climateurope
Linking science and society

POLICY BRIEF No 4

Climateurope, linking science and society: recommendations and legacy

From the Climateurope project, nine recommendations are presented to enhance the European capacity to transition to a sustainable and resilient society. The project brought together scientists and climate services users, and analyzed lessons learned from the past, the gaps that exist in the process between climate modelling and climate services, high-level research topics to be pursued. The project organized expert groups, webinars, Festivals, a Webstival and is developed a website to make all this content available.

In its five years of activity, the project Climateurope - Linking science and society has developed a series of actions and activities to create a framework, enhance and coordinate interaction among all climate service value-chain actors. Earth System Models are part of this chain that begins at one end with climate information, transform the results of climate science into tools, services, and activities that support a vast range of users, including the public sector, governments, businesses, and industry.

This policy brief summarizes results from Climateurope's activities, intending to provide useful information to support the European capacity to transition to a sustainable and climate-resilient society. This includes the recommendations produced by an expert group to the next Horizon Europe framework program for the cluster related to "Climate science and solutions", the network created and coordinated within the project, a series of digital events (webstivals and webinars), and the website and social media, that will remain online and accessible beyond the end of project activities.

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Research needs for Climate Modelling and Climate Services to enhance the European capacity to transition to a sustainable and resilient society

The knowledge needed to provide climate scenarios and projections, the tools and services available to face and anticipate risks in different sectors of society are all essential elements in the path towards sustainable development.
Climate models improve our knowledge of physical processes and outline future climate scenarios on different time scales. Improvements in this knowledge are crucial to the development of increasingly accurate and refined tools to support decision-making processes on mitigation and adaptation.

The integration of information produced by climate models into socio-economic systems and policy-making appears to be an essential element in realizing increasingly sustainable societies and development pathways.
Based on a series of meetings and discussions involving experts and Principle Investigators in several H2020 projects on these issues, a series of recommendations were proposed by Climateurope and addressed to the Horizon Europe framework programme for the fields of climate modelling and climate services.

These recommendations are described in the position paper
Recommendations to Horizon Europe on research needs for Climate Modelling and Climate Services
This document gives a summary of the nine recommendations highlighting their research needs and expected outcome.

#1 Supporting the IPCC process

The Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC) are crucial to support international policy on climate change.
Information on possible future climate is extensively based on simulations using climate models coordinated internationally by the World Climate Research Programme (WCRP). The European Commission (EC) plays a key role in supporting the European contribution to this research.
This support will be essential in sustaining European cooperation toward the next cycle of the WCRP experiments, in allowing the timely preparation of the relative simulation protocols and in addressing knowledge gaps identified in the IPCC Assessment Reports.

#2 Informing climate mitigation policy: scenarios with risk of overshoot

Climate model projections of possible future climate change are essential to assess plausible routes to realizing key policy goals, such as the Paris Agreement, and to investigate the consequences of exceeding such targets. Even though many countries signed the Paris Agreement, the risk of reaching global warming greater than 1.5 or 2°C, at least temporarily before returning below the target, remains high. Further research is needed to enhance the level of process realism and the representation of uncertainties in models and developing a larger range of likely overshoot scenarios. This will be essential to assess and inform on the risks of overshooting 1.5 or 2°C and associated impacts as well as to understand the interference of possible abrupt events and the impacts of aggressive mitigation actions.

#3 Enhancing adaptation and resilience to extremes

Despite improved understanding of extreme events including general agreement that different types of extremes, such as heat waves and heavy precipitation are expected to increase in frequency and intensity in a warming climate, further research is needed to address the remaining large uncertainties with regard to regional patterns and magnitude of changes. For other extremes, such as wind storms, even the signal of future change should be investigated in many regions including the North Atlantic and the European region. It is foreseen that very high spatial resolution climate models at the km scale can contribute to a breakthrough in representing extreme events.

#4 Supporting the formulation of adaptation strategies

Adaptation strategies need tailored information on climate and impacts at local scale and, for most users, ranging over time scales from seasons, years to decades up to centuries under different emission scenarios. Climate models provide essential information on climate, which however, needs to be tailored to provide adequate information to assess local impacts. To suit the expectations of most users in terms of systematic availability of impact-oriented projections and up-to- date near-term predictions downscaled to local scale, process understanding, models and infrastructure, and downscaling need continuous support. In addition, guidance is needed for selection, aggregation, and use of the local climate information.

#5 Understanding requirements, decision-making context and foresight for climate services

Climate services can be understood as “future makers” and “future enablers” to support resilient societies. For doing so, it is key to understand users’ requirements and their decision making context. This will further strengthen the role of climate services as “supporters” for science-based decision-making towards sustainable futures. Climate services research should contribute to increasing knowledge towards reaching societal goals and should be understood as crucial to develop future sociotechnical imaginaries and foresights. For this to happen, there is a need to trigger cross-pollination between social and natural sciences to include the human dimension into climate services research. This will be instrumental to address issues such as advancing decision-making, co-design, and communication issues.

#6 Enhancing diffusion of innovation and information for climate services

So far, the development of many climate services related to climate change and seasonal to decadal predictions has culminated in the creation of case studies and some semi-operational and operational services.
This means that many climate services have only been able to make a gradual transition from proof of concepts or case studies in the past (Technology Readiness Level - TRL 3) to semi-operational prototypes (TRL 5).
It is strategically important to move the climate services demonstrations to the demonstration of the services in an operational environment (TRLs 7 to 9).

#7 Assessing the value of climate services

Climate services help society avert the negative effect and embrace the opportunities related to climate change and climate variability. The value of climate services can be considered from an ecological, social, ethical, and economic point of view. The prevailing view is that, overall, the benefit potential of currently available climate services is as yet poorly exploited. A better understanding of the underlying values, expected and potential, is needed to increase the uptake of climate services. However, it is also important to understand why some users undervalue climate services and why they cannot valorize climate services.

#8 Standardizing climate services

Standards are key mechanisms to guarantee suitability, quality, and performance of technological solutions. They also provide common terminology between user, provider, and purveyor communities. The need for quality control, standards and certification for climate services emerged in consultations with users during the design of the European Roadmap for Climate Services. Users argued for standardization of the climate service field in order to generate trust across supply and demand, providing the infrastructure for a climate service market (public and private). Although there exist standards for some components of climate services, there is a need for a coherent and agreed upon set of authoritative standards for the overall value chain, in particular for services tailored to users.

> **Climate models and climate services are crucial elements for supporting the policy on mitigation and adaptation to climate change and for building a society more resilient to climate-related risks.**

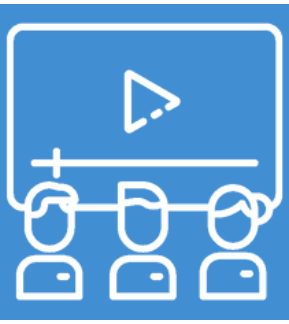
#9 Strengthening the links between the Climate Modelling and Climate Service communities

Enhancing and supporting the cooperation between the Climate Modelling and Climate Services communities would be of benefit for both communities in term of informing and rationalizing the pull for outputs from climate modelling and impact communities activities and informing the potential for additional (and potentially more) relevant climate services based on research directions and outputs. Both communities could also benefit from shared development in using big data technologies to enhance efficiency in extracting information from climate data.

The legacy of Climateurope

- **Digital and in-presence events**

The Climateurope project has developed a series of face-to-face and virtual events that aimed to offer opportunities for dialogue between the different community actors involved in the value chain of climate services, such as scientists, climate modelers, service providers, final users, decision/policy-makers, business representatives.



The webinars range from the evolution in Earth System Modelling to the application of climate services in different economic sectors. Presentations, videos, and contents about the webinars are available on a dedicated page of the project website.

https://www.climateurope.eu/climateurope-webinars/

Climateurope also organized **three festivals**, i.e. meetings that bring together lectures, discussions, and networking to explore the state-of-the-art of climate information and its uses and value in decision-making. The first two Climateurope Festivals took place in **Valencia, Spain (5-7 April, 2017**) and **Belgrade, Serbia (17-19 October, 2018).**

The third and last edition of the Festival was converted to an online Webstival due to the COVID-19 pandemic. It consisted of five separate events from June 2020 to January 2021, a new format with scientific presentations, tool demonstrations, speed dating, online games, artistic demonstrations, etc.
The **Webstival** put a particular emphasis on the multidisciplinary dimension, with scientists, climate service users, artists, experts in communication and data visualization, European institutions exchanging experience, ideas and projects.

Recordings, scribing outputs, and reports on the Climateurope Festivals and Webstivals are available online: **https://www.climateurope.eu/events-climateurope/festival/webstival-2020-home-page/)**

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Climateurope, 2019. D4.4
Recommendations to Horizon Europe on research needs for Climate Modelling and Climate Services

Recommendations have been elaborated within the Climateurope H2020 coordination and support action (CSA) with an expert group.
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Climateurope, 2020, D2.3
Potential future sustainability and improvement of network
Tyrone Dunbar, Met Office, with the contribution of all the Climateurope partners

Climateurope is:

- *The Europe-wide network for researchers, suppliers and users of climate information;*
- *A place to share best practices, gaps and recommendations and discover the state of the art about climate observations, climate modelling and climate services;*
- *An opportunity to actively interact with users and suppliers of climate information.*

Climateurope Partners:
Met Office (coordinator) / ANR – National Research Agency / BSC – Barcelona Supercomputing Center / Climate-KIC (UK) Limited / CMCC – Centro Euro-Mediterraneo sui Cambiamenti Climatici / CNRS - Centre National de la Recherche Scientifique / ECMWF - European Centre for Medium-Range Weather Forecasts / HZG-GERICS - Climate Service Center Germany / KNMI - Royal Netherlands Meteorological Institute / RHMSS - Republic Hydrometeorological Service of Serbia / SMHI - Swedish Meteorological & Hydrological Institute.

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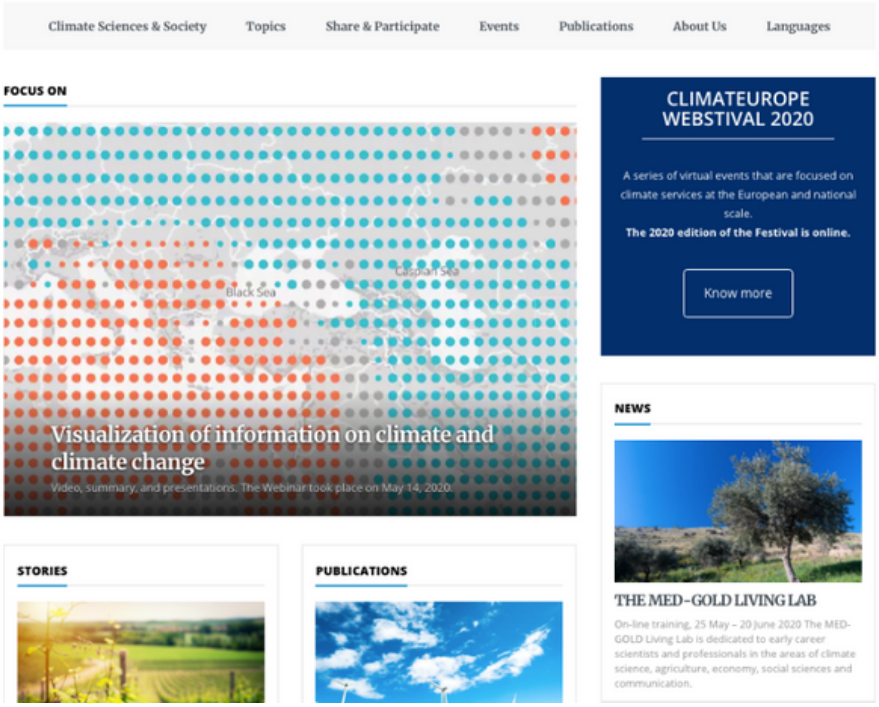
The Climateurope Network

In its five years of activity, Climateurope has created a vibrant and active network of actors that are involved in the entire value-chain between Earth System Modelling and climate services. The Network is composed of 380 members who have decided to sign up and participate in the project's initiatives. Collected and organized through Climateurope's Network Platform, the Network represents a wealth of experience and knowledge that could be enhanced with networking activities in major conferences (e.g., EGU, EMS, ICCS, ECCA).



Online presence: website and social media

The Climateurope website collected all the results and the activities outputs carried out during the project: videos of webinars, Festivals and Webstival, publications, descriptions of a wide range of projects. All this material will remain available on the web for consultation, in a static version until December 2025.
Social media played a role in informing and creating a network: a Twitter account with over 2,100 followers and a LinkedIn account with over 210 followers. The LinkedIn account has gathered a potentially self-sustaining community.

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