



## *European Research Area for Climate Services*

### **A short guide of ERA4CS projects**

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[WWW.ERA4CS.EU](http://WWW.ERA4CS.EU)

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**Lead beneficiary:** ANR

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## Table of Contents

Presentation of ERA4CS.....	3
AQUACLEW Advancing QUALity of CLimate services for European Water .....	4
CIREG Climate information for integrated renewable electricity generation .....	5
CitiSense Urban Climate Resilience through Participatory Risk Management.....	6
CLIM2POWER Translating climate data into power plants operational guidance.....	7
CLIMALERT Climate Alert Smart System for Sustainable Water and Agriculture.....	8
ClimApp Personalized strategies to cope with thermal climate stress.....	9
ClimINVEST Tailored Climate Information for Investment Decisions .....	10
CLISWELN Climate Services for the Water-Energy-Land Nexus.....	11
CoCliME CLimate services for adaptation to changing Marine Ecosystems.....	12
Co-Cli-Serv Co-development of place-based climate services for action .....	13
CO-MICC Risk assessment and adaptation at multiple spatial scales .....	14
EVOKED Climate risk and uncertainty utilizing a Living Labs approach .....	15
INNOVA Innovation in Climate Services Provision.....	17
INSeaPTION Climate services for coastal adaptation .....	18
ISIpedia The open inter-sectoral impacts encyclopedia .....	19
SALIENSEAS Services for marine mobility in European Arctic Seas.....	20
SENSES Climate Change ScENario SErviceS: Mapping the Future .....	21
WATExR Adaptation of water resources management to climate extremes.....	22
DustClim Dust storms in Northern Africa, Middle East and Europe .....	23
ECLISEA European advances on CLimate services for coasts and SEAs .....	24
EUPHEME Methodologies for attribution of extreme weather events .....	25
INDECIS Climate indicators for high- priority sectors across Europe.....	26
MEDSCOPE MEDiterranean Services Chain based On climate PrEdictions .....	27
SERV_FORFIRE Integrated services for fire and post-fire risk prevention .....	28
URCLIM URban CLIMate services .....	29
WINDSURFER Wind and wave risks for forestry, energy and reinsurance .....	30
Table of funding organizations and project partners.....	31

## Presentation of ERA4CS

The ERA-NET “European Research Area for Climate Services” (ERA4CS) is a network of 45 partner organisations: 15 public Research Funding Organisations (**RFOs**), and 30 Research Performing Organisations (**RPOs**) from 18 European countries designed to boost the development of efficient Climate Services (**CS**) in Europe. Most partners come from countries participating in the Joint Programming Initiative JPI Climate on “Connecting Climate Knowledge for Europe” ([www.jpi-climate.eu](http://www.jpi-climate.eu)), a collaboration of 17 European countries coordinating their climate research to inform and enable the transition to a low emission, climate resilient economy, society and environment in line with Europe’s long-term climate policy objectives.

ERA4CS is funded as an ERA-NET Co-fund action under the European Union’s Horizon 2020 Framework Program (Grant Agreement number 690462). Its partners intend to develop a durable collaboration in research funding policy and practices, thereby creating added value in high quality research contributing to the development of the European Research Area for CS. To improve user adoption of and satisfaction with CS, the overall aim is to research and advance CS development by supporting scientific research for developing better tools, methods and standards on how to produce, transfer, communicate and use reliable climate information to cope with current and future climate variability and change across national boundaries.

The 2016 joint call on “Researching and Advancing Climate Services Development” has been funded by ERA4CS partners contributing either by *cash* funding (RFOs, Topic A) or by *in-kind* resources (RPOs, Topic B) plus co-funding on both topics from the European Union. This call resulted in the selection of 26 projects that will be active from the autumn 2017 to the spring 2021.

The present document is intended to provide an overview of the objectives, pilot users, main deliverables and input data of the 26 projects supported by ERA4CS. A summary of achievements of the 26 projects will be published in 2021, as part of the final report of ERA4CS.

## **AQUACLEW** Advancing **QUALity** of **CLimate** services for European Water

**Lead PI:** Berit Arheimer, Swedish Meteorological and Hydrological Institute, Sweden

**Benefit areas:** Water resource, Risk reduction, Energy, Agriculture, Biodiversity, Tourism

**Internet:** <http://aquaclew.eu/>

**Summary:** The overall goal of AQUACLEW is to use innovative research techniques and integrated co-development with users to advance the quality, and usability of climate services to water-related sectors. The project will not only co-develop the climate service with users, but also co-develop the research requirements, the service interfaces and the guidance tools. Data providers and researchers will more fully understand user needs and users will be updated on the latest scientific knowledge; better understand potentials or limitations of the data, and can influence assumptions made in each step when producing the service output. AQUACLEW will develop regional, national and pan-European climate services together with some 30 users to be evaluated in 7 real-world climate adaptation case studies across Europe. These cover a diverse array of water affected sectors, i.e. (i) flash flood risks in pre-alpine regions, (ii) flash flood risks in urban areas (iii) drought and water resource allocation for industry, tourism, agriculture and energy, (iv) hydropower production, (v) biodiversity decline, (vi) agricultural production and (vii) sediment transport and coastal erosion.

### **Pilot users/Stakeholders:**

Engineering consultancies (e.g. SWECO, Ibermad, ESGEMAR, Omicron); Agricultural consultancy (e.g. SEGES); Scientists (e.g. IFAPA, Andalusian Research Centre for Agriculture, Spanish Research Council, University of Lund); Water managers (e.g. Andalusian Federation of Irrigation Farmers, Provincial Authority of Upper Austria, Andalusian Regional Government, Central Denmark Region); Policy-makers (e.g. Swedish Civil Contingencies Agency, Federal Government in Austria, Andalusian Regional Government, Municipality of Horsens); Climate Service providers (SMHI, German Federal Environment Agency, CCCA Data Center Austria, INNOVA, Danish Coastal Authority)

### **Main deliverables:**

The deliverables are organised by three main research topics: User Uptake, Advancing Data Quality, and User Needs

- 'User uptake' investigates advanced feed-back loops along the whole chain of information production in climate services, with the goal to better understand users' needs and provide an improved service through a co-development approach.
- 'Advancing data quality' researches performance metrics, bias adjustment methods and a calibration framework for climate indicators, with the goal to increase quality and usability of climate services.
- 'User Needs' conducts seven real-world case studies to find user needs in different sectors that need climate change information, with the goal to evaluate how co-developed climate services facilitate decision making.

### **Main input data:**

AQUACLEW is using the outcomes from one of the completed Copernicus Climate Change Services (C3S) Proof-of-Concept Sectoral Information Systems (SIS) for Water (C3S\_441\_Lot1\_SMHI) to research ways to improve user uptake, advance data quality and define user needs in climate services for Europe. The research outcomes will contribute to development of the C3S operational Water SIS (C3S\_424). The AQUACLEW project uses historical observations, climate projections, and reanalysis from other existing climate services (including C3S). The data originate from CORDEX, IMPACT2C and Copernicus (from ECMWF for reanalysis).

## **CIREG Climate information for integrated renewable electricity generation**

**Lead PI:** Fred Hattermann, Potsdam Institute for Climate Impact Research, Germany

**Benefit area(s):** Energy, Water, Agriculture, *with special relevance to Africa*

**Internet:** Site should open in October 2018

**Summary:** The aim of this project is the elaboration of a decision support system for the Western African energy sector by establishing and providing necessary climate services covering all spatio-temporal scales from short-term to scenario projections and from local to transboundary and large river basin scales while following a transdisciplinary approach. CIREG thus will consider the entire water-energy-food-climate nexus, because decisions taken in the energy sector will inevitably have a feedback on water supply and food production.

### **Pilot users/Stakeholders:**

(preliminary list, to be confirmed after workshop October 2018):

ECOWAS/WRC (Economic Community of West African States/Water Research Center)

IUCN (International Union for Conservation of Nature)

CILSS (Comite Permanent Inter-Etats de lutte contre la Sècheresse dans le Sahel)

ALG (Autorité de Développement Intégré de la Région du Liptako- Gourma)

AGRHYMET

AGRA West Africa (Alliance for a Green Revolution in Africa Fadel Ndiame)

UEMOA (Union Economique et Monétaire Ouest Africaine)

ABV (Autorité du Bassin de la Volta)

CORAF (Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles) CEEAC (Communauté Economique des Etats d’Afrique Centrale)

CEMAC (Communauté Economique et Monétaire de l’Afrique Centrale)

OMVS Organisation pour la Mise en Valeur du Fleuve Sénégal)

CBLT (Commission du Bassin du Lac Tchad)

FARA (Forum for Agricultural Research in Africa)

ICEED (International Center for Energy and Environment Development, Nigeria).

### **Main deliverables:**

Report on current situation of REG in West-Africa

Report on the decision-support needs and requirements for REG

Report on available Main input data (observations, climate models, etc.)

An operational decision-support tool demonstrator will be delivered to pilot end-users

Synthesis report on technical performance of demonstrator and socio-economics impacts

### **Main input data:**

ISIMIP (5 downscaled and bias-corrected GCMs, 4 RCPs)

CORDEX Africa (10 RCMs, 4 RCPs)

WASCAL high-resolution regional climate simulation ensemble for West Africa (1 RCM driven by 3 GCMs, RCP 4.5)

Reanalysis : WATCH ERA40, WATCH ERA-Interim, EWEMBI, GSWP3

## CitiSense Urban Climate Resilience through Participatory Risk Management

**Lead PI:** Tina-Simone Neset, Linköping University, Sweden

**Benefit area(s):** Risk reduction in urban environment

**Internet:** <https://citizensensing.itn.liu.se/>

**Summary:** CitiSense aims to co-develop a participatory risk management system (PRMS) with citizens, local authorities and organizations which enable them to contribute to advanced climate services and enhanced urban climate resilience as well as receive recommendations that support their security. Citizens are acting as sensors to collect and send information and also novel means of citizen-technology interaction. This allows a large amount of site-specific data on emerging risks to be rapidly collected, which can link to and inform existing recommendations in current urban climate-related risk management and adaptation plans. Site-specific recommendations to guide citizen responses will be sent through the CitiSense app and placed on the web portal. This platform will facilitate the exploration of available data collected by other citizens in the city.

**Pilot users/Stakeholders:** CitiSense has both municipal stakeholders and citizens as end-users of the participatory risk management system. The project will include four demonstrators in the cities of Rotterdam Trondheim, Norrköping and Porto. For each of these cities, various groups of users are targeted including professionals from the municipal services and various groups of citizens.

**Main deliverables:**

Reports on interaction with end-users and co-construction of the PMRS (Participatory Risk Management System).

A functional PMRS based on Internet and Mobile phones technology, including crowd-sourced observations and observations from city-scale networks of meteorological sensors.

Concept and demonstration of a wireless innovative sensor network and report on its reliability during demonstration phase.

A scientific paper on the architecture, functionality and evaluation of the PMRS by Pilot users/Stakeholders.

A policy brief with the tentative title: “Can a Participatory Risk Management System Inform Local Adaptive Governance for Urban Climate Resilience?”

**Main input data:**

Observations from the end-users (crowd sourcing) and the networks of sensors developed by CitySense  
Climate data from SMHI, Met.no and NOAA (or other climate data in Open Access)

Map data by Google Maps

## CLIM2POWER Translating climate data into power plants operational guidance

**Lead PI:** Sofia Simoes, Associação para a Inovação e Desenvolvimento da Faculdade de Ciências e Tecnologia, Portugal

**Benefit area(s):** Energy, Water resources

**Internet:** <https://clim2power.com/>

**Summary:** CLIM2POWER will develop a climate service that integrates seasonal weather forecasts into decision making in the electricity sector. The project will assess the value of current and possible future seasonal forecasts for an improved management of power generation portfolios and derive optimal operation schedules for the electricity sector, such as optimal operation of hydro-storage and of fossil fuel acquisition. The final climate service will be available for the whole Europe; the project develops four regional case studies in Portugal, France, Sweden and in the German-Austrian market zone. The case studies put a different focus on markets and market prices, dam operation restrictions due to ecological regulation in the river systems, and flexibility options in the power sector. Future climate scenarios are assessed in an additional sensitivity analysis. The climate service is made available as public web service online. In particular power generation & trading companies, power system operators & regulators, power consumers, and water managers are going to directly profit from the outcome of our project.

### **Pilot users/Stakeholders:**

Wien Energie GmbH ; Energias de Portugal, S.A. ; Vattenfall, AB; Directorate General for Energy of the European Commission; Directorate General for Climate Action of the European Commission; Directorate General Joint research Centre of the European Commission; European Environment Agency; European Network of Transmission System Operators for Electricity; Union of Electricity Industry; International Energy Agency; Águas de Portugal, S.A. ; Agência Portuguesa do Ambiente, I.P. ; Redes Energéticas Nacionais, SGPS, S.A. ; Associação Portuguesa de energias renováveis ; Direção Geral de Energia e Geologia ; Entidade Reguladora do Setor Energético; Réseau de Transport d'Électricité ; Energie Control ; Energieversorgung Offenbach AG ; Institut National de Recherche en Informatique et en Automatique ; Schneider Electric, S.A.; Irish Department for Climate Action and Environment.

### **Main deliverables:**

Reports on end-user expectations  
Reports on the quality of downscaled data  
Updated hydrological models for each case-study river  
Simulation framework for bias corrected wind, solar PV and electricity demand for Europe  
Enhanced power system models for whole of EU and each case-studies  
Various case studies of impacts of the new service on energy market at national and European scales  
Functional web service to access the impacts of seasonal forecasts and long-term climate projections on the power system (electricity prices, demand for power, power plant management)  
Report on assessment of the web service user satisfaction

### **Main input data:**

Seasonal forecasts from the German Climate Forecast System, and later on from the Copernicus multi-model seasonal forecast system  
Global and regional reanalyses, downscaled by dynamical-statistical methods (COSMO model)  
Climate scenarios by CORDEX Regional Climate Models

## CLIMALERT Climate Alert Smart System for Sustainable Water and Agriculture

**Lead PI:** Claudia Pascoal, University of Minho, Portugal

**Benefit area(s):** Water, Agriculture

**Internet:** <http://climalert.eu>

**Summary:** The CLIMALERT project will provide climate information in a format that prospective users find it easy to understand and/or incorporate into decision-making. Main goals are: i) improve the link between climate research, water resources, and the agriculture sector to assist in management of natural resources, enhance agricultural livelihoods and reduce underlying causes of vulnerability, ii) advance the techniques and tools currently used to incorporate weather and climate information at different time scales into risk assessment and decision-making in agriculture (management practices), and iii) contribute to a global framework to improve the transfer and exchange of information on future or near-term climate scenarios to help decision-makers in applying adaptation and mitigation strategies. The new long-term preparedness plans of actions to reduce the risks and vulnerabilities for the agriculture and water management sectors will be developed, providing economically valuable services and long-term benefits to farmers and society. Three case studies in different macroclimatic areas will be implemented to face drought and floods under a set of anthropogenic pressures to validate the integrated and transferable transnational alert system: 1) Spain: Algars River basin (Ebro River basin) 2) Portugal: Cávado River basin 3) Germany (Saxonia Anhalts): Saale catchment.

**Pilot users/Stakeholders:** (provisional list)

Câmara Municipal de Esposende ; Câmara Municipal de Braga ; Esposende Ambiente, EM ; TRATAVE Águas de Portugal ; CBMA; Raiz; Escola Superior Agrária – IPVC; Agere ; GESTAVE ; Município de Vila Verde ; SOGRAPE Vinhos ; CAP- Confederação dos Agricultores de Portugal.

**Main deliverables:**

Reports on interactions with users to co-construct the new service

Guidelines of good practices for water and agriculture management

Report on risks and vulnerabilities of the study case areas

A database with climate, hydrological, phenological, soil and agronomic information recognized as relevant for the stakeholders in the case study areas

A report on a choice of indicators relevant for decision-making, based on a mix of observations, weather and hydrological forecasts

A web service and a smartphone application to provide real-time easy access to these indicators

A scientific article on the effects of extreme climatic events on soil productivity and the functioning of freshwater ecosystems

A report on strategies for improving ecosystem services and biodiversity to face ongoing climate change

A scientific article on ecosystem services and drivers of biodiversity change under different climatic scenarios

A report on the monetary and non-monetary benefits of the Climalert tools

**Main input data:**

Real time meteorological observations from national met services

Climate reanalyses from Copernicus

Satellite observations and derived products from Copernicus and Eumetsat (Land SAF)

## ClimApp Personalized strategies to cope with thermal climate stress

**Lead PI:** Gao Chuansi, Lund University, Sweden

**Benefit area(s):** Health

**Internet:** <http://www.lth.se/climapp/>

**Summary:** The project is dedicated to support the integration of climate service data with thermal physiology and feedback from end-users. Researchers and stakeholders from climate services and end-user organizations will collaborate with thermal physiologists, clothing and hydration experts, sociologists, and engineers. We will combine information from climate forecasts and weather warnings, with end-user data to develop a decision support system through an App. The ClimApp will provide timely relevant guidelines for individuals and public and private sector agencies to take actions to improve thermal resilience when adverse environmental conditions are expected. Feedback will be utilized to improve the personalized climate service to maximize the impact and strengthen the integration of expertise from climatology and human physiology to optimize adaptation strategies for climate challenges.

### **Pilot users/Stakeholders:**

The Public Health Services Gelderland-Midden, The Netherlands; Taiga AB, Sweden; CeRIMP Italy; SAPA Extrusion (Hydro's Extruded Solutions), Denmark; AgeUK; Micke Nyman, Guide and Risk and security consultant in Sweden; Kindergartens in The Netherlands; Center for Technology Research and Innovation (Cetri)

A number of individual users have tried the ClimApp prototype, for example during Culture Night (open house) event in Lund, Sweden, on 15th of September 2018. More users will be using a functional app during testing phase. The final version of the ClimApp is expected to be used by both individual users and organizations.

### **Main deliverables:**

A smartphone application giving access to health-relevant advice in case of thermal stress (heat waves and cold spells)

Report of optimized "Heat-Module" (PHS) and environmental heat stress index (WBGT) linked to climate service data and individual characteristics.

Report of integrated hydration and cooling strategy module based on PHS prediction.

Report of indoor climate module including prediction of indoor climate based on prevailing outdoor climate.

Report of revised IREQ model and incorporated cold stress and clothing module.

Report of users' needs and usability, of the Climapp mockup.

Report of laboratory/database validation of the integrated ClimApp.

Functional ClimApp version 2.0 in English and version 2.1 – 2.8 in Danish, Swedish, Greek, Italian, Dutch and German, Spanish and French version 2.1 – 2.8) for open access and download.

### **Main input data:**

At present, we are using weather forecast data from OpenWeatherMap because it has simple, fast and free weather API for programming the app. We also consider using German weather service (DWD) data if the data are open and API is improved. ClimApp may take solar radiation forecast from Copernicus as one of the input data, particular if the API is easy for programming mobile phone apps.

## ClimINVEST Tailored Climate Information for Investment Decisions

**Lead PI:** Christa Clapp, Center for International Climate and Environmental Research – Oslo, Norway

**Benefit area(s):** Finance

**Internet:** <https://www.cicero.oslo.no/en/climinvest>

**Summary:** The primary aim of ClimINVEST is to co-design and co-produce tailored information on climate change with investors. The secondary aims are 1) to feed climate information into the various risk framings of financial decision-makers; and 2) to add value to investor decisions through the co-development of tools for transferring and communicating climate information. The envisioned impact is a contribution to capacity building on mitigating and adapting to climate change for investors, improved communication between climate researchers and the financial community, and value-added to facilitated investment decision-making that accounts for physical climate risks, with a potential to increase investment e.g. in climate-resilient infrastructure.

### **Pilot users/Stakeholders:**

Various institutional investors in Norway, the Netherlands and France. This includes the world-renown institutional investors on the Advisory Board of the CICERO Climate Finance Centre, representatives from pension funds, asset managers, banks and insurance companies.

### **Main deliverables:**

White paper/report on literature review and climate services needs for investors

Synthesis document with recommendations on use of seasonal forecasts to centennial climate projections at different time scales and for different climate variables

Science practice labs to develop and test the prototypes among the most engaged investors along case studies

Database of prototype of impact-relevant indicators for user groups (based on case studies)

Synthesis report of commonalities in the methodological frameworks and the developed prototypes for each case study

Peer-reviewed paper on impact-relevant indicators to support investment decisions

White paper on how to develop a Climate Impact Atlas and conduct a Climate Cost Assessment

Interactive reports for investors on visualized impact-relevant indicators, linked to the project Internet hosted by CICERO

Factsheet on key lessons learned on mapping and visualization across case studies and with the user group

Peer reviewed paper on visualization of impact-relevant indicators to support investment decisions

### **Main input data:**

This is under review, potentially this will include

Past observations supplied by international institutions and Nat Met Services

Reanalysis and gridded obs from CRU/GPCC/ERA-Interim

Seasonal/decadal predictions from GPCs / Nat Met Services

Climate models from Copernicus and various climate institutes

## CLISWELN      Climate Services for the Water-Energy-Land Nexus

**Lead PI:** Roger Cremades, Helmholtz-Zentrum Geesthacht, Germany

**Benefit area(s):** Water, Energy, Agriculture

**Internet:** <https://www.hzg.de/ms/clisweln>

**Summary:** The aim of CLISWELN is to advance the provision of Climate Services (CS) for drought-related decision making, by using the water-energy-land nexus (WELN) to integrate the cross-sectoral links of drought-risk management with further synergistic co-benefits between the provision of climate services and long-term societal objectives like sustainable land planning, mitigation of CO<sub>2</sub> emissions and other locally relevant policy targets connected with the Sustainable Development Goals. CLISWELN will study case studies with conflicting water uses dealing with cities, regions and river basins that have specific drought-related vulnerabilities: large amounts of water used for bioenergy, suboptimal forest management compromising water availability downstream, and a vulnerable touristic sector operating in the dry season.

### **Pilot users/Stakeholders:**

CLISWELN main stakeholders and pilot users are water managers both in urban and agricultural areas, as well as water and land use planners at municipal and regional administrative levels, together with associations of natural resource users, e.g. irrigation associations, and local environmental non-governmental organisations. A provisional list is following: Compania Apa Brasov; Sistemul de Gospodarire al Apelor Brasov ; Agentia Metropolitana pentru ; Dezvoltare Brasov ; Primaria Municipiului Sacele ; Primaria Municipiului Brasov ; Landwirtschaftskammer Burgenland ; Abteilung Pflanzenbau ; Amt der Burgenländischen Landesregierung; Wassergenossenschaftsverband Seewinkel ; Landwirtschaftliche Faschule Eisenstadt ; Sub-dirección General del Agua de la Generalitat Valenciana ; Confederación Hidrográfica del Júcar ; Diputación de Alicante, oficina del Ciclo Hidrico; Asociación Empresarial Hostelera de Benidorm; Costa Blanca y Comunidad Valenciana (HOSBEC); Ecologistas en Acción del País Valenciano.

### **Main deliverables:**

Academic working paper: "Challenges and Opportunities for incorporating the WELFN in climate services".  
Integrated model of the agricultural sector in the Austrian case. Integrated model with ad-hoc systemic model of urban water supply. Integrated model of river basin, land use and urban water supply. Integrated urban management tool  
Academic working paper: "Climate services for the agricultural sector: policy coherence through the WELFN".  
Academic working paper "Climate services for river basins: providing robust policy recommendations through the WELFN".  
Academic working paper: "Climate services for drought-prone touristic areas: policy coherence through the WELFN".  
Policy report about climate services for the WELFN, providing insights about stakeholder integration and risk reduction in the event of a drought.

### **Main input data:**

The input climate data of the project are two combinations of general circulation model and regional climate model (MI5\_REM and ECE\_CLM) of the EURO-CORDEX domain, for two representative concentration pathway scenarios (RCP 4.5 and RCP 8.5). The Austrian case study is an exception, as they found other data at higher resolution (ÖKS15) that would add value to the project. ÖKS15 is also based on EURO-CORDEX. The EURO-CORDEX data has been created by GERICs and other multiple climate services in Europe, and the ÖKS15 comes from the Central Institute for Meteorology and Geodynamics (ZAMG), the University of Graz, and the University of Salzburg. Use of the Copernicus Data Store to access some of these data is under investigation.

## CoCliME CLimate services for adaptation to changing Marine Ecosystems

**Lead PI:** Caroline Cuzack, Marine Institute, Ireland

**Benefit area(s):** Health, Aquaculture, Fisheries, Tourism

**Internet:** <https://www.coclime.eu>

**Summary:** The CoCliME project will co-produce a set of regionally focused climate services to address key impact areas including human health, aquaculture, fisheries and tourism across the regional seas of Europe. The developed services and associated decision support tools will empower and support vulnerable coastal sectors to accelerate adaptive decision-making and feed into key governance mechanisms. The project team brings together a newly established consortium of boundary organisation experts in co-development of climate services with leaders in marine ecosystem research, regional ocean climate modellers, and targeted users and decision makers in regions. The project will offer an innovative, user-focused approach and the development of a societally relevant climate service framework, in addition to the bespoke climate services, that will be transferable to other regions, impact areas, users and marine ecosystem vulnerabilities. Through a regional case study approach, the specific needs of national and European marine ecosystem impact and adaptation planners and regulatory authorities will be identified and addressed through an evidence-based and iterative process designed to feed into climate adaptation strategies across the EU and beyond.

### **Pilot users/Stakeholders:**

The project has defined six case study areas (Irish Atlantic, French Atlantic, Baltic Sea, Black Sea, Mediterranean, North/Norwegian Sea). The sector and focus of end-users is different between case studies. For case studies that focus on shellfish poisoning, the private sector (e.g. shellfish farmers) are the most involved stakeholder. Case studies that focus on pollution, water quality, and recreational bathing areas focused on governmental and policy making stakeholders. The project has identified about 50 pilot users, but did not want to reveal their identity.

### **Main deliverables:**

Case study specific climate service: Each case study will co-develop and co-produce a marine ecosystem climate service, suitable for their case study area. The developed services will include information bulletins, Internets and the development of statistical or hydrodynamic models, predicting trends and expected changes in marine ecosystem climate impact indicators.

Transferable framework: Through lessons learned and knowledge gained during the ERA project, to develop a CoCliME transferable framework for climate service development for application across different regions and impact areas. This will allow other nations to follow the same approach, avoid the same pitfalls, overcome similar challenges and produce a usable climate service for their region

### **Main input data:**

Long time series data from weather stations, water quality monitoring stations, ocean buoys etc. (different origin for each case study)

Hydrodynamic, meteorological and earth system model hindcasts and reanalyses

Hydrodynamic, meteorological and earth system forecasts under climate change scenarios

These data may come from National Met services and national monitoring programmes, Copernicus (all partners), iSWIM (Black Sea), Vattenwebb (Baltic Sea, North Sea), Symphony (Baltic Sea, North Sea), and the EC-Earth model.

## Co-Cli-Serv Co-development of place-based climate services for action

**Lead PI:** Jean-Paul Vanderlinden, Laboratoire Cultures, Environnements, Arctique, Représentations, Climat, Université de Versailles Saint-Quentin-en-Yvelines, France

**Benefit area(s):** Coastal zone risk mitigation, Land use planning, Urban planning, Citizen engagement, Adaptation planning,

**Internet :** <http://cocliserv.cearc.fr>

**Summary:** Co-cli-serv will identify future information and the nature of the climate science needs to address the local communities' concerns, aspirations and goals in view of climate variability and climate change. It will develop a novel approach for co-constructing climate services to support local planning and adaptation decision-making. Co-cli-serv will establish a collaborative relationship between climate science and local communities in five representative case studies in Norway, France, the Netherlands and Germany. Co-cli-serv's approach is its focus on narratives of change as a localisation device. Grounded in such narratives, vision-based scenarios will be developed by employing an incremental and community-led strategy, enabling the identification of current AND future knowledge needs. The project will experiment with art–science–policy integration in the case studies. Building on existing climate science and practices, Co-cli-serv will instigate and sustain community dialogues to co-construct place-based climate services.

### **Pilot users/Stakeholders:**

Association Clim'Action Bretagne Sud (Golfe du Morbihan, Brittany, France)  
Bergen Komune (City of Bergen, Norway)  
Centre Social de Kerourien (Brest, Brittany, France)  
Municipality of Dordrecht (The Netherlands)  
Comité régional de conchyliculture Bretagne Sud (Golfe du Morbihan, Brittany, France)  
Le Maquis (Brest, Brittany)  
Parc Natural Régional du Morbihan (Golfe du Morbihan, Brittany, France)  
Stichting Adaptation Services (The Netherlands)  
Stiftelsen Bryggen (Bryggen foundation, Bergen, Norway)

### **Main deliverables:**

Suite of ground tested guidelines for the implementation of a narrative and scenario centered climate service co-development process.  
Analysis and testing of representation schemes for climate service co-development (arts, metadata, GIS)  
Assessment framework for place based climate services.  
Training curriculum for climate service co-development.

### **Main input data:**

Interview and field observation work, citizen science

## CO-MICC Risk assessment and adaptation at multiple spatial scales

**Lead PI:** Petra Döll, Goethe University Frankfurt, Germany

**Benefit area(s):** Water resource, Risk reduction, *with special relevance to Africa*

**Internet:** <http://www.co-micc.eu/>

**Summary:** The main project goal is to co-develop methods for providing and utilizing multi-model ensembles (MME) data on freshwater-related hazards for risk and adaptation assessments at various spatial scales, and to provide data in a suitable way, for different types of end-users. The work will involve global hydrological modelers, scientists and stakeholders. They will participate in three stakeholder dialogues at the global scale (end-user industries), transboundary scale (Morocco, Algeria, Tunisia), and river basin scale (Ebro).

**Pilot users/Stakeholders:** (provisional list)

Tunisia: National Meteorological Institute, Agricultural Ministry/ Office of water Planning and Hydraulic Equilibriums, OSS, MAT, SONEDE (National Water Supply Agency). Algeria: Ministry of Water Resources, ANRH. Morocco: Hydraulic Basin Agency of Tensift ABHT, Regional office for adding agricultural value of Haouz ORMVAH, Hydraulic Basin Agency of l'Oum Er-Rbia ABHR, Regional office for adding agricultural value of Tadra ORMVAT, University of Casablanca, Direction of National Meteorology

**Main deliverables:**

Identification of several methods to utilize and present multi-model data, based on stakeholder dialogues for all three studied scales (global, transboundary, basin).

Exemplary CC risk assessment and adaptation strategy.

Compilation of adaptation measures in Morocco, Algeria and Tunisia.

Analysis of available ISIMIP multi-model ensembles with practical example of ensemble simulations for each stakeholder dialogue.

Open-source tools developed and applied that utilize the multi-model output

A web portal in which the processed multi-model ensemble data will be stored, visualized, disseminated to stakeholders, during the project and beyond its duration to the general public.

A handbook will synthesize how end-users at different scales may best utilize multi-model information for risk assessments and adaptation strategies.

Development of suggestions for future ISIMIP simulations, analysis, and presentations, based on the stakeholder dialogues.

**Main input data:**

The CO-MICC project will use climate Main input data based on ISIMIP2b numerical climate simulations to force the hydrologic models (conditions for RCP2.6 and RCP8.5 provided based on CMIP5 output of GFDL-ESM2M, HadGEM2-ES, IPSL-CM5A-LR and MIROC5, bias-corrected to the EWEMBI data set). For validation in the historic period, observed climate data from EWEMBI and from the Global Soil Wetness Project Phase 3 (GSWP3), based on the reanalysis data set 20CR and using the bias targets GPCC, GPCP, CPC-Unified, CRU and SRB, is used.

## **EVOKED Climate risk and uncertainty utilizing a Living Labs approach**

**Lead PI:** Oen Amy, Norwegian Geotechnical Institute, Norway

**Benefit area(s):** Water, Risk reduction, Coastal planning

**Internet:** <https://www.ngi.no/eng/Projects/EVOKED>

**Summary:** The objective of EVOKED is to re-frame the risk and uncertainty associated with climate data into knowledge products more understandable and useful for end-users concerned with risk mitigation. We engage end-users in a Living Labs approach and encourage them to evoke their perceptions of risk and uncertainty, and identify which kind of data or presentation evokes action towards climate adaptation. The project will initiate a feedback loop, which includes: (i) a co-design process between users, climate knowledge providers and translators; ii) the co-development of products such as visualization tools and climate- and socio-economic change scenarios; iii) field trials to co-validate the operational products and their potential to initiate climate adaptation measures; and subsequently iv) the re-assessment of risk and uncertainty to evaluate the user experience. The project team will implement Living Labs in Norway, Sweden, Germany and the Netherlands at established case study sites. EVOKED will focus on the vulnerable sectors of water management, disaster risk reduction and coastal management.

### **Pilot users/Stakeholders:**

- City of Larvik, Norway: landowners, neighbourhood organisations (Veldre, Kleiverhagen, Langestrand), Sky School, unions and clubs (Larvik og omegn Turistforening, Næringsforeningen, Larvik By), Larvik municipality and Vestfold County Council, National Road Authorities, Norwegian Food Safety Authority
- Province of North Brabant and the Drents Overijselse Delta Waterboard, the Netherlands: municipalities, house/property owners, Electrical companies, IT, drinking water, agriculture, nature conservation NGOs.
- City of Flensburg, Germany: Local politics and administration, regional politics, potentially affected companies, local interest groups, educational institutions, and citizens
- County of Värmland, Sweden: Municipalities, National Traffic Authority, Swedish Civil Contingencies Agency, Ministry of the Environment and Energy, Citizens, Businesses

### **Main deliverables:**

Inventory of climate services needs

Peer reviewed paper on the potential and challenges of developing a common framework for risk and uncertainty in a changing climate

Local set of scenarios (narratives and population projections)

Maps of exposure and vulnerability

Peer reviewed paper on the potential and challenges of field trials concerning the use of knowledge concerning climate adaptation measures and their implementation.

Report on user satisfaction of climate services

Peer reviewed paper on the potential for climate services to be an integral aspect of adaptive governance and decision support tool for engaged citizens

### **Main input data:**

- Eklima database curated by the Norwegian Meteorological Institute (<https://www.met.no/vaer-og-klima>)
- Norwegian center for climate services (<https://www.klimaservicesenteret.no/>)



- Elevation data in electronic format curated by the Norwegian Mapping Authority (<https://hoydedata.no/LaserInnsyn/>)
- German center for climate services (<https://www.climate-service-center.de/index.php.en>)
- German climate atlas (<http://www.norddeutscher-klimaatlas.de/>)
- Dutch Climate Impact Atlas (<http://www.klimaatteffectatlas.nl/en/>), this gathers the data available from the Royal Netherlands Meteorological Institute, but also from TNO, Universities and Deltares, (flooding/waternuisance and subsidence)
- Delta scenario's as developed by the Deltaprogramm (<https://english.deltacommissaris.nl/delta-programme/knowledge-programme/delta-scenarios>)

## **INNOVA** Innovation in Climate Services Provision

**Lead PI:** Máñez María, Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH, Germany

**Benefit area(s):** Market of Climate Services

**Internet:** <http://www.jpi-climate.eu/era4cs/innova>

**Summary:** The primary objectives of INNOVA are: 1) the co-development of innovative solutions to transform climate risks into opportunities actively engaging a variety of stakeholders and 2) the identification of measures for evaluating and monitoring, up-scaling, and replicating efficient current and future innovative climate services for decision making on managing climate risks taking into account their added value. The project aims to consolidate knowledge from leading earlier and on-going European initiatives and to distil specific complementary climate services essential for the enhancement and adoption of innovative solutions to support climate risk management. The project will provide prototypes including viable business models and practical innovation frameworks, and recommendations for creating and up-scaling opportunities through adaptive co-management approaches.

### **Pilot users/Stakeholders:**

Aguas de Valencia, Spain

City of Nijmegen, The Netherlands

French National Institute for Agricultural Research (Antilles-Guyane, Guadeloupe and Martinique)

Kiel Bay Climate Alliance

### **Main deliverables:**

Data repository for structured and non-structured, scientific and lay data to provide potentially interesting knowledge for climate service development.

Cross analyses studies that will need to collect and store extremely large datasets and to analyse them into a big data framework. On the one hand, data from hubs may flat files but also graphs or images, on the other external meteorological, geographical, demographical or social data are known to be extremely massive.

Toolkit of customized operators to extract comprehensive knowledge close to natural language from the data repository.

Knowledge base defining common trends and specific features on climate change with recommendations for innovative climate services from our hubs.

Report on risk and vulnerability in each INNOVA hub

Report displaying current institutional arrangements, responses to climate change risks and the utilization of climate services accompanied by an overall storybook

Report on the development of business models for each hub

Report on successful business models to transfer outside of the hubs

Development of long-term planning scenarios.

Report on business opportunities related to upscaling from innovation hubs.

A concept and prototype business case will be developed for ERDF funding.

### **Main input data:**

Dynamic downscaling and when necessary statistical downscaling; additional observational data will be as well used: Combination of REMO and observations for the development of climate services that will be produced by the project. Most data will come from German Climate Service Centre (GERICS), EOBS and Copernicus

## INSeaPTION Climate services for coastal adaptation

**Lead PI:** Goneri Le Cozannet, Bureau de Recherches Géologiques et Minières, France

**Benefit area(s):** Coastal planning

**Internet:** <http://www.inseaption.eu/>

**Summary:** Sea-level rise related information currently available is not customized to the practice of coastal adaptation, which requires services tailored to users' needs including full information on uncertainties, high-end estimates, accurate storm and flood modeling, shoreline change projections and relevant adaptation options within the context of current practices and governance arrangements. The INSeaPTION project aims at addressing these limitations by co-designing and co-developing coastal climate services based on state-of-the-art sea-level rise, impact, adaptation and transdisciplinary science. The project will deliver coastal climate services based on end-users' needs and their decision and governance context. As tropical islands are high impact sectors and currently receive little attention, the project selected Maldives and French Polynesia as pilot sites for local coastal climate services. The project's transdisciplinary approach combines continuous interactions with users of both the global and local services to be developed with cutting edge sea level, impact modelling, decision making and governance research.

### **Pilot users/Stakeholders:**

Puertos del Estado (Spain), Royal Haskoning (The Netherlands), LaMer (Republic of Maldives), Ministry of Environment and Energy (Republic of Maldives), Ministry in charge of Research (French Polynesia), Ministry in charge of Urban Planning (French Polynesia), Maritime cluster of French Polynesia

### **Main deliverables:**

Specification of global and regional coastal climate service  
New regionalized global mean sea level projections with non-Gaussian uncertainties  
New database of coastal extreme surges along the world coastlines  
New global coastal impacts projections within the DIVA coastal impact models with a global assessment of their uncertainties  
New assessment of swell waves impacts on the global coastlines and the projected modifications during the 21st century  
Comparative coastal risk governance in the Maldives and French Polynesia  
Impacts and adaptation pathways for the Maldives and for French Polynesia

### **Main input data:**

CMIP-5 reanalyses and projections  
More recent reanalysis and projections of ocean thermal expansion, ice-sheets and glaciers meltings  
Mean and extreme tide gauge records (PSMSL, GESLA, partly compiled from tide gauge data from Copernicus)  
Vertical ground motions databases (SONEL, InSAR data where available)  
Storm surges and wind-wave reanalyses and projections for the 21<sup>st</sup> century generated by the European Joint Research Centre (JRC)  
Wind-waves hindcasts and 21<sup>st</sup> century projections generated within the framework of the COWCLIP project and made available through the CSIRO data server

## ISlpedia The open inter-sectoral impacts encyclopedia

**Lead PI:** Frieler Katja, Potsdam Institute for Climate Impact Research, Germany

**Benefit area(s):** General

**Internet :** <https://www.isimip.org/isipedia/>

**Summary:** This project addresses the coproduction of climate-impacts knowledge, in collaboration between scientists and users such as climate-adaptation-policy experts. The project team boosts world-class experts in science-policy dialogue, cross-sectoral impacts research and research coordination, and scientific excellence in impacts modelling. The end product is an open climate-impacts service portal, ISlpedia, offering tailored access to state-of-the-art climate-impacts assessments and data, based on the cross-sectoral, multi-model simulations conducted within the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP). Four key tasks will be undertaken: 1) stakeholder-supported selection of focus topics and development of the scenario design for the next ISIMIP simulation round; 2) co-development of societally- and user-relevant impacts indicators based on the (bio-)physical projections generated within ISIMIP, such as “number of people affected”, “economic damages” or indicators related to the Sustainability Development Goals; 3) provision of Main input data and coordination of cross-sectoral impact-modelling activities within ISIMIP, and 4) establishment of a new online platform ISlpedia to provide access to simulation data, regional, cross-sectoral impact assessments based on ISIMIP data, and co-developed indicators.

### **Pilot users/Stakeholders:**

Agence Nationale de l'Aviation Civile et de la Météorologie, Senegal ; Asian Disaster Preparedness Center; Christian Aid; Climate Adaptation Services Foundation; Climate Information Platform for Copernicus ; Comité National sur les Changements Climatiques, Benin ; Deutsche Gesellschaft für Internationale Zusammenarbeit; European Environmental Agency; Global Change SysTem for Analysis, Research, and Training ; Green Climate Fund ; Hebei Provincial Institute of Water Resources; Institute for Sustainable Development, Poland; Joint Research Center; National Center for Atmospheric Research, USA; Hungary Regional Environmental Center; Macedonia Regional Environmental Center, Serbia Regional Environmental Center, Secrétariat Permanent du Conseil National pour le Développement Durable, Burkina Faso; SwissRE; UK MET Office; UNEP Focal Points; UNFCCC Focal Points; UNFCCC Secretariat; WASCAL West African Science Service Center; Wiseuropa; World Bank; World Food Programme ; World Wildlife Foundation.

### **Main deliverables:**

An open climate-impact service web portal offering tailored access to state-of-the-art climate-impacts assessments and data

Requirements for the next round of ISIMIP numerical simulations

### **Main input data:**

ISIMIP datasets

## SALIENSEAS Services for marine mobility in European Arctic Seas

**Lead PI:** Lamers Machiel, Wageningen University and Research, The Netherlands

**Benefit area(s):** Met Ocean services

**Internet:** <http://salienseas.com/>

**Summary:** The SALIENSEAS project will co-develop, in a team of social and natural scientists, met-ocean service personnel, and end-users, climate Arctic forecast products tailored to key social, environmental and economic needs. Based on a thorough understanding of the current mobility patterns and challenges, as well as the uptake and need for climate services in several mobile Arctic Ocean end-user groups, a range of demonstration services will be co-defined and co-produced with these stakeholders. The project will conduct in-depth social science research in relevant end-user practices, disseminate forecast products of climate information, and develop a more participatory, flexible and tailored approach to developing forecast products. Arctic sub-seasonal and seasonal prediction capabilities and climate projections in the Arctic will be systematically exploited, in order to establish baseline expectations for predictive power and to guide advances in predictive capability. The developed tailored forecast products will be merged into Norway's and Denmark's met-ocean and sea-ice forecasting infrastructures and maintained and developed beyond the lifetime of this project.

### **Pilot users/Stakeholders:**

Association of Arctic Expedition Cruise Operators; MARITIMT FORUM Nord; Arctia; Greenland Pilot Service; Royal Arctic Line; Greenland Hunters and Fishers Association; Harnvig Arctic & Maritime; Hermes fisheries; Carnival Corporation; Oceanwide Expeditions; Seatec Consulting; Tecla Sailing

### **Main deliverables:**

European Arctic met-ocean service delivery: reports on meteorological service perspectives  
Participatory mapping of European Arctic marine mobilities and relation to service needs  
Analysis of service use in critical Arctic maritime decision-making contexts  
Agent-based simulation model for assessing the relevance of marine climate services in European Arctic marine settings  
Demonstration product of seasonal ocean sea-ice forecasting in coastal Greenland  
Evaluation of new seasonal sea ice forecasts in order to develop a new product in the Barents Sea using statistical downscaling.  
Examples of Arctic marine end user specific services

### **Main input data:**

Seasonal atmospheric forecasts data  
Satellite observations of sea-ice and iceberg concentration  
Seasonal re-forecasts  
From Copernicus/Sentinel (ESA & EUMETSAT), ECMWF & National Met services

## SENSES Climate Change ScENario Services: Mapping the Future

**Lead PI:** Kriegler Elmar, Potsdam Institute for Climate Impact Research, Germany

**Benefit area(s):** Climate policies, Finance *special relevance to Africa*

**Internet :** <http://senses-project.org/>

**Summary:** The project aims at the development of tools and techniques to make the new generation of global climate change scenarios accessible to multiple and diverse user groups of climate change information. The project will develop techniques for the co-production of scenario knowledge for dedicated user groups and invest in the co-design of user-centred scenario visualization tools. Three key user groups are targeted: national and international climate policy makers, regional climate change scenario users, and businesses with a long term planning horizon. The developed co-production techniques and visualization tools will be integrated into a climate change scenario toolkit to translate complex scientific scenario information into relevant knowledge for these user groups enabling them to gain relevant insights into adaptation to climate change, mitigation of climate change and residual climate impacts. In order to tackle this challenge, the project will bring together climate scenario researchers, communication and design specialists and representatives of the climate policy making and international business communities as well as regional stakeholders in two case studies located in the Netherlands and East Africa.

### **End-users:**

German Environment Agency; European Commission; IPCC WG3; UNFCCC; World Wildlife Fund; Climate Works Foundation; CDP; Bundesanstalt für Finanzdienstleistungsaufsicht; BundesBank; 2degrees Investing Initiative; UN Sustainable Development Solutions Network, etc...

### **Main deliverables:**

Report on user needs - what do users need to understand climate change scenarios. How can this be brought close to a climate service informing decision makers.

Stocktaking of existing scenarios & co-production techniques - overview document summarizing appropriate co-production techniques.

Guidelines for co-production techniques for (international) climate policy makers and businesses - "how-to" document for co-production with decision makers from policy and climate

Case study report Netherlands

Case study report East Africa

Cross user analysis and guidelines for co-production techniques with regional stakeholders

Prototype of visual and interaction design

Fully functional API for community uptake - software side connection to data base

Final visualization framework including CC scenario navigation, visualization and exploration

SENSES CC scenario toolkit

### **Main input data:**

Climate Change Projections : CMIP Data Portal [https://cmip.llnl.gov/cmip5/data\\_portal.html](https://cmip.llnl.gov/cmip5/data_portal.html)

Climate Impact Scenarios : Isimip Database <https://www.isimip.org/outputdata/>

Mitigation Scenarios : IAMC Database <http://data.ene.iiasa.ac.at/database/>

## **WATExR    Adaptation of water resources management to climate extremes**

**Lead PI:** Marcé Rafael, Institut Català de Recerca de l'Aigua, Spain

**Benefit area(s):** Water resource

**Internet :** <https://watexr.weebly.com/>

**Summary:** WATExR aims to integrate state-of-the-art climate seasonal prediction and water quality simulation in an advanced solution to ensure efficient decision making and adaptation of water resources management to an increased frequency of climate extreme events. The goal is to assess the potential of solution-oriented, innovative integrative advanced modeling tool implemented in QGIS for understanding and anticipating the impacts of climate extreme events, thus increasing the adoption of Climate Services in water resources management. This will be achieved by identifying end-user demands in 7 case studies in Europe and Australia relating to the impact of climate extreme events on water supply companies, fisheries, and water authorities implementing the Water Framework Directive (WFD). WATExR will join the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP2), contributing a selected set of water quality impact models following the ISIMIP2 simulation protocol.

### **Pilot users/Stakeholders:**

Morsa River Basin Management Authority; Wupperverband; Danish Environmental Protection Agency; Acatalan Water Agency; Aigues Ter-Llobregat; Marine Institute; SAWater, Australia.

### **Main deliverables:**

Protocols and benchmarks for maximizing the performance of water quality seasonal hindcasts Review of the available climate information of interest for the water quality sector.  
Guidance document on the use of seasonal climate prediction information on the case studies  
Report describing the optimized model chain "seasonal prediction - impact model" at each case study  
Report on the new QGIS plug-ins, with examples of impact models being executed with seasonal climate prediction through the plug-in  
Open source code for mature QGIS plug-ins on Github  
End-user documentation on the Github Internet  
Inclusion of a water quality ensemble simulation in ISIMIP2  
Synthesis report of the usefulness of the QGIS tools for management and adaptation of water quality to CEE across case studies  
Report on visualization and quantification of combined Main input data and parametric model uncertainties at each site, and significance of this for decision-making

### **Main input data:**

Seasonal forecasts, initially from NCEP, then from Copernicus  
Climate change projections from ISI-MIP/CMIP5, then Copernicus  
Observations provided by National Met Services or local institutions  
ECMWF reanalyses, initially ERA-Interim, then ERA5  
EWEMBI dataset for the validation of seasonal forecasts

## DustClim Dust storms in Northern Africa, Middle East and Europe

**Lead PI:** Basart Sara, BSC, Spain

**Benefit area(s):** Energy, Aviation, Health *special relevance to Africa*

**Internet:** <https://sds-was.aemet.es/projects-research/dustclim>

### **Abstract:**

DustClim will support the development of the Sand and Dust Storms Warning Advisory and Assessment System (SDS-WAS) of AEMET and BSC. It will make a significant step forward in the way sand and dust storms (SDS) affects society. The objectives are to produce and deliver an advanced and thoroughly evaluated dust regional model reanalysis for Northern Africa, Middle East and Europe covering the satellite era of quantitative aerosol information, and to develop dust-related services tailored to specific applications. The novelties of the DustClim reanalysis include an unprecedented high resolution, the assimilation of satellite products over dust source regions with specific observational constraints for dust. There is currently a very limited integration of dust information into practice and policy. The reanalysis will provide reliable information on SDS trends and current conditions that will be used in pilot studies to assess dust impacts upon three key economic sectors (air quality, aviation and solar energy). There will be a continuous feedback between the scientific teams and the main user communities for better defining the dust parameters to be investigated and to optimize the provision of dust services.

### **Pilot users/Stakeholders:**

Currently, the SDS-WAS mailing list includes more than 500 contacts from National Meteorological and Hydrological Services (NMHS), UN agencies (WHO, WMO, UNEP, UNCCD), research institutions and private companies. Particularly within DustClim, we target research groups and private companies within air quality (ISPRA, ARPA), aviation (EUROCONTROL, SATAVIA) and solar energy (DLR, EnBW, Meteomatics) sectors.

### **Main deliverables:**

Catalogue of dust-related observations for data assimilation  
Catalogue of dust-related observations for model evaluation  
Dust climatology based on a high-resolution mineral dust reanalysis based on the in-house BSC atmospheric composition model (i.e. NMMB-MONARCH).  
Assessment of societal benefits of dust oriented climate services for aviation and solar energy  
Report containing region-specific recommendations to adapt to and mitigate desert dust impacts on Air Quality

### **Main input data:**

Ground-based and satellite aerosol observations/products from different platforms and institutions (e.g. EMEP, AERONET, EARLINET, MODIS, MISR, CALIOP) will be used for the assimilation of these observations within the reanalysis experiment but also for the evaluation of the model results.  
ECWMF global reanalyses (ERA-Interim, then ERA5 from the Copernicus Data Store)

## ECLISEA European advances on CLimate services for coasts and SEAs

**Lead PI:** Menendez Melisa, UC-IHC, Spain

**Benefit area(s):** Risk reduction, Coastal planning, Marine services

**Internet:** <http://www.ecliseaproject.eu>

**Summary:** ECLISEA aims to advance coastal climate science concerning sea surface dynamics over the European coasts and seas. Focused on (i) developing new data and climate information by supporting harmonized analysis at a consistent European scale, (ii) the research on climate variability, predictability and long-term projections, and (iii) the investigation of the complexity and uncertainties of impact models on the coastal region and shelf seas, ECLISEA proposes an integral research plan with the review of stakeholders needs and the development of a user-friendly and on-line open European prototype of a coastal climate service. Characterization and change of extreme met-ocean conditions or the assessment of uncertainties of regional mean sea level rise from the historical and future perspectives are considered, as well as wind-waves and storm surge climate predictability from seasonal to decadal time scales. The project will produce a set of recommendations and best practices about coastal climate and coastal impact aspects, a European data infrastructure with its atlas viewer, and several models, methods and tools that will be useful for a variety of stakeholder sectors.

### **Pilot users/Stakeholders:**

Creocean institution; EDP-Renovaveis energy company ; MCVulnera company ; Council of Ribamontán al Mar; Hellenic Petroleum (HELPE) ; Helmholtz-Zentrum Geesthacht, Center for Materials and Coastal Research; IHCantabria Cluster of marine energies.

### **Main deliverables:**

An internal synthesis report about the available climate datasets and related coastal exposure databases.

A documentation of what is known about stakeholder needs in terms of coastal climate information

An interim list of potential coastal climate indicators for a pan-European coastal climate service web tool will be developed on the basis of stakeholder demands and existing data sets.

A report about the marine climate variability over the European seas and coasts.

A European Database from historical and present climate conditions.

Synthesis report on the research about seasonal prediction of waves and surge.

Report on the potential skill of decadal predictions for wind waves and storm surges

Synthesis report on the regional climate change projections analysis and outcomes.

A European database of the estimated changes from the climate projections of SSDs.

A guide of good practices about the coastal impact approaches.

Prototype of a physical coastal impact model.

Prototype of a European Coastal Climate Service

### **Main input data:**

The project has identified potentially useful data and published a list of these data. They comprise *in situ* observations (buoys and tide gauges from all European operators), satellite observations of wave heights and sea level, historical climate datasets (waves and wind reanalyses from various sources, etc.), climate projections of sea level height, wave and storm surges at the scale of European coasts, bathymetric datasets, etc..

## EUPHEME Methodologies for attribution of extreme weather events

**Lead PI:** Peter Stott, Met-Office, UK

**Benefit area(s):** Risk reduction, *with relevance to Africa*

**Internet:** <http://www.eupheme.eu/>

### **Abstract:**

EUPHEME will demonstrate the capability of an integrated attribution system to meet the needs of European stakeholders for advice on how the risks of extreme weather and climate events are being affected by human-induced climate change. EUPHEME will develop state of the art methods for the attribution of extreme weather and climate events on a range of timescales, and new techniques for evaluating their reliability. EUPHEME will develop a scientific platform which hosts data, supports data processing and provides collaboration space for scientists from the partner institutions to carry out attribution analyses using complementary methods and data sources. Finally EUPHEME will provide a user-oriented synthesis, disseminate consistent attribution assessments through a prototype attribution service Internet and demonstrate the potential of attribution products to a wide variety of stakeholders.

### **Pilot users/Stakeholders:**

Česká televize (Czech TV), Český hydrometeorologický ústav (Czech Hydrometeorological Institute); Institut plánování a rozvoje hl. m. Prahy (The Prague Institute of Planning and Development); Národné lesnícke centrum (National Forest Center, Slovakia); OpenHydro; SEAI (Sustainable Energy Authority Of Ireland); Mocean Energy; Cork City Council; ESB (Electricity Supply Board); Zurich Insurance; CatinSight; IrishRail; DCCAE (Department of Communication, Climate Action and Environment); XL Catlin; Department of Agriculture, Food and the Marine; Climate Ireland; Department of Health; OPW (Office of Public Works);

### **Main deliverables:**

Protocols pertaining to all stages of an attribution study.

Development of a web processing service providing access to information and attribution functions through a graphical user interface.

Development of a site that will allow exchange of data and information, serve as a “lab-book” that underlies the conclusions, have a facility to collaboratively write scientific and derived texts, and contain a literature database.

Report on attribution assessments made so far including on seasonal and fast-track timescales

Report on attribution of climate change impacts, investigating how attribution products may be derived from impact studies. An early demonstration of how these products may be incorporated into the attribution service website

### **Main input data:**

Data from CMIP5 and CMIP6 simulations provided from different climate modelling centres via ESGF.

HadOBS observations datasets, including homogenized gridded products like CRUTEM4 and HadCRUT4.

Data from HadGEM3-A simulations produced with the Hadley Centre’s attribution system.

Data from other model simulations generated and provided by project partners.

ERA (ECMWF) Reanalysis data, provided by the Copernicus Data Store.

## INDECIS Climate indicators for high- priority sectors across Europe

**Lead PI:** Enric Aguilar, C3/URV, Spain

**Benefit area(s):** Agriculture, Disaster risk reduction, Energy, Health, Water and Tourism

**Internet:** <http://www.indecis.eu/>

**Summary:** INDECIS will provide an integrated approach to produce a set of relevant climate indices targeting the high priority sectors (agriculture, disaster risk reduction, energy, health, water) plus tourism. To accomplish this, INDECIS will inventory and catalogue existing datasets of precipitation, temperature, wind speed and sunshine duration, search new data holdings and develop new methods and tools to assure their quality and homogeneity. The project will gather information on climate indicators routinely computed by the participating institutions and third parties across Europe and work to improve them in consultation with sectorial experts. It will use sectorial statistics and teleconnection indices to explore predictive relations and responses to climate variability and change. This will be accompanied by the development of tools for indices near-real time calculation, spatial interpolation, visualization and communication of climate monitors. INDECIS will compare its products with those derived from reanalysis to assess their validity as alternate datasets to produce sectorial indices in the absence of observed datasets and with climate model output for validation and interpretation.

### Pilot users/Stakeholders:

- As of 10/2018: local/regional authorities and tourism sector stakeholders of the Bajo Aragon County, in Aragon, Spain (more to be added after General Assembly – 2 in November)

### Main deliverables:

- INDECIS Raw-Data Set and data portal
- INDECIS Quality Control and Homogenization Software Suites for daily climate data and Manual, based on benchmarking results
- INDECIS homogenized data set, including uncertainty evaluation
- Definition of Sector-oriented climate indices
- INDECIS Software for sectorial indices calculation
- Report on temporal evolution of the INDECIS-QCHDS and INDECIS-ISD, including the time-emergence of climate-change signals and relation with atmospheric patterns
- Report on the relation between INDECIS-QCHDS and INDECIS-ISD and atmospheric patterns
- Report on the reliability and uncertainties associated with the (hindcast-type) seasonal forecasts of selected sectorial INDECIS indices
- Report on the assessment of sectorial climate change impact based on INDECIS-ISD in the context of climate change scenarios
- Document Communication Strategy for Delivering Effective Climate Services
- Document Business Cases Study for the Delivery of Climate Services in the Tourism Sector
- Indices and Services Portal

### Input data:

- ECA&D Data as core data set + Data Rescued by INDECIS + Reanalysis Data
- Sectorial data obtained from local stakeholders + EUROSTATS

## MEDSCOPE MEDiterranean Services Chain based On climate PrEdictions

**Lead PI:** Silvio Gualdi, Fondazione CMCC, Italia

**Benefit area(s):** Mediterranean region in general, *with special relevance to northern Africa*

**Web site:** <https://www.medscope-project.eu/>

**Summary:** The MEDSCOPE project aims at advancing initiatives by developing climate forecast capabilities and related services on seasonal-to-decadal timescales. The strategy will be based on exploiting the wide range of existing datasets of climate observations and forecasts to improve our understanding of sources and mechanisms of predictability. This will be complemented by targeted sensitivity experiments focusing on key drivers of Mediterranean climate variability. Improved process understanding will serve as a basis to develop innovative empirical forecasting systems as well as novel process-based methods for bias correction, downscaling and optimal combination of sources of information, all of which will be publicly released via a toolbox. Special efforts will be devoted to sensitivity of climate predictions to models' climate drift, to spatial shifts of variability patterns and to the selection of sub-ensembles representative of the needs of specific applications. The added value provided by MEDSCOPE to climate services will be assessed for various sectors with high societal impact, e.g. renewable energy, hydrology and agriculture and forestry.

### **Pilot users/Stakeholders:**

Pilot users/Stakeholders of the MEDSCOPE project are mostly the hydro-meteorological service of the countries included in the Mediterranean region and involved in the MedCOF (Mediterranean Outlook Forum).

### **Main deliverables:**

Report on sources of climate predictability from seasonal to multiannual timescales in the Mediterranean region.

Assessment of the ability of state-of-the-art climate prediction systems to represent mechanisms of predictability in the Mediterranean and role of systematic errors.

Empirical forecasting system ready for the operational production of consensus seasonal forecasts, together with a complete documentation.

Toolbox of R/python software packages – for bias correction, forecast calibration, statistical and stochastic downscaling, process-based forecast quality assessment, multivariable prediction scores, ensemble member combination and selection – made available through the MEDSCOPE Internet.

Report assessing the added-value of methodologies developed in WP3 on sectoral (energy, hydrology, agriculture and forestry) predictions -for the target regions and locations defined in concert with end-users-publicly available through the MEDSCOPE Internet.

### **Main input data:**

Seasonal forecasts will come from the Copernicus Multi-model Seasonal Forecasting System

Reanalyses: ERA-Interim from ECMWF, ERA5 from Copernicus C3S

MEDSCOPE will also use some tools (bias correction, downscaling, etc) made available by the Copernicus Data Store.

## **SERV\_FORFIRE**    **Integrated services for fire and post-fire risk prevention**

**Lead PI:** Rosa Lasaponara, National Research Council, Italy

**Benefit area(s):** Disaster risk reduction

**Internet:** not available

**Summary:** The project aims at creating an international collaborative community, expert in remote sensing soil and vegetation, risk management and mitigation, to provide climate information along with decision makers and planning authorities in order to: (i) increase efficiency of decision and policy makers authorities response, to improve the preparedness level of our societies and to limit the high economic cost of climate variability impact on fire and post fire risks, develop methods and procedures within the framework of fire and post fire risk management in Europe at climatic time scales; (ii) strengthen the science-policy-society nexus using a participatory approach, by improving operational or experimentally tested climate services in Europe, tailoring relevant information for decision and policy makers through a participatory and circular approach, capacity building user-based tools, specific training programs, dissemination activities, (iii) increase the information regarding the drought conditions on wildfire and post fire risks management at climatic time scales for national and local authorities decision-making procedures and planning activities, (iv) collect scenarios on the effects of climate change on vegetation and fire occurrence, (v) investigate adaptation strategies and approaches to deal with future fire occurrence. The synergic and complementary activities of all the partners involved in the SERV\_FORFIRE consortium will lead to the development of an improved and integrated “fire and post fire” product portfolio complementary to what Copernicus Climate Change Service will routinely deliver for fire management.

**Pilot users/Stakeholders:**

Basilicata Region (Italy), Protezione Civile (It), Municipality of Chania (Creta)

**Main deliverables:**

Guideline for the implementation of joint activities  
Modelling  
Start of the case study applications  
Newsletters  
Case study demonstration updates  
Copernicus data, integration and validation in the selected case studies.

**Input data:**

Satellite data and products (e.g. EFFIS from JRC)  
Data from the Copernicus Emergency Management Service and Land Monitoring Service

## URCLIM      URban CLIMate services

**Lead PI:** Valéry Masson, Météo-France

**Benefit area(s):** Urban planning

**Internet:** <http://www.urclim.eu/>

**Summary:** The ambition of the URCLIM project is to advance significantly on Urban Climate Services (UCS), for urban planners and related stakeholders using open urban data and regional climate data. In order to realize this goal, the project has 4 scientific objectives : 1) to develop a methodology for the creation of high resolution maps of urban parameters for climate studies 2) to analyse the propagation of uncertainty from regional climate models to urban scale climate models and local impact models, 3) to evaluate multi-criteria impacts and various types of adaptation strategies, 4) to define pertinent Urban Climate Services in cooperation with stakeholders, and using a visualization interface. Several case studies will also be chosen, each located in a different climate, influenced by different geographical features, and with a different urban history and structure.

### **Pilot users/Stakeholders:**

Toulouse Metropole City Services; Agence d'Urbanisme et d'Aménagement Toulouse (urban planning agency); OPPIDEA (Urban developers at neighborhood scale); Helsinki Municipality; Helsinki Metropolitan Region Environmental Agency; Espoo and Vantaa municipal officials; The Netherlands National Adaptation Programmes; Amsterdam Metropolitan Area; Emergency Situations Institution of Bucharest; Agency for the Environment Protection; Bucharest city Hall; APA NOVA (Water Management system); Technical University of Civil Engineering Bucharest; City of Antwerp; Brussels Environment; Flanders Environment Agency; City of Ghent, department Environment, Climate & Energy.

### **Main deliverables:**

Several reports on and methods using available urban data (including administrative dataset and Open Street Map) to produce fine-scale urban maps for climate studies. A standardized interface will be developed to access the urban maps.

Reports on new downscaling methodologies from EURO-CORDEX regional climate simulations to many urban-scale impacts, with assessment of uncertainties

Analysis of adaptation strategies applied to the project case studies cities.

Development of urban climate services and of a smart visualization tool.

### **Input data:**

EURO-CORDEX regional climate simulations.

Local urban observations in cities for the several case studies.

Administrative (National or Local) geospatial datasets, Open Street Map.

Surface albedo, leaf area index and land cover type from Copernicus Global Land Service

Air quality products from Copernicus Atmospheric Monitoring Service

## WINDSURFER Wind and wave risks for forestry, energy and reinsurance

**Lead PI:** Len Shaffrey, University of Reading, UK

**Benefit area(s):** Forestry, Energy, Reinsurance

**Internet:** <http://www.windsurfer-project.eu>

**Summary:** Extreme winds pose major risks to life, property and forestry while extreme oceans waves can impact on offshore infrastructures and coastal communities. Understanding how European Windstorms may change in the future is critical for assessing future weather risk. There are gaps in understanding current and future windstorm risks, and the impact that windstorms have on key socioeconomic sectors such as insurance, forestry and energy. To address these knowledge gaps and to better inform strategies for mitigating current risks and for climate change adaptation, WINDSURFER will bring together eight leading research institutions across Europe to: 1. develop new methods and tools to better quantify current extreme wind and wave risk and understand how it might change in the future; 2. develop impacts studies and new impact models for European windstorms and associated extreme wind and wave damage; 3. provide localized climate information for current and future wind and wave risk, with a particular focus on the Insurance, Forestry, and Offshore Energy sectors.

### **Pilot users/Stakeholders:**

IBM, Dublin, Ireland  
BP Upstream, Sunbury, London, UK  
CatInisight, London, UK  
Finnish Forestry Centre, Finland  
StatOil, Oslo, Norway

### **Main deliverables:**

Synthesis report on the representation of windstorms and extreme winds in global climate models  
Synthesis report on regional modelling on European wind extremes  
Database of ocean winds and waves available through a centralised data portal easily accessible and visualisable by users  
Database of dynamically downscaled windstorms for current and future climates  
Synthesis report on different approaches and associated uncertainties for estimating future wind and wave risk (e.g. for statistical and dynamical downscaling)  
Synthesis report of user needs in forestry, insurance and offshore energy sectors building on understanding gained in national and Copernicus C3S SIS projects  
Database of historical storm events and return value maps for wind speed and wave height from extreme value analysis will be made publicly available for the design and installation of offshore infrastructure criteria  
Database of maps of wind power resource and relevant sector indicators will be made publicly available

### **Input data:**

Data from CMIP5 and CMIP6 simulations provided from different climate modelling centres via ESGF.  
HadOBS observations datasets, including homogenised gridded products like CRUTEM4 and HadCRUT4.  
Data from other model simulations generated and provided by project partners (MED-CORDEX and HiResMIP simulations, MERA and NORA regional reanalysis)  
Reanalysis data, including data from ERA-I provided by Copernicus C3S and ECMWF and NCEP-CFS from NOAA  
Other data required for specific studies may also be used (e.g. wave modelling input datasets).

## Table of funding organizations and project partners

The ERA4CS co-fund call was divided in two topics. Topic A includes projects funded in cash by research funding organizations (RFOs), with a top-up from the European Union. Topic B includes projects funded in kind by research performing organizations (RPOs), also receiving a top-up from the European Union.

### Research Funding Organisations supporting Topic A

Agence Nationale de la Recherche (**ANR**), France  
 Bundesministerium für Wissenschaft, Forschung und Wirtschaft (**BMWF**), Austria  
 Service public fédéral de programmation politique scientifique (**BELSPO**), Belgium  
 Deutsches Zentrum für Luft- und Raumfahrt EV (**DLR**), Germany  
 Innovationsfonden (**IFD**), Denmark  
 Agencia Estatal de Investigación (**AEI**), Spain  
 Environmental Protection Agency of Ireland (**EPA**), Ireland  
 Nederlandse organisatie voor wetenschappelijk onderzoek (**NWO**), the Netherlands  
 Norges forskningsrad (**RCN**), Norway  
 Fundação para a Ciência e a Tecnologia (**FCT**), Portugal  
 Executive Agency for Higher Education, Research, Development and Innovation Funding (**UEFISCDI**), Romania  
 Slovak Academy of Sciences (**SAS**), Slovakia  
 Forskningsrådet för miljö, areella näringar och Samhällsbyggande (**FORMAS**), Sweden

### Research Performing Organisations supporting Topic B

Universitaet Graz (**Uni Graz**), Austria  
 Institut Royal Météorologique de Belgique (**RMI**), Belgium  
 Global Change Research Centre CAS (**CzechGlobe**), Czech Republic  
 Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung (**AWI**), Germany  
 Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GMBH (**HZG**), Germany  
 Danmarks Meteorologiske Institut (**DMI**), Denmark  
 Agencia Estatal de Meteorologia (**AEMET**), Spain  
 Barcelona Supercomputing Center - Centro Nacional de Supercomputacion (**BSC**), Spain  
 Agencia Estatal Consejo Superior de Investigaciones Cientificas (**CSIC**), Spain  
 Universidad de Cantabria (**UC-IHC**), Spain  
 Universitat Rovira i Virgili (**URV-C3**), Spain  
 Ilmatieteen Laitos (**FMI**), Finland  
 Suomen ympäristökeskus (**SYKE**), Finland  
 Bureau de Recherches Géologiques et Minières (**BRGM**), France  
 Commissariat à l'Énergie Atomique et aux Énergies Alternatives (**CEA**), France  
 Centre National de la Recherche Scientifique (**CNRS**), France  
 Institut national de l'information géographique et forestière (**IGN**), France  
 Institut national de la recherche agronomique (**INRA**), France  
 Météo-France (**Météo-France**), France  
 National Center for Scientific Research "Demokritos" (**NCSR**), Greece  
 Department of the environment, community and local government (**Met Eireann**), Ireland

Fondazione Centro euro-mediterraneo sui cambiamenti climatici  
Italy

Consiglio Nazionale delle Ricerche (**CNR-DTA**), Italy

Koninklijk Nederlands Meteorologisch Instituut-KNMI (**KNMI**), the Netherlands

Meteorologisk institutt (**Met Norway**), Norway

Associação para a Investigação e Desenvolvimento de Ciências (**FCiencias.ID**) Portugal

Administrația națională de meteorologie R.A. (**Meteo-Ro**), Romania

Sveriges Meteorologiska och Hydrologiska Institut (**SMHI**), Sweden

The University of Reading (**UREAD**), United Kingdom

Met Office (**Met Office**), United Kingdom

(**CMCC**),

## Projects in Topic A

Acronym	Country	Name of organisation/institution/company	RFOs
AQUACLEW	SE	Swedish Meteorological and Hydrological Institute (SMHI)	FORMAS, DLR, BMWF, IFD, AEI, ANR
	DE	TU Dortmund University (TUDO)	
	AU	University of Innsbruck, Unit of Hydraulic Engineering	
	AU	Universität für Bodenkultur Wien	
	DK	Geological Survey of Denmark and Greenland	
	ES	University of Cordoba	
	ES	University of Granada	
	FR	National Research Institute of Science and Technology for Environment and Agriculture	
CIREG	DE	Potsdam Institute for Climate Impact Research	DLR, BELSPO, IFD, FORMAS
	DE	Smart Hydro Power GmbH	
	DE	ZEF / University of Bonn	
	BE	Vrije Universiteit Brussel	
	DK	Technical University of Denmark	
	DE	West African Science Service Centre on Climate Change and Adapted Land Use	
	SE	Stockholm Environment Institute	
CitiSense	SE	Linköping University	FORMAS, RCN, NWO, FCT
	NO	Norwegian Institute for Science and Technology	
	NL	Deltares	
	PT	University of Porto	
CLIM2POWER	PT	Associação para a Inovação e Desenvolvimento da FCT	FCT, DLR, BMWF, ANR, EPA, FORMAS
	PT	Associação para a Investigação e Desenvolvimento de Ciências	

	PT	EDP-Eletricidade de Portugal	
	DE	German Weather Service	
	AU	Institute for Sustainable Economic Development, Universität für Bodenkultur Wien	
	AU	Institute of Water Management, Hydrology and Hydraulic Engineering, Universität für Bodenkultur Wien	
	AU	Wien Energie	
	FR	ARMINES Centre de Mathématiques Appliquées de Mines ParisTech	
	FR	ACTeon	
	FR	ARMINES Centre Observation, Impacts, Energie de MINES ParisTech	
	IE	Centre for Marine and Renewable Energy (MaREI), Environmental Research Institute, University College Cork	
SE	Energy Science division, Luleå University of Technology		
CLIMALERT	PT	University of Minho	FCT, DLR, AEI
	PT	Instituto Português do Mar e da Atmosfera, IP	
	DE	Helmholtz-Centre for Environmental Research	
	ES	Institut Català de Recerca de l'Aigua	
ClimApp	SE	Lund University	FORMAS, IFD, NWO
	DK	University of Copenhagen	
	DK	Technical University of Denmark	
	NL	Vrije Universiteit Amsterdam	
ClimINVEST	NO	Center for International Climate and Environmental Research - Oslo	RCN, ANR, NWO
	FR	I4CE – Institute for Climate Economics	
	FR	Carbone 4	

	FR	Meteo-France	
	NL	Alterra – Wageningen UR	
CISWELN	DE	Climate Service Center Germany (GERICS)	DLR, BMWFW, AEI, UEFISCDI
	AU	Institute for Sustainable Economic Development, Universität für Bodenkultur Wien	
	ES	Centre de Recerca Ecològica i Aplicacions Forestals – Centre for Ecological Research and Forestry Applications	
	RO	National Institute for Research and Development in Forestry „Marin Dracea"	
CoCLiME	IE	Marine Institute	EPA, DLR, IFD, AEI, ANR, RCN, UEFISCDI, FORMAS
	IE	Daithi O'Murchu Marine Research Station	
	DE	Alfred Wegener Institut	
	ES	Consejo Superior de Investigaciones Científicas	
	FR	Institut Francais de recherche pour l'Exploitation de la Mer	
	FR	University of Nantes	
	FR	Universite Pierre et Marie Curie	
	NO	Center for International Climate and Environmental Research - Oslo	
	NO	Institute of Marine Research	
	RO	National Institute for Marine Research and Development “Grigore Antipa”	
	SE	Swedish Meteorological & Hydrological Institute (SMHI)	
SE	Stockholm Environment Institute		
Co-Cli-Serv	FR	Laboratoire Cultures, Environnements, Arctique, Représentations, Climat, Université de Versailles Saint- Quentin-en-Yvelines	ANR, DLR, BELSPO, RCN, NWO
	FR	Centre National de la Recherche Scientifique/ Laboratoire des Sciences du Climat et de l'Environnement	
	DE	Helmholtz-Centre for Materials and Coastal Research	
	DE	University of Bremen / artec – Sustainability Research Center and IFEK – Department of Anthropology and Cultural Research	
	BE	Université Libre de Bruxelles, Institut de Gestion de l'Environnement et Aménagement du Territoire	
	BE	Royal Belgian Institute for Space Aeronomy	

	NO	University of Bergen, Centre for the Study of the Sciences and the Humanities	
	DE	Copernicus Institute of Sustainable Development, Utrecht University	
CO-MICC	DE	Goethe University Frankfurt	DLR, BMFWF, ANR
	DE	Potsdam Institute for Climate Impact Research	
	DE	KISTERS AG, Business Unit Water	
	DE	International Centre for Water Resources and Global Change hosted by the Federal Institute of Hydrology (UNESCO Category 2 Center)	
	DE	Quantis GmbH&Co.KG	
	AU	International Institute for Applied Systems Analysis Initials	
	FR	Université du Maine - le Mans	
	FR	Laboratoire de Météorologie Dynamique du CNRS/IPSL	
EVOKED	NO	Norwegian Geotechnical Institute	RCN, DLR, NWO, FORMAS
	DE	Christian-Albrechts University Kiel	
	DE	City of Flensburg	
	NL	Deltares	
	NL	Provincie Noord-Brabant	
	NL	Drents Overijsselse Delta	
	SE	Swedish Geotechnical Institute	
	SE	Värmland County Administrative Board	
INNOVA	DE	Climate Service Center Germany (GERICS)	DLR, AEI, ANR, NWO
	DE	ECOLOGIC INSTITUT gemeinnützige GmbH	
	ES	UNIVERSITAT POLITECNICA DE VALENCIA	
	FR	UNIVERSITE DES ANTILLES	
	NL	Alterra – Wageningen UR	
INSeaPTION	FR	Bureau de Recherches Géologiques et Minières	ANR, DLR, AEI, NWO
	FR	CREOCEAN	
	FR	Université de La Rochelle	
	DE	Global Climate Forum	
	ES	University of the Balearic Islands	
	NL	Utrecht University	
ISpedia	DE	Potsdam Institute for Climate Impact Research	DLR, BMFWF, AEI, ANR, NOW,

	DE	Karlsruhe Institute of Technology	FORMAS
	DE	Global Climate Forum	
	DE	Senckenberg Biodiversity and Climate Research Centre	
	DE	Climate Analytics	
	DE	Institute of Physical Geography, Goethe University Frankfurt	
	AU	International Institute for Applied Systems Analysis	
	ES	Universidad Pablo de Olavide	
	ES	Universitat Autònoma de Barcelona	
	FR	Commissariat à l'Énergie Atomique	
	NL	Utrecht University	
	SE	Umeå Centre for Global Health Research, Department of Public Health and Clinical Medicine, Unit of Epidemiology and Global Health, Umeå University	
SALIENSEAS	NL	Wageningen UR	NWO, IFD, RCN, FORMAS
	DK	Danish Meteorological Institute	
	NO	University of Tromsø, Norwegian College of Fishery Science	
	NO	Norwegian Meteorological Institute	
	SE	Umeå University, Department of Geography and Economic History	
SENSES	DE	Potsdam Institute for Climate Impact Research	DLR, BMWFW, NWO, FORMAS
	DE	University of Applied Sciences Potsdam	
	AU	International Institute for Applied Systems Analysis	
	NL	Wageningen UR	
	SE	Stockholm Environment Institute	
WATExR	ES	Institut Català de Recerca de l'Aigua	AEI, DLR, IFD, EPA, RCN, FORMAS
	ES	Universidad de Cantabria	
	DE	Helmholtz-Centre for Environmental Research	
	DK	Aarhus University	
	IE	Marine Institute Galway	
	IE	Dundalk Institute of Technology	
	NO	Norwegian Institute for Water Research	
SE	Uppsala University		

## Projects in Topic B

Acronym	Country	Name of Research Performing Organization
DustClim	ES	Barcelona Supercomputing Center - Centro Nacional de Supercomputacion
	ES	Agencia Estatal de Meteorologia
	FI	Ilmatieteen Laitos
	FR	Centre National de la Recherche Scientifique
	IT	Consiglio Nazionale delle Ricerche
ECLISEA	ES	Universidad De Cantabria
	DE	Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH
	FR	Bureau de Recherches Géologiques et Minières
	FR	Centre National d'Etudes Spatiales
	GR	National Centre for Scientific Research "Demokritos"
EUPHEME	UK	Met Office
	UK	The University of Reading
	FR	Météo-France
	FR	Bureau de Recherches Géologiques et Minières
	FR	Commissariat à l'Energie Atomique et aux Energies Alternatives
	FR	Centre National de la Recherche Scientifique
	IE	Department of the Environment, Community and Local Government (Met Éireann)
	NL	Koninklijk Nederlands Meteorologisch Instituut
	CZ	Ustav Vyzkumu Globalni Zmeny Av Cr Vvi
INDECIS	ES	Universitat Rovira i Virgili
	ES	Universidad de Cantabria
	ES	Agencia Estatal de Meteorología
	ES	Consejo Superior de Investigaciones Científicas
	ES	Barcelona Supercomputing Center - Centro Nacional de Supercomputacion
	BE	Institut Royal Météorologique De Belgique
	FI	Ilmatieteen laitos
	FR	Bureau de Recherche Géologique Minières
	IE	Department of the Environment, Community and Local Government (Met Éireann)
	IT	Consiglio Nazionale delle Ricerche
	NL	Koninklijk Nederlands Meteorologisch Instituut

	PT	Associacao Para A Investigacao E Desenvolvimento De Ciencias
	RO	Administratia Nationala De Meteorologie
	UK	The University of Reading
	SE	Sveriges Meteorologiska Och Hydrologiska Institut
	CZ	Ustav Vyzkumu Globalni Zmeny Av Cr Vvi
MEDSCOPE	IT	Centro Euro-Mediterraneo sui Cambiamenti Climatici
	IT	Consiglio Nazionale delle Ricerche
	BE	Institut Royal Météorologique De Belgique
	ES	Barcelona Supercomputing Center - Centro Nacional de Supercomputacion
	ES	Agencia Estatal de Meteorología
	FR	Météo-France
SERV_FORFIRE	FR	Institut National de la Recherche Agronomique
	IT	Consiglio Nazionale delle Ricerche
	FI	Ilmatieteen Laitos
	FR	Bureau de Recherches Géologiques et Minières
	GR	National Center for Scientific Research "Demokritos"
	NL	Koninklijk Nederlands Meteorologisch Instituut
URCLIM	CZ	Ustav Vyzkumu Globalni Zmeny Av Cr Vvi
	FR	Météo-France
	FR	Centre National de la Recherche Scientifique
	FR	Institut National de l'Information Géographique et Forestière
	BE	Institut Royal Météorologique de Belgique
	FI	Ilmatieteen Laitos
	NL	Koninklijk Nederlands Meteorologisch Instituut
WINDSURFER	RO	Administratia nationala de meteorologie
	UK	The University of Reading
	ES	Universidad de Cantabria
	FI	Ilmatieteen Laitos
	GR	National Center for Scientific Research "Demokritos"
	IE	Department of the Environment, Community and Local Government (Met Éireann)
	IT	Centro Euro-Mediterraneo sui Cambiamenti Climatici
	NO	Meteorologisk Institutt
NL	Koninklijk Nederlands Meteorologisch Instituut	



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