNICUS
satellite-based	Soil moisture, actual evapotranspiration, crop phenology (e.g., leaf index)
GCM storylines	Physically consistent storylines for different levels of global warming, based on selected existing model simulations.
RCM storylines	Bias adjusted, including consistent storylines, based on selected existing model simulations.
RCM pseudo global warming simulations	Convection permitting (1-3km) pseudo global warming simulations for selected episodes (events, seasons) with CLM, driven with reanalysis boundary conditions, modified according to selected GCM change signals (for different levels of global warming), over approx. 1000 km x 1000 km domain in MENASA. To study local soil-moisture/atmosphere feedbacks and convection, and to explore deep uncertainties not sampled by standard RCMs..
Agricultural model simulations	Agricultural simulations (process-based, agro-climatic indcators) based on GCM and RCM simulations, including consistent storylines.

The representation of uncertainties is at the core of CID. Often, a probabilistic interpretation – be it from GCMs, RCMs or agricultural models – is hindered by the co-existence of equally plausible, but contradictory evidence of future changes. The traditional approach, so far used by the IPCC, is to lump this evidence together in a multi-model mean, and characterise uncertainties by measures of model spread and agreement. This approach runs the risk of issuing a message such as “we do not expect a major change” or “we do not know” where strong, but contradictory changes are to be expected. Across DECIFER, we will therefore represent uncertainties using a **storyline approach**[11], that separates the overall ensemble into physically consistent, but contradictory future lines of evidence, conditional on the competing evolution of key driving processes.

Climate information provision has a deep **ethical-epistemic dimension**: knowing that our models have substantial limitations and cannot be evaluated now against future observations, which information can we responsibly provide? Do we have to withhold information if the uncertainties are so large that our projections may result in wrong adaptation decisions? DECIFER will address this question informed by our specific case studies. Thereby, DECIFER also explicitly contributes to **responsible research and innovation**.

Climate and climate change information is often not provided in a way that is useful for users. Often, the information is not relevant, because the way it is aggregated does not match the user problem, uncertainties and their interpretation in a given context are not precisely communicated, or they are misunderstood. **How information should be integrated and communicated**, and how a fruitful interaction between users and providers could be organised, is central to DECIFER.

11 Shepherd, T.G, et al. (2018), Storylines: an alternative approach to representing uncertainty in physical aspects of climate change, Clim. Change 151:555–571.

1.1.2 Research methodology and approach

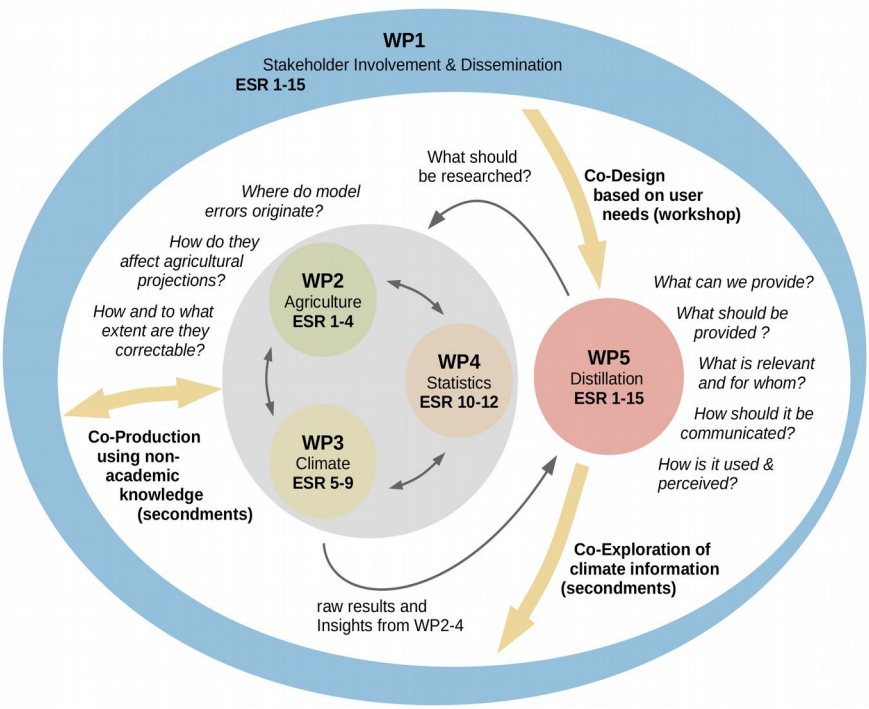

Fig 1. DECIFER Workpackages and involved ESRs.

DECIFER is interdisciplinary and integrates methodologies from agricultural science, meteorology, seasonal climate prediction and climate change research, statistics, philosophy and geography. Defining and learning a common vocabulary will thus be a key part of DECIFER (via workshops and interdisciplinary training schools).

A key element in DECIFER is the **integration of** climate information **users** in the project, from the proposal writing stage to the exploration and dissemination. DECIFER thus does not apply a top-down approach but rather an iterative process involving **Co-Design, Co-Production and Co-Exploration**. The overarching role of users is emphasised in the design of work-packages (WPs, see Fig. 1 and Table 1.1 below).

DECIFER is organised into five scientific workpackages addressing user involvement (WP1), agricultural, climatic and statistical aspects (WP2-4), and the overall synthesis and distillation considering also ethical-epistemic and social aspects (WP5).

Table 1.1: Work Package (WP) List

WP No.	WP Title	Lead Bene-ficiary No.	Start Month	End Month	Activity Type	Lead Beneficiary Short Name	ESR involvement
1	Stakeholder Involvement and Dissemination	3	1	48	user interaction, dissemination	CNRS	ESR1-15
2	Agriculture	9	1	48	research	UPM	ESR1-4
3	Climate	7	1	48	research	UCPH	ESR5-9
4	Statistics	4	1	48	research	PRED	ESR10-12
5	Distillation	6	1	48	research	UCT	ESR13-15 (all contrib.)
6	Management	1	1	48	management	UG	ESR1-15 (contrib.)
7	Training	8	1	48	training	UD	ESR1-15 (particip.)

Individual ESR projects (see also Section 3.1 & Table 3.1d) are organised such that no individual ESR depends crucially on the results of another ESR (e.g., by using existing data sets). Joint ESR research and interdisciplinary research across WPs will be facilitated by **interdisciplinary co-supervisors and interdisciplinary and intersectoral secondments**. In particular **WP5 is designed to integrate the results of the individual ESR projects into a coherent message**. Datasets used and generated in DECIFER are explained in Table X1.1.

WP1 is the anchor for all user interaction and dissemination activities. User needs will be integrated at the earliest stage by scientific debate during the kick-off meeting, and by early secondments. These are organised to better understand the requirements of our partners (e.g., the World Bank, FAO, and others), and to optimally link to their existing activities and projects. During the course of the project, secondments with non-academic partner organisations will enable the **co-production of user-relevant climate and agronomic information**. During the final phase, WP1 will build upon the results of all other WPs and work with the non-academic partner organisations to **co-explore, interpret and disseminate the results**.

WP2 will address uncertainties in **agricultural projections** (yield, other adaptation-relevant agro-information). The main objective is to understand how observational uncertainties, climate model errors and bias correction translate into uncertainties in agro-climatic indicators and yields. A key issue is to identify those variables most relevant for these uncertainties. Important foci will be the crossing of critical biophysical thresholds (i.e., critical

temperatures depending on crop and phenological stage), the frequency and magnitude of extreme events, and their impact on risks/opportunities for crops.

Observational uncertainties will be addressed by (1) comparing remote sensing data derived from **multi-waveband satellite observations** from Copernicus Sentinel sensors and historical data (e.g. AVHRR, Meteosat) with **station-based observations** of mainly crop phenology (essentially timing, e.g. leaf area index), surface soil moisture and actual evapotranspiration in the MENASA (**ESR1**). A focus will be quantifying the scale gap between a typical climate model resolution and the target scale, and closing this gap by using downscaled remote sensing products. For the African regions, we expect missing data on some crop-specific critical thresholds. Here, we will assess uncertainties by sensitivity studies for these thresholds across a range of plausible values, derived from the literature and expert knowledge in collaboration with our partner institutions (**ESR4**, FAO, INRAT).

For agricultural projections, **two complementary modelling approaches** will be used: **ESR2** will use **process-based agricultural models** (DECIFER simulations and existing simulations from AgMIP & MACSUR), and **ESR3** will develop crop-specific **agro-climatic indicators (ACIs).** Models and indicators will be calibrated for our target countries (likely Spain, France, Italy, Niger, Tunisia, to be decided in consultation with partner organisations) and a small number of crops (sorghum, millet, maize, wheat, potentially others depending on partner organisations and data availability/quality for the calibration of models/indicators). ACIs are derived from hydro-meteorological data and represent crop-specific weather and climate stress throughout the growing season. They can easily be calculated for a wide range of crops and the whole MENASA regions. The results from both approaches will be compared over the target countries **(ESR4)**. Models and indicators will be driven with ensembles of raw and bias corrected climate model simulations (reanalysis driven RCM simulations, historical and future GCM and RCM-downscaled GCM simulations). **ESR2+3** will investigate the following issues: (1) the influence of different climate model errors and (2) different bias correction methods on agricultural simulations; (3) the occurrence of artefacts in agricultural simulations when attempting to bias correct severe model errors; (4) the potential added value of RCMs for agricultural modelling.

A key element of the WP is the **connection with distillation** (WP5): different approaches for generating agricultural impact assessments (in particular the process-based models and the ACIs) will be intercompared and analysed for their relative merits and weaknesses and their complementarity for agricultural impact projections and their uncertainties (**ESR4**). The agricultural model evaluation will have a **citizen science** component: In collaboration with the partner organisation UPA, farmers will inform us via a simple app (to be developed by **ESR2+3** and a programmer) about meteorological stress on their crop, and we will evaluate whether our tools correctly predict these conditions.

WP3 will provide the **physical climate science basis** for the agricultural projections and distillation. The main objective is **to understand major model biases and uncertainties** in meteorological and climatic processes relevant for crop yield in MED and NA, their time dependence, and how they affect climate projections. We will focus, at the large scale, on biases in teleconnections (**ESR5**) and the mid-latitude atmospheric circulation **(ESR6)** and the West African monsoon circulation (**ESR7**); and at the local scale on biases in soil-moisture temperature (**ESR8**) as well as soil-moisture precipitation feedbacks and convection (**ESR9**). ACMAD and INRAT with their knowledge of local climatic conditions will provide relevant input to the identification of these processes.

Large-scale errors will be analysed in existing GCM-based climate change (mainly CMIP5 and HighResMIP) and decadal prediction simulations, and local-scale errors in existing GCM and RCM (CORDEX-Africa, Euro-CORDEX and Med-CORDEX) simulations as well as in targeted short but very high-resolution sensitivity studies of selected time periods (individual events, specific seasons) carried out within DECIFER.

We will analyse which misrepresentations of processes cause biases in relevant surface weather variables in the MENASA, and to what extent such misrepresentations affect future projections (known as ‘emergent constraints’). Moreover we will investigate how biases in climate predictions and free-running climate projections are linked, i.e., what can be learned about the credibility of future projections from climate predictions. In contrast to IPCC-type multi-model-mean projections, credible and physically coherent storylines of future projections will be developed, conditional on plausible, but contradictory evolutions of competing driving processes (e.g., “tropical amplification stronger than polar amplification” vs. “tropical amplification weaker than polar amplification”).
For the large-scale processes, we will assess the added value of HighResMIP GCMs compared to standard GCMs. For soil-moisture feedbacks and convection, we will investigate the potential added value (compared to standard GCMs) of high-resolution GCMs, standard RCMs and the generated high-resolution convection permitting simulations. For large- and regional-scale processes, we will assess what the discrepancy between standard model ensembles (CMIP, CORDEX) compared to higher resolution models means for the credibility of projections based on these standard ensembles.

WP4 tackles all issues related to **statistical bias correction and developing evaluation diagnostics**. The overarching objective is to understand how and to what extent biases can sensibly be corrected, and how model ensembles are evaluated and selected to serve for impact studies under future climate conditions. Thus, the biases we analyse are biases in both meteorological and agricultural (AgM and ACI) variables.

We will address **which model biases** (specific misrepresented processes as identified in WP3) **are correctable** (**ESR10-12**), i.e., (1) for which severe model biases does the attempt to correct these biases introduce unacceptable artefacts (unwanted side effects in, e.g., spatial and temporal structure)? (2) which bias correction methods - in particular novel process-based approaches - could mitigate these artefacts, and to what extent? In particular we will address the question to what extent biases in the temporal structure are defensibly correctable.

Moreover we will **develop novel, process-based bias correction approaches,** based on machine learning approaches and more tracable statistical models. We will address whether the inclusion of physical predictors can improve state-dependent biases (e.g., El Niño/no El Niño, **ESR10**), biases in the temporal variability (e.g., wrong wet-day probability in a non-resolved valley; **ESR11**), and the representation of sub-grid-scale processes (e.g. convection; **ESR12**). Finally, we will **develop process-based evaluation diagnostics** (for potential model selection, **ESR10-12**). One aspect will be to understand the limitations of machine learning in the context of strong extrapolations under climate change conditions (**ESR10**). A key issue of this WP is to connect the distillation question to the model's ability in representing relevant processes controlling future changes in surface weather and their impacts on agriculture.

WP5 addresses the **overall synthesis and distillation.** It combines the results from WP2-WP4 and relates them with WP1. All ESRs are involved in this WP, in particular **ESR 4, 12, 13, 14 and 15** have a distinct distillation objectives in their projects. The main aim is to understand what defensible information we have about agricultural impacts in the MENASA, what information can responsibly be provided, and how research to provide this information can take account of the values and perceptions in the adoption of climate information.

From a natural sciences perspective, we will **combine the results from WP2-4** into defensible narratives of climate and agricultural change over the MENASA regions. In particular, we will identify and potentially resolve contradictions between different model simulations and ensembles, and quantify the signal-to-noise ratio of projected changes for relevant meteorological variables (**ESR13**); potentially reduce projection uncertainties by referring to the process-based model evaluation and (if possible) selection, and emergent constraints (**WP3, ESR5-9**); combine the knowledge gained on limitations and potential artefacts of bias correction (**ESR2-4,10-12**); and qualitatively combine complementary evidence from different model types (e.g., changes in large-scale processes in high-resolution GCMs and changes in regional processes in high-resolution RCMs) into narratives of plausible changes (**all ESRs**).

From an ethical-epistemic perspective (**ESR14**): given that climate models are imperfect representations of reality, used to simulate unobserved future conditions for which they cannot be directly evaluated, and that climate is a complex system involving processes at non-resolved scales, **what constitutes epistemically credible and defensible information?** How do and should the values of climate information users shape the scientific research question? How do scientific uncertainties create challenges for responsibly providing climate information? **What constitutes responsible provision of information in the face of these uncertainties?** Does responsible provision require more than that information be credible and defensible? Drawing on a theoretical framework that jointly attends to epistemic and ethical responsibility, these questions will be addressed in close collaboration with natural scientists for specific case studies.

From a social-science perspective (**ESR15**), we address how climate change information is and should be integrated, and how uncertainty is aggregated, communicated, understood and perceived by users and influencers. And how does this information have to be communicated or shared to be of relevance? A network meeting will be dedicated to discussing the results of WPs 2-4 and their synthesis, and to coordinating the collaboration.

1.1.3 Originality and innovative aspects of the research programme

A rapidly increasing amount of data from climate projections is published (e.g., CMIP, CORDEX, AgMIP, ISIMIP) and used in impact studies. Its application for adaptation planning and policy decisions is more and more operationalised by easily accessible online portals (e.g, CC knowledge portal of the World Bank, Copernicus Climate Data Store). But it is becoming recognised that **data is not the same as information**.

A series of WCRP and IPCC workshops as well as the CORDEX initiative therefore highlight the need for research on climate information distillation (CID) as "in terms of scientific societal relevance, arguably the leading and most pressing research challenge"[12]. But so far, research on and applications of CID are in their infancy. Few if any projects on climate change impacts have put CID at the core of their agenda. Here, **DECIFER aims to establish a research standard for CID**.

12 WCRP WGRC Expert Meeting on Climate Information "Distillation". 10/2014, Santander, Spain

Table X1.2: Innovative Research in DECIFER

How DECIFER goes beyond the State-of-the-Art. DECIFER will specifically...	WP
generate novel observational soil moisture, evapotranspiration and phenology data, and systematically assess the influence of observational uncertainties on agricultural modelling	2
assess how observational data quality and agricultural model limitations will affect the representation of specific crop processes.	2
contribute to distillation of agricultural information by systematically assessing the relative merits and weaknesses of process-based agricultural models and agro-climatic indicators, complemented by a literature review of other existing appproaches	2
analyse high-resolution HighResMIP GCMs and targeted convection permitting RCM simulations to explore deep uncertainties beyond those sampled by standard CMIP GCMs and CORDEX RCMs and thereby to better understand the limitations and credibilityof these models	3
assess the credibility of regional climate (and in consequence impact) projections for NA and SA by analysing model errors in key processes controlling regional climate such as the Hadley cell, ITCZ, Monsoonal circulation or Medicanes.	3
systematically identify bias correction limitations and develop an understanding of which climate model biases are correctable.	4
develop novel process-oriented bias correction methods and explore possibilities /limitations of machine learning approaches.	4
develop novel process-oriented model diagnostics for case-specific model selection	3/4
address the link between epistemic uncertainties and ethical questions in an end-to-end research project	5
integrate understanding of processes and model limitations into CID and address the full range of uncertainties from climate modeling to impact modeling to perception of information.	5
represent uncertainties in a novel way by constructing physically plausible storylines for climate and agricultural impacts by conditioning the results on different physically plausible, but contradictory future evolutions of key processes.	2,3,5

Definitions of and research on CID are still in their infancy, and therefore typically a minor project component only. Arguably the only project so far focussing on CID is the South African FRACTAL project (led by B. Hewitson, UTC, 2015-2019). The focus of FRACTAL is on decision-making processses in major cities across southern Africa; its climate information component concentrates on exploring observations and climate model projections rather than understanding model limitations and artefacts. Few publications on CID exist, limited to finding rather than understanding model contradictions[13].

The major advance beyond state-of-the-art is that DECIFER explicitly and in new and comprehensive ways links process understanding and limitations in simulating these processes, with the distillation of climate and climate impact information to reduce adaptation risks. The ongoing CMIP6 initiative emphasizes the timeliness of advancing our understanding of the causes and consequences of model biases. The upcoming 6th assessment report of the IPCC acknowledges this requirement in the context of CID in Chapter 10 (Linking Regional to Local Climate Change). Six DECIFER participants are lead or coordinating lead authors of this chapter, and DECIFER will provide critical guidance to the authors in this chapter.

A major barrier for CID is the traditional separation of scientific disciplines, reflected in the limited interaction between IPCC working group I (physical science basis) and II (Impacts, Adapatation and Vulnerability). As a result, projects on agricultural impacts of climate change (e.g., AgMIP, MACSUR, PESETA, C3S, AgriCLASS) essentially take the output from climate modelling projects (e.g., CMIP, CORDEX) as given, but do not consider climate model limitations and errors. Only in its most recent assessment report did IPCC WGII publish regional cross cutting chapters[14] that provide an integrated interdisciplinary view of regional climate change and its impacts. DECIFER follows this new spirit and sets a **new standard in climate information provision by using a transdisciplinary approach to integrating the expertise across disciplines along the full climate impact modelling and assessment chain.**

Over recent years a debate has arisen about the ethical aspects of climate information provision. **DECIFER goes far beyond traditional research ethics questions** as it links the ethical question to model uncertainties und thereby puts this debate into a broader ethical-epistemic context. There are significant barriers to the adoption of climate information in the decision space that relate to the value systems, decision contexts, time and space scales, and modes of communication. **DECIFER acknowledges and will give greater visibility to these barriers, and identify transdisciplinary approaches to overcome them.**

Specific innovative aspects of DECIFER regarding these broad advancements are listed in Table X1.2.

In summary, we believe **DECIFER is the first project that is sufficiently broad in its expertise and scope to seriously assess the degree of defensible information that can and should be provided about climate change impacts** on agriculture in the MENASA region.

1.2 *Quality and innovative aspects of the training programme*

DECIFER **aims** to educate a new generation of ESRs that understand the full breadth of user-focussed climate research. To optimally achieve this aim, the **training programme is explicitly co-designed with the DECIFER partner organisations**. Based on our own experience, discussions with the academic and non-academic project

13 e.g., Fernández et al. (2018), Consistency of climate change projections from multiple global and regional model intercomparison projects, Clim. Dynam., DOI 10.1007/s00382-018-4181-8.

14 Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, 688 pp.

partners and colleagues, and results from national and international projects (e.g., European Research Area for Climate Services, ERA4CS, JPI-Climate), we identified the typical job market for our graduates and the required **employability profiles** (Table X1.3). The training programme will be designed to optimally meet these profiles.

Table X1.3: Potential employment of DECIFER graduates

Sector & Discipline	Position (examples)	Required Profiles
Science	Climate modelling, climate dynamics, statistical climatology	Disciplinary knowledge, methodological skills, transferable skills, interdisciplinary and intersectoral work experience, experience with user engagement
Social Sciences/Geography	Human geography, communication science	
Humanities	Ethics, philosophy of Science, good knowledge in one scientific discipline,	
Climate/Agricultural Service Providers	Translators between climate and impact science and user needs, climate consultants	Solid background in climate, impacts & uncertainties; working experience with users; knowledge about user needs, transferable skills; inter-disciplinary and intersectoral work experience
Logistics (transport, retail, energy) Enviromental Consultancies Food Industry	Risk modellers, climate analysts, translators, consultants	
Government Agencies / International Organisations / Non-governmental Organisations / Insurance Companies	Risk modellers, climate analysts, translators, consultants	Additionally knowledge on Climate policy, climate economics

Starting with the kickoff meeting, the employability profile will be further specified and serve as a basis for the career development plans. The **programme will be continually revised** to account for these specifications as well as topical and emerging fields.
A multitude of **training gaps** limits the research and career success in these sectors. In addition to the persistent lack of education in transferable skills, these are

1. the **lack of interdisciplinary training and collaboration** in climate research, impeding the development of defensible climate information as key interdisciplinary knowledge is not considered;
2. the **limited intersectoral contact with users of climate information**, which limits the consideration of user needs and the understanding of transdisciplinary aspects;
3. ESRs are **not trained as autonomous, entrepreneurial actors** with the relevant experiential knowledge. They are not well prepared to develop an independent research profile and career vision, to identify and address training needs, and thus have difficulties developing a career as independent scientists;
4. **a strong gender disparity, which has not been sufficiently addressed**. This includes awareness raising with both female and male researchers as well as targeted career training and networking for women.

To address these training gaps DECIFER pursues the following **training objectives**:

TO1	To provide the most stimulating international environment for excellent research, in particular also for female researchers, and to educate a new generation of leading experts.
TO2	To provide interdisciplinary training to overcome the structural separation of disciplines in climate research and thereby have sustained impact on the research and decision making process.
TO3	To train the ESRs in novel interdisciplinary questions and approaches including climate information distillation, storylines, ethical-epistemic questions and communication of climate information.
TO4	To expose the ESRs to different work environments across sectors and thereby raise awareness of user needs, and to increase their employability by building an inter-sectoral career network.

We **envision** that DECIFER graduates become **independent, creative and entrepreneurial researchers** with (1) excellent disciplinary knowledge, (2) a broad interdisciplinary overview to develop their own independent research profile in topical and emerging subjects, (3) high-level methodological understanding to easily tackle technical challenges, (4) intersectoral and interdisciplinary work experience to understand user needs, to collaborate with stakeholders and to pursue a career in non-academic climate services in NGOs, government agencies, international institutions and private companies, (5) a solid background in transferable skills and relevant knowledge in open science, RRI, intellectual property rights and ethical issues, (6) leadership qualities and considerable perseverance in following their objectives.

We will follow the **EC Principles for Innovative Doctoral Training.** In particular a supervisory agreement will be signed by all supervisors and ESRs, an individual career development plan will be developed for each ESR and continually revised (Section 1.3), and the ESR's progress will be monitored by the supervisory committee (Section 3). The ESR recruitment will follow the **Code of Conduct for the Recruitment of Researchers** (Table 1.2a and Section 3.2).

Table 1.2 a Recruitment Deliverables per Beneficiary

Researcher No.	Recruiting Participant (short name)	PhD awarding entities	Planned Start Month 0-45	Duration (months) 3-36		Researcher No.	Recruiting Participant (short name)	PhD awarding entities	Planned Start Month 0-45	Duration (months) 3-36
1	SAND	UCPH	7	36		8	UPCH	UCPH	7	36
2	UPM	UPM	7	36		9/12	UG	UG	7	36
3/4/11	CNRS	U Paris Saclay	7	36		10	PRED	UCAN	7	36
5	BSC	U Politecnica de Catalunia	7	36		13	UCAN	UCAN	7	36
						14	UD	UD	7	36
6/7	UR	UR	7	36		15	UCT	UCT	7	36

1.2.1 Overview and content structure of the training

Our training addresses scientific knowledge, methodologies and transferable skills. Theoretical training is complemented by interdisciplinary and intersectoral work experience. Our partner organisations not only ensure the greatest scientific impact, but also provide optimal work experience and training. We will also liaise with external experts (academic and non-academic) from relevant national and international initiatives (e.g., as lecturers) to provide the best possible training.

In particular the training in transferable skills will build upon existing local courses to avoid unnecessary travel and to integrate the ESRs and the project into the home institutions. These **local courses will be open to ESRs from other beneficiaries (in case the corresponding courses are not offered there)**. Network-wide training will as far as possible be specifically organised and designed for the ESR needs at individual beneficiaries (e.g. by the Doctoral Academy at UG) and open to all DECIFER ESRs and further ESRs supervised by the beneficiaries. The requirements in terms of structured training and ECTS points differ between the beneficiaries. All beneficiaries requiring ECTS points will accredit those awarded during the scientific training courses (Table 1.2b) to avoid unnecessary extra work by the ESRs. Independent of the requirements at the home institutions, DECIFER requires the ESRs to follow mandatory courses of 16 ECTS. These requirements will be specified in the career development plans and referred to in the supervisory agreements. We will also encourage the ESRs to apply to existing relevant international training schools (if they fit, ECTS will be accredited).

Secondments are at the core of DECIFER and will be arranged with academic and non-academic participants (see ESR descriptions, Table 3.1d). They aim at knowledge exchange in **interdisciplinary cooperation and intersectoral work experience**. They are a key element in the **co-design** of the research programme, the **co-production** of the results and **co-exploration** and dissemination of the resulting climate information (see Fig. 1). For instance, the World Bank (WB) will invite ESRs as trainees to learn about the specific user needs in WB projects, ESRs will collaborate to provide information for these projects, and will integrate the produced information into the WB Climate Change Knowledge Portal. In particular the non-academic beneficiaries and partners will provide **experience in non-academic work environments**. The secondments will also help to create a career network and work with potential employers. Prior to the secondments, specific targets will be defined. The ESR will submit a **secondment report** demonstrating to what degree the targets have been met. The project manager will review the report and pass it on to the supervisory board as a **measure for quality assurance.**

Network-wide training (NWT) will integrate the Action by fostering collaboration and the development of a personal and trustful research network. The NWT will also be used to interact with existing initiatives at the national and international level (e.g., AgMIP, ISI-MIP, by inviting key people as lecturers). We will open NWT workshops and training schools to a limited number (5-10) of other ESRs from European countries. NWT events will, as far as possible, be organised back-to-back with other meetings to avoid unnecessary traveling.

An important element of our training will be **capacity building for Africa**. Together with the partner organisations ACMAD and INRAT we will select 3-4 ESRs employed as PhD students at northern African institutions to join our NWT activities. These ESRs will thus receive continual training, transfer high-level scientific knowledge to their home institutions and thus have a sustained impact on African climate research.

Several NWT events will be based on **interactive web-streaming**. All beneficiaries have ensured that they can offer this service. Additionally, an **internet platform** with forum and wiki functions will be set-up to foster the exchange and collaboration within the Action. The following events will be organised:

Table 1.2 b Main Network-Wide Training Events, Conferences and Contribution of Beneficiaries

	Main Training Events & Conferences	ECTS	Lead Institution	Contributing Institutions	Action Month (*estimated*)
1	Co-Design Workshop with Partners and Stakeholders	-	CNRS	All benef. and partner orgs.	9
2	Network Meetings	-	UG	All benef., partner orgs. invited	1,13,25,37
3	Regular Webinar (talks by ESRs/participants)	2	UD/UG	All benef., partner orgs. invited	monthly
4	Grand Challenges Webinar (invited keynotes)	-	UG	All benef., partner orgs. invited	4 per year
5	Introductory Interdisciplinary Training School	3	UR	All benef., ACMAD, DMI, FAO, HORTA, INRAT, JRC, WB	12
6	Advanced Interdisciplinary Training School	3	UCPH	All benef., ACMAD, DMI, HORTA, INRAT, JRC, WB	24
7	Science & Transferable Skills Webinars	1	UD/UG	All benef., FAO, HORTA	2-4 /year
8	Transfer. Skills Workshop on Communication	1	UCT	All benef., FAO, HORTA	19
9	Methodological Workshop 1 (Co-Production)	1	UCT	UCT, UG, CNRS, UCPH, UD, FAO, HORTA, INRAT	9
10	Methodological Workshop 2 (Programming)	1	UCAN	UG, CNRS, DMI, UCT, UPM, UR	9
11	Methodological Workshop 3 (Statistics)	1	CNRS	UG, PRED, UCAN, JRC	13
12	Methodological Workshop 4 (Interpreting Information)	1	UCT	UG, UCAN, CNRS, UCPH, UD, UR, FAO, JRC	25
13	Career & Women in Science Workshop	-	UPM	All benef.,FAO,HORTA,INRAT,JRC,WB	31
14	Guest Scientist Proposals	-	UG	All benef.	2 calls/year
15	Web Forum (Writing lab, journal club, etc.)	-	UG	All benef., partner orgs. invited	permanent
16	Dissemination Training School	-	CNRS	All benef., ACMAD, INRAT, WB	42
17	ESR International Workshop	-	BSC	All benef.	30
18	International Network Conference	-	UG	All benef., ACMAD, HORTA, INRAT,WB	42

Table X1.3: Content of the Training Activities

a) Network Wide Training Activities
Co-Design Workshop: 4 days (incl. Co-Design Training, MW1, see below), to fine-tune the training and research programme to optimally address user needs and enable the best interaction with the non-academic partner organisations. About two months after the ESRs commence their work.
Annual Meetings: 2 days; supervisory committee meeting (3h), ESR meeting (3h, org. issues, sharing experience, discussing collab.), scientific progress presentations, invited lectures (e.g, from relevant international initiatives), feedback discussion (on previous year).
Regular Webinar: presentations by ESRs and DECIFER participants. Broadcast via video streaming (available at all beneficiaries), interaction via Skype, Zoom or comparable software. Presentations will be made available via DECIFER webpage. Changes location regularly from beneficiary to beneficiary. During the first session, ESRs will be trained in holding webinars
Grand Challenges Webinar: as above, but invited keynotes (e.g., experts from partner organisations or relevant international projects). To provide inter-/transdisciplinary context and to liaise with international initiatives.
Introductory Interdisciplinary Training School: 5 days, to ensure a common interdisciplinary understanding. **Topics**: agriculture/climate in the MED & NA, agricultural and climate modelling uncertainties, bias correction and its limitations, needs of climate information users (in general, World Bank, FAO, HORTA, INRAT, etc.), epistemic aspects of climate modelling, ethical aspects of climate information provision, social aspects of climate-user interaction. Where appropriate with hands-on sessions or role games. Lectures will be available prior to the school to foster discussions. Supervisors may attend to broaden their interdisciplinary knowledge.
Advanced Interdisciplinary Training School: 5 days. Similarly to the introductory training school, but providing more in depth knowledge, in particular on - climate modelling (short introduction to primitive equations, finite differencing, parameterisations, evaluation, uncertainties), - climate analysis (observations and simulations, process understanding - see also statistics workshop MW3), - agricultural modelling (eco-physiological basis, process modelling, calibration and validation, uncertainties), - ethical-epistemic aspects (conceptual issues of model evaluation, ethics of uncertainty evaluation) - social-science aspects (methodologies for eliciting information and stakeholder engagement)
Science Training Webinars: to accommodate ESR requests and complement local training and the interdisciplinary training schools. If necessary, external experts will be invited. **Topics**: climate policy, economic aspects of climate change, ethical aspects of climate services, and other relevant issues.
Transferable Skills Training Webinars: to accommodate ESR requests and to fill gaps in local training. If necessary, external experts will be invited. **Topics**: responsible research and innovation, scientific misconduct, intellectual property rights, open science, and other relevant topics.
Transferable Skills Workshop on Communication: 2 days, on working with the media and stakeholder communication. Drawing upon own expertise and external experts.
Methodological Workshops: MW2 and MW3 for subgroups of ESRs: MW1: **Co-Producing Climate Information** (1 day, tools to work in an interdisciplinary project, stakeholder dialog, addressing user needs), integrated into Co-Design workshop (see above); MW2: **Programming in Climate Research** (3 days, R/Python, NetCDF, visualisation), back-to-back with Co-Design Workshop; MW3: **Statistics** (3 days, advanced regression models, extreme value theory, multivariate statistical models, bias correction methods) ; back-to-back with Annual Meeting;

MW4: **Interpreting Climate Information for Decision Making** (2 days, interpreting uncertainties and conflicting messages, using storylines); back-to-back with Annual Meeting. **A few additional courses may be organised on demand**. Additionally, ESRs may attend more in-depth existing courses at the participant's institutions (see local training below).
Career & Women in Science Workshop: 3-4 days. Day 1 (women only): sharing experiences, networking. Day 2 (women/men): discussion of day-1 results, presentations by major male and female academics/non-academics (role models, also external) discussing career paths, reasons for success, challenges. Presentations of potential employers (also beyond our partner organisations, e.g., representing insurance companies), networking. Day 3-4: training courses on entrepreneurial skills with individual coaching (e.g., developing research vision and profile, becoming independent researcher, leadership qualifications, challenges in founding an enterprise).
Guest Scientist Proposals: regular internal calls for ESRs to invite external guest scientists for small collaborative projects (up to 3000 EUR each, taken from DECIFER overhead). To train proposal writing and entrepreneurial skills.
Web Forum (Writing Lab, Journal Club, etc.): an online forum and wikipage (project internal) to share knowledge and ideas and to foster collaboration, e.g., ESRs could upload their paper drafts to receive feedback, relevant papers could be shared and commented on, projects and WP tasks could be discussed.
Dissemination Training School: 5 days. Based on the project outcomes, the project participants will train climate service providers (governmental, international institutions, NGOs, private companies), including lectures, hands-on sessions, discussions of specific case studies from the audience. The school will be jointly organised by senior participants and ESRs. The ESRs will practice teaching, management and entrepreneurial skills. Organised well before ESRs hand in thesis (see Table 3.1c).
ESR International Workshop: 2-3 days, organised by the ESRs. They are free to choose the specific topic, but it could contain both a scientific and a networking and career building component. The ESRs will train management and entrepreneurial skills. Prior to Annual Meeting (location selected by ESRs).
International Network Conference: 3 day, organised by whole Action. The aim is to present the Action results in a broad international science and stakeholder context, i.e., also external keynote speakers will be invited to give perspective presentations. Advice will be sought from international initiatives such as GEWEX & AgMIP.
International conference for representatives of climate change doctoral schools to discuss requirements, challenges, and new ideas for structured doctoral training in the field of climate change research.
b) Local Transferable Skills Training **The training manager (W. Parker) will oversee that all these courses are of comparable quality. If no appropriate local courses exist, ESRs will visit these courses at other beneficiaries.**
- scientific writing and presentation; proposal writing; teaching skills; - project management; leadership skills; team skills; multicultural awareness; gender issues. - intellectual property rights; responsible research and innovation; open science.

Local training will be the backbone of the Action. All beneficiaries offer MSc courses on relevant **disciplinary knowledge** (e.g., climate modelling at UR & UG, agricultural modelling at UPM). If needed, the ESRs may attend these courses. We will also send individual ESRs to existing relevant in-depth training courses (e.g. NCAS climate modelling school, CLM courses, BSC courses on computing and data analysis for climate modelling). Additionally, most of the teaching on **transferable skills** will be offered locally (e.g., DocAcademy at UG, mandatory at some institutions). We will require to visit a minimum selection of courses in accordance with the individual Career Development Plan. These courses may complement or deepen NWT events (see Table X1.3b): Additionally, the ESRs will have the opportunity to **train teaching, supervision, entrepreneurial and management skills in practice** (e.g., to co-supervise BSc/MSc theses; teach at a maximum of 15h per year; to apply for guest scientist funding, see also network-wide training; to coordinate network-relevant tasks, such as organising dissemination and outreach activities and assisting in WP management).

1.2.2 Role of non-academic sector in the training programme

The non-academic sector is central to the training programme. Two non-academic beneficiaries will provide valuable experience to the ESRs (via direct supervision, secondments, and the training programme) and at the same time benefit from the close interaction with leading academic experts. Non-academic partner organisations such as the World Bank, the FAO and HORTA have expressed specific interest in the results of DECIFER and are thus dedicated to the success of the research and the training. They will be involved in the **design of the training** (e.g., developing an employability profile and training courses) and in the training itself. Our non-academic beneficiaries and partners include different sectors ranging from **international organisations** to **private companies**.

The **intersectoral secondments** will be organised such that they maximise the benefit for the ESRs and the partners, i.e., they provide **real-life work experience**. At the World Bank, e.g., the ESRs will contribute to the Climate Change Knowledge portal and learn about international organisation and funding of climate adaptation projects. At HORTA, the ESRs will learn about strategic planning of major food companies and will gain insight into the work and requirements in **industry**. At the partners in Africa (ACMAD, INRAT), the ESRs will be confronted with **the specific challenges in developing countries** regarding climate change impact research and adaptation. For details on the planned secondments refer to the ESR descriptions (Table 3.1d).

Additionally, the non-academic sector will **contribute to the training**. For instance, WB and FAO staff will give a detailed insight into the structure, work, and user requirements of WB/FAO, and career options in the

organisation. But they will also contribute to lectures (e.g., adaptation and policy challenges). Also some partner organisations have offered **co-supervision** of ESRs (see table 3.1d; e.g., World Bank, JRC, INRAT, HORTA). The non-academic partner organisations are also key to the exploitation and dissemination of the results, e.g., via the World Bank Climate Change Knowledge portal or FAO publications (Sections 2.3/2.4).

1.3 *Quality of the supervision*

1.3.1 Qualifications and supervision experience of supervisors

All beneficiaries have endorsed the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers. BSC, UCPH, UD and UR have been awarded the HR Excellence in Research Award.

Table X1.4: Experience of Supervisors in DECIFER

Name, Role, Beneficiary	Supervision (number)			Citation Metrics		Other relevant expertise (examples, see also Section 5), (AR: assessment report)
	Postdoc	PhD	MSc	Citations	H-Idx	
D. Maraun Associate Prof. Goup Leader UG	6	7	10	2131 (WoS) 3457 (Google)	19 24	IPCC Lead Author (6th AR), Chair of EU COST Action ES1102 VALUE, co-chair of EURO-CORDEX distillation pillar, PI of 3 national and 3 international projects, co-PI of 4 nat. projects, member of doctoral school on Climate Change. He will be supported by **H. Truhetz**, expert in RCM modelling at convection permitting resolution.
F. Doblas-Reyes Research Prof. Depart. Director BSC	20	6	4	5898 (WoS) 10570 (Google)	39 50	IPCC Lead Authot (5th AR), Coord. Lead Author (6th AR), co-chair WCRP Working Group on Subseasonal-to-Interdecadal Prediction (2012-17), member Decadal Climate Prediction Panel (2012-), co-chair WCRP Modelling Advisory Panel (2018-), responsible of the PRACE Advanced Training Course "Earth Sciences Simulation Environments"
N. de Noblet Senior Scientist Group Leader CNRS	10	10	>10	7708 (WoS) 12156 (Google)	39 49	IPCC Lead Author (Special Report on Climate Change and Land); former deputy vice-president of the University Versailles Saint-Quentin-en-Yvelines; design of new interdisciplinary international Master “Climate, Land-Use and Ecosystem Services”; elected member of French Academy of Agriculture.
M. Vrac Senior Scientist Group Leader CNRS	13	7	9	2229 (WoS) 3586 (Google)	24 28	Member doctoral school “Sciences de l’Environnement” at University Paris Saclay; PI of 3 national/international projects, Co-I in 7 projects, member of >10 others; board member of the IPSL “Regional Climate and Environment” group; member of the IPSL “Climate Services” cell.
M. García-Díez Senior Scientist PRED	0	0	1	493 (WoS) 643 (Google)	8 11	PhD, responsible for research activities for meteorological and climate products (simulations and post-processing) at Predictia.
I. Sandholt CEO SAND	5	15	13	2912 (WoS) 4957 (Google)	25 31	Organizer of 7 international PhD summer schools; Head of Geography PhD school, U. Copenhagen (2006-07), Member of Copenhagen Global Change Initiative PhD school, U. Copenhagen (2002-05), Danish expert to the ESA Education Committee, Chair of the Danish SpaceAcademy
J. Gutierrez Research Prof. Group Leader UCAN	6	8	5	2240 (WoS) 5926 (Google)	26 39	IPCC Coord. Lead Author (6th AR); member of the University of Cantabria PhD School “Science and Technology program”; co-director of “data science” UC-UIMP Master program; participation in 9 EU projects; FAO consultant (climate change adaptation & food security). He will be supported by **J. Fernandez**, expert in regional climate modelling and analysis of large model ensembles.
B. Hewitson Professor Group Leader UTC	18	31	15	4057 (WoS) 33601 (Google)	28 49	IPCC Coord. Lead Author (3rd-6th AR); South African National Research Chair in Climate Change, Director Climate System Analysis Group. Co-chair WCRP Working Group on Regional Climate and IPCC Task Force on data and scenario support; PI on many research projects and international consortia (>€1 million/year).
J. Christensen Professor UCPH	8	10	22	9542 (WoS) 21391 (Google)	41 58	IPCC Lead Author (2nd & 3rd AR), Coord. Lead Author (4th & 5th AR); coordinator of EU FP5 PRUDENCE project, PI at FP7 IMPRESSIONS project; directed a multi-disciplinary national Centre for Regional Change in the Earth System (CRES) including advanced PhD training courses. ERC Synergy grant for project Ice2Ice.
W. Parker Associate Prof. Assoc. Director UD	0	5	5	446 (Scopus) 886 (Google)	12 14	PI for two projects on philosophical issues in climate science funded by the U.S. National Science Foundation; work stream leader in ERC Advanced Grant “Knowledge for Use”; Co-Editor-in-Chief of the British Journal for the Philosophy of Science.
M. Ruiz-Ramos Associate Prof. UPM	1	3	>10	707 (WoS) 1142 (Google)	12 16	Member of UPM master programme Technology for Sustainable Agriculture; PI of 4 national/3 international projects; scientific collaborator for the State Research Agency; Joint Programming Initiative for Climate (JPI-Climate) xecutive Committee member.
T.G. Shepherd Professor Research Division Leader UR	33	23	14	9194 (WoS) 13897 (Google)	41 63	IPCC Coord. Lead Author (Special report on Safeguarding the Ozone Layer and the Global Climate System); Chair of Graduate Studies, Physics, Univ. of Toronto (2005-2010); Fellow AGU and Royal Society of London; Chief Editor J. Atmos. Sci. (2001-2005); ERC Advanced Grant; Chair of Met Office Hadley Centre Science Review Group.

A.G. Turner Associate Prof. Group Leader UR	9	2		1083 (WoS) 2185 (Google)	17 23	IPCC Lead Author (6th AR), co-chair of the Global Monsoons Model Intercomparison Project, Associate Editor, Quar. J. Roy. Meteorol. Soc. (2014-), PI of Belmont Forum/JPI Climate Forum project "BITMAP".

All academic supervisors have substantial experience in research supervision and have successfully supervised several PhD students. Those with comparatively low supervisory experience have all completed **training courses on supervision**. Supervisory teams are composed of experienced senior supervisors and more junior supervisors so that the latter can actively learn from the former and improve their supervisory skills. In particular the main supervisor of the ESR hosted by PRED will be J. Gutierrez (UCAN), who has long-standing experience in PhD supervision. This arrangement will help the small enterprise PRED to build up supervisory experience at an international top level. Most supervisors are members of PhD schools and are thus **experienced in structured PhD education**.

To add a strong user perspective to DECIFER supervision, several **representatives of partner organisations** (A. Bucher, WB; H. Kanamaru, FAO; A. Toreti, JRC; A. Dosio, JRC; S. Galmarini, JRC; O.B. Christensen, DMI; P. Meriggi, HORTA) will act as third supervisor. All of them hold a PhD and have worked for several years in academia. In particular Toreti, Christensen and Galmarini are experienced in student supervision, and Bucher and Kanamaru regularly host academic secondments at their institutions.

The beneficiaries and supervisors are chosen such that they cover all relevant expertise for DECIFER, in particular **world leading expertise** in climate information distillation (B. Hewitson), atmospheric and climate dynamics (T.G. Shepherd, F. Doblas-Reyes), regional climate modeling (J. Christensen), terrestrial eco-systems (N. De Noblet), and **leading expertise** in climate monitoring (I. Sandholt), monsoon dynamics (A.G. Turner), statistical climatology (J. Gutierrez, D. Maraun, M. Vrac), agricultural modelling (M. Ruiz-Ramos), epistemology and ethics in a climate context (W. Parker).

All beneficiaries and supervisors are experienced in **international collaboration**, as documented by leading roles in EU projects (e.g., PRUDENCE, ENSEMBLES, AMMA, IS-ENES, SPECS, EUPORIAS, IMRESSIONS, EU-COST Actions ES1102 VALUE and CA17109 DAMOCLES, ERC Advanced Grant ACRCC, ERC Synergy Grant ICE2ICE). Several of these projects have a **strong transdisciplinary aspect** with intense stakeholder involvement (e.g., IS-ENES, EUPORIAS, IMPRESSIONS). Many of the beneficiaries have previously collaborated in stakeholder-funded projects, e.g., with the Worldbank (e.g., B. Hewitson) or the FAO (e.g., J. Gutierrez).

The two non-academic beneficiaries (both small enterprises) as well as co-supervisors from our non-academic partners additionally bring an **intersectoral and entrepreneurial perspective** into the PhD supervision.

1.3.2 Supervisory arrangements

Every ESR will have a **clearly identified supervisory team** (see table 3.1d), a main supervisor at the home institution and two co-supervisors. One co-supervisor has to be from a different discipline (potentially also from a non-academic sector) to optimise **interdisciplinary and potentially intersectoral supervision** (see also next Section). The ESRs will be enrolled in the PhD schools of the home institutions or in offical joint programmes with a partner University (Technical Univ. of Barcelona for BSC, Paris Saclay for CNRS); in all cases the main supervisor is formally allowed to **award the PhD**.

A **supervision agreement** will be signed by supervisors and ESRs listing duties and rights of supervisors and supervisees, including a reference to the career development plan. Supervisors and ESRs will receive a copy of the European Charter for Researchers and the European Commission Principles for Innovative Doctoral Training.

Within the first two months of the PhD work, a **career development plan (CDP)** will be written by the ESR and the main supervisor with input from co-supervisors (in particular addressing interdisciplinary aspects). The CDP will stimulate the development of an **entrepreneurial mind** of the ESRs by addressing the following questions: What do I want to achieve? How and in which sector can I best achieve it? What do I need to learn to achieve it? The CDP will be continually revised and adjusted to accommodate project requirements, individual performance, personal development, and changing career plans. The CDP will identify individual training gaps, compile a list of training courses to close these gaps, and plan for publications, participation in conferences and secondments. A key element will be interdisciplinary collaboration across the network and intersectoral secondments.

The main supervisor will be available for regular **dedicated research meetings**, within reason on demand, but generally at least every two weeks. The ESR's progress will be monitored by **regular supervisory meetings** (every 6 months, possibly via skype). During these meetings, the ESRs present their progress, discuss the next research steps, and identify training needs. From the second year onwards, career perspectives of the ESR will be discussed in the light of the previous performance and interests (including the discussion of funding opportunities after the PhD). The CDP may be adjusted accordingly. One of these meetings will serve for a **mid-term PhD review**. As a **quality assurance** measure, the ESR will submit a meeting report to the project manager, who reviews the report and passes it on to the training manager (TM, Section 3.2). In case of irregularities or need for improvements in the

supervision, the TM will provide **feedback** to the supervisors and discuss possible solutions. In case of persistent problems, the TM may contact the ombudsperson (see below).

An **ombudsperson** (Section 3.2) will help confidentially in persistent problems in the supervision, harassment and other cases of misconduct. Additionally, the **gender balance officer** (Section 3.2) will help to ensure equal opportunities and provide confidential support in cases of any kind of harassment.

Every ESR may choose a **mentor** (in accordance with local regulations, maybe partner or other beneficiary). Mentor and mentee will have bi-annual meetings (skype or informal side meetings at network-wide events) to discuss performance and career plans confidentially. Locally, the ESRs will be supported by a **buddy** (senior PhD student/postdoc) to get help during the first weeks with administration at the institution or beyond.

1.3.3 Quality of the joint supervision arrangements

As discussed above, every ESR will be supervised by a team of three supervisors (see Table 3.1d for names). The main supervisor will be expert in the research area of the ESR. One co-supervisor may complement this expertise within the broader field of climate science, the other will be from a different discipline. One of the co-supervisors will be from a different institution (partner or beneficiary). These arrangements will ensure that at least one supervisor provides an **independent view** on the ESR's performance and that **interdisciplinary supervision, in some cases intersectoral supervision** is given and optimised. The latter is a key element of DECIFER to educate ESRs who are strong in their discipline but at the same time overcome traditional disciplinary boundaries. The supervisory team will be built such that experienced **senior supervisors** complement the **more junior supervisors** with less supervisory experience.

1.4 *Quality of the proposed interaction between the participating organisations*

1.4.1 Contribution of all participating organisations to the research and training programme

Table X1.5: Training Contribution of Participants via Secondments

Shortname	Transfer of knowledge and skills via secondments	ESRs
UG	Bias correction, downscaling, convection permitting modelling, pseudo global warming experiments, process-based evaluation	1, 8, 11, 13
BSC	Seasonal to decadal climate variability, teleconnections, large-scale climate model errors	3, 6, 10
CNRS	Statistical bias correction, agro-climatic indicators, requirements of climate model output for impact modelling	1, 12, 15
PRED	Data mining, machine learning, professional software development, development of online portals, entrepreneurial perspective	8, 11, 12
SAND	working with remote sensing products, observational uncertainties, entrepreneurial perspective	13, 14
UCAN	Statistical analysis of large model ensembles, model evaluation	7, 12
UCT	Climate information distillation, stakeholder engagement via co-design, co-production & co-exploration, user perception	5, 6
UCPH	Regional climate modelling, climate variability and change	2, 13
UD	Ethical-epistemic aspects of climate research, how values influence research	7, 15
UPM	Agricultural modelling, bias correction in an agricultural modelling context	1, 3, 4, 9
UR	Atmospheric dynamics, Monsoon dynamics, large-scale climate model errors	9, 12, 14
ACMAD	Weather and climate over NA and SA, challenges of operational weather and climate service provision in developing countries	6, 7, 9
DMI	Regional climate modelling	2, 13
FAO	Agricultural modelling, food security, functioning and requirements of a global UN-organisation, climate and food policy	3, 10
HORTA	Strategic planning of investments at decadal scales in the food and agricultural sector, entrepreneurial perspective	4, 5
INRAT	Crop phenoology in NA, specific challenges for agriculture and food security in a developing country	2, 3, 4
IsardSAT	Remote sensing, working with remote sensing products, entrepreneurial perspective	2
JRC	Agricultural modelling, statistical modelling and bias correction, climate service provision for EC, European agricultural policy	5, 10, 11
UPA	Daily farmers life, user needs, impacts of weather stress on crop	2
WB	Climate service provision and knoweldge transfer by WB, planning and financing of adaptation projects in developing countries, functioning and requirements of the WB, policy and economic aspects of climate impacts	8, 9, 14, 15

Most of the participants have collaborated in interdisciplinary sub-groups previously, e.g., in EU H2020 projects (e.g. ENSEMBLES, IS-ENES, SPECS, EUPORIAS), in the EU COST Action VALUE, in CORDEX-ESD, in international projects (e.g. FAO-MOSAICC), or in an IPCC context (e.g. AR6). All participants are highly committed to the research aims and cover climate monitoring (SAND, IsardSAT), atmospheric and climate dynamics (BSC, UR), climate modelling (BSC, UCPH, UG, DMI), statistics, bias correction and distillation (UCAN, CNRS, PRED, UG, UCT; JRC), agricultural modelling (CNRM, UPM; JRC, FAO), epistemology and ethics (UD) and social sciences (UCT). This expertise is complemented by (non-)academic beneficiaries and partners representing different sectors: small enterprises (SAND, PRED), international institutions (WB, FAO), region specific institutions (JRC, ACMAD, INRAT), a farmers association (UPA) and industry (HORTA). Links between disciplines and across sectors are key to the success of DECIFER (see following Section).

All participants will contribute to the training programme. Each beneficiary will organise at least one network-wide training event. In particular all beneficiaries and several partners will contribute to the training schools and webinars (see Table 1.2b and letters of commitment, Section 7). Most partners will contribute to the career workshop. Each ESR will be exposed to the full network by (also interdisciplinary and intersectoral) secondments (see Table X1.5), training schools and workshops.

1.4.2 Synergies between participating organisations

Several DECIFER participants initiated a non-funded international activity (Bias Correction for Agricultural Modelling, BADJAM) to support the AgMIP initiative. One aim of DECIFER is to develop the scientific foundations for this activity. Additional **non-academic beneficiaries** and partners have been invited to optimally complement the existing expertise. Interdisciplinary collaborations are a key innovative element of DECIFER and **fill crucial gaps in climate research**: they bring together ESRs working on climate monitoring, process understanding, bias correction, distillation and impact modelling to increase the credibility of climate impact assessments; climate modelling, epistemology and ethics to understand our responsibility when providing uncertain climate information; and physical climate science and social sciences to provide data products that are relevant and understandable for users. Additionally, DECIFER has **non-academic partners** that have strong interests in the project results and contribute to the design of the research and the production and exploration of results from a **user perspective**. Collaboration will be optimised by joint **interdisciplinary supervision** and by **interdisciplinary collaboration** (across WPs and within WP5) and **intersectoral collaboration with non-academic partners** (both backed up by secondments). All **supervisors are enthusiastic to learn** about the involved fields beyond their key expertise and will engage in discussions with several other PhD students. As such, DECIFER will develop a blueprint for collaboration that covers the **full scientific breadth of climate service provision for agriculture by internationally leading experts.**

1.4.3 Exposure of recruited researchers to different (research) environments, and the complementarity thereof

As discussed above, **all ESRs will work in interdisciplinary collaborations between different institutions, and intersectoral collaborations with non-academic beneficiaries and partners.** These collaborations will be realised through secondments, complemented by regular video conferences and exchange via the internal internet platform. These collaborations are not only designed for training purposes, but are key to the integrated research approach of DECIFER as discussed in the previous section. ESRs will learn to work in interdisciplinary environments across physical sciences, humanities and geography, as well as in intersectoral environments with climate information users from international organisations, private companies and industry. The training programme will equip the ESRs with the necessary skills for this work.

We are confident that DECIFER will thus shape a new generation of researchers ready to face the coming challenges in climate impacts research and climate service provision (see also Section 2.1).

2. Impact

2.1 *Enhancing the career perspectives and employability of researchers and contribution to their skills development*

DECIFER will offer the ESRs unique opportunities to develop a career in or outside academia. The combination of interdisciplinary research experience, intersectoral work experience, network-wide training and development of an entrepreneurial mind will shape ESRs with an outstanding profile to become **leaders in academic research on climate change and related topics as well as in environmental consultancies, government agencies, international organisations, the insurance sector or related industries** (see also Table X1.3).

Impact through interdisciplinary research experience: our ESRs will work with leading experts in their disciplines and obtain a high-level disciplinary education and training. Moreover, DECIFER will help close an important structural gap: climate science is an inherently interdisciplinary problem and traditional education in meteorology and climate, statistics and - in the DECIFER case - agricultural sciences are not sufficient to provide fully defensible information for society. All researchers involved in generating climate information need to have substantial knowledge in all disciplines involved in DECIFER. But typically, climate scientists at best have a working knowledge in only two of these disciplines. DECIFER provides this interdisciplinary knowledge in its full breadth (via workshops and training schools, see also below) and collaborations with researchers from other disciplines to develop a practical interdisciplinary research experience, which will prepare our ESRs to tackle the challenges in climate impact research for adaptation planning.

Impact through intersectoral work experience: Our two non-academic beneficiaries will provide a direct intersectoral work experience to our ESRs. Moreover, DECIFER aims to become a best practice example of co-

design, -production and -exploration to develop information that is really relevant for users. The ESRs have the opportunity to experience in-depth collaboration with users throughout their work. We have carefully chosen our partners to optimize this experience. All partners have expressed clear interest in our project results, which will directly feed into the partner's project-specific or general work (e.g., the WB wants information for their knowledge portal and their project work in Africa, the FAO is interested in the concept of agro-climatic indicators and would feed our results into their general policy recommendations, HORTA may use the results to strategically plan investments in agriculture). Thus our ESRs will experience a real case of science-based co-production with high-level climate information users, both in leading international institutions and private companies. This intersectoral work experience will prepare our ESRs to successfully work in the whole range of climate service provision, be it in academia, on the user side, or both.

Impact through network-wide training: we co-designed the training programme with our partners, based on a clear idea of the typical academic and non-academic job market and employability requirements (Table X1.3). The training programme will also be individually tailored (through selection of workshops, webinars and local training) to each ESR's needs, as defined by the career development plan. The training will cover interdisciplinary scientific knowledge (complementing the research experience), scientific methodology (through workshops and local training, partly offered on demand), and transferable skills. The training will go beyond generic issues and also provide the ESRs with the broad context of climate information provision (e.g., policy issues). This training will complement and enhance the research and work experience and will equip the ESRs with the skills necessary for a successful career inside and outside academia.

Impact on independent entrepreneurial spirit: starting with the career development plan, the ESRs will be supported in developing an entrepreneurial spirit and a career vision. **Specific training activities** such as a lecture of our non-academic beneficiaries on "challenges funding an enterprise", the guest scientist proposals or the organisation of workshops will foster this development. The supervisors, all leading researchers in their fields, and the partners, all at relevant positions in important international institutions and private companies, will provide role models. This support will help the ESRs to become independent and mature actors, who will actively develop their future career.

2.2 *Contribution to structuring doctoral/early-stage research training at the European level and to strengthening European innovation capacity, including the potential for a meaningful contribution of the non-academic sector to the doctoral / research training*

Contribution to structuring ESR training at the European level: DECIFER will help to establish joint training standards following the EU Principles for Innovative Doctoral Training by the following measures and initiatives:

- The interdisciplinary and intersectoral training with a strong entrepreneurial perspective (Section 2.1) in DECIFER will act as **best practice example** for other doctoral training schools across Europe. In particular the integration of climate science, statistics, philosophy and social sciences, complemented by private companies, national and international organisations **act as a role model** for scientific training of climate service providers.
- Several DECIFER graduates will at some point become supervisors themselves and **act as multipliers** of good training practice across Europe.
- The network-wide training will be **open to an additional 5-10 excellent students from across Europe** (as well as 3-4 from Africa for capacity building) and thereby have a direct impact on ESR training at the European level.
- For the network-wide training, the **course material will be published open access** and foster the establishment of DECIFER standards in interdisciplinary ESR training at the European level.
- We will compile a **primer** from the material of our training courses and publish it as a book with a major international publisher (the students will be offered co-authorship, potential title: "**Climate Change and Agriculture - an Interdisciplinary Primer**") to promote inter- and transdisciplinary training.
- We will offer our introductory **training school as a regular event** after the end of the Action (funded by fees covering travel expenses of trainers, and updated according to new scientific insight).
- We will **invite representatives of the participating doctoral schools** to some of our meetings, to foster exchange of best practice in ESR training between the beneficiaries.
- Towards the end of the project, we will organise an **international conference for representatives of climate change doctoral schools** to discuss requirements, challenges, and new ideas for structured doctoral training in the field of climate change research.

Impact on European research and innovation capacity:

- With its research and training, DECIFER will **strengthen Europe's leading role in providing climate services**. See Table X1.2 for our anticipated scientific innovations.
- The interdisciplinary collaboration will in particular **support Climate Smart Agriculture** and contribute towards the aims of the European Partnership for Research and Innovation in the Mediterranean Area (PRIMA)

initiative towards sustainable agricultural production. The European Commission will directly be informed about innovations in DECIFER by our partner organisation JRC.

- The **Dissemination Training School** will increase the impact of DECIFER by educating researchers and non-academics in innovative approaches and techniques in climate change and agriculture.
- All participants (supervisors, ESRs, partner organisations) will build a strong and trustful network that will allow us to form new consortia around a well-developed team and jointly **apply for international competitive funding** (e.g., H2020, EU COST, ERC Synergy, Belmont Forum, Horizon Europe). In particular the ESRs will profit and may contribute with innovative ideas in consortia already at an early career stage.
- DECIFER **supports and draws from innovation in two non-academic beneficiaries** at an internationally leading level.
- DECIFER will develop **specific products to support operational climate service provision** and climate smart agriculture: development of novel bias correction and analysis methods (published as open source software), and new remote sensing products for agriculture
- DECIFER will **support decadal-scale strategic agricultural planning** of European food producers (with our partner organisation HORTA, who works, e.g., for Barilla) and thereby create direct economic value.
- DECIFER will generate new defensible **agricultural projections provided via the COPERNICUS data portal** and thereby support adaptation planning in the context of climate smart agriculture.

Contribution of the Non-Academic Sector: The non-academic sector plays a key role in DECIFER. Two non-academic beneficiaries are directly involved in ESR training, research and innovation (see previous paragraph), and bring an **entrepreneurial spirit** to the project. Additionally, the non-academic partners - e.g. the World Bank, FAO, HORTA - represent important users of climate information and play an integral role in the project: **they contribute to the co-design of the research questions and the training, and to the co-production and co-exploration of climate information.** They will use DECIFER results for **policy advice** and **economic planning** (Section 2.2.2/2.3.1). In particular, these partners will bring a non-academic perspective to the supervisory board (all), **host secondments** (all), and **contribute to workshops**, in particular the **career workshop** (all but one). But more importantly, they will offer the ESRs an invaluable work experience at leading international institutions and private companies (Section 2.1).

2.3 *Quality of the proposed measures to exploit and disseminate the results*

2.3.1 Dissemination of the research results

The main stakeholders of DECIFER are the scientific community, international and national organisations and agencies, as well as private companies. The results of DECIFER will first of all be disseminated to the scientific community via **presentations at major conferences** (e.g., EGU/AGU general assembly, AgMIP conference, Philosophy of Science Association Biennial Meeting, Adaptation Futures; every ESR is expected to present at least twice at major international conferences) and expert workshops, as well as in **leading disciplinary and interdisciplinary journals** (e.g., Nat. Clim. Change, Clim. Change, Agric. Forest Meteo., Field Crops Res., Glob. Env. Change, Brit. J. Phil. Sci., Clim. Pol., made available as preprints via **social media**, e.g. Researchgate). Also some training measures will foster dissemination: guest scientists, invited with ESR proposal grants, will act as information multipliers, and the **dissemination training school** will inform stakeholders. In particular the **capacity building programme** for Africa will have a long-term effect on our dissemination. **Offering our introductory training school as a regular event**, and publishing a **primer as a book** will be sustained means of dissemination.

Beyond these more classical approaches, our European and international collaboration enables a very broad dissemination beyond our own disciplines and beyond academia: first, our beneficiaries and partners are involved in **major international activities and networks** such as the IPCC, CORDEX, the Working Group on Regional Climate of the WCRP, the Vulnerability, Impacts, Adaptation and Climate Services (VIACS) Advisory Board of the WCRP, the Joint Scientific Committee (JSC) of the WCRP, the AgMIP initiative (comparison of agricultural models), the VALUE network (former COST Action on bias correction evaluation), and the Global Allicance for Climate-Smart Agriculture (GACSA; FAO, WB and UTC are members). DECIFER results will be presented and considered in these initiatives.

Co-production and **co-exploration** with our partner organisations play a key role in our dissemination strategy to ensure that the provided information is **translatable and trustworthy** across disciplines and sectors, such that it may be **relevant for decision making**. For instance, the World Bank will use relevant DECIFER results in their projects in the target countries, and publish them via its **Climate Change Knowledge Portal**. The FAO will use DECIFER results to promote better use of climate data for impact assessment in their global work (**influencing policy**, raising awareness, publications). At the country level, the FAO may use DECIFER results to **influence national climate change policy, adaptation plans, and contributions to the UNFCCC**. Our results will be taken up by JRC to **support the European Commission and European policy** with independent scientific

evidence. DECIFER results will thus likely influence policy decisions at a national and international level. But additionally, they will have a direct **economic value**. For instance, our partner **HORTA may use DECIFER results for adaptation planning** (Section 2.2.2). We will make our results available to the European **PRIMA project on food security in the Mediterranean**. In Africa, ACMAD and INRAT will play a key role for our dissemination by providing contacts with regional stakeholders.

To facilitate dissemination via our partners we will compile the most relevant results into a **summary for decision and policy makers**. DECIFER results will also be relevant for the AgMIP climate team (represented by JRC and the Science and Stakeholder Advisory Board) and the future assessment reports of the **IPCC**. In our dissemination products, we will highlight (in case they arise) **robust differences in climate change messages compared to previous assessments**, including a user-accessible narrative based on the developed storylines.

Our results will be published following the ideas of **open science**, i.e., open data, open access to publications, and open software code. In particular we will contribute to the **COPERNICUS C3S Climate Data Store**. This portal will provide a range of data products and scripts to post-process these data. We will apply for our scripts being uploaded as best practice examples, including guidelines on the provision of defensible data. For details on corresponding deliverables see Table 3.1b. All dissemination issues will be coordinated by an **outreach manager (N. de Noblet)**. She will appoint **task forces** for specific activities and to compile reports.

2.3.2 Exploitation of results and intellectual property

Given the societal relevance of our work, we pursue - as it is a more and more accepted standard in climate science - an **open science policy**. All relevant data, software code and publications will be made publicly available via open access (e.g., in github). A **data and intellectual property manager (J. Gutierrez)** will be responsible for questions of intellectual property rights, choosing appropriate general public (GNU) licenses for our products, and dealing with our partners on potential license issues. If companies wish to commercially use IP generated by academic participants, there will be a formal, agreed contract between each party (based on consortium agreement).

2.4 *Quality of the proposed measures to communicate the activities to different target audiences*

2.4.1 Communication and public engagement strategy

Climate change and food security are of high relevance for society. We will therefore design our measures such that they also reach a broad non-academic audience. Again, **co-production** and **co-exploration** with our partner organisations will ensure that the provided information is **translatable, trustworthy an relevant** also for a general audience in Europe and the MENASA.

The internet will play an important role for communicating our results. We will set up a **professional webpage** (coordinated by IT services at PRED in close cooperation with the outreach manager and project manager) to present the results to the general public. We will exploit our international and national networks and link the webpage with other climate change outreach pages (blogs, climate service centers, etc.). Building on experience of UCT from the FRACTAL project, we will develop **easily accessible graphics** to communicate scientific results. The idea is to prepare **easily understandable narratives** that link to the daily lives of different audiences, both online and in pdf-format for download. By focussing not only on multidecadal, but also decadal time-scales, we will provide information that is also relevant for individual farmers and their mid-term decision making. Similarly we will prepare a **short cartoon movie** and some **podcasts** that translates the major findings into understandable and relevant narratives. Here we will collaborate with our partners, in particular ACMAD and INRAT. Major results will be translated to Italian, French, Spanish, German and the major languages spoken in the MENASA.

The major results will further be communicated via **press reports** resulting from scientific publications. All participants are experienced in working with the media, and the ESRs will be encouraged to attend targeted courses and contribute to the preparation of press reports and resulting interviews. Additionally, we will communicate these reports via our partner organisations and other dedicated networks.

Engaging with the general public in a **two-way communication,** and raising awareness about the scientific process is important in times of growing scepticism against science. The participants and ESRs will be encouraged to set up a **blog** to interact with the public in a two-way communication (in English and other languages spoken by the ESRs). Similarly, we will engage with the public via **open science days, (European) researcher's nights and other public events** (e.g., organised by local museums). **Girls' days** at the beneficiary premises may additionally help to inspire girls to start a career in science. Finally, we have made good experiences with **local exhibitions** (e.g., by the doctoral school at the University museum of UG). We will encourage our PhD students to organise a similar event to present the DECIFER results to the general public (held at all beneficiaries, translated into the local languages). Specific deliverables will be listed in Table 3.1b.

The **outreach manager** will be responsible to coordinate the outreach activities. For bigger events, she will appoint specific **task forces**.

3. Quality and Efficiency of the Implementation

3.1 Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources

Table 3.1 a Description of Work Packages

WP Number	**1**	**Start Month 1 – End Month 48**
WP Title	**Stakeholder Involvement & Dissemination (Communication, Dissemination)**	
Lead Beneficiary	**CNRS**	
Objectives Co-Design the details of DECIFER research with users (represented by partner organisations), co-produce and co-explore defensible and salient information about CC impacts on agriculture in the MENASA, and disseminate and communicate the results.		
Description of Work and Role of Specific Beneficiaries/Partner Organisations (lead in bold): Task 1.1 Co-Design with partner organisations (CNRS; ALL contrib**)** choose/develop a suite of crop-relevant weather-sensitive indicators; identify relevant climatic and meteorological phenomena to be considered in the region.. **Task 1.2 Co-Production (UG**; ALL contrib**)** continual exchange about user needs and progress with partner organisations, e.g., via secondments. **Task 1.3 Co-Exploration (UCT**; ALL contrib**)** joint interpretation of future agricultural simulations in the light of uncertainties and user needs. **Task 1.4. Dissemination (CNRS**, UG; ALL contrib**)** organise dissemination activities, in particular: training school primer book (UR), dissemination training school (CNRS), WB climate change knowledge portal (UG/WB). **Task 1.5 Communication (CNRS**; ALL contrib**)** public outreach activities, in particular webpage (incl. movie/podcast) and public events.		
Description of Deliverables: D1.1 Set of co-designed (with partner organisations) weather sensitive indicators, per crop and region, Month 12, **D1.2** List of relevant climatic and meteorological phenomena, Month 12, **D1.3/4/5** Annual dissemination & communication report to SAB & REA, Month 12/24/36, **D1.6** Major results including podcast and movie published on webpage, Month 48, **D1.7** Dissemination Training School, Month 42, **D1.8** Book primer on training school lectures, Month 36, **D1.9** Evaluation of user-collaboration incl. SWOT analysis, Month 48, **D1.10** Impact assessment review incl. factsheets and summary for decision & policy makers, Month 48.		
WP Number	**2**	**Start Month 1 – End Month 48**
WP Title	**Agriculture (Research)**	
Lead Beneficiary	**UPM**	
Objectives Understand the sensitivity of agricultural impact assessments to observational errors and climate model biases, and the complementarity of agricultural modelling approaches (statistical/process-based).		
Description of Work and Role of Specific Beneficiaries/Partner Organisations (lead in bold): Task 2.1 Data Acquisition (SAND/CNRS, UOM**)** 2.1.1 observational data, 2.1.2 model data **Task 2.2 Observational data and scale gaps (SAND**/CNRS, UPM**)** 2.2.1 Uncertainty analysis across different data products for hydrometeorological variables. 2.2.2 Analysis of scale gaps between RCM scale and local target scale of impact-relevant meteorological variables. 2.2.3 establishment of observational data record based on state-of-the-art satellite data. **Task 2.3 Crop modelling (UPM**/CNRS**)** 2.3.1 Description of the target cropping systems. 2.3.2 Development of App to retrieve additional local validation data from farmers 2.3.3 Data retrieving and crop model calibration and evaluation (DSSAT, Aquacrop models). 2.3.4 Data retrieving, development and calibration and evaluation of agro-climatic indicators. **Task 2.4 Understanding the role of observational uncertainty for agricultural modelling (UPM**/CNRS, SAND, INRAT**)** 2.4.1 assessment of uncertainties in meteorological input data; 2.4.2 assessment of uncertainties in crop-specific thresholds and parameters. **Task 2.5 Applying and understanding bias correction of climate outputs for agricultural modeling (CNRS**/UPM, UCAN, UG**)** 2.5.1 Applying a set of bias correction methods (from VALUE project and others) to key variables affecting rainfed crop systems simulated by GCMs and RCMs. 2.5.2 Assessment of bias correction methods, RCM added value and crop model errors in crop modelling. 2.5.3. Relating biases in climate meteorological processes/variability to bias in crop simulations. 2.5.4 Quantifying benefit from bias correction to improve the accuracy of agricultural simulations (case study of IsardSAT outputs in GLORIOUS project). **Task 2.6. Multi-method assessment of agricultural impacts (CNRS**/UPM, SAND, PRED, INRAT**)** 2.6.1 Compare different methods for agricultural impact assessment. 2.6.2 Development of approach to combine methods. 2.6.3 based on this approach, generate agricultural projections for MENASA.		
Description of Deliverables: D2.1 report on scale gap between model output and user requirements, month 23, **D2.2** satellite-based, downscaled observational time series of crop phenology, surface soil moisture and actual evapotranspiration for the target-region, month 32**, D2.3** App to retrieve local data from farmers, month 23, **D2.4** agricultural model projections, month 35, **D2.5** report relating observational uncertainty, biases and climate model resolution in climate inputs to the quality of crop simulations, month 23, **D2.6** agro-climatic indicator projections, month 35, **D2.7** Literature review of agricultural modelling approaches, month 23, **D2.8** Report on complementarity of crop modelling and indicator approaches incl. general guidelines, month 35, **D.2.9** 8 scientific papers submitted, month 48.		
WP Number	**3**	**Start Month 1 – End Month 48**
WP Title	**Climate (Research)**	
Lead Beneficiary	**UCPH**	
Objectives Assess the credibility of climate change simulations for agricultural impact assessments across the MENASA regions by understanding the causes and consequences of climate model errors. Create plausible physically consistent storylines of regional climate changes.		
Description of Work and Role of Specific Beneficiaries/Partner Organisations (lead in bold): Task 3.1 Data acquisition (UCPH/BSC, UR, UG**)** model data. **Task 3.2 Characterisation of systematic errors of teleconnections in historical simulations and climate predictions (BSC**, UR contrib**)** 3.2.1 Analysis of mean systematic errors. 3.2.2 Characterisation of the main teleconnections and their systematic errors. **Task 3.3 Construction of physically plausible storylines of climate change conditional on the plausible, but contradictory evolution of key driving processes (UR**/BSC, UCPH, UG**)** 3.3.1 Characterize range of plausible future climates in MENASA for particular levels of global warming, including out-of-sample behaviour not represented by CMIP. 3.3.2 Assess plausibility of different storylines in terms of their drivers and potential dependence on model bias. **Task 3.4 Understanding regional-scale soil-moisture feedbacks under climate change and their model representation (UCPH**/UG, UR**)** 3.4.1 Assess soil-moisture temperature feedbacks in MENASA & their representation in climate models. 3.4.2 Assess soil-moisture precipitation feedbacks and convection in MENASA & their representation in climate models.		
Description of Deliverables: D3.1 Report on main GCM errors affecting meteorological variables relevant to crop modelling, month 23, **D3.2** Report on attribution of main GCM errors to process representation, month 35, **D3.3** Report on physically-coherent storylines of large-scale aspects of climate change over MENASA, designed to probe agricultural vulnerabilities, month 35, **D.3.4** Report on out-of-sample storylines, month 48, **D3.5** Report on range of storylines for West African monsoon at different global warming thresholds, month 23, **D3.6** Report on likelihood and mechanisms of physically plausible high impact scenarios for agriculture, month 35, **D3.7** Report on soil-moisture temperature feedbacks in MENASA in observations and climate models, month 23, **D3.8** Report on soil-moisture temperature feedback projections, **D3.9** Report on soil-moisture precipitation feedbacks and convection in MENASA in observations and climate models. month 23. **D3.10** High resolution pseudo global warming simulations for selected episodes, month 35, **D.3.11** 10 scientific papers submitted, month 48.		

WP Number	4	Start Month 1 – End Month 48
WP Title	**Statistics (Research)**	
Lead Beneficiary	**PRED**	
Objectives Understand the statistical correctability of climate model biases for agricultural modelling, improving bias correction methods and developing process-informed bias correction methods.		
Description of Work and Role of Specific Beneficiaries/Partner Organisations (lead in bold): Task 4.1 Data Acquisition (PRED/CNRS, UG**)** meteorological observations **Task 4.2 Assessing correctability of biases and skill/limitations of bias correction methods (UG**/CNRS/UCAN**)** biases in: 4.2.1 interannual variability; 4.2.2 spatial-temporal variability; 4.2.3 circulation errors and sub-grid variability. **Task 4.2 Developing new process-based bias correction (CNRS**/UCAN/UG**)** methods for: 4.3.1 biases in variability at different time-scales; 4.3.2 spatial-temporal variability; 4.3.3 sub-grid precipitation. **Task 4.4 Developing process-based evaluation diagnostics (CNRS**/UG/UCAN**)** for: 4.4.1 interannual phenomena; 4.4.2 circulation errors, 4.4.3 regional feedback and sub-grid processes. **Task 4.5 Develop an open R package implementing the resulting methods (UCAN/**CNRS, UG**)** for increasing research transferability and reproducibility.		
Description of Deliverables: D4.1 Development of process-based bias correction (BC) method, month 23, **D4.2** R package with BC methods, month 35, **D4.3** Development of multivariate BC method, month 23, **D4.4** Report on applicability of multivariate BC for different types of biases, month 35, **D4.5** Report on precipitation bias correctability, month 23, **D4.6** Development of combined BC/downscaling method, and process-based evaluation diagnostics, month 35, **D4.7** 6 scientific papers submitted, month 48.		
WP Number	**5**	**Start Month 1 – End Month 48**
WP Title	**Distillation (Research)**	
Lead Beneficiary	**UCT**	
Objectives Synthesise the results of WP2-4 to assess what defensible information we have about agricultural impacts in the MENASA. Understand what constitutes applicable information, and what information we can in principle provide based on climate and agricultural models, and how research to provide this information can take account of the values and perceptions in the adoption of climate information. Examine what it means to provide and communicate climate information in a responsible way, and how it is perceived by users.		
Description of Work and Role of Specific Beneficiaries/Partner Organisations (lead in bold): Task 5.1 Natural science aspects (UCAN, all**):** 5.1.1 Identify and potentially resolve contradictions between different model simulations and ensembles from WP2-4 . 5.1.2. quantify the signal-to-noise ratio of projected changes for relevant meteorological variables. 5.1.3 potentially reduce projection uncertainties by using (1) results of process-based evaluation to potentially reject implausible climate model simulations, and (2) emergent constraints. 5.1.4 combine the knowledge gained on limitations and potential artefacts of bias correction. 5.1.5 qualitatively combine complementary evidence from different model types (e.g., changes in large-scale processes in high-resolution GCMs and changes in regional processes in high resolution RCMs) into joint narratives of plausible changes. **Task 5.2 Ethical-epistemic aspects (UD**/UCT**):** 5.2.1 understand epistemic character of WP2-4 results; 5.2.2 how values and perceptions of climate information users determine the research needed to provide credible, defensible and relevant information in particular cases. 5.2.3. examine what it means to provide climate information in a responsible way, encompassing both ethical and epistemic responsibility and interactions between them, and considering the related notions of 'credible' and 'defensible' information. **Task 5.3 Social aspects (UCT**,DU**)** understand how uncertainty is aggregated, communicated and understood and perceived and negotiated by users of climate information.		
Description of Deliverables: D5.1 Report on contradictions and signal-to-noise ratio of climate and agricultural projections, month 23, **D5.2** Final ensemble storylines of bias corrected projections for the MENASA, month 35, **D5.3** Report on ethical-epistemic analysis of selected case-studies month 23, **D5.4** Report on operationalising responsible, value driven approaches to advancing climate information, month 35, **D5.5** Report on methods for climate information distillation to linking modelling and users, month 23, **D5.6** Report on methods for information and uncertainty communication and perception, month 35, **D5.7** 6 scientific papers submitted, month 48, **D5.8** Good practice guide on distillation & user involvement, month 48.		
WP Number	**6**	**Start Month 1 – End Month 48**
WP Title	**Management**	
Lead Beneficiry	**UG**	
Objectives To ensure a smooth and efficient overall and scientific management of DECIFER and to optimally support all beneficiaries in order to facilitate internationally leading science and top-level interdisciplinary, international and intersectoral training.		
Description of Work and Role of Specific Beneficiaries (lead UG): Task 6.1 Preparing Consortium Agreement, **Task 6.2** Recruiting ESRs and PM, **Task 6.3** Organising Annual Meetings incl. SAB meetings, **Task 6.4** Chairing Supervisory and Management Board, **Task 6.5** Managing the Budget, **Task 6.7** compiling Annual Science Report (input from all beneficiaries), **Task 6.7** Reporting to REA & SAB.		
Description of Deliverables: D6.1 Advertising ESR+PM positions, Month 1, **D6.2** Researcher declarations on conformity, Month 8, **D6.3** Consortium agreement, Month 2, **D6.4** Kickoff meeting report, Month 4, **D6.5** webpage online, Month 6, **D6.6/7/8** Annual scientific reports to SAB & REA, Month 12/24/36, **D6.9** Final scientific & training report, Month 48		
WP Number	**7**	**Start Month 1 – End Month 48**
WP Title	**Training**	
Lead Beneficiary	**UD**	
Objectives to ensure a high quality supervision, and a smooth and outstanding interdisciplinary, international and intersectoral training.		
Description of Work and Role of Specific Beneficiaries/Partner Organisations (lead in bold): **Task 7.1 (UD**/all contrib**)** Preparing Career Development Plans, **Task 7.2 (UD**/all contrib**)** Holding supervisory meetings, **Task 7.3 (UG**/UD**)** Checking ESR progress and secondment reports, **Task 7.4 (OB/GBO/UD)** resolving conflicts, **Task 7.5 (UD**/all contrib**)** Preparing training events, **Task 7.6** Organising secondments **(UD**/all contrib**)**		
Description of Deliverables: D7.1 Supervisory agreements, Month 8, **D7.2** Career development plans, Month 10, **D7.3/4/5** Annual training progress reports to SAB & REA, Month 12/24/36, **D7.6** PhD theses (submitted), Month 48		

Table 3.1 b Deliverables List

Scientific Deliverables						
Deliverable Number	**Deliverable Title**	**WP No.**	**Lead Beneficiary Short Name**	**Type**	**Dissemination Level**	**Due Date, Month**
D1.1	Set of co-designed weather sensitive indicators	1	CNRS	R	PU	12
D1.2	List of relevant climatic and meteorological phenomena	1	UG	R	PU	12
D2.1	Analysis of scale gap	2	SAND	R	PU	23

D2.2	Time series of phenology, soil moisture & evapotranspiration	2	SAND	OTHER	PU	35
D2.3	Citizen science app for local validation data from farmers	2	UPM	R	PU	23
D2.4	Agricultural model projections	2	UPM	OTHER	PU	35
D2.5	Agricultural model sensitivity to meteorol. input uncertainty	2	CNRS	R	PU	23
D2.6	Agro-climatic indicator projections	2	CNRS	OTHER	PU	35
D2.7	Literature review of agricultural modelling approaches	2	CNRS	R	PU	23
D2.8	Complementarity of crop model & indicator approaches	2	CNRS	R	PU	35
D3.1	Main GCM errors relevant to crop modelling	3	BSC	R	PU	23
D3.2	Attribution of GCM errors to process representation	3	BSC	R	PU	35
D3.3	Physically-coherent storylines of large-scale aspects	3	UR	R	PU	23
D3.4	Out of sample storylines	3	UR	R	PU	35
D3.5	Storylines for West African monsoon	3	UR	R	PU	23
D3.6	physically plausible high impact scenarios	3	UR	R	PU	35
D3.7	Analysis of soil-moisture temperature feedbacks	3	UCPH	R	PU	23
D3.8	Analysis of feedback projections	3	UCPH	R	PU	35
D3.9	Analysis of soil-moisture precipitation feedbacks	3	UG	R	PU	23
D3.10	High resolution pseudo global warming simulations	3	UG	OTHER	PU	35
D4.1	Development of process-based BC method	4	PRED	R	PU	23
D4.2	R package with bias correction methods	4	PRED	OTHER	PU	35
D4.3	Development of multivariate BC method	4	CNRS	R	PU	23
D4.4	Analysis of applicability for different types of biases	4	CNRS	R	PU	35
D4.5	Analysis of precipitation bias correctability	4	UG	R	PU	23
D4.6	BC/downscaling method, process-based evaluation diagnostics	4	UG	R	PU	35
D5.1	Analysis of contradictions and signal-to-noise ratio	5	UCAN	R	PU	23
D5.2	Ensemble of bias corrected projections for the MENASA	5	UCAN	OTHER	PU	35
D5.3	Ethical-epistemic analysis of selected case-studies	5	UD	R	PU	23
D5.4	Operationalising responsible, value driven approaches to advancing climate information	5	UD	R	PU	35
D5.5	Analysis of methods for climate information distillation	5	UTC	R	PU	23
D5.6	Methods for communicating relevant climate information	5	UTC	R	PU	35
D2.9/3.11/4.7 /5.7	6-10 scientific publications per WP submitted to peer-reviewed journals	2-5	UPM, UPCH, PRED, UTC	R	PU	48

Management, Training, Recruitment and Dissemination Deliverables

Deliverable Number	Deliverable Title	WP No.	Lead Beneficiary Short Name	Type	Dissemination Level	Due Date, Month
D1.3/4/5	Annual dissemination and communication report to SAB & REA (incl. stakeholder & general public events)	8	CNRS	R	PU	12, 24, 36
D1.6	Results published on webpage (incl. movie/podcast)	1	UG	PDE	PU	48
D1.7	Dissemination Training School	1-5/7	CNRS	PDE	PU	42
D1.8	Book primer on training school lectures (full draft)	1-5/7	UR	PDE	PU	36
D1.9	Evaluation of collaboration incl. SWOT analysis	1	CNRS	OTHER	PU	48
D1.10	Impact assessment review incl. factsheets and summary for decision and policy makers	1-5	CNRS	PDE	PU	48
D5.8	Good practice guide on distillation & user involvement	5	UTC	PDE	PU	48
D6.1	Advertising ESR + PM positions	6	UG	ADM	CL	1
D6.2	Researcher declarations on conformity	6	UG	ADM	CL	8
D6.3	Consortium agreement	6	UG	ADM	CL	2
D6.4	Kickoff meeting report	6	UG	R	PU	4
D6.5	Webpage online	6	PRED	ADM	PU	6
D6.6/7/8	Annual scientific report to SAB & REA (incl. scientific peer reviewed papers & conference contributions)	6	UG	R	PU	12, 24, 36
D6.9	Final project report	6	UG	R	PU	48
D7.1	Supervisory agreement	7	UD	OTHER	CL	8
D7.2	Career development plan	7	UD	OTHER	CL	10
D7.3/4/5	Annual training report to SAB & REA (incl. ESR progress and network-wide training events)	7	UD	R	PU	12, 24, 36
D7.6	International conference for climate PhD schools	7	UD	OTHER	PU	42
D7.7	PhD theses (submitted)	7	UD	OTHER	PU	48

Table 3.1 c Milestones List

No.	Title	Related Work Package(s)	Lead Beneficiary	Due Date, Month	Means of Verification
1	Consortium agreement signed	6	UG	4	Signed document
2	ESRs and PM recruited	6	UG	7	Contracts signed
3	Career development plan written	7	UD	11	CDP checked by PM and TM
4	Indicators co-designed/meteorological & climatic phenomena co-identified	1	CNRS	9	Developed at co-design workshop and report written.
5	First training school held	7	CNRS	10	Students have successfully participated in hands-on training (certificate)
6	Observational and model data acquired	2/3/4	SAND	12	Pre-processed datasets stored and shared.
7	Mid-Term PhD review passed	7	UD	25	ESRs have presented written scientific document (e.g. paper draft, technical report) at supervisory meeting
8	Agricultural simulations conducted	2	UPM	32	Simulations evaluated
9	RCM sensitivity simulations conducted	3	UCPH	30	Simulations evaluated
10	New bias correction methods developed	4	UCAN	36	Methods evaluated on test data
11	Dissemination training school prepared	1	CNRS	38	Venue, speakers and schedule set

Table 3.1 d Individual Research Projects

Fellow *ESR1*	Host institution SAND	PhD enrolment Y	Start date Month 7	Duration *36 months*	***D2.1 D2.2*** *(D1.1 D1.7 D1.8 D1.10 D2.5 D5.2 D5.5 D5.8 D7.1-D7.7)*
Project Title and Work Package(s) to which it is related: **Spatial scale gaps in meteorological data for the assessment of climate impacts in agriculture in semi arid environments (WP2/contrib to 1,3,4,5)**					
Objectives: (1) Assess the uncertainty of hydrometeorological observations across different, mainly satellite-derived, data products. (2) Investigate how and under which condition the approx. 12-50km scale of regional climate projections is relevant to project impacts on agriculture in semi-arid environments (by comparing the variability at this coarse scale with the local variability for irrigation vs. rainfed systems, plateaux vs orographically complex areas). (3) Establish a time series record of land surface variables (soil moisture and evapotranspiration, phenology) based on multi-waveband satellite observations from the Copernicus Sentinel sensors and historical data sets (e.g. AVHRR, Meteosat) for comparison with and evaluation of RCMs, and for the calibration of agricultural models. Main focus will be on agricultural impact related to surface water stress and water availability. (4) Contribute to the distillation of climate information.					
Expected Results: An uncertainty assessment of satellite-based observations for agriculture in semi-arid regions. A consistent time series of land surface parameters based on satellite observations for the MENASA, in particular the semi-arid sub Saharan Africa (and the Mediterranean North Africa. Establish the link and related sensitivities and uncertainties between Regional Climate Model scale and Impact Model scale (3 scientific papers envisaged)					
Planned secondments: UPM (M. Ruiz-Ramos, month 17, 1 month): observational needs for crop modelling; **CNRS** (N. de Noblet, month 18, 1 month, back-to-back with UPM): needs for calibration of agro-climatic indicators; **UG** (D. Maraun, month 27-28, 2 months): quantifying and statistically modelling spatial scale gaps.					
Enrolment in Doctoral degree: UPCH: Supervisor: I. Sandholt (SAND), co-superv.: J.H. Christensen (UCPH), N. de Noblet (CNRS)					
Fellow ***ESR2***	**Host institution UPM**	**PhD enrolment Y**	**Start date Month 7**	**Duration** ***36 months***	***D2.3 D2.4*** *(D1.1 D1.7 D1.8 D1.10 D2.8 D5.2 D5.5 D5.8 D7.1-D7.7)*
Project Title and Work Package(s) to which it is related: **Impacts of observational and model errors as well as bias correction on agricultural modelling (WP2/contrib to 1,3,4,5)**					
Objectives: (1) Identify the influence of observational weather and crop data quality on the representation of phenological processes in crop models, and the resulting uncertainties in climate change impact assessments of rainfed cropping systems; (2) identify the effect of bias correction of meteorological input simulations across a range of various bias correction methods on climate change impact assessments of rainfed cropping systems; (3) identify well performing bias correction methods, and their limitations in this context; (4) linking biases in meteorological processes/variability to biases in rainfed agriculture. (5) Contributing to the distillation of climate information.					
Expected Results: Guidelines and criteria on the impact of observational data quality, and how to select appropriate bias correction methods to use when modelling rainfed cropping systems. Quantification of the improvement of agricultural simulations by bias correction and the potential limitations of such corrections. App to retrieve data from farmers. Between 2 to 4 scientific papers showing case study results and general conclusions are envisaged.					
Planned secondments: UPA (J. Alejandre, month 11, 2 weeks): preparing farmer involvement for the App; **INRAT** (L. Radhouane, month 14, 1 month): assessing regional characteristics, expert assessment of crop parameters (jointly with ESR3); **UPCH/DMI** (J. Christensen, O. Christensen, month 19-20, 1 month with each): linking agricultural model biases with climate model biases; **IsardSAT**, L. Romero (month 27-28, 2 months): analyse GLORIOUS agricultural impact projections.					
Enrolment in Doctoral degree: Technical Univ. of Madrid. Supervisor: M. Ruiz-Ramos; co-superv.: N. de Noblet (CNRS), S. Galmarini (JRC)					
Fellow ***ESR3***	**Host institution CNRS**	**PhD enrolment Y**	**Start date Month 7**	**Duration** ***36 months***	***D2.5 D2.6*** *(D1.1 D1.7 D1.8 D1.10 D2.8 D5.2 D5.5 D5.8 D7.1-D7.7)*
Project Title and Work Package(s) to which it is related: **Impacts of observational and model errors as well as bias correction on agro-climatic indicators (WP2/contrib to 1,3,4,5)**					
Objectives: (1) Identify the influence of observational weather and crop data quality on the representation agro-climatic indicators, and the resulting uncertainties in climate change impact assessments of rainfed cropping systems; (2) operationalise the calculation of agro-climatic indicators for all regions and crops that are of importance for our stakeholders . This will allow rapid calculation of impacts, resulting from various scenarios. Those indicators are useful for stakeholders as they give access to changes in sowing and harvest dates, and to all meteorological stress that crops will face during their growing season. They do not directly inform on changes in yields, but rather on all climatically-relevant risks to anticipate adaptation. (3) assessment of the robustness of our outputs, through a better understanding of the chain of errors from the upstream error in climate scenario to the downstream error in the climatic impacts on crop functioning. (4) Contribute to the distillation of climate information.					
Expected Results: (1) operational tool to calculate agro-climatic indicators in all our chosen regions and crops. A technical guide will be set-up to help use the 'model' and to allow an increase in the number of crops / regions studied; (2) understanding of the role of observational uncertainty, and which variables are the most important to correct for this specific tool, and a measure of the risks of wrong interpretation of climatic impacts, leading to irrelevant					

adaptation measures. (3) Set of robust risk / opportunities for the range of crops and regions chosen, for the following decades as well as for the end of the century. (4) Development of 'dialog-methodology' to make our results immediately useful to stakeholders, as well as to embark them from the start of our work (2-3 scientific papers).

Planned secondments: INRAT (L. Radhouane, month 14, 1 month): assessing regional characteristics, expert assessment of crop parameters (jointly with ESR2); **UPM** (M. Ruiz Ramos, month 15-16, 2 months, back-to-back with INRAT secondment): to align collaboration, explore initial comparison of approaches; **BSC** (F. Doblas-Reyes, month 20-21, 2 months): linking agricultural model biases with climate model biases; **FAO** (M. Fujisawa, month 27-28, 2 months): exploring the use of agro-climatic indicators for FAO applications (jointly with ESR10).

Enrolment in Doctoral degree: Univ. Paris Saclay, Supervisor: N. de Noblet; co-superv.: M. Ruiz Ramos (UPM), H. Kanamaru (FAO)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	***D2.7 D2.8*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*
ESR4	**CNRS**	**Y**	**Month 7**	***36 months***	

Project Title and Work Package(s) to which it is related:
Combining expert knowledge and all available tools to better assess the impacts of future climate change on agriculture (WP2/contrib to 1,3,4,5)

Objectives: (1) review of all the literature available regarding the tools used to assess the impacts of climate change on agriculture; assessment of the usefulness of those studies for adaptation; (2) comparative evaluation and analysis of the different approaches used in agricultural impact research (e.g., crop models and agro-climatic indicators; bias-adjustment and response surfaces) to understand how complementary they are in terms of, e.g., contribution to uncertainty quantification and potentially reduction, based on existing (e.g., from AgMIP, BADJAM) and DECIFER simulations; (3) to propose a methodology to combine these approaches in an assessment, and to apply them to assess the risks agriculture will face in the future in at least one of our studied areas (with ESR2/3), (4) to contribute to distillation of climate information.

Expected Results: (1) thorough literature review of available tools and their usefulness for adaptation purposes; (2) quantification of agricultural projection uncertainties induced by imprecisely known crop-specific parameters and thresholds; (3) a comparison of the outputs from the two approaches developed within the project complemented by a thorough literature review on additional approaches (jointly with ESR1-3); (4) a methodology to combine the outputs from crop models with those from agro-climatic indicators to provide useful results to stakeholders; (5) an analysis of how the assessment is modified when combining several approaches compared to the individual assessments by ESR2/3 or by bias-adjustement alone (3 scientific papers envisaged) .

Planned secondments: UPM (M. Ruiz-Ramos, month 22-23, 2 months): comparison of agricultural modelling tools; **INRAT** (L. Radhouane, month 32, 1 month) local proof of concept of combined approaches. **HORTA** (P. Meriggi, month 37-38, 2 months): tailoring agro-climatic indicators on decadal time scales (with ESR5).

Enrolment in Doctoral degree: Univ. Paris Saclay, Supervisor: N. de Noblet; co-superv.: M. Ruiz Ramos (UPM), D. Maraun (UG)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	***D3.1 D3.2*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*
ESR5	**BSC**	**Y**	**Month 7**	**36 months**	

Project Title and Work Package(s) to which it is related:
Process-based analysis of the systematic errors in global climate predictions and projections (WP3/contrib to 1,2,4,5)

Objectives: (1) Characterise the systematic errors in climate predictions & projections, and (2) analyse them from a process-based perspective to inform bias-correction methods. (3) Contribute to development of process-based evaluation diagnostics and distillation of climate information.

Expected Results: 1) An analysis of the systematic errors in both climate predictions and projections, focusing on their commonalities over the agricultural areas selected. 2) An estimate of the processes responsible for the main systematic errors, with a special focus on the errors in the most relevant teleconnections (ENSO, AMO). 3) An approach to inform bias correction processes and users about the relevance of the main global-model systematic errors to limit the reliability of the climate information required by agricultural applications (2-3 scientific papers).

Planned secondments: UCT (B. Hewitson, month 22-23, 2 months): to engage in the climate distillation process and discuss the usefulness of systematic error information (jointly with ESR12); **JRC** (A. Toreti, month 27-28, 2 months): linking climate model biases with agricultural model biases on seasonal to decadal scales; **HORTA** (P. Meriggi, month 37-38, 2 months): providing decadal climate information for agricultural planning (with ESR4).

Enrolment in Doctoral degree: Univ. Politécnica de Cataluña (UPC), Supervisor: F.J. Doblas-Reyes, co-superv.: J.H. Christensen (UCPH), P. Meriggi (HORTA)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	***D3.3 D3.4*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*
ESR6	**UR**	**Y**	**Month 7**	***36 months***	

Project Title and Work Package(s) to which it is related:
Constructing plausible storylines of large-scale climate change (WP3/contrib to 1,2,4,5)

Objectives: Understand the range of plausible future climates in the MENASA region by means of: (1) Use CMIP/HighResMIP climate model output to construct storylines of change in climate impacts relevant for agriculture, conditional on plausible, but contradictory evolution of large-scale drivers. (2) Contrbute to the development of process-based evaluartion diagnostics, and evaluate the credibility of the contributing climate model simulations w.r.t key physical drivers. Use results from high-resolution models, or observed relationships, to consider possible 'out-of-sample' storylines. Develop storylines of observed changes (e.g. role of internal variability) that are consistent with the future storylines. (3) Identify potential emergent constraints linking present model biases to the climate change signal to reduce projection uncertainties. (4) Contribute to the distillation of climate information.

Expected Results: Plausible, physically-coherent storylines of large-scale aspects of climate change over the MENASA, designed to probe agricultural vulnerabilities, and expressed in terms of different global warming levels. Identification of model simulations reflecting these storylines, which could be used for downscaling (2-3 scientific papers).

Planned secondments: UCT (B. Hewitson, month 20-21, 2 months): development of climate narratives; **BSC** (F.J. Doblas-Reyes, month 32-33, 2 months): assessing reliability of projections; **ACMAD** (E. Adefisan, month 38, 1 month): user translation of storylines (with ESR7).

Enrolment in Doctoral degree: Univ. of Reading**,** Supervisor: T.G Shepherd, co-superv.: F. Doblas-Reyes (BSC), W. Parker (UD)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	***D3.5 D3.6*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*
ESR7	**UR**	**Y**	**Month 7**	***36 months***	

Project Title and Work Package(s) to which it is related:
Quantifying and attributing key uncertainties in projections of the West African monsoon (WP3/contrib to 1,2,4,5)

Objectives: Determine the range of plausible future climates in the West Africa monsoon and Sahel domain at societally-intelligible levels of global-mean warming (e.g. 1.5/2.0C) from different experiment designs in RCMs and coupled GCMs. CMIP5/6 climate model outputs will be used to construct storylines of change in climate impacts relevant for agriculture (especially water availability), including frequency and intensity of rainfall and monsoon onset. Plausibility of storylines will be assessed based on the dominant driver in comparison to observed trends and any dependence on model bias. Determine robustness of a given storyline to internal variability, i.e. determine the robustness of the extent or lack of climate signal to decadal modes. Use results from new high-resolution models (e.g. HighResMIP, or Future Climate For Africa convection permitting experiments) to see if there are climate surprises due to unrepresented physic, and explore 'out-of-sample' storylines (physically plausible high-impact scenario) based on large ensemble experiments. Contribute to the development of process-based evaluation diagnostics and the distillation of climate information.

Expected Results: plausible, physically-coherent storylines of large-scale aspects of climate change over the West Africa monsoon/Sahel, designed to probe agricultural vulnerabilities, including of physically plausible but low probability high-impact scenarios, expressed in terms of different global

warming levels. Identification of model simulations reflecting these storylines, which could be used for downscaling (2-3 scientific papers).

Planned secondments: UCAN (J. Fernandez, month 20-21, 2 months): assessing changes in West African climate variability; **UD** (W. Parker, months 29-30, 2 months): responsible communication of low likelihood but high impact projections for West Africa; **ACMAD** (E. Adefisan, month 38, 1 month): user translation of projected changes in West African monsoon (with ESR6).

Enrolment in Doctoral degree: Univ. of Reading**,** Supervisor: A.G. Turner, co-superv.: J. Gutierrez (UCAN), A. Dosio (JRC)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	
ESR8	**UCPH**	**Y**	**Month 7**	***36 months***	***D3.7 D3.8*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related:
Understanding regional soil moisture - temperature feedbacks (WP3/contrib to 1,2,4,5)

Objectives: (1) To test the sensitivity of modeled current temperature climate and climate change to specific descriptions of soil moisture in a hierarchy of climate models (CMIP and HighresMIP GCMs, CORDEX RCMs). Investigate effects of related model shortcomings on model realism and climate change signal and the consequent calculated impacts. (2) To investigate relationships between the soil schemes of regional climate models and simulated climate trajectories. (3) Contribute to the development of process-based evaluation diagnostics and the distillation of climate information.

Expected Results: Documentation of the effects of certain climate model limitations on calculated effects of climate change. Possibly, a determination of minimal requirements of climate model elements for sufficiently realistic agricultural simulations (2-3 scientific papers).

Planned secondments: UG (D. Maraun, month 20-21, 2 months): design of RCM sensitivity simulations; **PRED** (D. San Martín/M. García-Díez, month 33-34, 2 months): processing and analysing CORDEX simulations for MENASA; **WB** (A. Bucher, months 35-36, 2 months, back-to-back with PRED secondment): distilling information from CORDEX data for Climate Knowledge Portal (with ESR9), based on WB secondment of ESR14+15.

Enrolment in Doctoral degree: U. of Copenhagen, Supervisor: J.H. Christensen, co-superv.: O.B. Christensen (DMI), A. Bucher (WB). ESR8 will have desks at UPCH and DMI (10 minutes by bike).

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	
ESR9	**UG**	**Y**	**Month 7**	***36 months***	***D3.9 D3.10*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related:
Understanding regional soil moisture - precipitation feedbacks and convection, and their changes in a warmer climate (WP3/contrib to 1,2,4,5)

Objectives: (1) to understand regional soil-moisture - precipitation feedbacks and their impact on convection, (2) contribute to the development of process-based evaluation diagnostics, and evaluate how these feedbacks are represented in a hierarchy of climate models (CMIP and HighresMIP GCMs, CORDEX RCMs), and how value is added (also for the representation of changes) by convection permitting simulations (based on pseudo global warming simulations for individual events and seasons), (3) assess precipitation projections and their uncertainties in a hierarchy of climate models, (4) contribute to the distillation of climate information.

Expected Results: Improved understanding of the representation of soil-moisture precipitation feedbacks and convection and their response to climate change in semi-arid climates, in a hierarchy of climate models (including HighResMIP and CORDEX, 2-3 scientific papers).

Planned secondments: UR (A. Turner, month 15, 1 month): large- and mesoscale drivers of convection over NA; **ACMAD** (E. Adefisan, month 18, 1 months): selection of case study events, discussion of regional characteristics; **UPM** (M. Ruiz Ramos, months 29-30, 2 months): influence of soil-moisture dynamics representation in climate models on agricultural simulations; **WB** (A. Bucher, months 35-36, 2 months): distilling information from CORDEX data for Climate Knowledge Portal (with ESR8), based on WB secondment of ESR14+15.

Enrolment in Doctoral degree: Univ. of Graz, Supervisor: D. Maraun, co-superv.: A.G. Turner (UR), A. Bucher (WB)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	
ESR10	**PRED**	**Y**	**Month 7**	***36 months***	***D4.1 D4.2*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related:
Machine learning for process-based correction of time-scale dependent biases (WP4/contrib to 1,2,3,5)

Objectives: (1) To develop process-informed bias correction methods based on machine learning (inc. deep learning) models using processes well represented by GCMs and to assess their added value over existing bias correction methods focusing on temporal aspects, including inter-annual variability and trends. (2) To assess the seamless applicability of these methods and their limitations across temporal scales (climate predictions and projections) and whether the evaluation results from climate prediction (e.g., reliability) could be informative for climate projections. (3) To contribute to the development of process-based evaluation diagnostics and the distillation of climate information.

Expected Results: Assess the effects and added value of process-informed bias correction in temporal aspects of key variables, with special focus on those aspects and processes relevant in agriculture. Understand the applicability of machine learning approaches for climate change applications. Development of new process-conditioned bias correction methods and their coding in R (2-3 scientific papers).

Planned secondments: BSC (F. Doblas-Reyes, month 14-15, 2 months): systematic model errors in climate prediction and projections; **FAO** (M. Fujisawa, months 27-28, 2 months): influence of model biases on agro-climatic indicators (jointly with ESR3); **JRC** (S. Galmarini/A. Dosio, month 29, 1 months, back-to-back with FAO secondment): assessing climatic changes in MED for EC policy advise.

Enrolment in Doctoral degree: Univ. of Cantabria. Superv: M. García (PRED), co-superv: J.M. Gutiérrez (UCAN, formal supervisor), M. Vrac (CNRS)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	
ESR11	**CNRS**	**Y**	**Month 7**	***36 months***	***D4.3 D4.4*** *(D1.1 D1.7 D1.8 D1.10 D4.2 D5.2 D5.5 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related:
Process-based correctability of spatial-temporal biases (WP4/contrib to 1,2,3,5)

Objectives: (1) To develop a flexible a spatial and temporal (multivariate) bias correction methodology enabling to include physically-driven information. (2) To assess this approach by exploring different configurations and assumptions: e.g., quality of the GCM to correct, preservation or not of some GCM properties (inter-site and/or inter-variable and/or temporal). This assessment will be performed not only from the climate point of view but also from the perspective of the impacts on the agriculture simulations and indicators. (3) To contribute to the development of process-based evaluation diagnostics and the distillation of climate information

Expected Results: Better understanding of correctability of multivariate, spatial temporal biases. Multivariate bias correction method(s) and the associated R code(s); Guidelines for use both in climate and agricultural impacts studies (2-3 scientific papers).

Planned secondments: UG (D. Maraun, 2 months, month 20-21): assess limitations of spatial-temporal bias correction; **JRC** (A. Toreti/A. Dosio, months 32-33, 2 months): development/application of new bias correction method for MED; **PRED** (D. San Martin, month 39, 1 month): develop R software package (with ESR12).

Enrolment in Doctoral degree: Univ. Paris-Saclay (UPS), supervisor: M. Vrac, co-superv.: M. García-Díez (PRED), A. Toreti (JRC)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	
ESR12	**UG**	**Y**	**Month 7**	***36 months***	***D4.5 D4.6*** *(D1.1 D1.7 D1.8 D1.10 D4.2 D5.2 D5.5 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related:

Correctability and correction of precipitation biases (WP4/contrib to 1,2,3,5)
Objectives: (1) Identify relationships between local precipitation and large & meso-scale processes, attribute climate model biases in local precipitation to biases in these processes (with ESR6,7), and understand the influence of biases in these processes on the local climate change signal. (2) Understand the statistical correctability of local biases in presence of large & meso-scale biases. (3) Develop a process-based stochastic bias correction & downscaling approach to improve the representation of convective precipitation under climate change. (4) coordinate the development of process-based evaluation diagnostics and the distillation of climate information.
Expected Results: (1) a better understanding of the controls of local-scale precipitation variability, their response to climate change, and their representation in climate models. (2) a better understanding of the causes of precipitation biases and their correctability. (3) a stochastic model to to stochastically downscale and bias correct climate model output to local, spatially coherent precipitation fields. (4) A set of process diagnostics to evaluate the representation of precipitation in climate models (2-3 scientific papers).
Planned secondments: UR (T. Shepherd/A. Turner, month 17-18, 2 months): influence of circulation errors on bias correction (with ESR13); **CNRS** (N. de Noblet/M. Vrac, month 29, 1 month): influence of model errors on agricultural modelling; **UCAN** (J. Fernandez, month 38, 1 month): role of bias correction artefacts for distillation; **PRED** (M. Garcia, month 39, 1 month, back-to-back with UCAN): develop R software package (with ESR11).
Enrolment in Doctoral degree: Univ. of Graz. Supervisor: D. Maraun; co-superv.: I. Sandholt (SAND), B. Hewitson (UCT)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	
ESR13	**UCAN**	**Y**	**Month 7**	***36 months***	***D5.1 D5.2*** *(D1.1 D1.7 D1.8 D1.10 D5.5 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related: **Exploratory distillation of climate model projections for agricultural impact assessment (WP5/contrib to 1,2,3,4)**
Objectives: (1) quantify the signal-to-noise ratio of climate model projections for agriculture-relevant meteorological variables; (2) identify contradictions in a hierarchy of climate model projections of these variables, (3) link these contradictions to the representation of processes across the chosen hierarchy of climate models (with ESR12), (4) contribute to the distillation of climate information.
Expected Results: Improved understanding, and a comprehensive assessment of the congruence of climate projections for agriculture-relevant meteorological variables across a hierarchy of climate model simulations; comprehensive assessment of signal-to-noise ratio of these projections (2-3 scientific papers envisaged).
Planned secondments: UR (T. Shepherd/A. Turner, month 17, 1 month): understanding large-scale climate model errors (with ESR12); **UCPH/DMI** (J. Christensen/O. Christensen, month 22, 2 weeks with each): understanding small-scale climate model errors; **SAND** (I. Sandholt, month 23, 1 month, back-to-back with UCPH/DMI): role of observational uncertainties for distillation; **UG** (D. Maraun, month 27-28, 2 months): developing distillation methods.
Enrolment in Doctoral degree: Univ. of Cantabria. Supervisor: J.M. Gutiérrez, co-superv.: J. Fernandez (UCAN), B. Hewitson (UCT)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration** *36*	
ESR14	**UD**	**Y**	**Month 7**	***months***	***D5.3 D5.4*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.5 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related: **Concepts and Practices for Responsible Provision of Climate Information (WP5,6,1/contrib to 2,3,4)**
Objectives: (1) To articulate an account of responsible provision of climate information, attending to both epistemic and ethical responsibilities and their interactions; (2) to consider how responsible provision is related to the prominent notions of 'credible' and 'defensible' information; (3) to analyze how scientific uncertainties create challenges for enacting these responsibilities; (4) to clarify the ways in which user value systems can legitimately shape methodological choices in the development of climate information products. (5) Contribute to the distillation of climate information.
Expected Results: A better understanding of responsible provision of climate information; guidelines for responsible provision of climate information, which in turn can aid practitioners.
Planned secondments: UR (T. Shepherd, month 22, 1 month): climate science and modelling; **SAND** (I. Sandholt, month 28, 1 month): role of observational uncertainties; **WB** (A. Bucher, month 32-33, 2 months): responsible climate information provision for NA (with ESR15).
Enrolment in Doctoral degree: Univ. of Durham. Supervisor: W.Parker; co-superv.: D. Maraun (UG), T. Shepherd (UR)

Fellow	**Host institution**	**PhD enrolment**	**Start date**	**Duration**	
ESR15	**UCT**	**Y**	**Month 7**	***36 months***	***D5.5 D5.6*** *(D1.1 D1.7 D1.8 D1.10 D5.2 D5.8 D7.1-D7.7)*

Project Title and Work Package(s) to which it is related: **Distillation, Communication and Perception of Information and Uncertainty (WP5,6,1/contrib to 2,3,4)**
Objectives: Understand how knowledge and information regarding climate change at the regional level is and could optimally be integrated into the user context, in particular with respect to how uncertainty is aggregated, communicated and ultimately understood and perceived and negotiated by 'users' and 'influencers' at the decision scale.
Expected Results: Guidelines for integration and distillation of climate change knowledge and information. Understanding of how information is understood and perceived by users. Methodologies to communicate information to be perceived as relevant, and of engagement (e.g., stories) to link modelers and users.
Planned secondments: UD (month 18, 1 month): values and user perception; **WB** (A. Bucher, months 32-33, 2 months): develop means for user uptake of information (jointly with ESR14); **CNRS** (N. de Noblet, month 34, 1 month): distillation of climate change impacts on crops.
Enrolment in Doctoral degree: Univ. of Cape Town, Supervisor: B. Hewitson, co-superv.: W. Parker (UD), D. Maraun (UG)

3.2 Appropriateness of the management structures and procedures

3.2.1 Network organisation and management structure

All beneficiaries have extensive expertise in coordinating research projects, and many have coordinated major international consortia and initiatives (e.g., IPCC, WCRP, CORDEX-ESD, EU-FP6/7/H2020 projects). The coordinator (D. Maraun) has successfully chaired the EU COST Action VALUE and several other international projects. Based on this experience, we have designed a management structure following **three principles**:

(1) a nimble and efficient structure allowing for fast decisions; (2) a transparent structure that democratically supervises the decision process (3) a fair structure that appreciates the interests of all participants and has mechanisms implemented to avoid or deal with scientific misconduct and harassment.

The aim is to guarantee an inspiring and trustful working environment. As a result, DECIFER will have three permanent bodies, event-specific task forces, and a limited number of managers and officers.

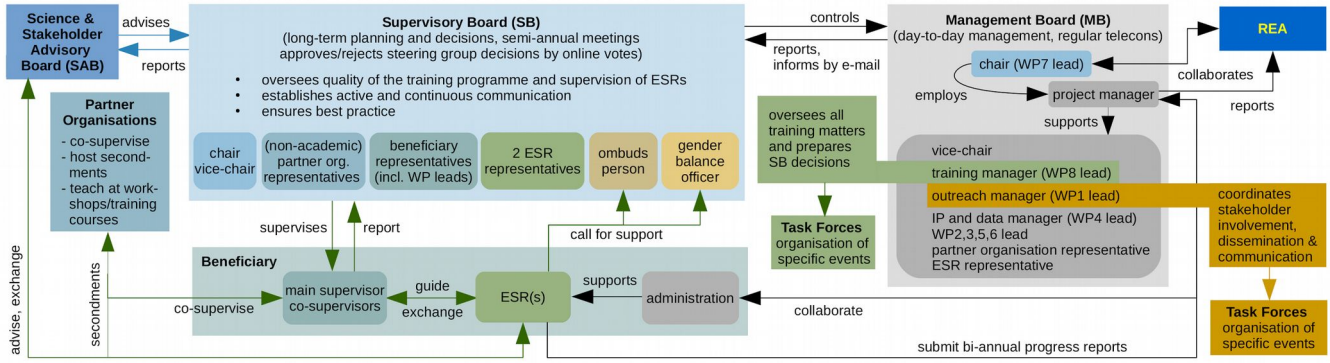

Fig. 3: Management structure of DECIFER.

Supervisory Board (SB): the SB is responsible for the long-term planning of the action. It will oversee the quality of the programme and research, in particular the supervision of the individual ESRs, and establish an active and continuous communication. It will ensure a balanced training programme, the exchange of best practice, and the involvement of the non-academic sector. Consensus is sought. In cases where consensus is not possible, decisions will be made by a simple majority.

The SB will meet once a year. Additionally, decisions may be drawn as e-votes via the project internet platform (with a two weeks notice, no vote counts as positive vote). The SB appoints and controls the management board (MB) of the Action (see below). All major MB decisions have to be approved or rejected by the SB.

The SB will be **chaired by the coordinator** (D. Maraun, see below) and a **vice-chair** (T. Shepherd). Every beneficiary and partner will send a representative (including the training and outreach managers and the WP leaders), the ESRs will send two representatives (1 male, 1 female). Additionally, the ombudsperson and gender balance officer will be members of the SB (see below). Within the SB and Management board (see below), the training manager (TM) will oversee the overall training.

Management Board (MB): the MB manages the action on a day-by-day basis. It convenes during all network-wide meetings, and additionally via teleconferences when matters arise. The MB is **chaired by the coordinator** to ensure a smooth progress of the Action. The coordinator employs a project manager (see below) to support the work of the MB. Additionally, five managers will serve on the board: the vice-chair, the IPR and data manager, the training manager (TM), the outreach manager (OM), a partner representative and an ESR representative. For details on the individual managers see below. All MB decisions (simple majority, may also be drawn by e-vote as in the SB) have to be approved by the SB.

Science and Stakeholder Advisory Board (SAB): the SAB is an **independent** body appointed to critically advise the Action. The members are (letters of support, Section 7): **Alex Ruane** (NASA, AgMIP initiative, Agricultural Science), **Joseph Darron** (UK MetOffice, Climate Science, Climate Services for Africa). The SAB will have joint meetings with the SB (in person or virtual) once a year to advise on co-design, review the progress of the Action and to give recommendations for future planning.

The **coordinator (WP7 lead, D. Maraun)** coordinates and is responsible for the whole action. He chairs the SB and MB meetings, oversees whether the overall training and research runs smoothly and according to schedule, and whether the overall budget is managed properly. He is the responsible contact with the EU H2020 officer in Brussels. The **vice-chair (Ted Shepherd)** has a trustful relationship with the coordinator and will discuss all relevant issues with him. He will stand in when the chair is not available.

The chair employs a **Project Manager (PM)** at UG (50-75% postdoc position, funded by overhead contributions of all beneficiaries). The PM will carry out all day-to-day tasks of the action such as: keeping deadlines in mind, preparing meetings, writing minutes, serving as contact point for the administration of all beneficiaries, contacting the REA on day-to-day issues, preparing reports for the EU, supporting all MB managers, and reviewing the supervisory meeting reports of the ESRs for the TC. The PM will have a background in one of the relevant disciplines at the PhD level, but will have opted for a career in research management.

The **Training Manager (TM, WP8 lead, W. Parker)** is responsible for all training activities. She will ensure that the supervision of all ESRs is running smoothly and that the training meets the requirements expressed by the ESRs and the project. She will coordinate all training-related issues relevant for the whole network (appointing task forces for training events, discussing adjustments of the training programme, giving feedback to the supervisory teams, calling the ombudsperson or gender balance officer, etc.). The TM will also contact the PhD schools at the beneficiaries in case of issues with accrediting network-wide training courses.

The **Outreach Manager (OM, WP1 lead, Nathalie de Noblet)** is responsible for the interaction with partners, external stakeholders, and the general public. She will coordinate the dissemination and communication activities of the action and will appoint **task forces** to organise specific events.

The **IPR and data manager (IM, WP4 lead, J. Gutierrez)** is responsible for all intellectual property rights related issues and coordinates the publication of DECIFER data.

The **Ombudsperson (OP, F. Doblas-Reyes)** is responsible to ensure that DECIFER follows the European Code of Conduct for Research Integrity. The OP may be called by any Action participant in case of any type of scientific misconduct (also authorship, plagiarism, and misuse of seniority by a supervisor). If desired by the complainer, the OP may arrange a meeting of the involved parties. The complainer may also call the gender balance officer for a joint meeting. All issues will be treated confidentially by all involved parties. If a conflict cannot be resolved, however, the OP may - if desired by the complainer, bring the case forward to the supervisory board. If local OPs are in charge, the DECIFER OP will collaborate to ensure that local procedures are respected.

The **Gender Balance Officer (GBO, I. Sandholt)** is responsible for all issues relating to gender, equal opportunities and harassment. The GBO may be called by any Action participant (male/female) in any gender-related case. Procedures as for the OP. The GBO has the mandate to oversee and to initiate actions to ensure gender balance. The GBO will attend a training course on her duties in the beginning of the project.

3.2.2 Financial management

UG has considerable expertise in managing big national (graduate schools, collaborative research centers) and international (EU FP6/7/H2020) research projects. UG has a research management and service unit with more than 20 staff members to support researchers and project coordinators in administrative, legal, financial and controlling matters. Moreover, the Wegener Center (the coordinator's institute) has, in addition to its regular administrative staff, a project manager dedicating 16 h per week to the coordinators research group. The chair and PM will closely collaborate with this support staff to ensure a smooth and professional management of the Action.

Financial management will be overseen by the coordinator. Day-to-day management, the prompt transfer of payments to participants and preparation of financial statements will be coordinated by the PM with support from the above-mentioned support staff. Up to 50% of the management overhead of all beneficiaries will be transferred to the coordinator to ensure a professional action management, in particular to employ the PM. Reimbursement of all partner organisations will be handled centrally by UG to ensure smooth reimbursement procedures.

3.2.3 Recruitment strategy

All beneficiaries have endorsed the European Charter for Researchers and Code of Conduct for their Recruitment and will follow its principles in the recruitment process. The recruitment process will commence immediately after a positive evaluation. Advertisements are expected to be published after one month, application deadline will be after 2½ months. The selection process is expected to be finished after 4 months. The start of the individual ESR projects is envisaged for month 7, but the project duration of 48 months gives some flexibility.

Advertisement and Recruitment: all positions (including the PM) will be advertised jointly via EURAXESS, discipline specific mailing lists (e.g., CLIMLIST, Metjobs, AgMIP, DSSAT, philos-l, climate-l, list of relevant master courses around Europe), via the individual participants networks and other relevant networks (e.g., START, ACPC, Climate Research for Development in Africa). We will not advertise in scientific journals as these channels are not yet relevant at such an early career stage. The actual advertisement will give a transparent and clear description of the positions (via links to downloadable pdf-documents) including the knowledge and competencies required and the working conditions at the corresponding beneficiary. The advertisement will include a general description of DECIFER, the involved partners and the training programme. Equal opportunities will be highlighted. In particular it will be emphasised that measures will be taken to reconcile family and work.

The actual recruitment will be local. Each applicant should submit their application to one specific beneficiary only, clearly indicating the position applied for, but may give alternative positions as second choice. A beneficiary may then during the selection process transfer the application if the applicant gives their consent. This mechanism will in particular be used to transfer strong female candidates (in case they are not ranked first) to improve the overall gender balance.

Selection: the selection will be conducted by a selection committee, chaired by the main supervisor and additionally comprising the (interdisciplinary) co-supervisors and the local GBO. Additionally, (non-academic) partners hosting the ESR and a female representative (from the beneficiary or a partner) may join the selection committee. This composition ensures a competent but diverse, interdisciplinary and intersectoral expertise. Initially, applications will be screened using eligibility criteria based on Marie Curie rules for mobility and research experience. Candidates will be shortlisted based on the required knowledge and skills, the overall CV, and the results section of their MSc thesis. Interviews (in person, if desired by the candidate also via skype) will be conducted in a fair and constructive way, with the intention to engage the candidate in a scientific discussion about their previous work and potential work in DECIFER. The aim of this discussion will be to assess the candidate's intellectual capacity, enthusiasm and potential.

3.2.4 Progress monitoring and evaluation of individual projects

All beneficiaries have an outstanding international reputation and are experienced in running big projects and supervising ESRs. To ensure smooth progress, we will implement the following monitoring mechanisms.

At the beneficiary level: the main supervisors are responsible for the training and research progress of each ESR. Regular meetings discussing the research will ensure a good guidance of the ESR and awareness of the supervisor about the progress. The 6-monthly supervisory meetings guarantee a regular monitoring with external co-supervision. The structure of these meetings will be well defined: specific mid-term goals will be defined and revisited, the CDP will be revisited, training gaps will be identified and measures to fill these gaps will be decided. The project tasks, milestones and deliverables will be checked and serve as targets for mid-term planning.

At the network level: the chair is responsible for the overall research and training progress, the monitoring is supported by the PM. The TM is responsible specifically for the training progress, the WP leaders for the research at WP level, the OM for all dissemination and communication issues. All ESRs will present their research at the regular webinar and once per year at the network meetings. Additionally, the PM will review the 6-monthly written ESR-reports of the supervisory meetings (max. 3 pages) and highlight potential delays and issues to the TM. The TM will review all critical issues. If necessary, she may get in touch with the ESRs and their supervisors, or bring the case forward to the full SB. In case of poor ESR performance, the supervisory team as a whole may confidentially contact the TM. The WP leaders will monitor tasks, milestones and deliverables and report to the SB and MB in case of delays. The chair, with input from the WP leaders and SB members and the support of the AM, will prepare an annual report to be submitted to the SAB. In a dedicated progress session at a network meeting, the SAB members will give detailed feedback on the progress and suggest adjustments and improvements. Also the (non-academic) partners will give feedback at these meetings.

Progress Indicators: progress will be measured based on the: (i) achievement of milestones and publications of deliverables; (ii) number and in particular quality of ESR publications and presentations at conferences and workshops; (iii) growing independence and maturity of the ESRs during the action; (iv) usefulness of the secondments for both parties; (v) uptake of the results by non-academic partners and other stakeholders.

3.2.5 Risk management at consortium level

A Consortium Agreement will be finalised and signed before the signature of the grant agreement with the EC following funding of DECIFER. Issues that will be specified in the Consortium Agreement will include (but not be limited to) (i) handling of confidential information, (ii) procedures and remedies for dealing with defaulting partners, (iii) usage rights for IP generated in DECIFER by partners who withdraw from the project before its completion, (iv) settlement of disputes that cannot be resolved by the SB, (v) duties of the SB and the SAB, (vi) role of the project coordinator and supervisors including a draft supervisory agreement, (vii) schedule for report and meetings, (viii) IP protection and licensing and (ix) financial management of the EU contribution. If disputes cannot be resolved by the procedures laid out above (with the involvement of the OP, GBO, TC and SB), the chair will consult with legal experts at UG and potentially the EC. A list of potential risks is given in Table 3.2a.

Table 3.2a Implementation Risks

Risk No.	Description of Risk	WP No.	Proposed mitigation measures
R1	Delay in recruitment	WP7	Early and broad advertisement of positions, and synchronised recruitment (Section 3.2) to avoid this risk. Potentially readvertise individual positions and delay start of related ESR projects. SB to adjust timeline and tasks accordingly.
R2	WP leader/manager not sufficiently committed.	All	Feedback discussion with Chair, Vice-Chair, and, if desired, OP. *Ultima ratio:* SB to elect new WP leader/manager.
R3	Supervisor leaves project/is unavailable	All	Inform REA. If possible replace by qualified substitute from home institution, otherwise by remote supervision from another beneficiary (note that the partner organisations offered more co-supervision than currently required in the project)..
R4	Partner leaves project/is unavailable	All	Inform REA. SB to decide about re-allocation of tasks and secondments to other partners or substitute partner (to be detailed in Consortium Agreement)
R5	Poor performance of individual ESR	All	Intensive interaction between ESR, supervisors, TM, and coordinator to set appropriate actions (personal support, adjustment of tasks, setting new timelines and deadlines). Adaptation of CDP if required. *Ultima ratio:* replacement of ESR by better qualified/motivated candidate.
R6	Poor supervision; tension between ESR/supervisor	All	Intensive interaction between ESR, supervisor, OB & TM to solve problems. Adaptation of CDP if required. *Ultima ratio:* replacement of supervisor (as in R2).
R7	Unresolved conflict in network	All	To be solved by the strategies on consortium level outlined above in 3.2. If mediation by OP fails, REA will be informed and external help will be sought.
R8	Political instability in African target country	All	Switching activities to alternative target country in the region, in close consultations with the partner organisations active in the region.
R9	Brexit resulting in UK not eligible for H2020 funding anymore	All	HM Treasury has guaranteed payment of H2020 funds should the UK not be eligible for H2020 funding. Should this commitment be withdrawn, we will consult immediately with REA and re-allocate tasks and budgets to other beneficiaries. The UK supervisors may still act as external co-supervisors. Details will

			be given in the Consortium Agreement.
R10	Meteorological /agricultural calibration data not available/too poor for region/crop.	WP2/ WP4	This reflects reality and will affect the degree of credibility which can be provided. But if possible choose additional region or crop to demonstrate relevance of high quality data for distillation, in close consultations with the partner organisations active in the region.
R11	Model simulations not available (e.g. HighResMIP, CMIP6)	WP3	Choose CMIP5 and/or already available HighResMIP (or PRIMAVERA, its predecessor) simulations only. This reflects reality and will affect the degree of defensibility which can be provided.
R12	Problems with convection permitting RCM simulations	WP3	Experienced modellers will support the ESRs and well-maintained high-performance supercomputing facilities are used (via PRACE) to minimise the risk. In case of problems with chosen episodes, switch to other episodes.
R13	Not all results available for distillation	WP5	If results from individual projects arrive too late, they will not be formally included in the distillation, but only expert guesses based on preliminary results. This will of course affect the degree of defensibility.
R14	Delay with milestones/deliverables	All	Overseen by PM. MB to propose appropriate actions to SB (repetition of individual studies, adjustment of timeline, reformulation or re-allocation of tasks). Inform REA.
R15	Delay in secondments	All	Some secondments might be delayed due to unforeseen reasons (supervisor unavailable, delays in the PhD progress, etc.); secondments will be rescheduled in coordination with those partners involved in hosting the ESR.

3.2.6 Intellectual Property Rights (IPR)

Fair principles of intellectual property (IP) and joint ownership of collaborative work will be recognised by supervisors and ESRs in line with the Consortium Agreement and Code of Conduct for Researchers. All participants will sign a Consortium Agreement before the signature of the EU grant agreement following DECIFER funding. The Consortium Agreement will regulate, inter alia, publication, confidentiality and ownership of IP rights. IP will lie with the inventors, not the consortium, and institutions will make mutually acceptable agreements to protect the rights of parties. Each ESR will enjoy royalty-free access to the knowledge required for their activities and negotiation on IP rights will not affect training. If companies wish to use IP generated by academic participants there will be a formal, agreed contract between each party.

3.2.7 Gender Aspects

All beneficiaries are dedicated and have formalised equal opportunities policies. A GBO (I. Sandholt) will oversee all gender aspects in the action and has the mandate to initiate actions to ensure gender balance.

Recruitment: we aim for 50% female ESRs. Announcements will be written to explicitly and seriously encourage women to apply; it will be emphasised that measures will be taken to reconcile family and work. Selection committees will have at least two female participants. The acting Action GBO will have to approve the overall selection to ensure gender balance. She may ask to reconsider the selection in case of a strong gender imbalance at the action level. In this case, the supervisory board will be called in to reconsider the applications of strong female candidates.

During the project phase: 31% of the main supervisors and 3 out of 7 WP leaders are female. We will aim for 50% female SB members, but at least 30%. All major female scientists will all act as role models. In particular we will organise a “women in science workshop” to raise awareness of gender issues (also for male ESRs), provide further role models, and to share experiences, identify problems and discuss solutions, and to enable networking. We will support in particular female ESRs by offering - if required - child care at all network-wide events (the availability for child care will be a criterion for selecting event locations), helping with finding kindergardens locally, and planning meetings such that they are easily attended by parents. Male ESRs are encouraged to contribute to family work and child care (e.g., parental leave). Home office and flexible work hours will be offered to balance family and work.

3.2.8 Data management plan

Given the relevance of our work for society, we pursue an open access and open data policy.

Open Access: all resulting peer-reviewed scientific publications will be published in open-access journals, or pdf-versions of accepted manuscripts will be uploaded in open access repositories. A repository number for each publication will be provided in the action reports, links will be given from the DECIFER webpage. All guidelines, reports and outreach documents will be published with open access on the DECIFER webpage.

Open Data: our IP and data manager will be responsible for all data issues. All relevant data generated by DECIFER beneficiaries and ESRs will be shared publicly. This concerns mainly bias-corrected climate model and yield projections. We will follow standard CORDEX format requirements for the climate model data and provide them via the open access Earth System Grid Federation servers (esgf.llnl.gov) and the Open Data Journal for Agricultural Research. Relevant data will also be published via the World Bank Climate Change Knowledge Portal (www.worldbank.org/climateportal), which itself follows an open data policy.

Additionally, we will cooperate with the **COPERNICUS Climate Data Store** (CDS). This portal will provide a wide range of standard climate model data, including those we will use as a basis for our research (CMIP, CORDEX). The CDS will allow for online post-processing of this data via scripts, providing some approved best

practice example scripts. We will provide our post-processing scripts (e.g., evaluation, bias correction, analysis) and apply for them being published as best practice examples.

3.3 *Appropriateness of the infrastructure of the participating organisations*

All hosts have excellent physical infrastructure and state-of-the-art equipment to successfully fulfill the work programme. Details of the research and training facilities and roles/profiles of partners are described in Section 5. All ESR will have a desk located not far from the main supervisor. The administrations of all beneficiaries are experienced in managing research projects, in particular also of EU-funded projects. All beneficiaries have institutions (or closely collaborate with Universities) that regularly offer training courses including training in transferable skills. Internet-streaming facilities for webinars are available for DECIFER at all beneficiaries. The partner organisations regularly host secondments, in particular the FAO, JRC and WB. All academic beneficiaries have welcome offices helping the ESRs with administrative issues.

3.4 *Competences, experience and complementarity of the participating organisations and their commitment to the programme*

3.4.1 Consortium composition and exploitation of participating organisations' complementarities

All beneficiaries are leading experts in their respective fields with an outstanding track record, some with a world-class reputation. They are experienced in managing big consortia as coordinators or WPs within consortia. All beneficiaries have substantial supervisory experience as laid out in Section 1.2 and Section 5. The partner organisations are mostly leading international organisations or private companies with close and long-standing connections to the academic sector. They are crucial for the real world impact of DECIFER and major dissemination bodies.

The **beneficiaries represent a wide range of disciplines,** ranging from climate dynamics to climate modelling, statistics, agricultural modelling, philosophy and social sciences. Two **non-academic beneficiaries** bring entrepreneurial expertise and will create innovative products. As detailed in Table 3.1d, every ESR project will be supervised by a **main-supervisor from the relevant discipline** (as defined by the research objectives and WP tasks). **Inter-disciplinary co-supervision** additionally brings in new ideas and perspectives and facilitates the exploration of innovative research avenues.

The **partner organisations are crucial for DECIFER having a real-world impact**. They comprise European research institutions (DMI, JRC) providing climate services, international organisations working in the field of climate services and food security and coordinating projects in the MENASA (WB, FAO), a platform to coordinate and facilitate user-driven climate research in Africa (ACMAD), a research institute with in-depth knowledge of agriculture in NA (INRAT) and private companies working in the agricultural sector in the MENASA (HORTA, IsardSAT). The partners will provide invaluable work experience for the ESRs, and moreover make direct use of the DECIFER results and disseminate them to a wider stakeholder community. Overall the consortium provides a stimulating research environment to produce world-class research and international impact.

3.4.2 Commitment of beneficiaries and partner organisations to the programme

All **beneficiaries** are committed to the training in DECIFER, and to making DECIFER play a crucial role in developing approaches for climate information distillation, establishing a sustained interdisciplinary research and user community, and advancing our understanding of climate change impacts on agriculture in MENASA. Sub-groups of all beneficiaries have collaborated earlier: in EU FP7/H2020 and other projects, in the EU COST Action VALUE, in IPCC and WCRP activities, and in the BADJAM (Bias adjustment for agricultural modelling) initiative. DECIFER will make these networks grow together into a new research community. Each individual will take over specific responsibilities as detailed in Sections 1, 2 and 3, and will be committed to the required research, training and outreach tasks. For details see Table 1.2b (organisation of training events), Section 3.1 (contribution to work packages and tasks, responsibility for deliverables and milestones, supervision and hosting of secondments, in particular Table X1.5), Section 3.2.1 (responsibility for management and training tasks) and Section 5 (description of participating organisations). In particular the interests of the beneficiaries go well beyond their discipline as demonstrated by the offer to host various interdisciplinary secondments.

The role of **partner organisations** and their active contribution to the research and training activities are clearly defined in the letters of commitment (Section 7), and in the respective proposal sections: Section 1.2 for the training programme; Table X1.5 and the ESR descriptions in Table 3.1d for the secondments. Each partner will send a representative to the SB. The facilities of each partner are detailed in Section 5. In some cases, the partner organisations offered co-supervision, but have no defined supervisory role in the proposal. These partner organisations could take over co-supervision in case another partner should be unavailable.

<u>DOCUMENT 2</u> (*no overall page limit applied*)

4. EID specific requirements (for EID only)

5. Participating Organisations

For **beneficiaries**:

Beneficiary Legal Name: University of Graz	
General Description	The University of Graz is the second biggest and second oldest University in Austria, founded in 1585. The Wegener Center for Climate and Global Change is an interdisciplinary research institute at the University. Founded in 2007, its 6 professors and approx. 60 staff members are organised in four research groups joining expertise in atmospheric remote sensing, atmospheric dynamics and chemistry, regional climate modelling, and the economics of climate change and global transformation. The Wegener Center is a core institute in "Climate Change and Sustainable Transformation", one of two recently established research focus areas of the University. It brings together researchers from physical climate science, chemistry, evolutionary biology, geography, social sciences and philosophy.
Role and Commitment of key persons (including supervisors)	**Prof. Douglas Maraun (20% ft)** is head of the regional climate modelling and analysis research group. He has a background in climate science with a focus on regional climate change and statistical modelling (extreme events, statistical downscaling, bias correction). He has chaired the EU COST Action VALUE on evaluating downscaling and bias correction approaches. He is the coordinator of DECIFER and WP6 (management) leader. He will be main supervisor of ESR9 and ESR12, and co-supervisor of ESR4, ESR14 and ESR15. **Dr. Heimo Truhetz (5% ft)** is a regional climate modeller with particular expertise in convection permitting simulations. He will support ESR6 at UG in all climate modelling specific issues.
Key Research Facilities, Infrastructure and Equipment	The Wegener Center has access to high performance computing facilities at the University of Graz and at the Vienna Scientific Cluster. The Wegener Center is a member of the Climate Change Centre Austria, which has professional data storage facilities.
Status of Research Premises	The Wegener Center is located in walking distance of the main University campus, in a building rented by the University. Desks in a shared PhD office will be offered to the ESRs in the Wegener Center building.
Previous Involvement in Research and Training Programmes	**Maraun** has chaired the EU COST Action VALUE (2012-2015). At Kiel University he has been associated with the PhD school ISOS (Integrated School of Ocean Sciences, ca. 150 PhD students). He has been, among others, PI of: PLEIADES (Projections and predictions of local precipitation intensities. Advanced downscaling using extreme value statistics; two postdocs, 2012-2015, Volkswagen Foundation); EUREX (Euopean and Russian Extreme Events; two Phd students, 2012-2015, Helmholtz Russia Joint Research Group); CE:LLO (Compound Events: muLtivariate statisticaL mOdelling; 1 PhD student, 2014-2018, Volkswagen Foundation); STARC-Impact (Supporting the Austrian Research Community in using recent Climate Change Projections for Climate Impact Studies, two postdocs, 2016-2018, Austrian Climate Research Programme); **Truhetz** has been involved in numerous research projects on regional climate change projections and impacts. In particular he was PI of the HighEndExtremes and NHCM2 projects about convection permitting simulations. Truhetz has been co-supervising several postdocs, PhD and MSc students.
Current Involvement in Research and Training Programmes	**Maraun** is PI in the Graduate School "Climate Change and Transformation" at UG (12 PhD students, Austrian Science Fund, 2018-2022), PI of the project EASICLIM (Eastern Alpine Slope Instabilities under Climate Change; 1 postdoc at UG, 2017-2019; Austrian Climate Research Programme), and co-PI in two additional projects. **Truhetz** currently participates in two research projects and co-supervises one PhD student and one MSc student.
Relevant Publications and/or Research / Innovation Product	**D. Maraun**, T.G. Shepherd, M. Widmann, G. Zappa, D. Walton, J.M. Gutierrez, S. Hagemann, I. Richter, P.M.M. Soares, A. Hall and L.O. Mearns: Perspective: Towards process informed bias correction of climate change simulations. Nature Climate Change 7, 764-773, 2017. E.P. Meredith, V.A. Semenov, **D. Maraun**, W. Park and A.V. Chernokulsky: Crucial role of Black Sea warming in amplifying the 2012 Krysk precipitation extreme. Nature Geoscience 8: 615-619, 2015 **D. Maraun**, M. Widmann, J.M. Gutierrez, S. Kotlarski, R.E. Chandler, E. Hertig, J. Wibig, R. Huth and R. Wilcke, VALUE - A framework to validate downscaling approaches for climate change studies. Earth's Future 3(1): 1-14, 2015. **D. Maraun**, F. Wetterhall, A.M. Ireson, R.E. Chandler, E.J. Kendon, M. Widmann, S. Brienen, H.W. Rust, T. Sauter, M. Themessl, V.K.C. Venema, K.P. Chun, C.M. Goodess, R.G. Jones, C. Onof, M. Vrac and I. Thiele-Eich: Precipitation Downscaling under climate change. Recent developments to bridge the gap between dynamical models and the end user. Rev. Geophys. 48, RG3003, 2010 A.F. Prein, A. Gobiet, M. Suklitsch, **H. Truhetz**, N. K. Awan, K. Keuler, and G. Georgievski. Added value of convection permitting seasonal simulations. Climate Dynamics, 41, 2655–2677, 2013

Beneficiary Legal Name: Barcelona Supercomputing Center	
General Description	The Barcelona Supercomputing Center – Centro Nacional de Supercomputación (BSC) combines unique high performance computing facilities and in-house research departments on Computer, Life, and Earth Sciences, and Computational Applications, counting more than 400 researchers and students from more than 40 different countries. The mission of the Earth Sciences department (BSC-ES) is to develop and implement global and regional models and data solutions for air quality and climate forecasting and their applications.. The department is structured around four groups, with more than 70 employees, including technical and support staff. Over the years, the department has been active in numerous European Projects including, in FP7 (7 projects) and H2020 (21 projects) not only as partner but also as coordinator. It is also currently involved in at least five COPERNICUS contracts coordinating one of the actions. BSC is a public consortium made up of the Spanish Ministry of Science, the Ministry of Business and Knowledge of Catalunya, and the Universitat Politècnica de Catalunya (UPC). ESR5 will be enrolled in the **UPC Environmental Engineering Doctoral Program**, which is affiliated to BSC.
Role and Commitment of key persons (including supervisors)	ICREA Research Professor **Francisco J. Doblas-Reyes (10% ft)** is the director of the BSC-ES. He is an expert in the development of seasonal-to-decadal climate prediction systems and has more than 20 years of experience in weather and climate modelling, climate prediction, as well as the development of climate services. He will be main supervisor of ESR5, co-supervisor of ESR6 and ombudsperson of DECIFER.
Key Research Facilities, Infrastructure and Equipment	BSC-CNS hosts a range of high-performance computing (HPC) systems, including MareNostrum IV, one of the most powerful supercomputers in Europe with a peak performance of 13.7 Petaflops. Additionally, BSC manages Minotauro, a Sandy Bridge's cluster with NVIDIA GPUs, providing more than 100 TFlops.
Status of Research Premises	All BSC's departments maintain independent research premises.
Previous Involvement in Research and Training Programmes	BSC has hosted around 44 national and European fellowships among early-stage and senior postdoctoral fellowships which include Marie Curie ITN projects (e.g. SCALUS, FP7-PEOPLEITN-2008-238808; NEMOH, PF7-PEOPLE-2011-ITN-289976, COPA-GT) and several Marie Curie IEF (e.g. EEPPIBM, FP7-PEOPLE-2012-IEF-327899; MDRAF, FP7-PEOPLE-2013-IEF-622662). **Doblas-Reyes** has supervised over 37 European and national projects as well as international contracts on climate dynamics/prediction. He received the 2006 Norbert Gerbier-MUMM International Award of the World Meteorological Organization.
Current Involvement in Research and Training Programmes	**Collaboration with universities**: within BSC, there is a large record of collaboration with Universidad Politècnica de Catalunya (UPC) and Universidad de Barcelona (UB), including the Master degree in Environmental Engineering (UPC), associated with BSC-ES. **Excellence programmes and networks**: A number of training activities are organized under the framework of: Severo Ochoa Excellence Programme (Research seminars series); RES (RES training sessions); NVIDIA CUDA/GPU excellence center (PUMPS summer school); PRACE (PRACE Advanced Training Center); HiPEAC (ACACES summer school, Computing system weeks and HiPEAC conferences). **Research fellowships**: BSC is currently awarded with 24 postdocs, and is supporting 3 ITN 2 MSC RISE and 4 Marie-Curie Individual Fellowships. Noteworthy, three of these Marie-Curie actions are currently developed in BSC-ES, which will host the present ITN proposal. BSC has recently been awarded with 2 ERCs, one of them is hosted by the BSC-ES. **On-going projects (examples)**: PRocess-based climate sIMulation: AdVances in high resolution modelling and European climate Risk Assessment (H2020, PRIMAVERA-641727); European Climate Prediction system (H2020, EUCP-776613); IMproving PRedictions and management of hydrological Extremes (H2020, IMPREX- 641811); Climate monitoring and seasonal forecast for global crop production (H2020 MSCA, CLIM4CROP- 740073). **Doblas-Reyes** serves on scientific panels of the World Climate Research Programme (WCRP) and the World Weather Research Programme (WWRP). He is a member of the European Network for Earth System modelling HPC Task Force and is also involved in Horizon 2020 Collaborative projects as a Principal Investigator (PRIMAVERA, ERA4CS, ClimatEurope, SPECS) and is supervising one of the Marie Skłodowska-Curie Individual Fellowship awarded at BSC.
Relevant Publications and/or Research / Innovation Product	Lienert, F. and **F.J. Doblas-Reyes** (2017). Prediction of interannual North Atlantic sea surface temperature and its remote influence over land. Climate Dynamics, 48, 3099-3114, doi: 10.1007/s00382-016-3254-9. Ceglar, A., M. Turco, A. Toreti and **F.J. Doblas-Reyes** (2017). Linking crop yield anomalies to large-scale atmospheric circulation in Europe. Agricultural and Forest Meteorology, 240-241, 35-45, doi:10.1016/j.agrformet.2017.03.019. Bellprat, O. and **F.J. Doblas-Reyes** (2016). Attribution of extreme weather and climate events overestimated by unreliable climate simulations. Geophysical Research Letters, 43, 2158-2164, doi:10.1002/2015GL067189. Massonnet, F., O. Bellprat, V. Guemas and **F. J. Doblas-Reyes** (2016). Using climate models to estimate the quality of global observational data sets. Science, 6311, 452-455, doi:10.1126/science.aaf6369.

Beneficiary Legal Name: CNRS	
General Description	The “Centre National de la Recherche Scientifique” (CNRS) is the French largest public research organization. As one of the largest fundamental research organization in Europe, CNRS contributes to the production and diffusion of knowledge in all scientific fields. With more than 1,200 laboratories, mostly in partnership with universities, other research organizations or industry, the CNRS considers interdisciplinary programs and actions as a gateway into new domains of scientific investigation. It employs 32,000 permanent employees (researchers, engineers, and administrative staff) and 6,000 temporary workers. CNRS has a long experience in management and coordination of European projects. The present project will get the support from the Délégation Régionale Ile de-France Sud (Gif-sur-Yvette). The research work will be carried out at "Laboratoire des Sciences du Climat et de l’Environnement" (LSCE). ESR3, 4, and 11 will be enrolled in the **Doctoral College at University Paris Saclay** (UPS, see partner organisations). UPS signs the agreement on joint international supervision of Doctoral Thesis for these ESRs.
Role and Commitment of key persons (including supervisors)	**Dr. Nathalie de Noblet (10% ft)** is CEA senior scientist at LSCE. She’s co-coordinating a laboratory of excellency (BASC - Biodiversity, Agrosystems, Society and Climate) of more than 300 scientists and is a member of the french academy of agriculture. Her background is on land-atmosphere interactions and modelling of the land surface in climate models. She has been involved in impacts of climate change on crops over the past 5 years. She will be the main supervisor of ESR3 and ESR4, co-supervisor of ESR1 and ESR2, and WP1 leader. **Dr. Mathieu Vrac (10% ft)** is CNRS senior scientist at LSCE, and head of the "Extremes – Statistics – Impacts – Regionalization" (ESTIMR) group at LSCE. He has a background on statistical modelling of climate variables (dowsncaling, bias correction, extremes) and analysis of climate model simulations. He will be the main supervisor of ESR11 and co-supervisor of ESR10.
Key Research Facilities, Infrastructure and Equipment	The LSCE/CNRS is a member of the "Institut Pierre Simon Laplace" (IPSL) and has therefore access to high performance computing facilities and professional data storage at IPSL.
Status of Research Premises	The LSCE/CNRS is located on the "plateau de Saclay" (an geographical area gathering "grandes ecoles", research centers, private companies, and University Pars-Saclay) in a building rented by the CNRS to CEA, and where CNRS, CEA and University researchers are gathered). Desks in a shared PhD office will be offered to the ESRs in LSCE/CNRS building.
Previous Involvement in Research and Training Programmes	**M. Vrac** was PI of one French project (StaRMIP: Statistical Regionalization Models Intercomparison Project), WP leader of three French projects (GIS "REGYNA", ANR "McSIM", GICC "REMEDHE"), Co-PI of the VW "PLEIADES" and "CE:LLO" projects, among others. **N. de Noblet** has coordinated, among others, the nationally-funded project ORACLE (Opportunities and Risks for Agrosystems in response to climate change and socio-economic scenarios for 5 years, and led a work package of the LUC4C European Project (Land-use change: assessing the net climate forcing, and options for climate change mitigation and adaptation). She has coordinated the LUCID international intercomparison project on the impact of land-use on climate (endorsed by WCRP/GEWEX and IGBP/iLEAPS). She was part of CMIPs Land Use Model Intercomparison Project (LUMIP) scientific committee.
Current Involvement in Research and Training Programmes	**M. Vrac** is currently member of two ERA4CS projects: CoCliServ and EUPHEME. He is also member of the IPSL "Climate Services" group and board member of the IPSL "Regional Climate and Environment" group. **N. de Noblet** is coordinating research in the laboratory of excellency BASC and supervising a master 2 module on land/atmosphere interactions and impacts of climate change on land. She’s lead author in the special IPCC report on ‘climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems’ that will come out in October 2019.
Relevant Publications and/or Research / Innovation Product	**Vrac, M.**, Noël, T., Vautard, R. (2016) Bias correction of precipitation through Singularity Stochastic Removal: Because Occurrences matter. JGR-Atmosphere, 121 (10), 5237–5258, DOI: 10.1002/2015JD024511 **Vrac, M**. and Friederichs, P. (2015) Multivariate – intervariable, spatial, and temporal – bias correction. Journal of Climate, 28 (1), 218–237, doi: 10.1175/JCLI-D-14-00059.1 Caubel, J., Cortázar-atauri, G. De, Launay, M., **de Noblet-ducoudré, N.**, Huard, F., Bertuzzi, P., & Graux, A. (2015). Agricultural and Forest Meteorology Broadening the scope for ecoclimatic indicators to assess crop climate suitability according to ecophysiological , technical and quality criteria, 207, 94–106. doi:10.1016/j.agrformet.2015.02.005 Berg, A., Sultan, B., & **de Noblet-Ducoudré, N.** (2010). What are the dominant features of rainfall leading to realistic large-scale crop yield simulations in West Africa? Geophysical Research Letters, 37(5). Smith, P. C., **de Noblet-Ducoudré, N.**, Ciais, P., Peylin, P., Viovy, N., Meurdesoif, Y., & Bondeau, a. (2010). European-wide simulations of croplands using an improved terrestrial biosphere model: Phenology and productivity. Journal of Geophysical Research, 115, 1–14. doi:10.1029/2008JG000800

Beneficiary Legal Name: Predictia Intelligent Data Solutions SL	
General Description	Predictia is a Spanish SME emerged in 2008 as a spin-off of the Santander Meteorology Group (UCAN-Universidad de Cantabria, Spain). Its mission is to offer data management and mining solutions for problems in scientific disciplines requiring specialized services for storage, access, visualization, and non-standard data mining techniques for extracting relevant information from data. Predictia offers custom software solutions based on web technologies, including the development of portals for data access, visualization and on-line data mining algorithms. Predictia maintains a core of R&D as a key driver of competitiveness of its products. ESR10, based at Predictia, will be enrolled in the **PhD programme at UCAN**, formal supervisor will be J. Gutierrez.
Role and Commitment of key persons (including supervisors)	**Dr. Markel García Díaz (10% ft)**, Researcher. Interests in HPC computing, machine learning and weather forecasting. He will be main supervisor of ESR10, and co-supervisor of ESR11. **Daniel San Martín (5% ft)**, Researcher. Interests in statistical downscaling and machine learning. He will support the supervision of ESR10.
Key Research Facilities, Infrastructure and Equipment	Predictia will contribute its expertise in machine learning and statistical downscaling techniques. The company will enable computing facilities, including in-house and cloud-based solutions and will offer use of existing open products supported by the company such as the statistical downscaling portal.
Status of Research Premises	Predictia rents independent research premises in Santander.
Previous Involvement in Research and Training Programmes	Predictia has participated in international research programmes dealing with climate information. In the FP7 EUPORIAS project Predictia lead the stakeholder engagement work package where several climate services where developed to address specific users' needs. Predictia contributed to the EU COST action VALUE with several statistical downscaling methods and developing a web validation portal. Predictia participarted in the QA4Seas COPERNICUS tender dealing with the quality and evaluation of seasonal forecasts. Predictia has also contributed to the development of the Modelling System for Agricultural Impacts of Climate Change (MOSAICC) tool for the FAO – in particular, the module for regional climate information – and has provided technical support for this tool during the last five years.
Current Involvement in Research and Training Programmes	Predictia participates in the following Research and Training Programmes: 1-PRIMAVERA: Process-based climate sIMulation: AdVances in high- resolution modelling and European climate Risk Assessment. H2020 project, Grant agreement 641727. 2-The Copernicus C3S 512 tender aims to implement the Evaluation and Quality Control function for the Copernicus Climate Data Store. The purpose of the EQC function in C3S is to provide quality assurance information for all C3S products and services as well as to ensure that users have the information they need in order to use the products and services for their own purposes. 3-CAFE: Climate Advanced Forecasting of sub-seasonal Extremes. Innovative Training Networks, H2020-MSCA-ITN-2018. 4-Predictia collaborates with several universities (UC, UNIR) in different Master's degrees.
Relevant Publications and/or Research / Innovation Product	M. Iturbide, et al., inc. **D. San Marín** (2019) The R-based climate4R open framework for reproducible climate data access and post-processing, Environ. Mod. Soft., 111, (42-54) **M García-Díez**, J Fernández, L Fita, C Yagüe (2013) Seasonal dependence of WRF model biases and sensitivity to PBL schemes over Europe. Quart. J. Roy. Meteorol. Soc. 139 (671), 501-514. Predictia has also developed a number of innovative products: • **Statistical downscaling portal**, online tool which allows to interactively configure and apply several standard downscaling methods. • **Roadcast**, meteorological predictions for road conditions building on statistical postprocess weather predictions. • On demand **seasonal forecast** regionalized predictions to explore the potential of these predictions for stakeholder relevant indices in different sectors.

Beneficiary Legal Name: Sandholt ApS	
General Description	Sandholt ApS is an SME funded in 2107. The company develops new high quality products and systems based on satellite imagery and provides research-based advice on the use of satellite data in climate, water, agriculture, nature and the environment. With more than 25 years of international experience in remote sensing research and education, the company's mission is to spread the use of the latest science-based methods for analyzing satellite data, to ensure that the potential for using satellite data is fully utilized. Formal supervisor of ESR1, based at Sandholt, will be **J.H. Christensen** at UPCH, see below, ESR1 will formally enroll as **PhD student at UPCH** (incl. moderate tuition fees).
Role and Commitment of key persons (including supervisors)	**Inge Sandholt (10% FT)** is founder and CEO of Sandholt ApS, and adjunct professor at the Technical University of Denmark. Her research has particularly contributed to the state of the art in environmental remote sensing in semi-arid environments, with regional focus extending from Africa, China to Europe. She will be gender balance officer, supervise ESR1 and co-supervise ESR12.
Key Research Facilities, Infrastructure and Equipment	Sandholt ApS will contribute expertise related to remote sensing and satellite processing facilities to the project. The company has its own operational, in-house processing system, and operational chain for satellite data acquisition and processing.
Status of Research Premises	The research facilities are fully owned by Sandholt ApS and independent of other beneficiaries.
Previous Involvement in Research and Training Programmes	Professor Sandholt has an extensive previous experience in formal training of researchers. She has served as head of Geography PhD school, U. Copenhagen (2006-07), and a Member of Copenhagen Global Change Initiative PhD school, U. Copenhagen (2002-05), She was among the pioneer developers of e-learning content for higher education, funded by a grant from the Copenhagen University Center for Didactic.
Current Involvement in Research and Training Programmes	Sandholt ApS currently host two external students for their thesis work, and Professor Sandholt currently serves as Danish expert to the ESA Education Committee and Chair of the Danish SpaceAcademy. Sandholt ApS contributes to the EU-RUS training programme in application of optical and radar remote sensing for land surfaces, with specific focus on agricultural applications. Staff members at Sandholt ApS contribute to teaching at DTU-SPACE at the Technical University of Denmark, and are regular members of PhD evaluation committees.
Relevant Publications and/or Research / Innovation Product	**Relevant publications** Torbern Tagesson, Rasmus Fensholt, Idrissa Guiro, Mads Olander Rasmussen, Silvia Huber, Cheikh Mbow, Monica Garcia, Stéphanie Horion, **Inge Sandholt**, Bo Holm-Rasmussen, Frank M. Göttsche, Marc-Etienne Ridler, Niklas Olén, Jørgen Lundegard Olsen, Andrea Ehammer, Mathias Madsen, Folke S. Olesen, Jonas Ardö (2015) Ecosystem properties of semi-arid savanna grassland in West Africa and its relationship to environmental variability. Glob. Chang. Biol. Jan, 21(1):250-64. doi: 10.1111/gcb.12734. Alberto de Tomás Calero, Héctor Nieto, Radoslaw Guzinski, Javier Salas, **Inge Sandholt** and Pedro Berliner (2014) Validation and scale dependencies of the triangle method for the evaporative fraction estimation over heterogeneous areas. Remote Sensing of Environment 09/2014; 2014(152):493–511. DOI: 10.1016/j.rse.2014.06.0288. Mertz O, Mbow C, Reenberg A, Genesio L, Lambin EF, D'haen S, Zorom M, Rasmussen K, Diallo D, Barbier B, Moussa IB, Diouf A, Nielsen JO, **Sandholt I** (2011) Adaptation strategies and climate vulnerability in the Sudano-Sahelian region of West Africa. Atmos. Sci. Lett., 12 (1), 104-108, 2011. **Relevant products** • Satellite based Water Stress Assessment tool for Danish Farmers • Satellite Acquisition scheduler

Beneficiary Legal Name: Universidad de Cantabria (UCAN)	
General Description	Universidad de Cantabria (UCAN) is a modern public institution with an overall budget in 2017 of 107,7 M€. UC consists of around 1,663 researchers and 11,862 students, from which 1,207 are permanent research staff and 456 funded by research projects. It also has 5 Research Institutes, 3 Foundations and 1 business incubator, as well as 167 R+D groups from 32 departments. UC hosts the "Instituto de Física de Cantabria" (IFCA) Joint Centre, born from the combined effort of two institutions: the National Spanish Research Council (CSIC) and the UCAN itself. The primary goal of IFCA is to carry out research in basic science, including theoretical and applied topics of Meteorology and Climate Change. The research group in Meteorology and Data Mining conducts research on different topics related to local and regional climate variability and climate services.
Role and Commitment of key persons (including supervisors)	**Prof. José Manuel Gutiérrez (10% ft)** is CSIC research professor at IFCA, affiliated both with UCAN and CSIC. He is head of the Meteorology and Data Mining group and co-director of the "data science" Master Program UC-UIMP. His background is in applied statistics and machine learning with a focus on regional climate variability and statistical downscaling. He is main supervisor of ESR13, co-supervisor of ESR10 and ESR7, and data manager. **Prof. Jesús Fernández (5% ft)** is professor at the University of Cantabria and works within the Meteorology and Data Mining group. He is an expert in regional climate modelling, climate model evaluation and analysis of multi-model ensembles. He is also member of the doctoral school "Science and technology" at UCAN. Fernández will be co-supervisor of ESR13.
Key Research Facilities, Infrastructure and Equipment	IFCA hosts one of the nodes of the Spanish Supercomputing infrastructure (the Altamira node), which is maintained by an IT and support service. All IFCA member have access to this facility, which includes both computing and storage resources.
Status of Research Premises	IFCA has its own building in the campus of UCAN, the Juan Jordá building, with four floors and more than 3000 square meters, including offices, research labs and a data centre in the basement (which is part of the Spanish Supercomputing infrastructure). IFCA has its own management office, lab and IT services and also dedicated electrical and network connections.
Previous Involvement in Research and Training Programmes	In the MSCA programme, UCAN has participated in the actions SAGA and OceaNET from the FP7-PEOPLE-ITN 2007 and 2013 calls respectively, with a total attraction of more than 527k€ and in the H2020-MSCA-IF-2014 project, CLIMAPROX, with a total funding of more than 158k€. UCAN also took part in two MSCA-NIGHTS 2013 and 2014 calls (AllNights and OurFuture). IFCA/Meteo has participated in over ten EU-funded projects dealing with regional climate information and impact studies in different sectors, including agriculture (e.g. FP6: ENSEMBLES, EELA2; FP7: FUME, QWECI, SPECS, EUPORIAS, METAFOR, INTACT, EU COST Action VALUE). J.M. Gutiérrez was coordinator of one of the Spanish strategic actions in the National Adaptation Plan (PNACC). He has participated as PI in ten EU projects dealing with climate prediction and projection (e.g. ENSEMBLES, SPECS) and impact studies (e.g. FUME, QWECI, INTACT). He also was the coordinator of the Mathematics and Computer Science UC PhD Program until 1998.
Current Involvement in Research and Training Programmes	In H2020, UCAN has obtained funding for more than 39 projects with a total attraction of more than 10 M€ during the 2014-2018 period. UCAN also participates in other funding schemes such as Interreg Atlantic Area, Interreg SUDOE, Creative Europe, RFCS, etc. In particular in the MSCA programme, UC is participating in the actions SAFERUP and EUROFLOW and in two actions from the MSCA-RISE 2017 call, PDE-GIR and RESISTANCE. UCAN is currently coordinating the MSCA-RISE action "BIOTRAFO". Other research and training programmes that are currently being coordinated by the UCAN are the ERC-StG-2014 project INTRAHETEROSEQ and the Erasmus+ project BLUES funded by the call "Strategic Alliance Higher Education 2017". IFCA/Meteo currently participates in several international activities related to climate services: An ERA4CS project (INDECIS: Integrated approach for the development across Europe of user oriented climate indicators for GFCS high-priority sectors), a H2020 project (AFRICULTURES: Enhancing Food Security in AFRIcan AgriCULTUral Systems with the Support of REmote Sensing) and the QA4Seas COPERNICUS tender dealing with the quality and evaluation of seasonal multimodel forecast systems. IFCA also collaborates with FAO in the development of MOSAICC (MOdelling System for Agricultural Impacts of Climate Change) and is an active member of the EURO-CORDEX and CORDEX-ESD initiatives. J.M. Gutiérrez is the co-director of the "data science" Official Master Program UC - UIMP and member of the **UC PhD Program in Science and Technology**.
Relevant Publications and/or Research / Innovation Product	R Manzanas, A Lucero, A Weisheimer, **JM Gutiérrez** (2017). Can bias correction and statistical downscaling methods improve the skill of seasonal precipitation forecasts?. Clim. Dynam., doi 10.1007/s00382-017-3668-z D San-Martín, R Manzanas, S Brands, S Herrera, **JM Gutiérrez** (2017) Reassessing Model Uncertainty for Regional Projections of Precipitation with an Ensemble of Statistical Downscaling Methods. J. Climate 30, 203-223 A Casanueva, S Kotlarski, S Herrera, **J Fernández**, **JM Gutiérrez**, et. al. (2016) Daily precipitation statistics in a EURO-CORDEX RCM ensemble: Added value of raw and bias-corrected high-resolution simulations. Clim. Dynam. 47, 719-737. R Manzanas, S Brands, D San-Martín, A Lucero, C Limbo, **JM Gutiérrez** (2015) Statistical Downscaling in the Tropics Can Be Sensitive to Reanalysis Choice: A Case Study for Precipitation in the Philippines. J. Climate 28, 4171-4184 **JM Gutiérrez,** D San-Martín, S Brands, R Manzanas, S Herrera (2013) Reassessing statistical downscaling techniques for their robust application under climate change conditions. J. Climate 26 (1), 171-188

Beneficiary Legal Name: University of Cape Town	
General Description	The University of Cape Town is the leading research university in Africa, ranked in the top 200 of universities in the world, and with strong track record of serving the knowledge need of Africa. The Climate System Analysis Group (CSAG - http://www.csag.uct.ac.za) is a leading research centre at the university with ~40 research staff and MSc/PhD students. CSAG is focused at its core on the physical climate system with an emphasis on climate change and variability, and strong working groups on climate services, stakeholder engagement and training, capacity development in Africa, and tailoring of climate information for decision makers.
Role and Commitment of key persons (including supervisors)	Bruce Hewitson is a full professor in atmospheric science, director of CSAG, and holds the South African National Research Chair in Climate Change **(10% ft)**. He has extensive experience in downscaling, developing regional climate information, and engagement with stakeholders. He will be main supervisor of ESR11, co-supervisor of ESR12 and ESR13, and WP5 leader.
Key Research Facilities, Infrastructure and Equipment	CSAG has full facilities for visiting researchers, hosts its own High Performance Computing facility with extensive data archives for Africa climate, as well as archives of key global mode climate projection data, and runs global and regional climate models for targeted research. CSAG also has structured supervision for interns and training, including running short course capacity development. The multi-disciplinary expertise of the research staff (including social sciences) and international collaboration partnerships is available to enhance the ESR experiences.
Status of Research Premises	CSAG has its own dedicated premises as a research centre of the university.
Previous Involvement in Research and Training Programmes	CSAG has received funding EU FP7 (as consortium partner), and directly received extensive contract funds from research and national development agencies in the UK, Sweden, Norway, Germany, Denmark, USA, and Canada, World Bank, and more. Hewitson established CSAG in 1992, and has been singularly instrumental in attracting the research und from national and international sources to grow the centre to its current status. He was PI and proposer on many of the projects. He was CLA for WG1 on its contribution to the IPCC TAR, AR4, and for WG2 in AR5. He co-chaired the WCRP working group on Regional Climate, and the IPCC TGICA committee. Additionally, he established the internationally funded pan-Africa CORDEX training programme, the second phase of which is still led by CSAG.
Current Involvement in Research and Training Programmes	CSAG currently receives funding from a broad range of international sources, including USAID, CDKN, UK-DFID, and more. Currently CSAG has ~20 funded contracts. The single leading example of these if the UK-funded FRACTAL research and capacity development project (www.fractal.org.za), one of four consortia funded projects under the UK FCFA programme, and the only one led from Africa (~£4 million). Hewitson is the PI of FRACTAL, and PI or co-PI on the majority of the remaining current projects. He is currently supervising 4 PhD students on projects covering both the physical and social sciences.
Relevant Publications and/or Research / Innovation Product	**Hewitson, B.**, et al., 2017: Climate Information Websites: an evolving landscape, WIREs Clim Change 2017, e470. doi: 10.1002/wcc.470 Steynor, A., Padgham, J., Jack, C., **Hewitson, B.** et al., C. 2016. Co-exploratory climate risk workshops: Experiences from urban Africa. Climate Risk Management. Vol 13, 95–102, doi: 10.1016/j.crm.2016.03.001 Endris, H., Lennard, C., **Hewitson, B.** et al., 2015. Teleconnection responses in multi-GCM driven CORDEX RCMs over Eastern Africa, Climate Dynamics, 46: 2821. doi:10.1007/s00382-015-2734-7 **Hewitson, B.**, A.C. Janetos, T.R. Carter, F. Giorgi, R.G. Jones, W.-T. Kwon, L.O. Mearns, E.L.F. Schipper, and M. van Aalst, 2014: Regional context. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros, V.R., C.B. Field, D.J. Dokken, M.D. Mastrandrea, K.J. Mach, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1133-1197. **Hewitson, B.C.**, Daron, J., Crane, R.G. et al., 2014: Interrogating empirical-statistical downscaling. , Clim. Change (2014) 122: 539. doi:10.1007/s10584-013-1021-z

Beneficiary Legal Name: Københavns Universitet (UCPH)	
General Description	With more than 40.000 students (including 4.000 international students) enrolled, just over 2.500 PhD students and an additional 9.000 employees (both research and administrative) the University of Copenhagen is the largest research and education institution in Denmark. Internationally, the University is highly competitive and is ranked as one of the leading universities globally with the most recent ARWU (Shanghai) rankings placed the University as No. 29 worldwide and No. 6 in Europe. The Niels Bohr Institute (NBI; www.nbi.ku.dk), Faculty of Science at the University of Copenhagen (UCPH) consists of 10 research groups and 12 science centers and has approximately 140 full-time and project-based academic staff, 90 technical staff and currently about 130 PhD-students, as well as approximately 100 foreign researchers. The newly formed group Physics of Ice, Climate and Earth (PICE) at NBI represents the main educational organisation for meteorology, atmospheric dynamics, physical oceanography and glaciology – together representing the climate system - in Denmark. A long tradition exists for collaboration with the Danish Meteorological lnstitute (DMI) both on education at all academic levels, and on research.
Role and Commitment of key persons (including supervisors)	**Jens Hesselbjerg Christensen (10%ft)** is a full professor in Climate Physics and has a long experience in climate modelling and the use of models in projecting future climate change. He will be main supervisor of ESR8, co-supervisor of ESR1 and ESR5, and leader of WP3.
Key Research Facilities, Infrastructure and Equipment	A considerable part of the work will be carried out in collaboration with DMI, and it is also planned to set up a special project at ECMWF for DECIFER calculations, and/or to use the DMI HPC computing facility installed in Iceland. The ESRs will have access to knowledge and experience on climate modelling and their analyses from activities at PICE as well as from the tight collaboration existing between NBI and DMI.
Status of Research Premises	The department owns its own premises.
Previous Involvement in Research and Training Programmes	The Faculty of Science itself gained 19 ITN grants in FP7 of which 8 as coordinator and the rest as partner. The Faculty's level of experience with the Marie Curie programme is furthermore demonstrated by the fact it obtained over 80 Individual Fellowships in FP7. Christensen came to UCPH from DMI in 2017. At DMI he was leading Climate Research for a decade. He has been a CLA or LA for WG1 on its contribution to the IPCC TAR, AR4 and AR5. At DMI he was PI on numerous EU-Projects including PRUDENCE where he was coordinator. Furthermore, he has been involved in Nordic and national projects, including Centre for Regional Change in the Earth System (CRES) funded by the Danish Strategic Research Council for which he was director. He has successfully co-supervised 7 PhD students while he was at DMI.
Current Involvement in Research and Training Programmes	Beyond the ITN projects in FP7 mentioned above, the Faculty of Science received 28 ITN grants in the first round of applications in H2020 – seven as coordinator and 21 as a beneficiary. In addition, it has obtained 68 MSCA IFs so far in H2020. Currently Christensen is one of four PIs, together holding an ERC Synergy grant (ice2ice) focusing on the role of sea ice in controlling rapid climate change in past and future climates. He is supervising 3 PhD students.
Relevant Publications and/or Research / Innovation Product	Matte, D., Larsen, M.A.D., Christensen, O.B. and **Christensen, J.H.**, 2018: Robustness and scalability of regional climate projections over Europe, Front. Environ. Sci., doi: 10.3389/fenvs.2018.00163 Madsen, M.S., Langen, P.L., Boberg, F., and **Christensen, J.H**. 2017: Inflated uncertainty in multi-model based regional climate projections, Geophys. Res. Lett. 44, doi: 10.1002/2017GL075627 Larsen, M.A.D., **Christensen, J.H**., Drews, M., Butts, M.B., and Refsgaard, J.C. 2016: Local control on precipitation in a fully coupled climate-hydrology model. Sci. Rep., 6, 22927; doi: 10.1038/srep22927 **Christensen, J.H.**, Krishna Kumar, K. et al., 2013: Climate Phenomena and their Relevance for Future Regional Climate Change. 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. et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1217–1308, doi: 10.1017/CBO9781107415324.028 Boberg, F. and **J.H. Christensen**, 2012: Overestimation of Mediterranean Summer Temperature Projections due to Model Deficiencies, Nature Climate Change, 2, 433-436, doi: 10.1038/NCLIMATE1454

Beneficiary Legal Name: University of Durham	
General Description	Durham University, founded in 1832, has an excellent worldwide reputation in all areas of arts, humanities, natural and social sciences (ranked 78th in the QS World University Rankings 2018). The University has ~17,500 students (of whom 3,500 are postgraduate and 3,000 international students from over 120 countries). Its academic teaching and research programmes are delivered through 25 academic departments contained within three faculties: Arts and Humanities, Science, and Social Sciences and Health. The University also has 16 Colleges - Durham's distinctive residential and educational communities. The University is engaged in a full range of higher educational activities, including high-quality teaching and learning at undergraduate and postgraduate levels, advanced research and scholarship, partnerships with businesses and other private and public sector bodies, and partnerships and initiatives with community and voluntary sector organisations. It provides a stimulating environment to nourish and support the needs of a world-class academic community. The research will be carried out within the Philosophy Department and the Centre for Humanities Engaging Science and Society (CHESS)
Role and Commitment of key persons (including supervisors)	**Dr. Wendy Parker (10%ft)** is Associate Professor of Philosophy and Associate Director of the Centre for Humanities Engaging Science and Society (CHESS) at Durham University. She will be main supervisor for ESR14 and co-supervisor for ESR6 and ESR15, as well as WP7 leader (training).
Key Research Facilities, Infrastructure and Equipment	Durham has excellent library facilities. The Department of Philosophy has a large and thriving postgraduate community and provides professional development seminars for its postgraduate students as well as a postgraduate lounge with computing facilities.
Status of Research Premises	Durham University owns the research premises involved in the project, wholly independent from other beneficiaries and partner organisations.
Previous Involvement in Research and Training Programmes	Durham University has extensive experience in coordination and managing FP7 ITNs, including CosmoComp, FLUOR21, FUNMOLS, HiggsTools, MICSED, MOLESCO, NanoEmbrace and NOTEDEV. Furthermore, the University has hosted/currently hosts over 20 FP7 Marie Curie fellowships and 6 IRSES projects (5 coordinated by UDUR) and hosted the first ever UK Researcher's Night in 2009**.**
Current Involvement in Research and Training Programmes	The university currently coordinates an 8 million Euro COFUND-ed programme "DIFeREns2" which extends the programme built on Durham's coordination of the previous COFUNDED programme "DIFeREns" for a further 4 years, increasing the scale to 21 Junior Research Fellowships and 30 Senior Fellowships per year. Success in Horizon 2020 includes but is not limited to 13 Horizon 2020 MSCA fellowships, 12 Horizon 2020 ITNs, one of which Durham coordinates, and 4 Horizon 2020 RISE projects, 2 of which Durham coordinates. This demonstrates not only vast experience of successfully running research and training programmes but also outstanding collaboration and outreach.
Relevant Publications and/or Research / Innovation Product	**Parker, W.S**. and E. Winsberg (in press) Values and Evidence: How Models Make a Difference. *European Journal for Philosophy of Science*. **Parker, W.S.** and J.S. Risbey 2015. False precision, surprise and improved uncertainty assessment. *Philosophical Transactions of the Royal Society A* 373(2055): 20140453. Katzav, J. and W.S. **Parker 2015**. The future of climate modeling. *Climatic Change* 132(4): 475-487. **Parker, W.S. 2014**. Values and uncertainties in climate prediction, revisited. *Studies in History and Philosophy of Science* 46: 24-30. **Parker, W.S.** 2009. II – Confirmation and adequacy-for-purpose in climate modeling. *Aristotelian Society Supplementary Volume* 83: 233-249.

Beneficiary Legal Name: Universidad Politécnica de Madrid	
General Description	Universidad Politécnica de Madrid (UPM) is the largest Spanish technological university. With two recognitions as Campus of International Excellence, more than 2,400 researchers work at the UPM, grouped in 200 Research Groups, 22 Research Centers or Institutes and 55 Laboratories. UPM has endorsed the "European Charter for Researchers" and "The Code of Conduct for the Recruitment of Researchers". UPM graduates around 5.000 students every year, of which 20% have participated in international mobility programs and have been trained in companies. There are more than 2.000 students enrolled in doctoral programs, and each year 200 of them attain their Ph.D degree. CEIGRAM within the School of Agricultural Engineering has over 10 years of experience in coping with agricultural and environmental risks, with especial emphasis on weather and climate related hazards. Current investigations are concerned, among others, with the development of strategies to manage drought and other extremes, and support agricultural insurance companies, public administration and farmers in relation to climate variability and change.
Role and Commitment of key persons (including supervisors)	**Dr. Margarita Ruiz-Ramos (10%FT)**, Researcher and Associated Professor. Interests in modelling adaptation to climate variability and change. She will be main supervisor of ESR2, co-supervisor of ESR3 and ESR4 and WP2 leader. **Dr. Jon Lizaso (5% FT)**, Researcher and Associated Professor. Lecturer in training on crop modelling. Interests in developing and applying crop models. Will support the supervision of ESR1.
Key Research Facilities, Infrastructure and Equipment	The expertise of the group of CEIGRAM (UPM) relevant to the current project is in modelling and field experiments to support modelling. The group has access to experimental fields and to UPM-own computing facilities with several servers and massive storage capacity. CEIGRAM hosts numerous PhD and postdoc students that promote training courses and seminars that are organized with external experts to meet this demand, ensuring a suitable environment for training and transfer of knowledge.
Status of Research Premises	Research premises are independent from other beneficiaries and/or partners in the consortium.
Previous Involvement in Research and Training Programmes	UPM heads the Spanish Universities' participation with 290 projects in the 7th European Framework Program. Under FP7, UPM has obtained 62 Marie Curie projects and has employed 66 fellow researchers. UPM signs annually around 600 contracts with private businesses, due to its traditional and close relationship with the industrial and business sector. In the past 10 years, CEIGRAM has been involved in 217 research projects, of which 51 are international, 42 national competitive and 124 are funded by private sector.
Current Involvement in Research and Training Programmes	Research projects and networks: Heads the Spanish Universities' participation with more than 209 projects in H2020. Specific projects from CEIGRAM: 1- "Assessing options for the SUSTainable intensification of Agriculture for integrated production of food and non-food products at different scales", SUSTAg, 2016-2019, EC-FACCEJPI program, SURPLUS call) –INIA. IP: M. Ruiz Ramos 2-"Modelling European Agriculture with Climate Change for Food Security (MACSUR1 and 2)."- Coordinator of Partner 24. , 2012-2015, 2015-2017 (Still running in Spain). EC-FACCEJPI program . IP: M. Ruiz Ramos 3- The Agricultural Model Intercomparison and Improvement Project (AgMIP)- International network. IP: Jon Lizaso 4- Towards SUstainable and REsilient EU FARMing systems (SURE-Farm) EC-H2020. 2017-2021. IP: A. Garrido 5-"Journey Climate-KIC 2018". Summer School for entrepreneurs on Climate Change and Climate Services, 2018. Climate-KIC, IP UPM: M. Ruiz-Ramos Training: UPM leads 2 Erasmus Mundus master networks and participates in 5 more. The researchers on this proposal are actively involved in the Master and Doctorate Programme on Agro environmental Technology for a Sustainable Agriculture from the UPM. Also, UPM has run Journey Climatw –KIC summer school 2018 (https://journey.climate-kic.org/), led by m Ruiz-Ramos, and is applyig for the 2019 Journey
Relevant Publications and/or Research / Innovation Product	Trnka M., Rötter R.P., **Ruiz-Ramos M**., Kersebaum K. C, Olesen J.E., Zalud Z. and Semenov M., 2014. Adverse weather conditions for European wheat production will become more frequent with climate change. Nature Clim Change 4, 637–643 **Ruiz-Ramos M.**, Rodríguez A., Dosio A., Goodess C. M., Harpham C., Mínguez M.I., Sánchez E, 2016. Crop impact projections in Iberian Peninsula for mid and end of C21 improved by bias correction of RCM outputs. Clim Change, 134:283-297. **Ruiz-Ramos M**. , Ferrise R, Rodríguez A, et al., 2017. Adaptation response surfaces for managing wheat under perturbed climate and CO2 in a Mediterranean environment. Agric Systems, in press. Webber H, Ewert F, Olesen J, Müller C, Fronzek S, Ruane A, Bourgault M, Martre P, Ababaei B, Bindi M, Ferrise R, Finger R, Fodor N, Gabaldón-Leal C, Gaiser T, Jabloun M, Kersebaum KC, **Lizaso JI**, Lorite I, Manceau L, Moriondo M, Nendel C, Rodriguez A, **Ruiz-Ramos M**, et al., 2018. Diverging importance of drought stress for maize and winter wheat in Europe. Nature Communications (in press) Kahiluoto H, Kaseva J., Balek J., Olesen JE, **Ruiz-Ramos M.** et al., 2018. Decline in climate resilience of European wheat. PNAS (in press)

Beneficiary Legal Name: University of Reading (UR)	
General Description	UR is a research intensive university with 17,000 students and 3,000 staff from over 150 countries. The most recent results of the UK-wide Research Excellence Framework exercise (REF), conducted in 2014 to assess research quality, revealed that 98% of University of Reading research is internationally recognised, 78% is classed as internationally excellent and 27% is world leading. Our weighted score placed us third in the UK in the Earth Systems and Environmental Science category. We were rated particularly strongly on the new 'Impact' metric, and on 'Research Environment'.
Role and Commitment of key persons (including supervisors)	**Professor T.G. Shepherd (10% ft)** is Grantham Professor of Climate Science and Research Division Leader for Climate, and a specialist in large-scale circulation. He is vice-Chair of DECIFER and will be the main supervisor of ESR6 and co-supervisor of ESR14. **Dr. A.G. Turner (10% ft)** is Associate Professor in Monsoon Systems and a leading expert in Monsoon dynamics. He will be main supervisor of ESR7 and co-supervise ESR9.
Key Research Facilities, Infrastructure and Equipment	The Department of Meteorology is a world-leading centre for research and training in weather and climate, and the largest such department in Europe. It comprises approximately 45 permanent academic staff, a similar number of senior research staff, 25 embedded researchers from the Met Office, 80 post-doctoral fellows, and 80 PhD students. The Department hosts NERC-funded national capability research units in Atmospheric Science, Computational Modelling Support, and Earth Observations, and has extensive research links with the Met Office in Exeter and the European Centre for Medium-range Weather Forecasts in Reading.
Status of Research Premises	The Department of Meteorology occupies several buildings in close proximity on the University of Reading's Whiteknights campus, which are owned by the University and are wholly independent from other beneficiaries and partner organizations.
Previous Involvement in Research and Training Programmes	The University of Reading has a strong track record of working in European projects and received awards for >150 EU projects across FP7 and H2020 resulting in over €65M EU Contribution. It is home to excellence and frontier research, having received 5 ERC Starting/Consolidator grant awards and 7 ERC Advanced grant awards. Nearly 40 of the EU projects are H2020 MSCA or FP7 Marie Curie People projects (over €10M EU Contribution), which include 14 Initial/Innovative Training Networks (ITN) with 2 as Coordinator (EU FP7 LegumePlus and H2020 MultiMind). 7 of these ITNs were in the Environment Theme and 2 were in the Food Theme.
Current Involvement in Research and Training Programmes	NERC SCENARIO Doctoral Training Programme in Science of the Environment (UK); EPSRC Centre for Doctoral Training in Mathematics of Planet Earth (UK). UREAD is currently also involved in 7 active ITNs (e.g MedPlant (Phylogenetic exploration of medicinal plant diversity), PRIDE (Drivers of Pontocaspian biodiversity RIse and DEmise). There are several ERC Advanced Grants: ACRCC (Understanding the atmospheric circulation response to climate change); Global Change 2.0: Unlocking the past for a clearer future (GC2.0); Causality Relations Using Nonlinear Data Assimilation (CUNDA). The annual research income of the Department of Meteorology is roughly £16M.
Relevant Publications and/or Research / Innovation Product	Hirons, L. and **Turner, A. G**., 2018. The impact of Indian Ocean mean-state biases on the representation of the East African short rains. Journal of Climate, **31**, 6611-6631. **Shepherd, T.G**., 2014. Atmospheric circulation as a source of uncertainty in climate change projections. Nature Geosci., **7**, 703–708.Stein, T. H. M., Parker, D. J., Hogan, R. J., Birch, C., **Turner, A. G.** and Annamalai, H., 2012. Climate change and the South Asian summer monsoon. Nature Climate Change, **2**, 587-595. Zappa, G. and **Shepherd, T.G.**, 2017. Storylines of atmospheric circulation change for European regional climate impact assessment. J. Clim, **30**, 6561–6577. **Shepherd, T.G.**, et al., 2018. Storylines: an alternative approach to representing uncertainty in physical aspects of climate change. Climatic Change, **151**, 555–571.

For partner organisations:

Partner Organisation Legal Name: African Center of Meteorological Application for Development	
General description	ACMAD is the Weather and Climate Centre with African continental competence. It was created in 1987 by the Conference of Ministers of the United Nations Economic Commission for Africa (UNECA) and the World Meteorological Organisation (WMO). ACMAD has been operational in Niamey since 1992. ACMAD is composed of 53 Member States, the 53 countries of "Africa" continent. ACMAD's mission is the provision of weather and climate information and for the promotion of sustainable development of Africa (notably within the context of national strategies for poverty eradication), in the fields of agriculture, water resources, health, public safety and renewable energy. To ensure its mission, ACMAD functions primarily with meteorologists detached by its Members States. ACMAD hosts the African Regional Climate Centre (ACMAD/RCC).
Key Persons and Expertise	**Dr. Elijah Adefisan** is head of the newly founded Research & Development department at ACMAD. He is an expert in West African climate variability and change.
Key Research Facilities, Infrastructure and Equipment	ACMAD owns its research premises and infrastructure such as computers, meeting and networking facilities. It maintains a climate data server in collaboration with Columbia University, NY, USA. In the execution of its action programmes, ACMAD operates in synergy and in a network with its focal points, the National Meteorological Services of 53 African states and various partners amongst whom are: France, United States, United Kingdom, Spain, Germany, Canada, China, Australia.
Previous and Current Involvement in Research and Training Programmes	ACMAD is involved in capacity building through training-activities of junior staff in National Meteorological Services (NMHSs) in Africa. ACMAD/RCC organises training on data services, climate monitoring, long range, and climate projections.
Relevant Publications and/or Research / Innovation Product	Olaniyan, E., Adefisan, E. A., Oni, F., Afiesimama, E., Balogun, A. A., & Lawal, K. A. (2018). Evaluation of the ECMWF Sub-seasonal to Seasonal Precipitation Forecasts during the Peak of West Africa Monsoon in Nigeria. Frontiers in Env. Sci., 6, 4. Abatan, A. A., Abiodun, B. J., Adefisan, E. A., & Gutowski, W. J. (2018). Hot days and tropical nights in Nigeria: trends and associated large-scale features. Theor. Appl. Climatol., 1-17. Balogun, R. A., Liu, C., Adeyewa, Z. D., Okogbue, E. C., & Adefisan, E. A. (2018). Intra-seasonal and seasonal variability of convective properties of monsoon precipitation systems over West and Central Africa. Theor. Appl. Climatol., 1-14.

Partner Organisation Legal Name: Danmarks Meteorologiske Institut	
General description	The Danish Meteorological Institute (DMI, www.dmi.dk) is an institution under the Danish Ministry of Energy, Utilities and Climate and has an annual turnover of about 40 M€. DMI provides meteorological services in the Commonwealth of the Realm of Denmark, the Faroe Islands, Greenland, and surrounding waters and airspace. Founded in 1872, DMI has collected and processed meteorological, climatological and oceanographic measurements/observations, and measures, collects and compiles related geophysical parameters throughout the Realm. Through scientific research and development, DMI secures the optimum accomplishment of its tasks and serves the community with up-to-date information on weather and climate and other geophysical issues. The Department of Research and Development (R&D) at DMI has extensive experience in climate research, including development of state-of-the-art global and regional climate models (e.g., EC-Earth, HIRHAM) and studies of climate processes. DMI's R&D provides in-depth information and advice on climate and climate change to governmental institutions and the general public. The DMI plans to integrate the WIGOS coordination efforts into its operational activities.
Key Persons and Expertise	Senior Scientist **Dr. Ole Bøssing Christensen** has been employed at the DMI since 1993, working with regional climate models and data archiving and analysis; he has also worked with provision of climate model output to end users and impact modellers. . He has participated in several EU-funded projects as primary DMI representative, in several cases as WP leader. He has co-supervised several Master's students and two PhD students, and he teaches regularly at the University of Copenhagen. He will be co-supervisor of ESR8.
Key Research Facilities, Infrastructure and Equipment	DMI rents its research premises. It owns a CRAY XC supercomputer, which serves for the daily operational numerical weather prediction, R&D model experiments, as well as long-term regional and global climate prediction and projection experiments. ESGF datanode, hosting CORDEX data for several institutions. ESR5 will have a permanent desk at DMI.
Previous and Current Involvement in Research and Training Programmes	EC-funded projects for three decades. Among these: FP4 PRUDENCE (coordinator), FP5 ENSEMBLES, H2020 IMPRESSIONS, COPERNICUS PRINCIPLES and DECM.
Relevant Publications and/or Research / Innovation Product	Christensen, O. B., S. Yang, F. Boberg, C. F. Maule, P. Thejll, M. Olesen, M. Drews, H. J. D. Sørup, J. H. Christensen 2015: Scalability of regional climate change in Europe for high-end scenarios. Climate Research 64 (1), 25-38 Knist, S., K. Goergen, E. Buonomo, O.B. Christensen, et al. (2017), Land-atmosphere coupling in EURO-CORDEX evaluation experiments, J. Geophys. Res. Atmos., 122, 79–103, doi:10.1002/2016JD025476 Jacob, D., J. Petersen, B. Eggert, A. Alias, O. B. Christensen, et al., 2013: EURO-CORDEX: new high-resolution climate change projections for European impact research. Reg. Env. Change. doi: 10.1007/s10113-013-0499-2

Partner Organisation Legal Name: United Nations Food and Agriculture Organisation	
General description	The Food and Agriculture Organization of the United Nations (FAO), headquartered in Italy, is an intergovernmental organization with 194 member nations with a mandate to achieve food security for all so that people have regular access to enough high-quality food to lead active, healthy lives.
Key Persons and Expertise	**Dr. Hideki Kanamaru**, Natural Resources Officer (Climate Change), is based in the Regional FAO office in Bangkok. Expertise: climate downscaling, climate change impact and vulnerability assessments, adaptation, disaster risk management. Of particular relevance to the current proposal, he works on making use of regional climate information for assessing impacts of climate change on agriculture, water resources, and food security to provide evidence-base for adaptation. Kanamaru will be co-supervisor of ESR3. **Dr. Mariko Fujisawa**, Climate Change Officer, works in the department of Climate, Biodiversity, Land and Water Department (CB) in the FAO headquarters in Rome. Expert in impact assessment of climate change on agriculture, adaptation and vulnerability assessment. She works on crop models in the impact assessment tool and agrometeology related projects.
Key Research Facilities, Infrastructure and Equipment	FAO owns their research premises as well as infrastructure such as computers and servers, meeting and networking facilities.
Previous and Current Involvement in Research and Training Programmes	CLIMAFRICA, COST Action VALUE, ENSEMBLES, GFCS, CLIMAGRImed, MODEXTREME, A number of training programmes on climate change impact assessments and climate change adaptation in FAO projects, Regional climate model training workshops.
Relevant Publications and/or Research / Innovation Product	MOSAICC – Modelling System for Agricultural Impacts of Climate Change http://www.fao.org/climatechange/mosaicc/ AMICAF – Analysis and Mapping of Impacts Under Climate Change for Adaptation and Food Security http://www.fao.org/climatechange/amicaf/ Gommes, R., El Hairech, T., Rosillon, D., Balaghi, R., and Kanamaru, H., 2009: Impact of Climate Change on the Agricultural Sector - impact on crop yields, FAO, Government of Morocco, World Bank.

Partner Organisation Legal Name: HORTA S.R.I	
General description	HORTA is a spin-off of the University Cattolica del Sacro Cuore, founded in 2008. It offers high-level services for food production, food quality, sustainability and food safety. The mission of HORTA is to provide highly qualified services, both nationally and internationally, in the field of plant production in order to increase the competitiveness of agricultural and agri-food companies. HORTA is a permanent platform for the exploitation of results from research in the agri-food sector through (1) the development of decision support systems for the sustainable management of crops, (2) the transfer of technological innovation to production companies nationally and internationally, with particular reference to productivity, environmental sustainability and food safety; (3) the design, development and implementation of new production routes and new products and technologies; (4) advice to the agri-food industries. Customers of HORTA include, among many others, Barilla (food producer) and Limagrain (seed producer).
Key Persons and Expertise	**Dr. Pierluigi Meriggi**: president and founding member. Responsible for the Ravenna head-quarters, responsible for the large crops sector. He will be co-supervisor of ESR5. **Dr. Valentina Manstretta**. Responsible for research and innovation; Dr. Sara Legler. Responsible for the European projects and for the research and innovation on vine. **Prof. Vittorio Rossi**: founding member. Full Professor of Plant Pathology at the University Cattolica del Sacro Cuore.
Key Research Facilities, Infrastructure and Equipment	HORTA owns their premises. DSS (Web platform), Experimental fields, meteorological station network, agronomic field data.
Previous and Current Involvement in Research and Training Programmes	EU H2020 Project MedGOLD, IWMPRAISE, SOIL4WINE, PATHOGEN, INNOWINE, MODEM, WATER4CROP
Relevant Publications and/or Research / Innovation Product	**Granoduro.net:** a decision support system to increase the quality of soft and hard wheat using a single web platform **Pomodoro.net:** support to optimize tomato production by industry through the management of phytosanitary treatments, irrigation and fertilization **Vite.net:** designed to help vineyard managers draw more targeted and therefore more correct decisions for high-quality viticulture

Partner Organisation Legal Name: National Institute of Agronomic Research of Tunisia (INRAT)	
General description	INRAT is a public institution linked to the Ministry of Agriculture. It is ranked as the first institute specialized in the full-time agricultural research and it is the oldest in the country (creation date in 1893). INRAT has 6 Laboratories and 5 Agricultural Experimentation Units, located in different areas of Tunisia and one Scientific Information and Documentation Unit. INRAT has 81 statutory researchers, 16 engineers, 35 technicians and 141 administrative and support staff. INRAT recruits approximately 150 to 200 people annually as contract workers. In addition, about 100 students do their internships to obtain degrees. The tasks of INRAT are: * Organize, carry out and publish all researches and experimental works for the improvement of crop and animal production techniques. * Collect and study of biodiversity * Improve production system through the development of appropriate techniques and methods * Economical and sociological research linked to rural environment * Participate in the training and supervision of student
Key Persons and Expertise	**Prof. Dr. Leila Radhuane** is a group leader in the Agronomy and Physiology Laboratory at INRAT. She is an expert in plant physiology and climate change impacts on agriculture.
Key Research Facilities, Infrastructure and Equipment	INRAT owns their research premises and research infrastructure such as laboratories, computers, meeting and networking facilities. INRAT operates in synergy with many organizations (ICARDA, FAO…) and countries (Canada, France, Italy..).
Previous and Current Involvement in Research and Training Programmes	INRAT is involved in in capacity building through research activities of students.
Relevant Publications and/or Research / Innovation Product	**Radhouane, L.**; 2013. Climate change impacts on North African countries and on some Tunisian economic sectors. Journal of Agriculture and Environment for International Development, 107(1): 101-111. Slama, A.; Mallek-Maalej, E.; Ben Mohamed, H.; Rhim, T.; **Radhouane, L**; 2018. A return to the genetic heritage of durum wheat to cope with drought heightened by climate change. PLoS ONE, 13(5) : 1-11. **Radhouane, L**. 2018. Why don't adapt Tunisian agriculture to climate change? I. Climate change and agriculture in Tunisia. International Journal of Science, Environment and Technology, 7(5): 1495 – 1508

Partner Organisation Legal Name: isardSAT	
General description	isardSAT is a group of R&D SMEs providing, since 2006, engineering and scientific remote sensing solutions to our clients, based on our expertise in altimetry, passive microwave and SAR technologies. isardSAT Group is composed of isardSAT-Cat (Barcelona) and two fully owned subsidiaries: isardSAT-UK (Guildford) and isardSAT-PL(Gdynia). isardSAT conducts algorithm development, geophysical validation, product generation, service delivery and outreach activities. isardSAT is also involved in applications and service-based projects for the exploitation of Earth Observation data (droughts, floods, atmospheric pollution and climate change adaptation)
Key Persons and Expertise	**Laia Romero** (F) is responsible for Operations and Strategy at isardSAT, and has more than 10 years of experience in the design and operation of Earth Observation services. MSc in Research in Physical Oceanography. **Maria José Escorihuela** (F) is PhD in space and environmental science, specialized in hydrology. **Bernat Martinez** (M), is an experienced project manager and in the areas of hydrology, air quality and climate change.
Key Research Facilities, Infrastructure and Equipment	isardSAT rents premises in the technological park "Barcelona activa" promoted and run by Barcelona city council and owns its research infrastructure. It has access to ultra-wide Internet access, conference facilities, and meeting rooms, video conference rooms and multi-core Linux System Workstations for data processing.
Previous and Current Involvement in Research and Training Programmes	isardSAT has a wide experience successfully managing complex technical projects lasting several years. In particular, the Global Users in the Copernicus Climate Change Service (GLORIOUS, 2017-2019) is relevant for DECIFER. GLORIOUS brings together 15 organisations from 6 continents across the globe, including 4 National Climate/Meteorological/Hydrological Services, 5 national Universities or research institutes, 2 international research institutes, 2 SMEs and 2 Climate Adaptation Services. isardSAT acts as a Knowledge Purveyor working with global users PwC, Oxfam, and UN Habitat in the codesign of the Climate Adaptation Service. Downscaling and bias adjustment techniques using Earth Observation data are explored.
Relevant Publications and/or Research / Innovation Product	Gao Q, Zribi M, Escorihuela MJ and Baghdadi N. 2017. Synergetic Use of Sentinel-1 and Sentinel-2 Data for Soil Moisture Mapping at 100 m Resolution, Sensors 2017, 17, 1966; doi:10.3390/s17091966 Escorihuela MJ and Quintana-Seguí P. 2016. Comparison of remote sensing and simulated soil moisture datasets in Mediterranean landscapes, Remote Sensing of Environment 180, 99-114, doi.org/10.1016/j.rse.2016.02.046. Merlin O, Escorihuela MJ, Aran-Mayoral M, Oagolle O, Al Bitar A. and Kerr Y. 2013. Self-calibrated evaporation-based disaggregation of SMOS soil moisture: an evaluation study at 3 km and 100 m resolution in Catalunya, Spain. Remote Sensing of Environment, 130, pp 25–38, doi:10.1016/j.rse.2012.11.008

Partner Organisation Legal Name: European Commission Joint Research Center	
General description	The Joint Research Centre (JRC) is the European Commission's science and knowledge service. It supports EU policies with independent scientific evidence throughout the whole policy cycle. JRC creates, manages and makes sense of knowledge and develops innovative tools and makes them available to policy makers. It anticipates emerging issues that need to be addressed at EU level and understands policy environments.
Key Persons and Expertise	**Dr. Andrea Toreti** is a senior scientist at JRC. His main research interests focus on: climate extremes and impacts on agriculture; climate variability, climate change and impacts on agriculture; extreme value theory; statistical climatology; change point detection and attribution; agro-meteorology. He will be co-supervisor of ESR11. **Dr. Stefano Galmarini** is a senior scientist at JRC since 2000. He has extensive competence in model evaluation and ensemble modelling. He has published 183 peer-reviewed publications and has participated in several international projects on the assessment of model performance and improvement of model results. He will be co-supervisor of ESR2. **Dr. Alessandro Dosio** is a senior scientific officer at the JRC. His expertise is primarily on: regional climate modelling; production, evaluation, and analysis of climate change projections at regional scale (Europe/Africa) and their linkage with impact models (floods, droughts, crop yield forecast, etc.), with focus being on downscaling and bias-correction. He will be co-supervisor of ESR7.
Key Research Facilities, Infrastructure and Equipment	JRC own their research premises and infrastructure such as HPC, servers
Previous and Current Involvement in Research and Training Programmes	Numerous EU projects (EU-FP6, FP7, H2020), e.g., IMPACT2C, ACQWA, MedGOLD, as well as international initiatives such as AgMIP, CORDEX, MedCLIVAR and MedECC.
Relevant Publications and/or Research / Innovation Product	Zampieri M. et al. 2017. Wheat yield loss attributable to heat waves, drought and water excess at the global, national and subnational scales. Environmental Research Letters 12. Ceglar et al. 2016. Impact of meteorological drivers on regional inter-annual crop yield variability in France. Agricultural and Forest Meteorology 216. Dosio A. (2016): Projections of climate change indices of temperature and precipitation from an ensemble of bias-adjusted high-resolution EURO-CORDEX regional climate models, Journal of Geophysical Research D: Atmospheres, DOI: 10.1002/2015JD024411

Partner Organisation Legal Name: Unión de Pequeños Agricultores y Ganaderos	
General description	Association representing most of the Spanish farmers (as small farmers are the majority in Spain). They have 80.000 affiliates and maintain dialogue with Spanish and European institutions.They belong to COPA.
Key Persons and Expertise	**Javier Alejandre**, farmer and staff at the Technical Department
Key Research Facilities, Infrastructure and Equipment	UPA has offices in Madrid, owned by the Spanish Ministry of Agriculture. UPA has an extensive network of farmer contacts.
Previous and Current Involvement in Research and Training Programmes	UPA funds the “Fundación de Estudios Rurales” - Foundation for rural studies to promote analysis and debate on aspects related to agricultural activity. Currently UPA participates in the project ADAPAGRI on adaptation to climate change funded by Fundacion Bioversidad (http://fundacion-biodiversidad.es/en)
Relevant Publications and/or Research / Innovation Product	-Bimonthly journal for farmers, in Spanish: “La Tierra”, last issue on current drought effects: Emergencia nacional. La Tierra del agricultor y ganadero, 265, nov-dic 2017. -Series of yearly report on family agriculture, last issue: Agricultura Familiar en España, Anuario, 2017. -Monographies: Mujeres rurales. Cuadernos de la Tierra, 10, 2017. Publications can be downloaded at the website https://www.upa.es

Partner Organisation Legal Name: Université Paris-Saclay	
General description	Université Paris-Saclay (UPS) is a new federation comprising higher educational institutions and research organisations, including CNRS. Taken together UPS includes 5.000 doctoral students among them 45% of foreigners. The 20 Doctoral Schools of UPS, that cover all scientific domains, form a Doctoral College whose goal is to define a common doctoral policy and implement high standards and effective governance. The Doctoral College has also created a common charter for doctoral students based on European recommendations. UPS delivers the Doctorate degrees and signs the agreement on joint international supervision of Doctoral Thesis for PhD students recruited by CNRS. It provides also training both in scientific and complementary skills. UPS is signatory of the European charter for researchers and code of conduct for the recruitment of researchers.
Key Persons and Expertise	**Prof. Sylvie Pommier** is Professor of Mechanics since 2003 at École Normale Supérieure de Cachan. She was vice-president for research of ENS Cachan from 2012 to 2014, where she prepared the integration of research and doctoral training of ENS Cachan within UPS. Since 2014 she is the project manager for the Doctoral College of UPS.
Key Research Facilities, Infrastructure and Equipment	The Doctoral students of UPS benefit from an exceptional scientific environment, including equipment and infrastructure such as Synchrotron SOLEIL (the French national synchrotron facility), ImaGif (an integrated platform dedicated to life sciences and chemical biology), Neurospin (the research centre dedicated to neurosciences), 12 infrastructures included in the ESFRI Roadmap (ICOS, ELI, EATRIS, EuroBioImaging, INSTRUCT, ESS 5lund, XFEL, etc.), and several FABLabs (UVSQ, UPSUD).
Previous and Current Involvement in Research and Training Programmes	As a new federating entity, UPS gathers the wide expertise of its organisations members previously and currently involved in more than 35 ITN projects (among them some in coordination: ISOTOPICS or MAMI).
Relevant Publications and/or Research / Innovation Product	1. Doctoral Charter: https://www.universite-paris-saclay.fr/en/doctoral-charter 2. Quality manual (Doctoral College): https://www.universite-paris-saclay.fr/sites/default/files/2015_10_29_quality_manual.pdf 3. Doctoral studies enrolment procedure: https://www.universite-paris-saclay.fr/en/how-to-apply

Partner Organisation Legal Name: The World Bank Group	
General description	The World Bank Group is one of the world's largest sources of funding and knowledge for developing countries. Its five institutions share a commitment to reducing poverty, increasing shared prosperity, and promoting sustainable development. The World Bank Group is committed to working with countries to deliver climate-smart development in key sectors such as agriculture and food security
Key Persons and Expertise	**Dr. Ana E Bucher**, Senior Climate Change Specialist, Climate Change Group. She will be co-supervisor of ESR8 and ESR9.
Key Research Facilities, Infrastructure and Equipment	The World Bank owns their headquarters in Washington (USA), as well as infrastructure including computers, databases, spatial analysis laboratories, meeting and networking facilities, climate data servers and Amazon cloud (AWS).
Previous and Current Involvement in Research and Training Programmes	The WBG is involved in several research and training programs related to climate impacts, vulnerability and risks. The WBG engages closely with a large number of country Meteorological Services, Universities, private sector, and Research Centers focusing on Hydro Meteorological Research and Analysis. The WBG provides technical assistance to WMO Members to modernize their weather, climate and hydrological forecasting. Through training and knowledge sharing opportunities, the WBG facilitates the sharing of international best practice and supports national Met Services to develop their operational concepts.
Relevant Publications and/or Research / Innovation Product	**Climate Change Knowledge Portal** http://climateknowledgeportal.worldbank.org. The Climate Change Knowledge Portal (CCKP) is a central hub of information, data and reports about climate change around the world. The portal allows users to query, map, compare, chart and summarize key climate and climate-related information. **From Climate Science to Action:** Each part of the world faces specific vulnerabilities to climate change and has different opportunities to mitigate the effects and build resilience in the 21st century. Without climate action, decades of development progress are threatened, meaning that we are at a 'make it or break it' point in time. This course presents the most recent scientific evidence, explains the different regional impacts and divulge climate action strategies, and some opportunities for you to take action on climate change. https://olc.worldbank.org/content/climate-science-action. **Climate Smart Agriculture Profiles:** Mainstreaming climate smart agriculture (CSA) requires critical stocktaking of ongoing and promising practices for the future, and of institutional and financial enablers for CSA adoption. A series of country profile provides a snapshot of a developing baseline created to initiate discussion, both within countries and globally, about entry points for investing in CSA at scale. The profiles are effective tools for synthesizing complex information into focused outputs that compare in a visually-appealing way the 'climate smartness' of many country activities and their adoption potential. http://sdwebx.worldbank.org/climateportal/index.cfm?page=climate_agriculture_profiles

6. Ethics Issues

No ethics issues as stated in part A.

7. Letters of Commitment

Please use this section to insert scanned copies of the required **letters of commitment from partner organisations**. These should be on headed paper and signed in order to demonstrate the credibility of the organisation's commitment to the ITN. There is no specific template for these letters.

CENTRE AFRICAIN POUR LES APPLICATIONS
DE LA METEOROLOGIE AU DEVELOPPEMENT

ACMAD

AFRICAN CENTRE OF METEOROLOGICAL
APPLICATIONS FOR DEVELOPMENT

N°343/ACMAD/DG/ Niamey, December 20, 2018

Prof. Dr. Douglas Maraun
Wegener Center for Climate and Global Change
University of Graz
Austria

Subject: Letter of Commitment

Dear Dr. Maraun,

I am happy to inform you that ACMAD is committed to contribute as partner organization to the project DECIFEr (Distilling Ensemble Climate Information for Food sEcuRity), submitted as proposal within the H2020 call MSCA-ITN-2019: Innovative Training Networks, should the proposal be funded.

ACMAD, with a continental mandate is involved in capacity building and provision of weather and climate information and services, geared towards development. Robust and defensible climate information is at the core of our mission. This holds in particular for the selected target regions of Northern Africa and the Sahel, where climate model projections are still afflicted with huge uncertainties. Thus, the DECIFER project is very relevant to the operations of ACMAD.

ACMAD's commitments to the project includes the following, supervised by Dr. Elijah Adefisan, head of the Department of Research and Development:

- Qualified ACMAD staff co-supervise a PhD student in the field of Northern African climate change and its uncertainties
- Host up to four secondments of students on understanding and communicating regional climate and climate change in Northern Africa
- Contribute to the Co-Design workshop (in the discussion of user needs and regional climate phenomena), the training schools (on climate change in Africa, and providing climate services for Africa), the grand challenges webinar (e.g. on the challenges to establish and maintain weather and climate services in Africa), and the international network conference
- Help with providing contacts with local stakeholders, e.g., for outreach activities.

Yours sincerely,

Benjamin L. Lamptey, PhD
Acting Director General

55, Avenue des Ministères PL6 BP : 13184 Niamey- Niger
☎ : (227) 20 73 49 92 -- Fax : (227) 20 72 36 27 -- : dgacmad@acmad.org -- Web : http//www.acmad.org

5 January 2018

Danish Meteorological Institute

Associate Professor Douglas Maraun
Head of the Reloclim Research Group
Wegener Center for Climate and Global Change University of Graz
Brandhofgasse 5
8010 Graz
Austria

Letter of support for DECIFER

Dear Douglas Maraun,

I am very pleased with this letter to support your initiative DECIFER (Distilling Ensemble Climate Information for Food sEcuRity) to form a Marie Skłodowska-Curie Innovative Training Network under the H2020 call MSCA-ITN-2019.

I am confident that with the envisaged focus of the network on the ability to model and interpret atmosphere land surface interactions in climate models, which should lead to advances in the understanding of drought and drought related impacts related to ongoing and projected future climate change in the Mediterranean region and beyond.

The scientific focus of DECIFER addresses many aspects of my own scientific expertise and is in the interest of the DMI. Therefore, I will be happy to act as a co-supervisor for any students of DECIFER who will need enrolment with a PhD programme in Copenhagen. This supervision work will be done in close collaboration with the University of Copenhagen, which will be the formal host institution and award the PhD grade. The DMI will contribute to DECIFER training activities, particularly regarding climate models, and offers to host two secondment activities for other students in collaboration with the University of Copenhagen.

Danish Meteorological Institute

Lyngbyvej 100
DK-2100 Copenhagen Ø

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F +45 3927 1080

www.dmi.dk
epost@dmi.dk

CVR 1815 9104
EAN 5798000893252

DANISH MINISTRY OF CLIMATE, ENERGY AND BUILDING

Yours sincerely

Ole B. Christensen
Senior Scientist

منظمة الأغذية والزراعة للأمم المتحدة
联合国粮食及农业组织
Food and Agriculture Organization of the United Nations
Organisation des Nations Unies pour l'alimentation et l'agriculture
Продовольственная и сельскохозяйственная организация Объединенных Наций
Organización de las Naciones Unidas para la Agricultura y la Alimentación

Viale delle Terme di Caracalla, 00153 Rome, Italy
Fax: +39 0657053152
Tel: +39 0657051
www.fao.org

Our Ref.:

January 10, 2019

Prof. Dr. Douglas Maraun
Wegener Center for Climate and Global Change
University of Graz
Austria

Dear Douglas,

We are happy to express our support to the project DECIFER (Distilling Ensemble Climate Information for Food Security), submitted as Marie Curie Innovative Training Network proposal within the H2020 call MSCA-ITN-2018: Innovative Training Networks.

The goal of the Food and Agriculture Organisation of the United Nations (FAO) is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. DECIFER addresses key issues relevant to the mandate of FAO. In particular it aims to provide better information about climate-induced agricultural changes in some of the most climate-vulnerable regions of the world. Such information is crucial to inform projects within the FAO and policy advise issued by FAO.

Dr. Mariko Fujisawa, Climate Change Officer, and Dr. Hideki Kanamaru, Natural Resources Officer, will therefore be committed to contribute to DECIFER, should the project be funded.

Our commitment to DECIFER includes the following:

- co-supervise one PhD student working on agro-climatic indicators
- hosting two secondments of PhD students working on agricultural impacts on climate change
- contribute to the Introductory Interdisciplinary Training School (role of the FAO, agricultural modelling),
- contribute to the workshops on Co-Producing Climate Information, Interpreting Climate Information for Decision Making,
- contribute to the Dissemination Training School (e.g., presenting the relevance of DECIFER results for FAO)

We wish you the best success with the proposal!

Yours sincerely,

Hideki Kanamaru, PhD
atural Resources Officer
FAO

HORT@
From research to field

Prof. Dr. Douglas Maraun
University of Graz
Wegener Center for Climate and Global Change
Brandhofgasse 5
8010 Graz

Piacenza 11/01/2019

Subject: Participation to the DECIFER proposal for the H2020-MSCA-ITN-2019

We hereby express our support to the Marie Curie Innovative Training Network proposal 'Distilling Ensemble Climate Information for Food Security' DECIFER presented by the University of Graz in the H2020-MSCA-ITN-2019 call.

We express our commitment to participate as Partner Organisation and to host during the secondment period a maximum of 3 Ph.D. students involved in the program. We also express our interest in: co-supervising a maximum of 3 Ph.D. students; contributing to the career workshop, co-design workshop, the training schools, the grand challenges webinar and the international network conference

Presidente di Horta Srl
Pierluigi Meriggi

HORTA S.R.L.
SPIN OFF UNIV. CATTOLICA
Via E.Gorra, 55
29122 Piacenza
C.F./P.I. 01529030338

Informativa ai sensi del Reg. 679/2016/UE

1. Ai sensi del Reg. 679/2016/UE i dati saranno trattati dal destinatario per la gestione del servizio/prodotto richiestoci/offerto
2. I dati verranno trattati con modalità cartacee ed informatizzate
3. I dati non saranno oggetto di diffusione ma, eventualmente, di comunicazione ad altri soggetti bene identificati per gli aspetti organizzativi inerenti all'espletamento del servizio/fornitura del prodotto.
4. In qualunque momento potranno essere esercitati dagli interessati i diritti di cui agli artt. 7, 15-21, 51 del Reg. 679/2016/UE contattando il Titolare del trattamento presso la sede sociale della Società. L'informativa completa è disponibile sul sito http://www.horta-srl.com/

HORTA S.r.l.
Sede Legale: Via Egidio Gorra 55, 29122 Piacenza
Sede Operativa: Via Sant'Alberto 327, 48123 Ravenna - c/o Az. Agricola Cà Bosco
P.I./C.F. 01529030338 - REA: PC-0170291 - Capitale Sociale €30.000,00 i.v.
www.horta-srl.com - info@horta-srl.com

Spin Off di
UNIVERSITÀ CATTOLICA del Sacro Cuore

REPUBLIQUE TUNISIENNE

MINISTERE DE L'AGRICULTURE

INSTITUTION DE LA RECHERCHE ET DE L'ENSEIGNEMENT SUPERIEUR AGRICOLES

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE DE TUNISIE
Laboratoire des Sciences et Techniques Agronomiques

الجمهوريـــة التونسيـــة

وزارة الفلاحة و الموارد المائية و الصيد البحري

مؤسسة البحث والتعليم العالي الفلاحي

المعهد الوطني للبحوث الزراعية بتونس
مخبر العلوم والتقنيات الزراعية

Tunis, December 24, 2017

Prof. Dr. Douglas Maraun
Wegener Center for Climate and Global Change
University of Graz
Austria

Letter of Commitment

Dear Dr. Maraun,

I am happy to inform you that INRAT is committed to contribute as partner organization to the project Distilling Ensemble Climate Information for Food Security (DECIFER), submitted as proposal within the H2020 call MSCA-ITN-2019: Innovative Training Networks, should the proposal be funded.

INRAT is the national institute of agronomic research of Tunisia, with a history of more than 100 years. The mission of the institute comprises a wide range of aspects in agronomic research, including the research on genetic resources, breeding new plant varieties for the climate of Tunisia, technology and knowledge transfer to stakeholders, and the training of students, postdocs and practitioners.
An important concern of the institute is the impact of climate change on agriculture, in particular in the context of increasing food demand. Against this background, the Agronomy and Physiology Laboratory at INRAT addresses the impacts of different stressors on crop physiology. Thus the focus of DECIFER on providing information on climate change impacts on agriculture is very relevant for INRAT and our stakeholders.

INRAT is therefore committed to contribute to DECIFER in the following way:

- Co-supervise a post-doc student in the field of climate impacts on agriculture in Northern Africa
- Host up to two secondments of students on the influence of meteorological stressors in plant physiology, and the impacts of climate change on agriculture in Tunisia
- Contribute to the Co-Design workshop (in the discussion of user needs and plant physiology), the training schools (on climate change impacts on agriculture in Tunisia), the grand challenges webinar (e.g. on the challenges for food security in Northern Africa), and the international network conference
- Help with providing contacts with local stakeholders, e.g., for outreach activities.

Yours sincerely,

Prof. Dr. Leila Radhouane

Rue HédiKarray, 1004MenzahTunisie نهج الهادي كراي ، 1004المنزه - تونس
Tél : 216 23023971 / 216 71 230024 الهاتف : 216 71 230239 / 216 23002471
Fax : 216 71 716537 / 216 71 216752897 71 716537 / 216 71 752897 الفاكس:

isardSAT®

Parc Tecnològic Barcelona Activa
C/ Marie Curie, 8-14, A 213-219. 08042 Barcelona
Tel. + 34 933 505 508 · Fax. + 34 932 917 815
www.isardSAT.cat

Barcelona, December 10th, 2018

Object / Project reference: H2020-ITN-2019
Attention to: Universidad Politécnica de Madrid (UPM)

Dear Margarita Ruiz Ramos,

isardSAT (http://www.isardsat.cat/) expresses its interest and confirms its commitment to participate in the proposal DECIFER (Distilling Ensemble Climate Information for Food sEcuRity), that you are going to apply for the call ***"H2020 call MSCA-ITN-2019: Innovative Training Networks".***

The commitment from isardSAT is to host during a period of 2 months a PhD student from DECIFER to applying bias correction techniques or other developments resulting from DECIFER to outputs of C3S 422 Lot 1 projects (in consultation with the output's user Oxfam if needed). This stay will take place in the isardSAT offices, located at Barcelona. Specific dates will be agreed between isardSAT, the PhD student and his/her thesis supervisors, probably during 2020, depending on the thesis development.

Kind regards,

isardSAT®
Parc Tecnològic BCNord · c/. de Marie Curie, 8-14
08042 BARCELONA · www.isardSAT.cat
CIF· B-64.290.828

Laia Romero
-
Operations and Strategy Director
Laia.Romero@isardSAT.cat

isardSAT, S.L. – C.I.F.: B64290828. Inscrita al Reg.Mercantil de Barcelona – Volum 38882, Foli 56, Full B330727, Inscripció 1

EUROPEAN COMMISSION
JOINT RESEARCH CENTRE

Directorate D - Sustainable Resources (Ispra)
Director

Ispra, 08 January 2019

NOTE TO MR DOUGLAS MARAUN

Subject: **Participation to the DECIFER proposal for the H2020-MSCA-ITN-2019**

Dear Mr. Maraun

We hereby express our support to the Marie Curie Innovative Training Network proposal *"Distilling Ensemble Climate Information for Food Security-* DECIFER" presented by the University of Graz in the H2020-MSCA-ITN-2019 call on Innovative Training Networks.

We express the commitment to participate as Partner Organisation and to host during the secondment period a maximum of 6 Ph.D. students involved in the program on the following topics: impacts of model errors and bias correction on eco-climatic indicators; understanding regional soil moisture- temperature feedbacks; process-based analysis of the systematic errors in global climate predictions and projections. Ph.D. students can be hosted by the European Commission, Joint Research Centre (JRC) as unpaid visiting scientists, however the conditions below must be fully met.

An agreement between the Directorates, the unpaid visiting scientist and the associated University will be a pre-requisite on the meeting of a number of formalities, and if all administrative procedures will finish successfully (i.e. if all documents will be provided, in case of non-EU nationals, security screening completed and derogation of Director General received). There will be no transfer of money between the Parties and all conditions of the visit will be defined in the visiting scientific agreement, which will need to be signed by the sending party, the unpaid visiting scientist and the JRC.

Furthermore, we express the interest in co-supervising 3 Ph.D. students. The Co-supervision will be assigned to the following JRC scientists: Andrea Toreti, Stefano Galmarini and Alessandro Dosio.

Finally, we express the willingness to contribute to the activities foreseen in the proposal: interdisciplinary training school, career workshop, workshop on statistics and on climate information.

Kind Regards,

Director
Giovanni DE SANTI

European Commission, Via Enrico Fermi 2749, I-21027 Ispra (Varese) - Italy. Telephone: (39)0332-78-9111.
Office: bld. 100. Telephone: direct line (39)0332-78-9482.

E-mail: giovanni.de-santi@ec.europa.eu

Letter of commitment

Madrid, December 7th 2018

The Unión de Pequeños Agricultores (UPA; https://www.upa.es, Association of Small Farmers) expresses its interest and confirms its commitment to participate in the proposal **DECIFER** (Distilling Ensemble Climate Information for Food sEcuRity) to be submitted to the **H2020 call MSCA-ITN-2019: Innovative Training Networks.**

The commitment accepted by UPA is hosting, during a period of **two weeks** to be determined in the course of the Project (likely during 2020), a PhD student belonging to DECIFER for co-designing main aspects of an mobile app to support decision making for famers.

This brief stay will take place in UPA's offices at Calle Agustín de Betancourt nº 17, 3ª planta 28003 Madrid, also taking advantage of the net of offices of UPA in Spain if the interest and development of the project requires so. Specific dates will be agreed by UPA, the PhD student and his/her thesis co-supervisors, depending on the thesis progress and the agricultural season.

What I sign for the record,

Lorenzo Ramos Silva
General Secretary

Unión de Pequeños Agricultores y Ganaderos
Agustín de Betancourt, 17. 3º. 28003 Madrid. Tlf.: 91 554 18 70 | Fax: 91 554 26 21
upa@upa.es | www.upa.es

université
PARIS-SACLAY

Letter of commitment

I, undersigned Sylvie RETAILLEAU representing Université Paris-Saclay (UPSaclay) in the capacity of President hereby declare that my organization will participate as partner organization in the project "**Distilling Ensemble Climate Information for Food sEcuRity**" (DECIFER) submitted under the call for proposals H2020-MSCA-ITN-2019-ETN.

UPSaclay was created in January 2015 and is now composed of 19 members: three universities, seven research organizations, and nine prestigious university-level colleges. UPSaclay gathers 10 500 researchers and teachers in 300 research laboratories thus offering an exceptional scientific environment.

The **Doctoral College** of UPSaclay, http://www.universite-paris-saclay.fr/en/Doctoral%20college, is in charge of coordinating and pooling the activities of its **20 Doctoral Schools**, which provide training for both scientific and complementary skills for PhD students enrolled in one of UPSaclay members, **CNRS** being one of them. Its goal is to define a common doctoral policy and implement high standards and effective governance (see the common **Charter for doctoral students** based on European recommendations: https://www.universite-paris-saclay.fr/en/doctoral-charter). It offers a unique doctoral studies' programme to 5000 PhD students and delivers one common doctoral degree.

The doctoral student(s) of the undersigned project will be registered in the Doctoral School called "Sciences de l'Environnement" (ED129) which is positioned around teams whose research activities deal with Climate Sciences (atmosphere and oceans, environmental and climate changes, analysis and modeling of the climate system, variability, projections, dynamics, etc.).

Université Paris-Saclay is authorized to sign agreements on joint international supervision of Doctoral Theses with other institutions. Should it be needed, and as project partner organization, UPSaclay will deliver a Doctoral Degree (either within the framework of a double, joint or multiple degree), and will contribute to the project by ensuring personalized scientific supervision of the highest quality as well as collective training.

Yours sincerely,

Done in Saint-Aubin

Date: 07/01/2019

Name and function: Sylvie RETAILLEAU, President

Signature and official stamp: .....

Route de l'Orme aux Merisiers
Université PARIS-SACLAY
université-paris-saclay.fr
Espace Technologique
Immeuble Discovery
91190 SAINT AUBIN / France

www.universite-paris-saclay.fr

Espace Technologique / Immeuble Discovery
Route de l'Orme aux Merisiers RD 128 / 91190 Saint-Aubin, France

WORLD BANK GROUP

January 8, 2019

Douglas Maraun
Associate Professor
Head of the Regional Climate Research Group
Wegener Center for Climate and Global Change
University of Graz, Austria

Dear Dr. Maraun,

I am happy to confirm that the World Bank is committed to support the proposal for the DECIFER (Distilling Ensemble Climate Information for Food Security) project, submitted as Marie Curie Innovative Training Network proposal within the H2020 call MSCA-ITN-2019: Innovative Training Networks, should the proposal be funded.

By 2050, the world will have to feed 9 billion people, extend housing and services to 2 billion new urban residents, and provide universal access to affordable energy, and do so while bringing down global greenhouse gas emissions to a level that make a sustainable future possible. At the same time, floods, droughts, sea-level rise, threats to water and food security and the frequency of natural disasters will intensify, threatening to push 100 million more people into poverty in the next 15 years alone. The World Bank is committed to support developing countries meet climate resilient and low carbon development targets specified in their National Development Contributions (NDCs). This entails support to enhance resilient development in several high-impact areas, including provision of climate services for key sectors such as climate-smart agriculture and social development, as well as in mobilizing the private sector to expand climate investments in developing countries.

DECIFER will provide the opportunity to translate and operationalize the use of latest climate data and information to be used in decision making regarding agriculture and food security. Outputs from DECIFER should help provide sector specific information for improved climate smart planning processes at different levels of details. In addition, DECIFER will provide an opportunity to support in-country capacity building related to the development of climate services for food security and improved understanding of climate impacts.

In particular, the World Bank staff working on climate and agriculture could contribute to the project by helping supervise the work of PhD students focusing on the climate/development nexus and host up to 5 non-paid secondments of PhD students as interns, both at the Washington DC Headquarters and/or within country projects particularly in the African Region.

The secondments would contribute to the support and enhancements of analytical platforms, such as the Climate Change Knowledge Portal, conceptualization and development of climate

THE WORLD BANK IBRD • IDA | IFC International Finance Corporation | MIGA Multilateral Investment Guarantee Agency

services studies in the countries, and/or the implementation of investment projects based on climate model interpretations. The World Bank would also contribute to the design of the overall training programme, including training schools, the grand challenges webinar, and the career workshop. Topics for the training school and the webinar could revolve around the use of climate science for development actions, the role of the World Bank for international climate policy and the Paris Agreement, and issues related to climate economics and financing of climate adaptation.

I wish you the best success for the project and look forward to collaborating with you.

Yours sincerely,

Ana E. Bucher, Ph.D.
Senior Climate Change Specialist
Climate Change Group I Climate Analytics and Advisory Services
T +1 202 458 5249
E abucher@worldbank.org
W www.climateknowledgeportal.worldbank.org
W www.worldbank.org
WORLD BANK GROUP
Climate Change

National Aeronautics and Space Administration
Goddard Institute for Space Studies
New York, N.Y.

Douglas Maraun
Wegener Center for Climate and Global Change
University of Graz Brandhofgasse 5, 8010 Graz, Austria
+43 316 380 8448

December 14, 2018

Dear Douglas,

It is my pleasure to offer my commitment to serve as a member of the Science and Stakeholder Advisory Board for the DECIFER initiative ("Distilling Ensemble Climate Information for Food sEcuRity") proposed to the H2020 call MSCA-ITN-2019: Innovative Training Networks. The proposed work addresses the fundamental challenge of providing useful climate information as many vulnerable populations face a future where change is inevitable but uncertain. Challenges are particularly acute in the agricultural sector of the Mediterranean and Northern Africa, where agricultural markets and food security are susceptible to extreme events punctuating long term climate shifts and technological trends. Public, private, and non-governmental organization stakeholders are eager for accurate assessment of climate trends and evolving risk distributions with a lead time that provides a useful knowledge basis for investment and policy planning given the timelines needed to effect adaptation and transformational change. Your proposal provides the necessary concerted and coordinated effort that will identify actionable climate signals and their implications across interconnected local and regional agricultural areas, and then communicate these to stakeholders to inform science-based decision making.

I look forward to advising DECIFER drawing upon lessons gleaned from my experience founding and leading the Agricultural Model Intercomparison and Improvement Project (AgMIP). AgMIP is an international network of 1000+ climate, crop, livestock, economics, and food security experts working to systematically evaluate and apply integrated modeling frameworks to understand the impacts of climate variability and global changes on agricultural markets and food security. As AgMIP Science Coordinator and Climate Team leader since AgMIP's launch in 2010, I will share lessons from our experiences connecting across disciplines, scales, and models to produce useful climate and agricultural risk information that is transparent in its treatment of uncertainty and tailored to stakeholder needs. Connections and findings from previous AgMIP projects in several of your focus countries will also likely be helpful in orienting project activities. I also will provide perspective as Coordinating Lead Author of the Hazards Chapter (CH12) of the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6). I also can share insights from my role as co-chair of the Vulnerability, Impacts, Adaptation, and Climate Services (VIACS) Advisory Board of the Coupled Model Intercomparison Project phase 6 (CMIP6), which has a mandate to improve communications between climate modeling groups and the many groups and stakeholders applying climate information.

Congratulations to you and your excellent team for proposing DECIFER. I look forward to working closely with this much-needed initiative in the years ahead!

Sincerely,

Alex C. Ruane

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17 December 2018

To whom it may concern,

I am writing to express my willingness to join an advisory board for the proposed DECIFER (Distilling Ensemble Climate Information for Food sEcuRity) project as part of the H2020 call on Innovative Training Networks, MSCA-ITN-2019.

The proposed project addresses critical issues in the use of downscaled climate information, advancing research methods to integrate climate information into decision-making and improve understanding of key climate change uncertainties relevant to the agriculture sector. The research outputs will provide benefits to the agricultural community in North Africa and the Mediterranean region, as well as support the international climate services community in demonstrating improved methods for distilling multiple sources of climate information.

The Met Office develops and provides tailored climate services for users across the world. Through joining the advisory board for this project, it provides an opportunity to provide expert guidance for the research, drawing on experiences from a range of relevant projects and utilising expertise in climate science, impacts and services. The Met Office stands to benefit from learning about the new research as well as being able to engage with a network of scientists and practitioners in the focal regions.

We look forward to the opportunity to support the proposed DECIFER project.

Yours faithfully,

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MARIE Skłodowska-CURIE ACTIONS

Innovative Training Networks (ITN)
Call: H2020-MSCA-ITN-2019

PART B

Distilling Ensemble Climate Information for Food sEcuRity

This proposal is to be evaluated as:

[ETN]