SEVENTH FRAMEWORK PROGRAMME

THEME [SPA.2013.1.1-05] [Attribution products]

Grant agreement for: Collaborative project

Annex I - "Description of Work"

Project acronym: EUCLEIA

Project full title: "EUropean CLimate and weather Events: Interpretation and Attribution"

Grant agreement no: 607085

Version date: 2013-09-23

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A1: Project summary

Project Number ¹	607085	Project Acronym ²		EUCLEIA						
	One form per project									
	General information									
Project title ³ EUropean CLimate and weather Events: Interpretation and Attribution										
Starting date ⁴	01/01/20	01/01/2014								
Duration in months ⁵	36									
Call (part) identifier ⁶	FP7-SP	ACE-2013-1								
Activity code(s) most relevant to your topic ⁷	SPA.201 products	SPA.2013.1.1-05:Attribution products								
Abstract ⁹										
			_							

Climate change is expected to impact extreme weather in Europe. There is therefore a clear need to adapt effectively to climate change, particularly in Europe, where recent heatwaves, floods and droughts have demonstrated the vulnerability of European citizens to extreme weather. However, scientifically robust information about the extent to which recent extreme weather can be linked to climate variability and change is often lacking. There is therefore a clear need to develop better information on weather and climate risks as part of the operational capacities in the climate change context of GMES.

EUCLEIA will develop the means to provide reliable information about weather and climate risks by developing a quasi-operational event attribution system for Europe. This system will be used to investigate heat waves, cold spells, floods, droughts and storm surges by means of developing a comprehensive set of diagnostics of the processes under study. It will provide well verified assessments of the extent to which such weather-related risks have changed due to human influences on climate. It will also identify those types of weather events where the science is still too uncertain to make a robust assessment of attributable risk.

EUCLEIA will work closely with targeted stakeholder groups, including the insurance industry, regional managers and policy makers, general public and the legal field, to establish user requirements for event attribution products and to facilitate the development of climate attribution strategies. The attribution system developed by EUCLEIA will deliver reliable and user-relevant attribution assessments on a range of timescales; on a fast track basis in the immediate aftermath of extreme events, on a seasonal basis to stakeholder groups and annually to the scientifically prestigious annual attribution supplement of the Bulletin of the American Meteorological Society.

A2: List of Beneficiaries

Project Number ¹		607085	Project Acronym ²		EUCLEIA						
	List of Beneficiaries										
No	Name				•	Country	Project entry month ¹⁰	Project exit month			
1	MET OFFICE			Met Office		United Kingdom	1	36			
2	EIDGENOESSISCHE	TECHNISCHE HOCHSCHULE Z	URICH	ETH Zurich		Switzerland	1	36			
3	CENTRE NATIONAL	DE LA RECHERCHE SCIENTIFIC	QUE	CNRS		France	1	36			
4	THE UNIVERSITY OF	EDINBURGH		UEDIN		United Kingdom	1	36			
5	FUNDACIO INSTITU	T CATALA DE CIENCIES DEL CL	MA	IC3		Spain	1	36			
6	DANMARKS METEO	ROLOGISKE INSTITUT		DMI		Denmark	1	36			
7	KONINKLIJK NEDER	LANDS METEOROLOGISCH INS	TITUUT-KNMI	KNMI		Netherlands	1	36			
8	THE UNIVERSITY OF	F READING		UNI READIN	١G	United Kingdom	1	36			
9	THE CHANCELLOR, OF OXFORD	MASTERS AND SCHOLARS OF	THE UNIVERSITY	UOXF		United Kingdom	1	36			
10	HELMHOLTZ-ZENTR UND KUSTENFORSC	UM GEESTHACHT ZENTRUM FU CHUNG GMBH	JR MATERIAL-	HZG		Germany	1	36			
11	UNIVERSITE DE VER	RSAILLES SAINT-QUENTIN-EN-Y	VELINES.	UVSQ		France	1	36			

A3: Budget Breakdown

Project Number ¹	607085 Project Acronym ² EUCLEIA									
				Or	ne Form per Proje	ct				
Participant				Estin	nated eligible cos	oject)		Poguastad		
number in this project ¹¹	Participant short name	Fund. % ¹²	Ind. costs ¹³	RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total A+B+C+D	Total Receipts	EU contribution
1	Met Office	50.0	A	445,768.11	0.00	97,480.03	60,911.52	604,159.66	0.00	381,275.61
2	ETH Zurich	75.0	Т	396,985.60	0.00	0.00	0.00	396,985.60	0.00	297,739.00
3	CNRS	75.0	Т	423,680.00	0.00	0.00	0.00	423,680.00	0.00	317,760.00
4	UEDIN	75.0	S	138,866.00	0.00	0.00	0.00	138,866.00	0.00	104,149.00
5	IC3	75.0	S	184,377.00	0.00	0.00	0.00	184,377.00	0.00	138,282.00
6	DMI	75.0	A	211,150.00	0.00	0.00	0.00	211,150.00	0.00	158,362.00
7	KNMI	75.0	A	571,925.00	0.00	0.00	15,671.00	587,596.00	0.00	444,614.75
8	UNI READING	75.0	Т	309,187.20	0.00	0.00	0.00	309,187.20	0.00	231,890.00
9	UOXF	75.0	Т	452,374.40	0.00	0.00	33,296.00	485,670.40	0.00	372,576.80
10	HZG	75.0	A	375,176.00	0.00	0.00	7,890.00	383,066.00	0.00	289,272.00
11	UVSQ	75.0	Т	327,896.00	0.00	0.00	9,072.00	336,968.00	0.00	254,994.00
Total			3,837,385.31	0.00	97,480.03	126,840.52	4,061,705.86	0.00	2,990,915.16	

Note that the budget mentioned in this table is the total budget requested by the Beneficiary and associated Third Parties.

* The following funding schemes are distinguished

Collaborative Project (if a distinction is made in the call please state which type of Collaborative project is referred to: (i) Small of medium-scale focused research project, (ii) Large-scale integrating project, (iii) Project targeted to special groups such as SMEs and other smaller actors), Network of Excellence, Coordination Action, Support Action.

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project, and it cannot be changed. The project number **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

2. Project acronym

Use the project acronym as indicated in the submitted proposal. It cannot be changed, unless agreed during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents** to prevent errors during its handling.

3. Project title

Use the title (preferably no longer than 200 characters) as indicated in the submitted proposal. Minor corrections are possible if agreed during the preparation of the grant agreement.

4. Starting date

Unless a specific (fixed) starting date is duly justified and agreed upon during the preparation of the Grant Agreement, the project will start on the first day of the month following the entry info force of the Grant Agreement (NB : entry into force = signature by the Commission). Please note that if a fixed starting date is used, you will be required to provide a detailed justification on a separate note.

5. Duration

Insert the duration of the project in full months.

6. Call (part) identifier

The Call (part) identifier is the reference number given in the call or part of the call you were addressing, as indicated in the publication of the call in the Official Journal of the European Union. You have to use the identifier given by the Commission in the letter inviting to prepare the grant agreement.

7. Activity code

Select the activity code from the drop-down menu.

8. Free keywords

Use the free keywords from your original proposal; changes and additions are possible.

9. Abstract

10. The month at which the participant joined the consortium, month 1 marking the start date of the project, and all other start dates being relative to this start date.

11. The number allocated by the Consortium to the participant for this project.

12. Include the funding % for RTD/Innovation - either 50% or 75%

13. Indirect cost model

- A: Actual Costs
- S: Actual Costs Simplified Method
- T: Transitional Flat rate
- F :Flat Rate

Workplan Tables

Project number

607085

Project title

EUCLEIA - EUropean CLimate and weather Events: Interpretation and Attribution

Call (part) identifier

FP7-SPACE-2013-1

Funding scheme

Collaborative project

WT1 List of work packages

Project Nu	Imber ¹	607085	Project Acronym ²		EUCLEIA								
	LIST OF WORK PACKAGES (WP)												
WP Number ⁵³	WP Title		Type of activity ⁵⁴	Lead beneficiary number ⁵⁵	Person- months ⁵⁶	Start month ⁵⁷	End month ⁵⁸						
WP1	Manageme	ent of EUCLEIA		MGT	1	15.00	1	36					
WP2	Scientific c	oordination of EUCLEIA	ł	RTD	1	6.00	1	36					
WP3	Dissemination and outreach			OTHER	1	8.00	1	36					
WP4	Assessing detection and attribution through general public and stakeholder analysis			RTD	10	66.00	1	36					
WP5	Development of attribution methodologies and exploration of framing issues			RTD	9	88.00	1	36					
WP6	Evaluation	and diagnostics		RTD	3	106.00	1	33					
WP7	Applications of the methods to targeted tes cases		geted test	RTD	7	67.00	19	36					
WP8	Development and application of near real time attribution service		ear real	RTD	1	52.00	1	36					
WP9	Overarching coordination between FP7 Copernicus climate change projects			OTHER	1	2.00	1	36					
					Total	410.00							

WT2: List of Deliverables

Project Nu	umber ¹	60708	07085		Project	Acronym ²	EUCLEIA			
			List of De	eliveral	bles - to	be submitted fo	or review to EC			
Delive- rable Number ⁶¹	Deliverable Title	e	WP number⁵	Lead ciary numb	benefi- ber	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴	
D1.1	Internal pro website	ject	WP1		1	2.00	Other	СО	3	
D3.1	Project information	pack	WP3		1	0.50	Other	PU	3	
D3.2	Updated disseminati plan	on	WP3		1	0.50	Report	PP	3	
D3.3	External pro website	oject	WP3		9	0.50	Other	PU	3	
D3.4	Report on stakeholder feedback	r	WP3		9	2.00	Report	PU	18	
D4.1	Theoretical working paper: socia articulation attribution	al of	WP4		11	12.00	Report	PU	12	
D4.2	Empirical working pap analysing stakeholder needs and understand	per: rs' ing	WP4		10	16.00	Report	PU	20	
D4.3	Empirical working par commercial dimension of attributio product	per: I n	WP4		10	17.00	Report	PU	24	
D4.4	Empirical working pap perceiving attribution	per:	WP4		11	20.00	Report	PU	35	
D4.5	Work packa synthesis re	age eport	WP4		10	1.00	Report	PU	36	
D5.1	Analogue fl analyses fo temperature and precipit summaries seasonal ba	ow e tation on a asis	WP5		3	18.00	Report	PU	24	

WT2: List of Deliverables

Delive- rable Number ⁶¹	Deliverable Title	WP number⁵	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D5.2	Analysis of "never observed before" events	WP5	3	24.00	Report	PU	24
D5.3	Sensitivity of attribution conclusions to model structure	WP5	9	46.00	Report	PU	24
D6.1	Description of existing observational datasets and observational needs	WP6	2	11.00	Report	PU	18
D6.2	Description of key sensitive processes leading to extreme events	WP6	2	29.00	Report	PU	24
D6.3	Model evaluation over the ensemble of diagnostics defined	WP6	3	22.00	Report	PU	33
D6.4	Evaluation of the full attribution system's reliability	WP6	1	22.00	Report	PU	33
D6.5	Description of reliability assessment methods	WP6	1	22.00	Report	PU	18
D7.1	Attribution of test heatwaves	WP7	9	13.00	Report	PU	36
D7.2	Attribution of test cold spells	WP7	6	13.00	Report	PU	36
D7.3	Attribution of test droughts	WP7	2	13.00	Report	PU	36
D7.4	Attribution of test floods	WP7	7	13.00	Report	PU	36
D7.5	Attribution of test storm surges	WP7	10	13.00	Report	PU	36
D8.1	A HadGEM- A based operational attribution system	WP8	1	31.00	Prototype	PP	24

WT2: List of Deliverables

Delive- rable Number ⁶¹	Deliverable Title	WP number⁵	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D8.2	Attribution assessments for the BAMS report	WP8	1	10.00	Report	PU	30
D8.3	Fast-track response assessments based on statistical methodologies	WP8	7	9.00	Report	PU	30
D8.4	Summary report on the new attribution service and future directions	WP8	1	2.00	Report	PU	36
D9.1	Development and update to coordination plan	WP9	1	0.70	Report	PU	3
D9.2	Development of a common web page	WP9	1	0.15	Other	PU	6
D9.3	Common lessons learned relevant for the development of the Copernicus Climate Change Service	WP9	1	1.00	Report	PU	24
D9.4	Minutes from coordination meetings with European Commission	WP9	1	0.15	Other	PU	3
			Total	384.50			

Project Number ¹	607085		Project Acronym ²	E	UCLEIA				
One form per Work Package									
Work package numb	er ⁵³	WP1	Type of activity ⁵⁴		MGT				
Work package title		Management of EUCLEIA							
Start month		1							
End month		36							
Lead beneficiary number ⁵⁵		1							

Objectives

The main aims are:

To run a well managed project, involving stakeholders, and achieve the maximum benefit to the users, wider community and European Commission through delivery of results and agreed deliverables on time and in full. Primary objectives within this work package are:

- Provide top level management of the project to ensure aims of the project are efficiently and effectively met, on time and with the resources budgeted;
- Provide effective reporting and communication between the consortium and the EC/REA;

• Coordinate and facilitate effective communication within the project, between partners and stakeholders; including information associated with all project management aspects.

Description of work and role of partners

WP1 - Management of EUCLEIA [Months: 1-36] Met Office

The management of the project is described in detail in Section B.2.1 (Management Structure and Procedures), but is summarised through two discrete tasks in this work package.

T1.1 - Project management and internal communication [Months: 1-36] Met Office

Manage the project using effective management procedures based on PRINCE2 (Projects IN Controlled Environments) formal methodology. PRINCE2 is de facto standard for project management used extensively by the UK Government and widely used in the UK and internationally. Managing the project includes the following (non exhaustive) activities:

Maintenance of the Consortium Agreement; Overall legal, financial, administrative management and reporting; Handling of legal issues, IPR and other issues under the responsibility of the Special Interests Management Group (dispute/complaints resolution); Handling of project correspondence and day-to-day requests from partners and external bodies; adaptation of project and management structure after changes in the work plan and the consortium; Implementation of competitive calls for the participation of new beneficiaries/partners; Organisation of meetings relating to the management of the project.

T1.2 - Communication with the Research Executive Agency [Months: 1-36]

Met Office

Provide regular and comprehensive communication with the REA in Brussels. The conduit for this will be the EUCLEIA Coordinator. This task will ensure the appropriate follow-up of project obligations from the Grant Agreement (scientific, reporting (of science results and finances), project reviews (as agreed under Special Clause five of the Grant Agreement), communication, and management. The EUCLEIA Coordinator will ensure that the appropriate REA representative is invited to the Management Board meetings. If there are any major problems

within the project that cannot be solved through the appropriate management structure, the Coordinator will liaise with the REA in order to seek advice and a solution.

Person-Months per Participant											
Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	WP1 additional effort	WP1 TOTAL							
1 - Met Office	12.00	3.00	0.00	15.00							
2 - ETH Zurich	0.00	0.00	0.00	0.00							
3 - CNRS	0.00	0.00	0.00	0.00							
CEA	0.00	0.00	0.00	0.00							
4 - UEDIN	0.00	0.00	0.00	0.00							
5 - IC3	0.00	0.00	0.00	0.00							
6 - DMI	0.00	0.00	0.00	0.00							
7 - KNMI	0.00	0.00	0.00	0.00							
8 - UNI READING	0.00	0.00	0.00	0.00							
9 - UOXF	0.00	0.00	0.00	0.00							
10 - HZG	0.00	0.00	0.00	0.00							
11 - UVSQ	0.00	0.00	0.00	0.00							
Total	12.00	3.00	0.00	15.00							

List of deliverables

Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D1.1	Internal project website	1	2.00	Other	со	3
		Total	2.00			

Description of deliverables

D1.1 : This website will be developed and used to facilitate the effective communication between partners within the project. It will be used as the tool for the legal, financial and administrative management of the project. [month 3]

Schedule of relevant Milestones

Milestone numberMilestone nameDelivery benefi- ciary numberDelivery date from Annex I ⁶⁰ Comments
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Project Number ¹	6070	85	Project Acronym ²	2	EUCLEIA			
One form per Work Package								
Work package numb	er ⁵³	WP2	Type of activity ⁵⁴		RTD			
Work package title		Scientific coor	dination of EUCLEIA					
Start month		1						
End month		36						
Lead beneficiary number ⁵⁵		1						

Objectives

To establish and maintain the scientific coordination in order to meet the scientific objectives of the project, including ensuring the appropriate level of consultation with the advisory board of independent experts.
Ensure the appropriate level of consultation with the advisory board of independent experts.

Description of work and role of partners

WP2 - Scientific coordination of EUCLEIA [Months: 1-36]

Met Office

There are four tasks within this work package. These will primarily be the responsibility of the EUCLEIA Science Coordinator who provides the scientific leadership for the project.

T2.1 - Scientific coordination and monitoring [Months: 1-36] Met Office

Carry out the scientific coordination and monitoring of the research themes, work packages, work package leaders and project progress milestones. This task includes verifying the quality, consistency and timeliness of the work and deliverables. It also includes preparing the scientific element of the reports and deliverables to be submitted to the REA.

T2.2 - Co-ordinate interdisciplinary and cross-cutting activities [Months: 1-36] Met Office

Co-ordinate the interdisciplinary activities and cross-cutting activities. This task is necessary in order to make maximum use of the scientific and innovative research within the project, ensure it meets the needs of the identified users and policy makers, and avoids duplication of effort. The Science Coordinator will organise meetings (utilising electronic remote methods wherever possible) with all the work package leaders to facilitate this task.

T2.3 - Management of scientific risk [Months: 1-36]

Met Office

This will include resolving any conflict relating to technical issues. It will mean acting on unforeseen events and adapting work packages as required.

T2.4 - Advisory Board management [Months: 1-36]

Met Office

Ensure the appropriate level of consultation with the scientific Advisory Board. It is essential that the project receives independent advice and feedback from the Advisory Board, especially in relation to the direction of the scientific research and application through to prototype climate services. This task will be undertaken by the EUCLEIA Coordinator and Science Coordinator to ensure that the consultations with the Advisory Board are organised and co-ordinated in an efficient and effective manner, and that advice given is reviewed and acted on appropriately. Also the appropriate level of project information needs to be provided to the Advisory Board.

		Person-Mor	ths per Partic	ipant		
Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	Task4 specific effort	WP2 additional effort	WP2 TOTAL
1 - Met Office	2.00	2.00	1.00	1.00	0.00	6.00
2 - ETH Zurich	0.00	0.00	0.00	0.00	0.00	0.00
3 - CNRS	0.00	0.00	0.00	0.00	0.00	0.00
CEA	0.00	0.00	0.00	0.00	0.00	0.00
4 - UEDIN	0.00	0.00	0.00	0.00	0.00	0.00
5 - IC3	0.00	0.00	0.00	0.00	0.00	0.00
6 - DMI	0.00	0.00	0.00	0.00	0.00	0.00
7 - KNMI	0.00	0.00	0.00	0.00	0.00	0.00
8 - UNI READING	0.00	0.00	0.00	0.00	0.00	0.00
9 - UOXF	0.00	0.00	0.00	0.00	0.00	0.00
10 - HZG	0.00	0.00	0.00	0.00	0.00	0.00
11 - UVSQ	0.00	0.00	0.00	0.00	0.00	0.00
Total	2.00	2.00	1.00	1.00	0.00	6.00

List of deliverables							
Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴	
Total 0.00							
Description of deliverables							

Schedule of relevant Milestones

Milestone number ⁵⁹ Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
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Project Number ¹	6070	85	Project Acronym ²	EU	CLEIA			
One form per Work Package								
Work package numb	er ⁵³	WP3	Type of activity ⁵⁴	(OTHER			
Work package title		Dissemination	and outreach					
Start month		1						
End month		36						
Lead beneficiary number ⁵⁵		1						

Objectives

The primary objectives are to:

• Encourage and facilitate communication, promotion and dissemination of project progress, results and achievements;

• Oversee and manage the stakeholder user panel within the project and ensure optimum exchange of information between stakeholders and project.

Description of work and role of partners

WP3 - Dissemination and outreach [Months: 1-36] Met Office

The activities within this work package will closely interact with the individual dissemination activities of the project. Section B.3.2.1 describes the project plans for the dissemination and exploitation of the project results.

T3.1 - Implementation of dissemination activities [Months: 1-36]

Met Office, UOXF, HZG, UVSQ

An updated dissemination plan will be developed at the start of the project, and will include ideas identified in discussions with partners during the kick off meeting. The plan will contain the project specific guidelines that all participants will have to follow when providing information and results from the project. Opportunities will be actively sought out to present the project at external conferences and at IDAG and ACE meetings.

T3.2 - Design and management of public website [Months: 1-36] UOXF

Public facing website will be designed, tested and released as soon as possible after the start of the project. This will contain the basic information about the project.

T3.3 - Coordination of stakeholder participation [Months: 1-36]

UOXF, KNMI, HZG, UVSQ

Oversee the coordination of the stakeholder participation. Involving the selected stakeholders is key to defining the user requirements for this project and building upon their expertise throughout the project. The Science Coordinator will work with WP4 and other partners to establish the stakeholder user panel very early on in the project and to ensure suitable representation of the stakeholders on the Management Board and at the General Assembly. These groups will provide support and guidance throughout the project on issues such as: scientific methodology, developing product outputs and aspects of dissemination and engagement as outlined in WP3. Representation from all WP researchers at the stakeholder meetings will ensure that ideas can be easily shared and discussed. Full reports, disseminated amongst the stakeholders and researchers, of these meetings will capture key ideas that can be used as reference in between meetings. Use of technology, including video/teleconferencing will ensure maximum participation through increased flexibility of access.

Person-Months per Participant

Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	WP3 additional effort	WP3 TOTAL
1 - Met Office	1.00	0.00	0.00	0.00	1.00
2 - ETH Zurich	0.00	0.00	0.00	0.00	0.00
3 - CNRS	0.00	0.00	0.00	0.00	0.00
CEA	0.00	0.00	0.00	0.00	0.00
4 - UEDIN	0.00	0.00	0.00	0.00	0.00
5 - IC3	0.00	0.00	0.00	0.00	0.00
6 - DMI	0.00	0.00	0.00	0.00	0.00
7 - KNMI	0.00	0.00	1.00	0.00	1.00
8 - UNI READING	0.00	0.00	0.00	0.00	0.00
9 - UOXF	1.00	1.00	2.00	0.00	4.00
10 - HZG	0.50	0.00	0.50	0.00	1.00
11 - UVSQ	0.50	0.00	0.50	0.00	1.00
Total	3.00	1.00	4.00	0.00	8.00

List of deliverables

Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D3.1	Project information pack	1	0.50	Other	PU	3
D3.2	Updated dissemination plan	1	0.50	Report	PP	3
D3.3	External project website	9	0.50	Other	PU	3
D3.4	Report on stakeholder feedback	9	2.00	Report	PU	18
		Total	3.50		l.	1

Description of deliverables

D3.1 : A project pack will be put together to provide information about the project to both colleagues and the media so that it can be distributed by project partners. [month 3]

D3.2 : The updated plan will ensure the optimal dissemination and use/exploitation of project results. The description will cover the consortium strategy for dissemination and measures regarding the use of results and the dissemination of foreground during the lifetime of the project and afterwards [month 3]

D3.3 : Development of a public facing project website, and URL released. Project factsheet will be produced and placed on the website. This website will be continually maintained and updated to provide EUCLEIA information to audiences worldwide. [month 3]

D3.4 : Report on stakeholder feedback to inform implementation of development of methodologies (WP5) and diagnostics (WP6) into application of methods into targeted test cases (WP7), and development and application of near-real time attribution service (WP8). [month 18]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
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Project Number ¹	6070	85		Project Acronym ²	Εl	UCLEIA		
One form per Work Package								
Work package numb	er ⁵³	WP4	Ту	/pe of activity ⁵⁴		RTD		
Work package title		Assessing det	letection and attribution through general public and stakeholder analys					
Start month		1						
End month		36						
Lead beneficiary number ⁵⁵		10						

Objectives

• Understand how different social actors/groups conceptualise "detection and attribution" and assess how useful an event attribution service would be to them.

More specifically:

- Analyse relevance claims to identify conditions under which detection and attribution matters to society;
- Analyse evidence claims to identify misunderstandings related to detection and attribution;
- Analyse normative claims to identify how attribution may be attuned to the values of society;

• Form propositions on how to close the expected gap between stakeholder expectations and scientific innovative, curiosity-driven research.

Description of work and role of partners

WP4 - Assessing detection and attribution through general public and stakeholder analysis [Months: 1-36]

HZG

In this work package we will study in three cases (regional stakeholders, commercial interests, general public vs. scientists applied across two case studies (storm surges in the Baltic and heat waves in the greater Paris area) how different social actors/groups conceptualise what is technically named "detection and attribution" and assess the usefulness of a service, which would provide "event attribution". We will deal both with the general question of how the evidence for the presence and emergence of anthropogenic climate change is perceived, but also specifically with the question how a product, as designed and tested in WP8, will be accepted and understood by different stakeholders. This will entail an analysis of how the general public and key stakeholders frame the benefits of attribution in terms of evidence claim, relevance claim and normative claims. Relevance claims are expressing what matters to society. Analysing relevance claims will allow the understanding the conditions, in practical terms, under which detection and attribution will matter to society. Evidence claims are expressing causal linkages. Analysing evidence claims will allow for the identification of potential misunderstanding on attribution and detection and for the identification of the most important deficit currently observable within society. Finally, normative claims are expressing what is good, tolerable, and/or acceptable. Their analysis will allow for an understanding of how progresses in detection and attribution may be attuned to the values of society. This theoretical approach is currently developed and tested by UVSQ within the "Innovative technologies for safer European coasts in a changing climate" (THESEUS) FP7 project.

A first task will be to develop a robust conceptual and theoretical framework rooted in a suitable description of the envisaged product of event attribution. Task 4.2 will be to run the focus regional focus groups, and it is expected that this part of the work is completed within the first 18 months. Months 19-24 will be used studying the interests and views hold by representatives of the insurance and re-insurance industry; the final year will be used to do the internet-based surveying of the general public and scientists.

One must stress that this Workpackage focuses on two particular "terrains" – storm surges and heat waves -, yet EUCLEIA goes beyond these two terrains. Nevertheless, in order to develop a coherent conceptual and methodological framework, these two terrains contain the needed diversity (culturally, in terms of the nature of "risk", and in terms of the nature of dominant stakeholders). In order to dwell on, and benefit to, EUCLEIA diversity,

each deliverable will explicitly refer to transferability of the theoretical framework, the methodological approach and the results.

The results of the various Tasks will lead to propositions on the following key element: how to close the expected gap between stakeholder expectations and scientific innovative, curiosity-driven research. One of the key innovative elements that will give an added robustness and clarity to the results lies in the systematic identification of what, within views and perceptions, belongs to gaps in terms of needs (differences in relevance claims), to gaps in terms of knowledge (differences in evidence claims) and to gaps in terms of associated values (differences in normative claims).

T4.1 - Social articulation of attribution: defining the conceptual and theoretical foundations [Months: 1-12]

UVSQ, HZG

This first work-task will develop the conceptual foundations of the WP. This will entail the definition, with WP8, of what is a suitable description of the envisaged product of event attribution. Using this description; various existing theoretical frameworks (risk perception theory, cultural risk cognition, social constructs, integrated risk governance, soft system analysis) will be assessed in terms of their potential to theorise the social articulation of attribution. These theoretical frameworks will be assessed against their potential to allow for an understanding of the attribution products' consistency with stakeholder (including public) needs without compromising scientific rigour.

T4.2 - Attribution: regional level stakeholders' needs and understanding [Months: 1-20] **HZG**, UVSQ

The first two empirical test cases deal with regional public and regional stakeholders, namely:

a) In the greater Paris area, dealing with the climatic extreme of heat waves and the their challenges for public health; and

b) Along the German Baltic Sea coast, dealing with the threat of storm surges and their challenges for public safety and coastal erosion. This work will be related to ongoing cooperation within the BALTEX network of regional climate scientists.

This work task will consist on stakeholder identification according to an attribution-relevant typology that is coherent with the theoretical framework developed in Task 4.1. Both partners, HZG and UVSQ have developed good working relationships with regional and municipal authorities and other stakeholders on the two issues of Baltic Sea Coast management and environmental health in the greater Paris area.

Three focus groups in each test case will be run. The results will be analysed and compared. The analytical framework, although organised around evidence claim, relevance claim and normative claims, will stem for its finer dimensions from the theoretical frame developed in Task 4.1.

A wider internet-based survey will be conducted as well (a first collection of stakeholders has been established and the methodology was already tested in the framework of the German Project RADOST, see Bray, D. and G. Martinez, 2011: A survey of the perceptions of regional political decision makers concerning climate change and adaptation in the German Baltic Sea region. International BALTEX Secretariat, ISSN 1681-6471 Publication No. 50).

T4.3 - Attribution: its interest for the insurance and re-insurance sectors as a proxy to commercial interests and other stakeholder groups [Months: 1-24]

HZG, UOXF, UVSQ

There is already a documented interest in the insurance industry to learn about evidence of ongoing climate change, and about new products, which may come out of "event attribution". All partners in WP4, as well as the coordinator of the overall project, have contacts to such companies and their associations.

Months 19-24 will be used studying the interests and views hold by representatives of the insurance and reinsurance industry. Throughout the project there will be on-going engagement with a targeted group of stakeholders via the stakeholder user panel.

T4.4 - Attribution: identifying the gap between the general public and scientific community, and dissemination of the survey results to stakeholders [Months: 13-36]

UVSQ, UOXF, HZG

The general public will be polled using a commercial surveying company, who will run about telephone interviews among a representative segments (about 1000 samples) of the two regional publics. Similar polling has been done on a similar issue for the perception of climatic threats in Hamburg since 2008 (cf. Ratter, B.M.W., K. H.I.

Philipp and H. von Storch, 2012: Between hype and decline – recent trends in public perception of climate change. Environmental Science & Policy 18: 3 – 8).

An internet-based approach for surveying scientists and/or stakeholders is available at the IfK in Geesthacht and at the UVSQ. The IfK approach has been used to investigate views of regional scientists about issues related to climate and climate change (Bray, D., 2010: A survey of the perspectives of climate scientists concerning climate change and climate science in the Baltic Sea basin. International BALTEX Secretariat ISSN 1681-6471, Publication No. 48) in the framework of the GEWEX-Project BALTEX.

The UVSQ approach has been used to survey Scientists and Stakeholders within the "Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe (APHEKOM EU funded) project and within the "a Transdisciplinary approach to the Emerging Challenges of Novel technologies: Lifeworld and Imaginaries in Foresight and Ethics" (TECHNOLIFE) FP7 project.

There will be development of online resources to support key concepts and ideas crucial to understanding attribution science and the project website will be developed to include information on how attribution results can be used in the decision-making process.

		Person-Mon	ths per Partic	ipant		
Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	Task4 specific effort	WP4 additional effort	WP4 TOTAL
1 - Met Office	0.00	0.00	0.00	0.00	0.00	0.00
2 - ETH Zurich	0.00	0.00	0.00	0.00	0.00	0.00
3 - CNRS	0.00	0.00	0.00	0.00	0.00	0.00
CEA	0.00	0.00	0.00	0.00	0.00	0.00
4 - UEDIN	0.00	0.00	0.00	0.00	0.00	0.00
5 - IC3	0.00	0.00	0.00	0.00	0.00	0.00
6 - DMI	0.00	0.00	0.00	0.00	0.00	0.00
7 - KNMI	0.00	0.00	0.00	0.00	0.00	0.00
8 - UNI READING	0.00	0.00	0.00	0.00	0.00	0.00
9 - UOXF	0.00	0.00	2.00	1.00	0.00	3.00
10 - HZG	6.00	8.00	8.00	9.00	0.00	31.00
11 - UVSQ	6.00	8.00	8.00	10.00	0.00	32.00
Total	12.00	16.00	18.00	20.00	0.00	66.00

List o	t de	liver	abl	es
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Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D4.1	Theoretical working paper: social articulation of attribution	11	12.00	Report	PU	12
D4.2	Empirical working paper: analysing stakeholders' needs and understanding	10	16.00	Report	PU	20

List of deliverables

Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D4.3	Empirical working paper: commercial dimension of attribution product	10	17.00	Report	PU	24
D4.4	Empirical working paper: perceiving attribution	11	20.00	Report	PU	35
D4.5	Work package synthesis report	10	1.00	Report	PU	36
		Total	66.00			I

Description of deliverables

D4.1 : Theoretical Working Paper on the conceptual foundations of exploring the social articulation of attribution. [month 12]

D4.2 : Empirical Working Paper analysing regional stakeholders' needs and understanding in terms of attribution for two cases: storm surges on the Baltic and heat waves in the greater Paris area. Includes transferability consideration for other situations. [month 20]

D4.3 : Empirical Working Paper on commercial dimension of attribution product using the insurance and reinsurance sectors as proxy. [month 24]

D4.4 : Empirical Working Paper on perceiving attribution: gaps between the general public and scientists. [month 35]

D4.5 : Synthesis report "Promoting attribution products: condition for success with stakeholder and recommendations". [month 36]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS1	Suitable description of the envisaged product of event attribution	10	8	Description agreed as fit for purpose by stakeholder user panel and EUCLEIA Management Board
MS2	Harmonised methodology for the focus group organisation and results analysis for the regional level stakeholder needs and understanding analysis	10	13	Methodology will be released.
MS3	Definition of general public and scientist survey methods	11	25	Definition of survey methods based on the results of Tasks 4.2 and 4.3. Definition provided to EUCLEIA Stakeholder User Panel

Project Number ¹ 607085		Project Acronym ²	Εl	UCLEIA		
			On	e form per Work Packa	ige	
Work package numb	er ⁵³	WP5	Ту	/pe of activity ⁵⁴		RTD
Work package title		Development	of	attribution methodologi	es	and exploration of framing issues
Start month		1				
End month		36				
Lead beneficiary number ⁵⁵		9				

Objectives

• Develop methodologies to explore framing issues on the basis of both dynamical and statistical models;

• Investigate how different ways of framing the attribution problem impact different classes of weather events;

• Identify the best experimental design to implement in the core attribution system;

• Develop a quality assurance plan for the delivery of attribution products.

Description of work and role of partners

WP5 - Development of attribution methodologies and exploration of framing issues [Months: 1-36] UOXF

This WP will develop methodologies for dynamical modelling and develop statistical methodologies and will explore the impact of different ways of framing the attribution problem on conclusions regarding different classes of weather events, to identify events for which these framing issues are particularly important. This will require "ensembles of ensembles" exploring multiple ways of defining present-day and natural climate and exploring their implications for attribution. The design, ensemble size and interpretation of results matter as much as, or more than, model biases. These issues will be explored using a combination of low-cost statistical methods, and a relatively computationally efficient model (HadAM3P with the nested HadRM3 regional climate model, or RCM), and, if available on home computers, the HadGEM3-A model which forms the core of the qausi-operational attribution system being developed in WP8. Multi-thousand-member dynamical model ensembles will be generated by members of the European public at very low cost. Our aim will be to identify one or two optimal experimental designs, with a clear understanding of their properties, to implement in the core attribution system.

The WP will also consider how to relate statistical and dynamical model based approaches, the latter of which provide a more direct approach to attribution but which may be subject to dynamical model error. The findings of WP5 will therefore inform the setting up of the near-real time attribution system in WP8.

The work package will consist of the following elements:

• Exploration of framing issues using both dynamical models and statistical models;

• Development of methodologies for dynamical modelling including bias adjustments;

• Development of statistical methodologies including flow analogues and development of a basket of statistical indices;

• Explore sensitivity to ensemble size by making parallel multi-thousand member ensembles;

• Explore sensitivity to spatial resolution by making parallel high resolution ensembles using both the nested regional model design and global model experiments;

• Explore sensitivity to the representation of ocean-atmosphere interactions by making parallel experiments in which a prescribed SST boundary condition is compared with an ocean mixed layer boundary condition;

• Develop a quality assurance plan for the delivery of attribution products.

T5.1 - Develop framing of issues [Months: 1-36]

UOXF, Met Office

This task will test different methods of designing attribution studies and framing attribution questions generating very large climate model ensembles using the "weatherathome" distributed computing project. This will allow us to explore different experimental designs, permit a comprehensive analysis of the impact of ensemble size on the robustness of attribution conclusions, and also provide inputs to WP4 for assessing how attribution conclusions are

understood. Different experimental designs will be explored under the EUCLEIA project, spanning a spectrum in the extent to which different factors are held constant in the attribution problem. Results from these different designs will be presented to stakeholders under WP4 to assess which design best matches their expectations and interpretation of attribution studies. The designs include experiments in which ensembles of atmosphere models driven with observed sea surface temperatures and sea ice (SSTSI) are compared with ensembles driven with SSTSI and atmospheric composition modified to simulate "natural" conditions without anthropogenic influence, where these natural SSTSI conditions are estimated from coupled models from the CMIP-5 ensemble in conjunction with standard detection and attribution methods to estimate the pattern and amplitude of anthropogenic warming, with associated uncertainties. This will be compared with an alternative design in which reanalysis boundary conditions drive an RCM and are compared with boundary conditions modified to remove anthropogenic signal in temperature and humidity but otherwise held constant, and a further design in which observed SSTSI fields are replaced with an ensemble of 6-month-lead forecast SSTSI fields generated by the EuroSIP multi-model seasonal forecasting project, hence redefining "present day climate" as not what actually happened, but the component that could have been predicted several months in advance. To ensure a fair comparison of approaches, EuroSIP SSTSI fields will be bias-corrected using the EuroSIP hindcast ensemble.

This task will also compare results from atmosphere only models with results from coupled models from CMIP-5. This will be done by comparing attribution results from the atmosphere only models as described above with coupled models analyses based on the methodology which has already been applied to seasonal mean temperatures of Europe, Australia and other regions (Stott et al (2004). Karoly et al (2013) in which the odds of extreme temperature and rainfall anomalies from coupled model simulations including both anthropogenic and natural forcings are compared with the odds from coupled model simulations including natural forcings only).

An important outcome of this WP will be the development of a quality assurance plan for the delivery of attribution products in WP8 based on the insights gained on experimental design, framing of issues, sensitivity of attribution conclusions to model structure, and comparison of dynamical and statistical approaches. There will therefore be a delverable at month 24 that will provide this plan.

T5.2 - Sensitivity of attribution conclusions to model structure [Months: 1-36] **UOXF**, KNMI, UNI READING

The objective of this task is to investigate the sensitivity of attribution conclusions to aspects of model structure, specifically: the choice of atmosphere model (comparing HadAM3P, HAdGEM3A and EC-EARTH); the spatial resolution of the atmosphere model; and the representation of ocean-atmosphere interactions. The core experiments in Task 5.1 and WP8 rely on a prescribed SSTSI boundary condition, but two-way ocean-atmosphere interactions are an important influence on the development, persistence and decay of the atmospheric circulation anomalies that play a key role in high impact events. This task will therefore investigate the importance of these interactions for attribution.

The research will focus on analysis of a set of case studies (informed by WP7). Ensemble simulations of the chosen case studies will be carried out using the different global model systems. Sensitivity to ocean-atmosphere interactions will be investigated by comparing HadGEM3A simulations that use a prescribed SSTSI boundary condition with simulations in which the same model is coupled to a high resolution version of the KPP mixed layer scheme, using a combination of "Q-flux" and relaxation boundary conditions to ensure that low-frequency (multi-annual) SSTSI variations match those observed, but allowing the model to simulate short-term variations stochastically. [Additional experiments may be carried out using HadAM3P couple to a similar or simpler ocean mixed layer.] Sensitivity to atmosphere model resolution will be investigated by comparing simulations with EC-EARTH at several different resolutions between T159 and T799. A wide range of process-based diagnostics (WP6) will be used to identify the reasons for differences between results from the different experimental designs.

T5.3 - Statistical methodologies for comparing current climate with past climate events [Months: 1-36] CNRS, KNMI

This task will produce statistical diagnostics aiming at comparing events on seasonal and sub-seasonal timescales (precipitation, temperature) with those in previous decades, allowing detection of changes. First, weather events will be compared with those expected during circulation analogues (Yiou et al., 2007; Vautard and Yiou, 2009) of past decades. This will allow to first attribute events to specific atmospheric circulations. This "analogue" method designed in previous studies will be further extended to all types of extreme events concerned by the EUCLEIA project and the operational system, and to sub-seasonal phenomena such as shorter cold spells or heat waves. Simple products such as histograms of best analogue years, movies of analogue composite variables will be published in weekly increments. The "quality" of circulation analogues will be estimated, in order to define a measure of the exceptional character of the atmospheric circulation and detect possible unprecedented flows.

When only poor analogues are found or temperature/precipitation past analogue composites do not encompass the current observation, an analysis of the event will be performed in order to try identifying possible causes in unusual forcing (regional SST, snow cover, soil moisture). Seasonal updates of the comparison of return times of events that occurred for temperature and precipitation at various time scales (daily, monthly and seasonal) with those in groups of previous decades (1950 – 1980) and (1980 – 2010) will be designed, using extreme value theory under hypothesis of stationarity. These developments will consider single time series but also other characteristics of extreme events such as the duration of events and spatial extent. CNRS / CEA will also investigate the possibility of extending return time estimation in a non-stationary context. Other statistical indices qualifying the magnitude of the events (amplitude, duration, seasonal statistics of dry days, heavy rainfalls, drought (and heatwave), will be designed, based on results of WP4, compared across multi-decadal time series and updated on a seasonal time scale.

Person-Months per Participant									
Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	WP5 additional effort	WP5 TOTAL				
1 - Met Office	6.00	0.00	0.00	0.00	6.00				
2 - ETH Zurich	0.00	0.00	0.00	0.00	0.00				
3 - CNRS	0.00	0.00	16.00	0.00	16.00				
CEA	0.00	0.00	2.00	0.00	2.00				
4 - UEDIN	0.00	0.00	0.00	0.00	0.00				
5 - IC3	0.00	0.00	0.00	0.00	0.00				
6 - DMI	0.00	0.00	0.00	0.00	0.00				
7 - KNMI	0.00	8.00	6.00	0.00	14.00				
8 - UNI READING	0.00	15.00	0.00	0.00	15.00				
9 - UOXF	15.00	20.00	0.00	0.00	35.00				
10 - HZG	0.00	0.00	0.00	0.00	0.00				
11 - UVSQ	0.00	0.00	0.00	0.00	0.00				
Total	21.00	43.00	24.00	0.00	88.00				

List	of	del	ive	rab	les
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Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D5.1	Analogue flow analyses for temperature and precipitation summaries on a seasonal basis	3	18.00	Report	PU	24
D5.2	Analysis of "never observed before" events	3	24.00	Report	PU	24
D5.3	Sensitivity of attribution conclusions to model structure	9	46.00	Report	PU	24
		Total	88.00			

Description of deliverables

D5.1 : Analogue flow analyses for temperature and precipitation summaries on a seasonal basis. [month 24]

D5.2 : Analysis of "never observed before" events. [month 24]

D5.3 : Sensitivity of attribution conclusions to model structure and development of quality assurance plan for delivery of attribution products. [month 24]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS4	Specification of quasi real time analogue analysis programme	3	18	Programme specified and found applicable by WP7 partners engaged in case studies
MS5	Specification of dynamical experimental designs for implementation in WP8	9	18	Designs specified and found applicable by WP8 partners

Project Number ¹ 6070		85		Project Acronym ²	Εl	UCLEIA
			On	e form per Work Packa	ige	
Work package numb	er ⁵³	WP6	Ту	/pe of activity ⁵⁴		RTD
Work package title		Evaluation an	d d	liagnostics		
Start month		1				
End month		33				
Lead beneficiary number ⁵⁵		3				

Objectives

• Collect observations relevant to each type of extreme events that will be used for model evaluation;

• Identify observational gaps and needs for verification and bias correction of attribution models;

• Identify key processes driving extreme events;

• Develop an ensemble of quantitative diagnostics to assess the skill of attribution models;

• Develop, apply and extend methodologies for assessing the reliability of attribution products and formulate calibrated statements about the trustworthiness of attribution results.

Description of work and role of partners

WP6 - Evaluation and diagnostics [Months: 1-33] CNRS

"Trust building" is an essential component of the development of an attribution of climate events service. This must rely both on a demand-driven component (covered by WP4) and on an objective analysis of the ability of models to simulate the development of high-impact events and underlying processes (this WP) (Nature Editorial, 2012). WP6 will (i) collect related existing observations and identify observational gaps [Task 6.1],]; (ii) identify key processes that drive the development of extreme events using sensitivity experiments and analyses of observations [Task 6.2];, (iii) define quantitative diagnostics (indices, energy budgets, synoptic situations...) in order to better characterize and explain events development and to evaluate attribution models used in the prototype service (WP8) against observations [Task 6.3],; and (iv) define quantitative measures of reliability of the overall attribution system and to define methodologies and rules to produce reliability assessments [Task 6.4]. WP6 will provide a selection of observations, numerical experiments, indices and reliability measures to WP7 and WP8, with distinction between fast-track and slow-track availability, together with an array of diagnostics to be applied to the cases under study.

T6.1 - Observations for key climate processes : collection and identification of needs [Months: 1-18] **ETH Zurich**, CNRS

The task will identify existing in situ and remote sensing observations relevant to each type of extreme event (drought, flood, heat wave, cold spell, storm surge) considered and collect them for model evaluation, such as the ESA CCI soil moisture dataset (http://www.esa-soilmoisture-cci.org) or GEOLAND data sets. In addition, ground observations will be used, including soil moisture, runoff, surface fluxes and classical meteorological datasets. Modern reanalysis products will also be considered. The task will then identify observational gaps for event attribution, observation needs for verification and bias correction of attribution models, methodological developments that make synergetic use of in situ and space-borne observations, as well as requirements for observation network density, dataset length, and homogeneity [ETH, CNRS].

T6.2 - Identification of key processes driving extreme events [Months: 1-24]

ETH Zurich, CNRS, UEDIN, DMI, UNI READING

The task will aim at identifying a set of key climate processes leading to high-amplitude events. This will help (i) providing a mechanistic understanding the development of events; (ii) disentangling the contribution of single factors (e.g. large-scale circulation anomalies versus initial soil moisture conditions) to the respective events; and (iii) evaluating attribution models used in WP7 and WP8. It will be based on a thorough literature review for each

event type considered, based in particular on the IPCC Special Report on Extreme Events (Seneviratne et al., 2012) and other recent publications having in particular highlighted the respective roles of large-scale drivers vs. regional feedbacks for extremes (Mueller and Seneviratne, 2012; Quesada et al., 2012; Hoerling et al., 2012; Kenyon and Hegerl, 2008 & 2010). Identification of key processes will also be done using statistical analysis (see also Task 6.3), including based on the observations compiled under Task 6.1 and dedicated long-term model sensitivity experiments, in contrast with experiments made in WP7 dedicated to end-to-end case studies. The conducted sensitivity experiments will focus on (i) the role of the North Atlantic and Arctic ocean-atmosphere interactions on sub-seasonal, seasonal and decadal time scales on European weather anomalies using a GCM (HadGEM3) with coupled or uncoupled ocean [Uni Reading]; (ii) the contribution of regional and sub-regional distributions of soil moisture and snow cover vs. large-scale forcing using long-term sensitivity simulations with regional climate models (COSMO-CLM2 [ETH], WRF [CNRS]); (iii) the impact of changes in aerosol burden on European anomalies and the ocean state [Uni Reading]; as well as (iv) the role of recent changes in Arctic sea ice extent with GCM (EC-Earth) simulations [DMI]. Furthermore, model-data comparisons will identify mechanisms involved in causing occurrence of extremes both in models and observations, including from observations compiled under Task 6.1. This task will include composite analysis over a number of events, including those of lower amplitude than cases studied in WP7, and will include quantile regression analyses [Uni Edinburgh, ETH]. These analyses will lead to the definition of relevant key processes and variables to be evaluated in attribution models under Task 6.3.

T6.3 - Development of diagnostics and model evaluation [Months: 1-33]

CNRS, ETH Zurich, UEDIN, DMI, KNMI, UNI READING

Given the processes and observations identified in Task 6.1 and 6.2; Task 6.3 will develop an ensemble of quantitative diagnostics that will help in assessing the skill of the operational attribution models used under WP7 and WP8 for the respective considered events. Diagnostics will include indices of standardized precipitation index, soil moisture indices [ETH], indices of the evapotranspiration regime (Teuling et al., 2009; Seneviratne et al., 2010) [ETH, CNRS], snow cover [CNRS], regional SST [Uni Reading], arctic sea-ice extent [DMI], stratospheric vortex [DMI], circulation regimes [CNRS, Uni Edinburgh], aerosols [Uni Reading], land surface water and energy budgets [ETH, CNRS] and moist static energy (Shongwe et al., 2009) [KNMI]. These quantitative indices, applied to observations or reanalyses, will then be used as metrics for the evaluation of long simulations of the operational models used in WP7 and WP8 [all]. For instance, the skill of attribution models involved in WP8 in simulating the circulation states (spatial extent, amplitude, frequency, duration; Hamilton et al., 2012) involved in possibly less extreme precipitation cases than WP7 will be evaluated [Uni Edinburgh]; the ability of models to correctly simulate soil moisture and surface energy and water fluxes in drought/heat wave will also be measured using the observations identified in Task 6.1 and the relationships derived under Task 6.2 [ETH]. Bias correction methods, using observations and long-term simulations will be proposed to WP7 and WP8 and their impact will also be assessed. In addition, an evaluation of the confidence (using e.g. IPCC calibrated language) in the operational models as attribution tools for specific extremes will be provided as input to Task 6.4 [ETH, Uni Edinburgh].

T6.4 - Development of reliability assessments methods [Months: 1-33]

Met Office, IC3

This task will develop and apply and extend measures developed in seasonal forecasting for assessing the overall reliability of the attribution [Christidis et al., 2012c] and convert such measures into calibrated statements about the trustworthiness of attribution results. Examples of reliability measure are the reliability diagram used in ensemble prediction, or the rank histogram [Met Office, IC3]. The measures will be applied to the verification runs of the prototype attribution system based on ensembles generated with the HadGEM3-A [Met Office] [Task 8.1]. Consideration will be given to appropriate calibration of model output, an important methodological challenge when considering attribution statements from different sources (Christidis et al., 2012c; Palmer et al., 2008; Stephenson et al., 2005). This task will therefore develop a protocol for model calibration and model verification to be applied to the operational system tested in WP7 and run routinely in WP8 [Met Office]. This task will also develop rules to produce confidence levels for assessments, which would be based on calibrated language (for example using the IPCC uncertainty language), whereby results of Task 6.3 will also be taken into account in confidence assessments. The key aspect here would be to communicate the extent to which a user should place trust in results from attribution products including limitations given the current resolution of models being used in WP8. Therefore this aspect will be informed by engagement with stakeholder groups, via WP4. Output from this task will also inform the quality assurance plan developed in WP5 to ensure that where ambitions have been set too high, attribution products clearly state where the science is still too limited to provide robust assessments of particular events.

Person-Months per Participant

Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	Task4 specific effort	WP6 additional effort	WP6 TOTAL
1 - Met Office	0.00	0.00	0.00	10.00	0.00	10.00
2 - ETH Zurich	5.00	9.00	7.00	0.00	0.00	21.00
3 - CNRS	6.00	4.00	14.00	0.00	0.00	24.00
CEA	0.00	0.00	0.00	0.00	0.00	0.00
4 - UEDIN	0.00	4.00	6.00	0.00	0.00	10.00
5 - IC3	0.00	0.00	0.00	12.00	0.00	12.00
6 - DMI	0.00	6.00	6.00	0.00	0.00	12.00
7 - KNMI	0.00	0.00	6.00	0.00	0.00	6.00
8 - UNI READING	0.00	6.00	5.00	0.00	0.00	11.00
9 - UOXF	0.00	0.00	0.00	0.00	0.00	0.00
10 - HZG	0.00	0.00	0.00	0.00	0.00	0.00
11 - UVSQ	0.00	0.00	0.00	0.00	0.00	0.00
Total	11.00	29.00	44.00	22.00	0.00	106.00

List of deliverables

Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D6.1	Description of existing observational datasets and observational needs	2	11.00	Report	PU	18
D6.2	Description of key sensitive processes leading to extreme events	2	29.00	Report	PU	24
D6.3	Model evaluation over the ensemble of diagnostics defined	3	22.00	Report	PU	33
D6.4	Evaluation of the full attribution system's reliability	1	22.00	Report	PU	33
D6.5	Description of reliability assessment methods	1	22.00	Report	PU	18
<u> </u>		Total	106.00			

Description of deliverables

- D6.1 : Description of existing observational datasets and observational needs. [month 18]
- D6.2 : De.scription of key sensitive processes leading to extreme events. [month 24]
- D6.3 : Model evaluation over the ensemble of diagnostics defined. [month 33]
- D6.4 : Evaluation of the full attribution system's reliability. [month 33]
- D6.5 : Description of reliability assessment methods. [month 18]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS6	Description of the ensemble of diagnostics to be applied for model evaluation	2	18	Diagnostics specified and found applicable by WP7 partners engaged in case studies
MS7	Description of attribution system skill measures	1	18	Skill measures specified and found applicable by WP7 partners engaged in case studies

Project Number ¹	t Number ¹ 607085		Project Acronym ²	Εl	JCLEIA	
		On	e form per Work Packa	ige		
Work package numb	er ⁵³	WP7	Ту	/pe of activity ⁵⁴		RTD
Work package title	Applications of	of th	ne methods to targeted	tes	st cases	
Start month		19				
End month		36				
Lead beneficiary number ⁵⁵		7				

Objectives

• Carry out a set of detailed analyses on targeted test cases.

- More specifically:
- Demonstrate how to apply event diagnostics to identify processes that generate the extreme events;
- Demonstrate the application of fast-track methods that provide attribution assessments within a week after the occurrence of an event;

• Demonstrate the application of the prototype attribution system that provides information at a timescale of 6-9 months after the occurrence of an event by producing a thorough analysis for each test case using relevant validated observations, output from simulations with the atmospheric model and reliability assessments.

Description of work and role of partners

WP7 - Applications of the methods to targeted test cases [Months: 19-36] KNMI

This work package will apply methods developed in WP4, WP5 and WP6 and carry out a set of targeted in-depth analyses on chosen test cases as demonstration and proof of concept of the prototype attribution services. The results feed back into the design of the systems in WP8. For each class of extreme climate events two examples are chosen from the recent past. If events occur during the project these are given precedence over older events. As in the real application of event attribution, for each event one partner will be responsible for collecting the analyses from all other partners on the basis of the work in WP5 and WP6 and writing a scientific article. We will also provide the information on the basis of WP4. The classes, partners responsible and preliminary events are:

- 1) Heat waves: University of Oxford: Russian heat wave 2010, Southern Europe 2005 (west) or 2006 (east);
- 2) Cold spells: DMI: February 2012 cold spell, December 2010 snow and cold;
- 3) Floods: KNMI: Britain summer 2012, Rhine winter 1996;
- 4) Droughts: ETHZ: Central Europe summer of 2003, Mediterranean summer of 2012; and
- 5) Storm surges: HZG: Baltic 1 November 2006, one other event to be decided.

For these events, we will estimate the change in the risk due to anthropogenic factors. Attribution will be performed with the full range of methods developed: a comprehensive description using the observations and diagnostics developed in WP6; a fast-track response that would be available within a week based on near-real-time (NRT) observations (WP6), analogues and statistical measures such as return times and their evolution (WP5), precomputed model analyses (WP5), reliability indicators (WP6) that would be available within a week; and a more thorough analysis with the validated observations (WP6), the SST-driven runs (WP5) and dedicated sensitivity experiments (WP7) to test the 6-9 month response time after an event occurred.

T7.1 - Application of exhaustive event diagnostics to these events [Months: 19-28]

KNMI, ETH Zurich, CNRS, DMI, UNI READING, UOXF, HZG

This task will determine the meteorological and climate processes that generate the extreme events under study (either historical or during the project), using the process diagnostics developed and evaluated in WP6. We will gather remotely sensed observations, in situ meteorological observations, analyses and modern 4DVAR reanalyses that would be available in NRT (within a few days) and half a year later. These will be complemented by evaluations of the land surface water and energy budgets, and moist static energy budgets (including the surface radiations balances) of the region affected during the course of the events, circulation regimes evolution and

comparison with historical analogues. The task will also include regional/global model sensitivity experiments as designed in WP6 but targeted to the test cases (e.g. sensitivity to convection parameterization, soil moisture, model resolution, SST, snow cover, sea-ice, etc...) to assess sensitive processes and the skill in simulating the particular case-study event. These case-study based numerical experiments will build upon the methods developed in WP6 based on long-term numerical experiments and observations. The work will be carried out by the same participants that develop the diagnostics in WP6 but in the context of a series of scientific papers written in collaboration with the other partners. (approximately 5 pm per event type, 30 pm total, months 19-28).

T7.2 - Application of the fast-track methods [Months: 23-30]

KNMI, ETH Zurich, DMI, UNI READING , UOXF, HZG

For each event a statistical analysis is performed with the data that would have been available shortly after the event, as would be the case in fast-track attribution. The input data consist of the following components:

- 1. NRT satellite and in-situ observations of the event, meteorological analyses and reanalyses;
- 2. historical homogenous satellite and in-situ datasets and reanalyses;
- 3. pre-industrial and present-day control GCM simulations at the required resolution;
- 4. analogues of past circulation anomalies to measure the contribution of circulation anomaly.

The fast-track method consists of (1) establishing the meteorological characteristics of the event in observations; (2) application of the statistical analyses developed in Task 5.3 on historical observations and reanalyses; (3) a statistical analysis established in Task 5.3 of appropriate dynamical model output that has been pre-processed in WP5; and (4) a study based on past analogues as defined in Task 5.3. For each event an attribution statement is prepared in collaboration with all partners using the collaboration tools being developed in Task 8.2. This can be a first estimate of the Fraction of Attributable Risk accompanied by an estimate of the uncertainty, but also a statement that based on the data available at this time scale no attribution is possible. The conclusions should then be compared to the full diagnostic information developed in Task 7.3. Problems in using the methods should feed into Task 8.2 (approximately 2 pm per event type, 11 pm total, months 23-30).

T7.3 - Application of targeted methods [Months: 25-36]

KNMI, Met Office, ETH Zurich, IC3, UNI READING, UOXF, HZG

For each event in the catalogue, the model output of Task 5.2, the reliability indicators of Task 6.3 and sensitivity experiments are used to simulate a model-based attribution study as could be performed using the information available at a time frame of 6-9 months. In this time frame the datasets available include:

1. validated satellite and in-situ observations of the event;

2. output from climate models at the resolution required to attribute the extreme event under consideration, forced by observed or model-generated SST data;

3. reliability assessments of the model for these kind of events;

4. targeted experiments that investigate the role of external factors on the event under study, as well as seasonal predictions.

For this task the data from (2) will be delivered by WP5; and (3,4) will be taken from the experiments already performed in WP6 if these are available. Otherwise the sensitivity experiments will be performed in this task. On the basis of these data a thorough attribution will be undertaken. This should start with a comparison of the diagnostics developed in Task 7.2 to both the model and observations or reanalysis data to validate whether the model correctly simulates the relevant processes. For instance, for heat waves this task will consider the role of land use changes and soil moisture feedbacks in addition to other anthropogenic and natural drivers on the occurrence of targeted heat wave and drought events in Europe, including targeted experiments to elucidate the role of different forcings. For the storm surges the global model output will be downscaled with 1.6km resolution 3D ocean model. On the basis of the assessment of which models represent the physical processes correctly the simulations of these models are used to compute the FAR and an uncertainty band based on natural variability and model uncertainty as estimated from the model spread. This information will be presented in the scientific articles that also include the physical description. If the event occurs within the second-last year of the project it will be included in the annual BAMS attribution report. Additionally, the system developed in Task 5.1 will be tested as if the event occurred during this time period (or alternatively, if the event occurred during the project it would be used). (approximately 5 pm per event type, 30 pm in total, months 25-36).

Person-Months per Participant

Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	WP7 additional effort	WP7 TOTAL
1 - Met Office	0.00	0.00	3.00	0.00	3.00
2 - ETH Zurich	5.00	2.00	4.00	0.00	11.00
3 - CNRS	4.00	0.00	0.00	0.00	4.00
CEA	0.00	0.00	0.00	0.00	0.00
4 - UEDIN	0.00	0.00	0.00	0.00	0.00
5 - IC3	0.00	0.00	4.00	0.00	4.00
6 - DMI	5.00	1.00	0.00	0.00	6.00
7 - KNMI	5.00	3.00	4.00	0.00	12.00
8 - UNI READING	1.00	1.00	1.00	0.00	3.00
9 - UOXF	5.00	2.00	5.00	0.00	12.00
10 - HZG	5.00	2.00	5.00	0.00	12.00
11 - UVSQ	0.00	0.00	0.00	0.00	0.00
Total	30.00	11.00	26.00	0.00	67.00

List of deliverables

Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D7.1	Attribution of test heatwaves	9	13.00	Report	PU	36
D7.2	Attribution of test cold spells	6	13.00	Report	PU	36
D7.3	Attribution of test droughts	2	13.00	Report	PU	36
D7.4	Attribution of test floods	7	13.00	Report	PU	36
D7.5	Attribution of test storm surges	10	13.00	Report	PU	36
		Total	65.00			

Description of deliverables

D7.1 : Paper on the attribution of test heatwaves. [month 36]

D7.2 : Paper on the attribution of test cold spells. [month 36]

D7.3 : Paper on the attribution of test droughts. [month 36]

D7.4 : Paper on attribution of test floods. [month 36]

D7.5 : Paper on the attribution of test storm surges. [month 36]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS8	Validation of the fast-track attribution system	7	30	System (set up by Task 8.3) validated on different types or events
MS9	Validation of the HadGEM3-A attribution system	3	30	System validated (for routine event attribution) on different types of events. System set up by Task 8.1

Project Number ¹	Project Number ¹ 607085		Project Acronym ²	Εl	UCLEIA	
				e form per Work Packa	ige	
Work package numb	er ⁵³	WP8	Ту	vpe of activity ⁵⁴		RTD
Work package title		Development	an	d application of near re	al t	time attribution service
Start month		1				
End month		36				
Lead beneficiary number ⁵⁵		1				

Objectives

Develop a prototype quasi-operational attribution system based on the HadGEM3-A model;

Apply a range of statistical methodologies to deliver fast response attribution assessments;

 Application of the near-real time attribution service to the study of high-impact events for the annual report on extremes of the Bulletin of the American Meteorological Society (BAMS).

Description of work and role of partners

WP8 - Development and application of near real time attribution service [Months: 1-36] Met Office

In the aftermath of devastating extreme weather and climate events there is high demand for information on how anthropogenic causes might have influenced the occurrence of such events. Effective adaptation planning could help minimise the socio-economic impact of extremes and is often facilitated by robust and reliable attribution assessments. The information is required by users on a variety of time scales: a fast-track response on the media time scale of a week, a more robust targeted response at the end of each season and an annual assessment of last year's extremes delivered by research papers. WP8 aims to develop a service that delivers high-quality attribution assessments in a timely manner. WP8 will be informed by the user perspective investigated by WP4, will use tools developed in WP5, will apply evaluation methodologies from WP6 to quantify the reliability of the results and will apply lessons learned from the case studies in WP7. The main products and output of this work package include: Attribution assessments at the end of each season;

- Assessments of main extreme events of the past year delivered to BAMS;
- Fast-track assessments of extremes to the extent possible;
- Report on lessons learned and future improvements of the service.

T8.1 - Development of a quasi-operational HadGEM3-A attribution system [Months: 1-24] Met Office. IC3

This task will develop a prototype attribution system based on ensembles generated with the HadGEM3-A model (Christidis et al., 2012c) and will incorporate it into a near-real time framework that will provide attribution assessments on a seasonal timescale. The model output will be downscaled, if necessary, for the study of events developing on local scales that the model cannot resolve.

This task includes the following components:

a) Upgrading the model to higher horizontal and vertical resolution (Months 1-12). The model resolution will increase from N96L38 (current configuration) to N216L85 consistent with the seasonal forecasting model. The upgrade will resolve smaller spatial scales (~60km instead of ~135km at mid-latitudes) and will have a better representation of the stratosphere. The upgrade will also benefit from a new hydrology scheme and updated estimates of the historical anthropogenic and natural forcings;

b) Evaluation runs (Months 13-24). Once the system is upgraded, a small ensemble of five to10 multi-decadal simulations (1950-present day) with all the main historical forcings will be produced for the purpose of model evaluation. The output will be used to construct reliability diagrams and rank histograms developed in WP6 to assess how reliably the model can attribute different types of extremes in different regions. The ability of the model to provide a realistic statistical representation of extreme events will also be assessed;

c) Ensembles generation (On a seasonal basis from month 24 onwards). Ensembles of 100 simulations will be produced for the actual climate and a hypothetical climate without human influences. The former will employ SST and sea-ice boundary conditions from HadISST observations. The latter will use estimates of the anthropogenic change in the SSTs from coupled models that will be subtracted from the observations to provide the boundary conditions in simulations without human influences. An adjustment will also be made to the sea-ice based on empirical relationships derived from observations. The simulations will be six months long, spanning not only the most recent season, but also the one before.

T8.2 - Delivery of seasonal and annual assessments of extreme events for the BAMS report [Months: 24-36]

Met Office

This task will provide attribution assessments of key events from the previous year based on the attribution system developed in Task 8.1 to BAMS. Seasonal delivery of assessments based on the upgraded HadGEM3-A system will begin in year three, once the system has been set up and evaluated and the necessary simulations have been produced. Attribution of extremes from seasonal timescales to specific events. A comprehensive analysis will include both a model evaluation assessment and an estimate of the change in likelihood of the events due to human influences.

T8.3 - Delivery of fast response assessments [Months: 24-36]

KNMI, CNRS

This task will provide fast-track response assessments of the human influence on climate extremes on the media time scale of about one week. It will deliver estimates of the Fraction of Attributable Risk (FAR), which measures how anthropogenic forcings change the likelihood of exceeding (or going below) the observed extreme. This task will employ a range of statistical methods, including time series analyses (van Oldenborgh, 2007; van Oldenborgh et al 2012), optimal fingerprinting (Christidis et al., 2012a; Christidis et al., 2012b) and other tools developed in WP5 and WP6 that can be applied to the time scales required. A semi-operational analysis chain will be set up that will produce a first estimate of the FAR within about a week.

Task 8.3 consists of the following steps, each of which requires some infrastructure to be built and tested:

a) Collection of near-real-time observational data on events using the in-situ, satellite and (re)analysis products explored in WP6. Required: a system that automatically collects necessary information within days after the event;
b) Statistical analysis of the observations using the methods developed in Task 5.3 and validated in Task 6.2. Required: a system that analyses the observations of step (a) using these methods;

c) Attribution assessments of seasonal temperature extremes will be prepared on the basis of pre-computed FAR tables from optimal fingerprinting analyses with CMIP-5 models. Required: pre-computed tables produced during months 1-12, evaluation of the models from WP6;

d) Discussion of the results among the participating institutes and partners world-wide. Required: discussion software, network of partners willing and able to contribute at these time scales.

Final results will be disseminated to the user groups of WP5. The test events of WP7 serve to test the system.

T8.4 - Summary report and future directions [Months: 31-36] **Met Office**

This task will produce a report on the main results and the steps needed for the next upgrade of the attribution service, including identification of the gaps in additional modelling and observational capability required. It will include an analysis of development needs for the downstream service sector including from both policy and commercial users and will examine the potential diversification of future products including additional sectors not studied in this project (eg the energy sector). The report will also provide an analysis of elements currently blocking take up of attribution products including uncertainties arising from observational, modelling and methodological limitations and will examine the associated costs of overcoming such blocking elements in future. Input into this task will be expected from all partners.

Person-Months per Participant

Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	Task4 specific effort	WP8 additional effort	WP8 TOTAL
1 - Met Office	22.00	10.00	0.00	2.00	0.00	34.00
2 - ETH Zurich	0.00	0.00	0.00	0.00	0.00	0.00
3 - CNRS	0.00	0.00	3.00	0.00	0.00	3.00
CEA	0.00	0.00	0.00	0.00	0.00	0.00
4 - UEDIN	0.00	0.00	0.00	0.00	0.00	0.00
5 - IC3	9.00	0.00	0.00	0.00	0.00	9.00
6 - DMI	0.00	0.00	0.00	0.00	0.00	0.00
7 - KNMI	0.00	0.00	6.00	0.00	0.00	6.00
8 - UNI READING	0.00	0.00	0.00	0.00	0.00	0.00
9 - UOXF	0.00	0.00	0.00	0.00	0.00	0.00
10 - HZG	0.00	0.00	0.00	0.00	0.00	0.00
11 - UVSQ	0.00	0.00	0.00	0.00	0.00	0.00
Total	31.00	10.00	9.00	2.00	0.00	52.00

List of deliverables

Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D8.1	A HadGEM-A based operational attribution system	1	31.00	Prototype	PP	24
D8.2	Attribution assessments for the BAMS report	1	10.00	Report	PU	30
D8.3	Fast-track response assessments based on statistical methodologies	7	9.00	Report	PU	30
D8.4	Summary report on the new attribution service and future directions	1	2.00	Report	PU	36
		Total	52.00		•	

Description of deliverables

D8.1 : This operational attribution system will run on a seasonal cycle. This will deliver attribution assessments for each season together with estimates of the associated uncertainty. [month 24]

D8.2 : Attribution assessments of main events of the past year for the BAMS annual report. [month 30]

D8.3 : Fast-track response assessments based on statistical methodologies. [month 30]

D8.4 : Summary report on the new attribution service and future directions. [month 36]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
MS10	Upgrade model resolution and production of the multi-dacadal evaluation runs	1	24	Software released. Model upgrade to N216L85 with updated forcings and production of five to 10 multi- decadal evaluation runs with natural and human influences
MS11	First ensembles for attribution assessments	1	30	Model runs completed. First ensembles - months 24-36; and on a quarterly basis thereafter
MS12	Development and testing of methodologies for fast-track response	7	24	Methodologies applied to case studies and validated. Development and testing of statistical methodologies for fast- track response (months 12-24) and dissemination of output information among users (months 24-36)
MS13	Research paper for BAMS with the upgraded system	1	30	First Research paper for the annual BAMS report with the upgraded higher resolution HadGEM3-A system - accepted for publication. Complementary contribution from IC3

Project Number ¹	nber ¹ 607085		Project Acronym ²	Εl	UCLEIA	
		On	e form per Work Packa	ige		
Work package numb	er ⁵³	WP9	Ту	vpe of activity ⁵⁴		OTHER
Work package title	Overarching o	00	rdination between FP7	Сс	ppernicus climate change projects	
Start month		1				
End month		36				
Lead beneficiary number ⁵⁵		1				

Objectives

• Coordination activity among the five FP7 projects from the 2013 FP7 space call (ERA-CLIM2, UERRA, QA4ECV, CLIPC, EUCLEIA);

• Coordinated information exchange between the five FP7 projects and the outside world;

· Coordinated approach to relevant Commission DGs;

• Joint stakeholder liaison activities.

Description of work and role of partners

WP9 - Overarching coordination between FP7 Copernicus climate change projects [Months: 1-36] Met Office

EUCLEIA, ERA-CLIM2, UERRA, QA4ECV and CLIPC are acronyms for five FP7 projects from the 2013 FP7 space call that all share the common objective to prepare for a future operational Copernicus Climate Change Service (hereafter the CCCS5 projects). To ensure a proper coordination among these projects, there is the need to have an overarching coordination among these projects. This overarching coordination will be embedded in each individual DoW as a separate WP named "Overarching coordination between FP7 Copernicus climate change projects". The overarching coordination team consists of the Coordinators of the five projects and will itself be coordinated by Dr. Albert Klein Tank of KNMI. This team will attend project Assembly meetings where possible and desired. Note that the role assigned to Dr. Albert Klein Tank is that of facilitator rather than supervisor and that KNMI has been chosen as it is partner in four out of the five projects.

Note: The dates against the deliverables under this work package are indicative. They will depend on when the five projects begin, and are deliberately flexible due to the nature of the activities and coordination expected in this work package.

T9.1 - Information exchange and ideas among the five projects [Months: 1-36] **Met Office**

This task will focus on the exchange of information and ideas among the projects. A coordination plan will be prepared by the coordination team to detail the specific actions to be undertaken by the projects. It will be maintained and updated during the life time of the projects (D9.1). This plan will cover also the optimal arrangements for data exchange and data services to be developed as part of each project (according to the DoWs). Other participants in this task are KNMI and REA-PO.

T9.2 - Organisation of coordination meetings [Months: 1-36] **Met Office**

This task will be in charge of organising teleconferences on a six-monthly basis.

A first joint meeting will be organised at the premises of REA in Brussels after the kick-off of all the projects.

Additional physical meetings (possibly replacing a teleconference) may be organised upon REA's or Coordinators' request. Where possible, these meetings will be organised in combination with project Assembly meetings to limit travel costs.

Other participants in this task are KNMI and REA-PO.

T9.3 - Common web page [Months: 1-36] Met Office

A common web page which links to the individual project websites will be created and maintained. The system support will be provided within CLIPC WP3. Designated staff from all projects will be able to edit content and upload documents. There will be both public areas and a protected area for exchange of information among the CCCS5 projects. This task will provide editorial support for these pages.

Other participants in this task are KNMI and STFC.

T9.4 - Liaising activities with potential users and other stakeholders including ESA [Months: 1-36] **Met Office**

This task will assess the options for common approaches for liaising with potential users and other stakeholders, including ESA-CCI projects, etc. This includes coordination of surveys, workshops, meetings, and preparation of common outreach material. Taking into account the differences in planning of the five projects, common approaches will avoid overburdening stakeholders. Joint efforts will also increase the possibilities for stakeholder liaison.

Other participant in this task is KNMI.

T9.5 - Coordination activity and meetings with the European Commission [Months: 1-36] **Met Office**

The task will focus in organising coordinated input and meetings with the European Commission directorates linked to the development of the Copernicus Climate Change Service (DG ENTR) or other Climate Services (DG CLIMA, EEA). This activity aims at discussing common elements and guarantee adequate representation of each individual project. It will help to communicate a coordinated message, rather than five distinct messages from the five projects. This applies to general policy related meetings at commission level only; communication with the Commission on project specific elements will be managed at the project level.

Additional tasks may follow during the course of the projects.

Other participants in this task are KNMI and REA-PO.

		Persor	n-Months pe	r Participant			
Participant number and short name ¹⁰	Task1 specific effort	Task2 specific effort	Task3 specific effort	Task4 specific effort	Task5 specific effort	WP9 additional effort	WP9 TOTAL
1 - Met Office	0.50	0.50	0.00	0.50	0.50	0.00	2.00
2 - ETH Zurich	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 - CNRS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 - UEDIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 - IC3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 - DMI	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 - KNMI	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 - UNI READING	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 - UOXF	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 - HZG	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 - UVSQ	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.50	0.50	0.00	0.50	0.50	0.00	2.00

List of deliverables

Delive- rable Number ⁶¹	Deliverable Title	Lead benefi- ciary number	Estimated indicative person- months	Nature ⁶²	Dissemi- nation level ⁶³	Delivery date ⁶⁴
D9.1	Development and update to coordination plan	1	0.70	Report	PU	3
D9.2	Development of a common web page	1	0.15	Other	PU	6
D9.3	Common lessons learned relevant for the development of the Copernicus Climate Change Service	1	1.00	Report	PU	24
D9.4	Minutes from coordination meetings with European Commission	1	0.15	Other	PU	3
		Total	2.00			

Description of deliverables

D9.1 : A coordination plan will be (a) developed [month 3], and (b) and (c) updated throughout the project [months 20 and 36]. This plan will detail the specific actions to be undertaken by the projects in this cluster. (these dates may alter and are flexible) [month 3]

D9.2 : A common web page will be developed and URL released. This webpage will link to the individual project websites. There will be both public areas and a protected area for exchange of information among the CCCS5 projects. [month 6]

D9.3 : Report on the common lessons learned for the development of the Copernicus Climate Change Service. [month 24]

D9.4 : Minutes will be provided from the six monthly coordination meetings. The current plan for meetings is: months 3, 6, 12, 18, 24, 30, 36. [month 3]

Schedule of relevant Milestones

Milestone number ⁵⁹	Milestone name	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
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WT4: List of Milestones

Project Number ¹		607085		Proje	ect Acronym ²	EUCLEIA			
			List a	and S	chedule of Milest	ones			
Milestone number ⁵⁹	Milestone	name	WP numbe	er ⁵³	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments		
MS1	Suitable description of the envisaged product of event attribution		WP4		10	8	Description agreed as fit for purpose by stakeholder user panel and EUCLEIA Management Board		
MS2	Harmonised methodology for the focus group organisation and results analysis for the regional level stakeholder needs and understanding analysis		WP4		10	13	Methodology will be released.		
MS3	Definition of general public and scientist survey methods		WP4		11	25	Definition of survey methods based on the results of Tasks 4.2 and 4.3. Definition provided to EUCLEIA Stakeholder User Panel		
MS4	Specification of quasi real time analogue analysis programme		WP5		3	18	Programme specified and found applicable by WP7 partners engaged in case studies		
MS5	Specification of dynamical experimental designs for implementation in WP8		WP5		9	18	Designs specified and found applicable by WP8 partners		
MS6	Description of the ensemble of diagnostics to be applied for model evaluation		WP6		2	18	Diagnostics specified and found applicable by WP7 partners engaged in case studies		
MS7	Description of attribution system skill measures		WP6		1	18	Skill measures specified and found applicable by WP7 partners engaged in case studies		
MS8	Validation fast-track a system	Validation of the fast-track attribution system			7	30	System (set up by Task 8.3) validated on different types or events		
MS9	Validation HadGEM3 attribution	of the -A system	WP7		3	30	System validated (for routine event attribution) on different types of events. System set up by Task 8.1		
MS10	Upgrade n resolution	nodel and	WP8		1	24	Software released. Model upgrade to N216L85 with		

WT4: List of Milestones

Milestone number ⁵⁹	Milestone name	WP number ⁵³	Lead benefi- ciary number	Delivery date from Annex I ⁶⁰	Comments
	production of the multi-dacadal evaluation runs				updated forcings and production of five to 10 multi-decadal evaluation runs with natural and human influences
MS11	First ensembles for attribution assessments	WP8	1	30	Model runs completed. First ensembles - months 24-36; and on a quarterly basis thereafter
MS12	Development and testing of methodologies for fast-track response	WP8	7	24	Methodologies applied to case studies and validated. Development and testing of statistical methodologies for fast- track response (months 12-24) and dissemination of output information among users (months 24-36)
MS13	Research paper for BAMS with the upgraded system	WP8	1	30	First Research paper for the annual BAMS report with the upgraded higher resolution HadGEM3-A system - accepted for publication. Complementary contribution from IC3

WT5: Tentative schedule of Project Reviews

Project Number ¹		607085 Project Acr		onym ²	EUCLEIA						
	Tentative schedule of Project Reviews										
Review number ⁶⁵	Tentative timing	Planned venue of review		Comments	s, if any						
RV1	9	REA HQ, Brussels									
RV2	18	At venue of EUCLEIA Assembly	General								
RV3	27	REA HQ, Brussels	E	Brief interir	n review meeting						
RV4	36	At venue of EUCLEIA Assembly	General								

WT6: Project Effort by Beneficiary and Work Package

Project Number ¹ 607085			Project Acronym ²			E	EUCLEIA			
		Indicat	ive efforts (Person-mo	nths) per B	Beneficiary	per Work P	ackage		
Beneficiary number and short-name	WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	Total per Beneficiary
1 - Met Office	15.00	6.00	1.00	0.00	6.00	10.00	3.00	34.00	2.00	77.00
2 - ETH Zurich	0.00	0.00	0.00	0.00	0.00	21.00	11.00	0.00	0.00	32.00
3 - CNRS	0.00	0.00	0.00	0.00	16.00	24.00	4.00	3.00	0.00	47.00
CEA	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	2.00
4 - UEDIN	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	10.00
5 - IC3	0.00	0.00	0.00	0.00	0.00	12.00	4.00	9.00	0.00	25.00
6 - DMI	0.00	0.00	0.00	0.00	0.00	12.00	6.00	0.00	0.00	18.00
7 - KNMI	0.00	0.00	1.00	0.00	14.00	6.00	12.00	6.00	0.00	39.00
8 - UNI READING	0.00	0.00	0.00	0.00	15.00	11.00	3.00	0.00	0.00	29.00
9 - UOXF	0.00	0.00	4.00	3.00	35.00	0.00	12.00	0.00	0.00	54.00
10 - HZG	0.00	0.00	1.00	31.00	0.00	0.00	12.00	0.00	0.00	44.00
11 - UVSQ	0.00	0.00	1.00	32.00	0.00	0.00	0.00	0.00	0.00	33.00
Total	15.00	6.00	8.00	66.00	88.00	106.00	67.00	52.00	2.00	410.00

WT7: Project Effort by Activity type per Beneficiary

Project Number ¹		607085			Project /	Acronym ²	-	EUCLE	EIA				
Indicative efforts per Activity Type per Beneficiary													
Activity type	Part. 1 Met Off	Part. 2 ETH Zur	Part. 3 CNRS	CEA	Part. 4 UEDIN	Part. 5 IC3	Part. 6 DMI	Part. 7 KNMI	Part. 8 UNI REA	Part. 9 UOXF	Part. 10 HZG	Part. 11 UVSQ	Total
1. RTD/Innovation a	ctivities												
WP2	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.00
WP4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	31.00	32.00	66.00
WP5	6.00	0.00	16.00	2.00	0.00	0.00	0.00	14.00	15.00	35.00	0.00	0.00	88.00
WP6	10.00	21.00	24.00	0.00	10.00	12.00	12.00	6.00	11.00	0.00	0.00	0.00	106.00
WP7	3.00	11.00	4.00	0.00	0.00	4.00	6.00	12.00	3.00	12.00	12.00	0.00	67.00
WP8	34.00	0.00	3.00	0.00	0.00	9.00	0.00	6.00	0.00	0.00	0.00	0.00	52.00
Total Research	59.00	32.00	47.00	2.00	10.00	25.00	18.00	38.00	29.00	50.00	43.00	32.00	385.00
2 Demonstration a	tivities												
Total Demo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3. Consortium Mana	agement ac	tivities											
WP1	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
Total Management	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00
	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.00	1.00	1.00	8.00
	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	2.00
Total other	2.00	0.00	0.00	0.00	0.00	0.00	0.00	1 00	0.00	4 00	1 00	1 00	10.00
	5.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	4.00	1.00	1.00	10.00
Total	77.00	32.00	47.00	2.00	10.00	25.00	18.00	39.00	29.00	54.00	44.00	33.00	410.00

WT8: Project Effort and costs

Project Nu	mber ¹	607085		Project Acrony	EUCLEIA	EUCLEIA					
Project efforts and costs											
	Beneficiary short name	Estimated eligible costs (whole duration of the project)									
Beneficiary number		Effort (PM)	Personnel costs (€)	Subcontracting (€)	Other Direct costs (€)	Indirect costs OR lump sum, flat- rate or scale- of-unit (€)	Total costs	Requested EU contribution (€)			
1	Met Office	77.00	335,477.30	3,000.00	49,750.00	215,932.36	604,159.66	381,275.61			
2	ETH Zurich	32.00	233,116.00	0.00	15,000.00	148,869.60	396,985.60	297,739.00			
3	CNRS	47.00	249,800.00	0.00	7,500.00	154,380.00	411,680.00	308,760.00			
	CEA	2.00	0.00	0.00	7,500.00	4,500.00	12,000.00	9,000.00			
4	UEDIN	10.00	58,675.00	0.00	29,400.00	50,791.00	138,866.00	104,149.00			
5	IC3	25.00	100,000.00	0.00	15,000.00	69,377.00	184,377.00	138,282.00			
6	DMI	18.00	102,831.00	0.00	15,000.00	93,319.00	211,150.00	158,362.00			
7	KNMI	39.00	290,125.00	0.00	17,500.00	279,971.00	587,596.00	444,614.75			
8	UNI READIN	29.00	170,225.00	0.00	23,017.00	115,945.20	309,187.20	231,890.00			
9	UOXF	54.00	263,539.00	0.00	40,005.00	182,126.40	485,670.40	372,576.80			
10	HZG	44.00	226,386.00	12,000.00	14,800.00	129,880.00	383,066.00	289,272.00			
11	UVSQ	33.00	187,105.00	12,000.00	16,000.00	121,863.00	336,968.00	254,994.00			
	Total	410.00	2,217,279.30	27,000.00	250,472.00	1,566,954.56	4,061,705.86	2,990,915.16			

1. Project number

The project number has been assigned by the Commission as the unique identifier for your project. It cannot be changed. The project number **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

2. Project acronym

Use the project acronym as given in the submitted proposal. It cannot be changed unless agreed so during the negotiations. The same acronym **should appear on each page of the grant agreement preparation documents (part A and part B)** to prevent errors during its handling.

53. Work Package number

Work package number: WP1, WP2, WP3, ..., WPn

54. Type of activity

For all FP7 projects each work package must relate to one (and only one) of the following possible types of activity (only if applicable for the chosen funding scheme # must correspond to the GPF Form Ax.v):

• **RTD/INNO =** Research and technological development including scientific coordination - applicable for Collaborative Projects and Networks of Excellence

- DEM = Demonstration applicable for collaborative projects and Research for the Benefit of Specific Groups
- MGT = Management of the consortium applicable for all funding schemes
- OTHER = Other specific activities, applicable for all funding schemes
- COORD = Coordination activities applicable only for CAs
- SUPP = Support activities applicable only for SAs

55. Lead beneficiary number

Number of the beneficiary leading the work in this work package.

56. Person-months per work package

The total number of person-months allocated to each work package.

57. Start month

Relative start date for the work in the specific work packages, month 1 marking the start date of the project, and all other start dates being relative to this start date.

58. End month

Relative end date, month 1 marking the start date of the project, and all end dates being relative to this start date.

59. Milestone number

Milestone number:MS1, MS2, ..., MSn

60. Delivery date for Milestone

Month in which the milestone will be achieved. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

61. Deliverable number

Deliverable numbers in order of delivery dates: D1 - Dn

62. Nature

Please indicate the nature of the deliverable using one of the following codes

\mathbf{R} = Report, \mathbf{P} = Prototype, \mathbf{D} = Demonstrator, \mathbf{O} = Other

63. Dissemination level

Please indicate the dissemination level using one of the following codes:

• PU = Public

- PP = Restricted to other programme participants (including the Commission Services)
- RE = Restricted to a group specified by the consortium (including the Commission Services)
- CO = Confidential, only for members of the consortium (including the Commission Services)

• Restreint UE = Classified with the classification level "Restreint UE" according to Commission Decision 2001/844 and amendments

• **Confidentiel UE =** Classified with the mention of the classification level "Confidentiel UE" according to Commission Decision 2001/844 and amendments

• Secret UE = Classified with the mention of the classification level "Secret UE" according to Commission Decision 2001/844 and amendments

64. Delivery date for Deliverable

Month in which the deliverables will be available. Month 1 marking the start date of the project, and all delivery dates being relative to this start date

65. Review number

Review number: RV1, RV2, ..., RVn

66. Tentative timing of reviews

Month after which the review will take place. Month 1 marking the start date of the project, and all delivery dates being relative to this start date.

67. Person-months per Deliverable

The total number of person-month allocated to each deliverable.