



The implications of a changing climate

EU policy briefs provide research insights at a glance, allowing decision makers to more easily discover thought-provoking results and comparisons in Europe. **CORE-CLIMAX** is utilising this medium to increase the impact of its work in a structured way

THE CORE-CLIMAX CONSORTIUM is comprised of several international research institutions, each responsible for measuring, monitoring and disseminating various aspects of climate change related to their particular areas of expertise. Specifically, the participants consist of seven European institutions and two international cooperation partner countries (ICPCs).

The consortium aims to provide coordination for producing and validating essential climate variables (ECVs) with the objective of reanalysing existing data to develop a clearer picture of global climate change and its implications. The project is coordinated by the University of Twente. Together with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) coordination will be made with European Space Agency's Climate Change Initiative through several key national ECV producers and climate change service providers – along with the major reanalysis centre in Europe (ECMWF), and satellite data processing and validation centres. In addition, the two ICPC participants are tasked with maintaining all of the activities at the major climate observations stations situated on the Tibetan Plateau (also known as the Third Pole). As such these participants provide an essential role in

coordinating the validation of ECVs and reanalysis results. Furthermore, these participants are also responsible for monitoring climate variations at the Tibetan Plateau in central and Southeast Asia. With such a wide range of expertise spread throughout key geographical locations, it is anticipated that CORE-CLIMAX will be able to implement an internationally recognised mechanism for the coordination of ECV climate data records (CDR) generation. The varying geographical locations of the consortium's participants will also facilitate links with Space nations holding satellite data repositories.

On 15-16 May 2013, the CORE-CLIMAX researchers organised a collocation meeting at the Research Executive Agency in Brussels. The aim of the meeting was to provide a better understanding of the gaps between Global Climate Observing System (GCOS) ECVs and user needs in climate change and mitigation. This would be facilitated by taking an inventory and bringing together knowledge and practices relating to the generating, validating and updating of GCOS ECVs and the downstream applications. This, in turn, would provide the necessary information for informed policy and decision making regarding climate change.

PREPARING FOR CLIMATE CHANGE

The first key point of the collocation meeting was the essential need for societies to prepare adaptation strategies for projected climate change. Despite uncertainties (rooted in existing observational products and projections) regarding future climate changes and their potential impact, the risk and needs of different societies need to be adequately addressed via climate change 'proofing'. Continued monitoring and research must be conducted to improve the climate change impact indicators. Datasets, graphs, maps, tools and platforms for sharing 'best practices' should all be made available to policy and decision makers via sites such as Climate-ADAPT. Dissemination of indicator reports and guidance documents from various relevant projects should also be facilitated through these platforms. Quality control of this information can ultimately be better monitored by the expert guidance of the climate and climate change community if made available through these proposed channels.

GENERATING ECVS AND DATA VALIDATION

The need to assess the European capacity for generating GCOS ECV has been highlighted as an

important objective of the consortium. Suitable tools need to be developed to assess whether data record generation follows best practice. These tools should also provide guidance on the use of data records for specific applications. Suggested tools that could be used for this purpose are the proposed System Maturity Matrix and the Application Performance Matrix. These tools should be used in conjunction with the ECV inventory list. At the upcoming CORE-CLIMAX capacity assessment workshop to be held 21-23 January 2014 at the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the consortium intends to implement these proposed tools to generate the first European capacity database. As such, CORE-CLIMAX is encouraging members of the climate and climate change community to attend the workshop to provide their views and input.

The importance of establishing detailed documentation regarding the validation of the GCOS ECV data records was also highlighted at the meeting. This kind of validation documentation is essential for the development of a useful ongoing evaluation strategy. It was also recommended that an independent review mechanism on validation results should be developed, and that validations should be regularly updated. Factors that result in uncertainty in GCOS ECV data records – such as inconsistency, representation and homogeneity – should also be analysed in order to provide essential reliable information about climate change.

ESTABLISHING ECV CONSISTENCY

Assessment of ECV consistency cannot be achieved through analysis of single ECV data records alone. It was thus proposed at the meeting that reanalysis data derived by assimilating data into models (both short- and long-term, *in situ* and satellite data) could provide an alternative

source for GCOS ECVs. By evaluating ECV data against processes embedded in established models, a greater consistency of data can be achieved. It was also highlighted that data rescue activities from old observation records can provide important information when analysing climate change. The observation feedback mechanism of reanalysis has already been prototyped, and the usage of the Observation Feedback Archive (OFA) will be developed further and promoted by CORE-CLIMAX.

ONGOING CHALLENGES

Detailed analysis of both long-term climate data records and data records close to real-time are not presently available. This analysis must be conducted to allow effective mitigation of the effects caused by extreme climate events. Sound scientific information can then be produced regarding extreme weather conditions and how these are linked with climate change. This information can then be disseminated through the aforementioned user-friendly channels and platforms in order to assist policy and decision makers in following the best practices and making informed decisions.

A new challenge for data providers is the need to place witnessed extreme events into the context of climate change to ensure adaptation measures can be developed if changes in frequency or intensity are expected. It was suggested that the delivery of this data could be planned in the framework of the Copernicus Climate Change Service. Cooperation and interaction amongst the various institutions involved with ongoing and upcoming Copernicus climate related projects is essential in order for the project to grow and develop. The promotion of CORE-CLIMAX as primary coordinators for these projects also needs to continue.

INTELLIGENCE

CORE-CLIMAX

COORDINATING EARTH OBSERVATION DATA VALIDATION FOR RE-ANALYSIS FOR CLIMATE SERVICES

OBJECTIVES

- To coordinate with Copernicus ongoing activities and contribute to the formulation of the Copernicus Climate Change Service theme
- To propose a structured process for delivering essential climate variables (ECVs) through the stepped and quality controlled elaboration of climate data records (CDR)
- To propose a validation process aiming at qualifying the accuracy of the climate variables
- To propose a feedback mechanism ensuring that the results of the reanalysis process get appropriately reflected into updates of the CDR
- To propose a process to compare reanalyses

PARTNERS

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COPERNICUS AT A GLANCE

The wellbeing and security of future generations are more than ever dependent on everyone's actions and on the decisions being made today on environmental policies. To take the right actions, decision makers, businesses and citizens must be provided with reliable and up-to-date information on how our planet and its climate are changing: Copernicus, previously known as GMES (Global Monitoring for Environment and Security) provides this information.

As the European programme for the establishment of a European capacity for Earth observation, Copernicus consists of a complex set of systems which collect data from multiple sources: earth observation satellites and *in situ* sensors such as ground stations, airborne and sea-borne sensors. It processes these datasets and provides users with reliable and up-to-date information through a set of services related to environmental and security issues.

The services address six thematic areas: land, marine, atmosphere, climate change, emergency management and security. They support a wide range of applications, including environment protection, management of urban areas, regional and local planning, agriculture, forestry, fisheries, health, transport, climate change, sustainable development, civil protection and tourism.

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