

# EUMEDCONNECT2 Case Study

## CIRCE: e-infrastructures help save the Mediterranean



Climate change is a global phenomenon with very specific local impacts. Until recently, its implications for the Mediterranean were inadequately understood. Now, for the first time, facilitated by pioneering e-infrastructures, the CIRCE project is undertaking a comprehensive and integrated assessment of the nature and consequences of climate change in the region.

Key to the collaborative and data-intensive nature of CIRCE's research are two state-of-the-art high-capacity data-communications networks, EUMEDCONNECT2 and GEANT2. Together they connect academics and researchers across the Mediterranean region with their peers in Europe and the rest of the world. This powerful network infrastructure and the grid computing it supports facilitate global collaboration across a wide range of key activities, from accessing existing research to stakeholder participation, from the production and dissemination of high-resolution climate simulations to remote training.

CIRCE's uniquely comprehensive research and the cutting-edge technology by which it is enabled are both targeted to the needs of policy-makers in the Mediterranean region, supporting crucial decision-taking in sectors of immense societal impact.

### Assessing climate change impact in the Mediterranean region

CIRCE aims to understand and predict climate change in the Mediterranean and to provide, for the first time, a comprehensive, integrated assessment of its impacts in quantifiable, directly relevant terms that will support national and trans-national policy-makers in their decision-taking across a wide range of sectors. The sectors supported include health, agriculture and rural development, tourism,

coastal and terrestrial ecosystems, urban and regional planning, as well as water and energy supply. CIRCE will also identify and evaluate practical adaptation and mitigation strategies, designed to manage the causes and effects of climate change.

Up until now, climate change research has privileged physical and natural sciences to the exclusion of social sciences. CIRCE gives them equal status and attention, and analyses impacts more realistically as the joint product of climate change and socio-economic activity. Its adaptation strategies therefore respond not only to climate change, but also to socio-economic policies, while bearing in mind the imperatives of economic growth, development and competitiveness.

The ultimate goal is to be able to assess the impacts of climate change in the Mediterranean region, with an emphasis on estimating how the variables in the baseline climate and socio-economic scenarios will affect key sectors of high societal impact.

### CIRCE: turning the threat of climate change into an opportunity

Water shortages, poor harvests and relentless desertification expose the Mediterranean region's acute vulnerability to climatic extremes. Against this backdrop, the prospect of major climate change brought about by human activities, exacerbating existing extreme events and causing new ones, is a source of growing concern, raising serious questions about the sustainability of the region. Reviewing recent trends and projecting future scenarios, CIRCE aims to make a tangible contribution to sustainable development in the Mediterranean.



- extends our understanding of the effects of projected climate changes in the Mediterranean region
- strengthens collaborative research between the countries of the southern shore of the Mediterranean
- supports the development of reliable, accurate and policy-relevant climate information
- adopts an interdisciplinary, integrated approach to climate change impacts, pulling together expertise from several fields

Funded by the EU under the Sixth Framework Programme (FP6), CIRCE brings together multi-disciplinary research teams at 64 institutions across Europe and the southern fringe of the Mediterranean – the Middle East and North Africa.

### EUMEDCONNECT2 – the research and education network for the Mediterranean

- providing high-capacity Internet connectivity for academic and scientific collaborations
- directly connecting southern and eastern Mediterranean partner countries: Algeria, Egypt, Jordan, Morocco, Palestine, Syria and Tunisia
- connecting other Mediterranean and European partners via GEANT2
- taking forward Mediterranean region e-infrastructures pioneered by EUMEDCONNECT since 2004
- jointly funded by the European Commission and the Mediterranean partners to reduce the digital disparity between the Mediterranean and European regions



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#### EUMEDCONNECT2: enabler of bandwidth-hungry collaborative research

CIRCE's physical science research is unprecedentedly comprehensive and specific to the Mediterranean. It collects, consolidates and analyses data on climate changes in terms of a range of atmospheric, oceanic, meteorological and ecological parameters, including temperature, sea level, rainfall and water supply, and relates them to the global climate system. Building on existing global climate models, it develops modelling scenarios specifically for the Mediterranean region. In this way, a comprehensive set of data describing the physical impacts of climate change is being developed, which is then used to assess the social and economic consequences of climate change.

The collaborative research between the project partners involves the time-critical exchange of huge datasets – several hundred megabytes in size – as well as the data- and computing-intensive production and analysis of observations and model simulations. Furthermore, the project relies on access to remote databases, in Europe and the US, to build on existing climate-related observational and analysis datasets and geographic information system (GIS) data.

Grid computing allows the geographically dispersed research teams to harness the processing power from multiple distributed computer centres to address complex computational tasks, such as the high-resolution visualisation and analysis of patterns of physical climate change parameters.

Stakeholder participation and training are as important to the success of the project as data-oriented collaboration. They are facilitated, and made cost and time-effective, by virtual meeting methods such as video-conferencing.

All these applications and activities are made possible by the existence of a reliable, high-capacity network connection – courtesy of EUMEDCONNECT2 and GÉANT2.



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The Mediterranean region is singularly vulnerable to climate change, and therefore singularly well-placed to benefit from CIRCE's climate change research. The scale, accuracy and relevance of that benefit are directly proportional to the scope of the research, the number of partners and the level of collaboration, all of which have been significantly increased and facilitated by e-infrastructures. E-infrastructures are helping to determine a sustainable future for the Mediterranean.

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Dr Antonio Navarra,  
CIRCE Executive Board Co-chair  
and CMCC Director



#### e-infrastructures: helping to save the planet – and the Mediterranean

CIRCE could not have been conceived or executed without the high-capacity data-communications networks EUMEDCONNECT2 and GÉANT2, and the grid computing they support. This pioneering e-infrastructure underpins the collaboration between researchers and academics in the Mediterranean region and their peers in Europe and the rest of the world, and facilitates the collection, storage, processing and sharing of the project's huge amounts of data.

Powerful and empowering, these e-infrastructure tools enable scientists in the southern Mediterranean countries to engage in world-class, leading-edge climate research and, ultimately, to help policy-makers respond to global challenges whilst addressing local concerns.

#### CMCC: a complementary initiative

CIRCE is supported by research activities undertaken at the Euromediterranean Centre for Climate Change (CMCC) in Italy, which is involved in grid-enabled climate change and impact studies with particular focus on the Mediterranean.

To learn more about the CMCC, please visit [www.cmcc.it](http://www.cmcc.it)

#### Find out more

To learn more about CIRCE and its work, visit: [www.circeproject.eu](http://www.circeproject.eu)

Find out more about EUMEDCONNECT2 from: [www.eumedconnect2.net](http://www.eumedconnect2.net)

Find out more about GÉANT2 from: [www.geant2.net](http://www.geant2.net)

DANTE is a non-profit organisation that operates the GÉANT2 and EUMEDCONNECT2 networks. Further information about DANTE and its activities can be found at: [www.dante.net](http://www.dante.net)