General overview of the CIRCE project

Climate Change and Impact Research: the Mediterranean Environment
Integrated Project granted by the European Commission's Sixth Framework Programme, Priority 1.1.6.3 Global Change and Ecosystems
Contract no.:036961
Start date of the project: 1st April 2007; duration of the project: 48 months
European Commission financial contribution: 10 million Euro

www.circeproject.eu

The project

Examining the climate change not only in regard to scientific data but also in connection with economic and social impacts. This is the aim of CIRCE (Climate Change and Impact Research: the Mediterranean Environment), the European project that, for the first time, will study the Mediterranean climate thanks to a multidisciplinary scientific staff. CIRCE involves 64 partners from Europe, Middle East and North Africa, (61 of which are research institutions), working together for 4 years to evaluate the best strategies of adaptation to the climate change in the Mediterranean. Beyond research. In CIRCE, the role of public engagement will be fundamental, especially at the local level. Case studies and specific participative methods will be designed to achieve this result. Exploiting several research skills in different disciplines, CIRCE will deal with climatic simulations in the Mediterranean area in relation with the global climatic change to properly understand the evolution of radiative fluxes, water cycle, cloudiness, aerosol and extreme events (like intense precipitations or floods). Impacts on agriculture, ecosystems, forest, air quality and human health will be estimated. A special emphasis will be placed on economics and social consequences, especially regarding tourism, energy markets and local migration.
The European project, granted under the Sixth Framework Programme (FP6), is coordinated by INGV – National Institute of Volcanology and Geophysics (Italy) and led by Antonio Navarra from INGV and Laurence Tubiana from IDDRI- Institut du Développement Durable et des Relations Internationales (France).

A research at regional level

The Mediterranean is positioned at the border between the tropical climate zone and the middle-latitude climate belt. It means that in most of the region, precipitation is concentrated in the winter months, summers are relatively dry and hot and summer storms are very important. Climate change could pose serious questions on the sustainability of the whole development process in this area. Regional water resources are already under significant economic and demographic pressure while increased severity of weather extremes and land-use change may add to the existing problems of desertification, water scarcity, and food production, introducing new challenges to human health, ecosystems, and national economies. Thus, research focus at the local level is crucial in order to take into account all the particular features of the Mediterranean area and to tune studies according to the needs of the Mediterranean population. Thanks to the integrated approach of the CIRCE project, it will be possible to have results referred particularly to the area of interest. It will be like having a more powerful telescope that can help us to zoom on the Mediterranean region sharply rather than looking at it from a global scale.

From socio-economic scenarios to climate scenarios

CIRCE will provide climate scenarios for the 21st century over the Mediterranean region for use in impact studies. CIRCE will build on the extensive modelling experience already available, but it will produce a set of models targeted at the Mediterranean area. Socio economic scenarios already available such as those from IPCC will be used by a multi-model system to produce a set of climate

scenarios which, for the first time, will allow to assess the role and the feedbacks of the Mediterranean Sea in the global climate system. CIRCE will also analyse a number of climate parameters including temperature, precipitation, humidity, wind, waves and sea-level rise. Besides these, special attention will be devoted to understand distribution of extreme events, nutrient load into the sea and sensitivity to water stress.

Evaluating the impacts of climate change

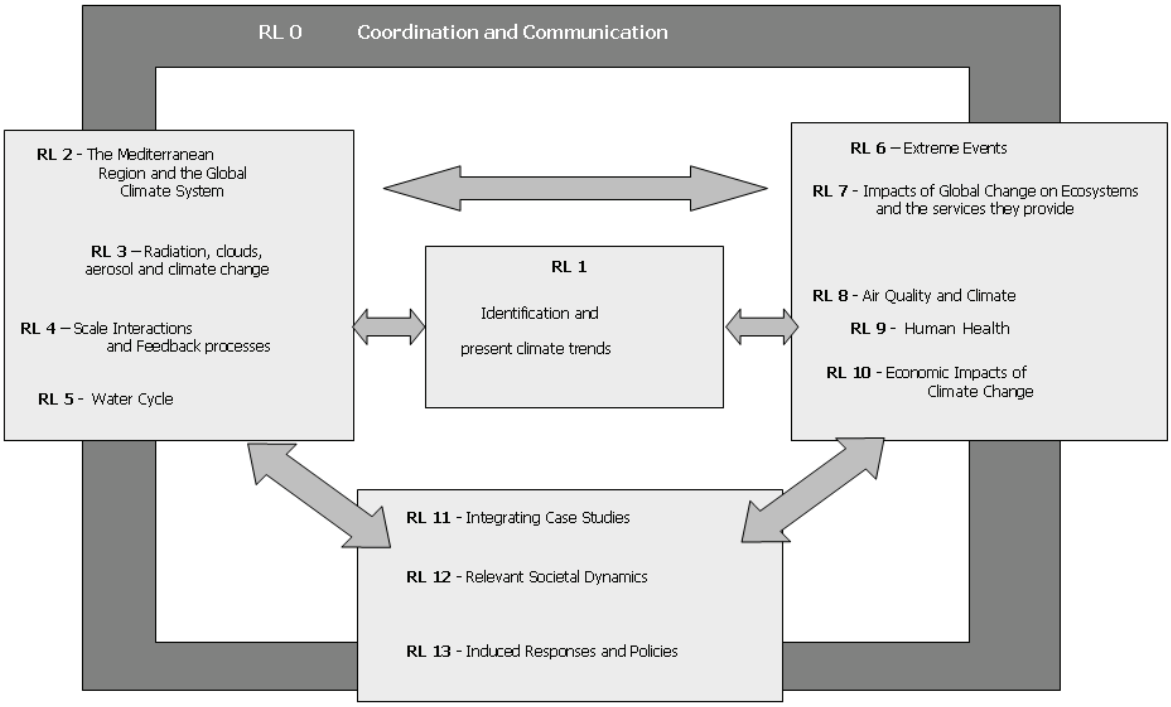
The main objectives of CIRCE are to predict and to quantify the physical impacts of climate change in the Mediterranean through a comprehensive set of data. These impacts will then be used to assess the consequences of climate change for human society and ecosystems. In particular, CIRCE will study economically meaningful variables such as productivity changes, variation of resource stocks, shifts in technology and demand patterns in order to better describe how climate changes will affect our future lives. Four crucial sectors for the Mediterranean region have been identified: health, tourism, energy demand and human migration. Moreover, in order to test its ability to predict impacts and to assess strategies of mitigation, CIRCE has foreseen a number of case studies (urban, rural, coastal). A risk-based approach will be used trying to identify, with the involvement of local institutions, experts and citizens, the strengths and weaknesses of potential adaptation strategies.

Adaptation and mitigation

Human beings used to adopt a number of strategies to tackle the impacts of weather like crop diversification, irrigation, water management and so on. But climate change introduces novel risks as drought, heatwaves, hurricanes or scarcity of crop productivity.
Considerations of future climate change should now be taken into account in all development strategies, both to mitigate the climate impacts (strategies to reduce CO2 emissions) and to find new approaches to handle the issue that can be adaptive, especially in the Mediterranean region where the climate change are expected to be significant. Adaptation practices refer to actual adjustments, or changes in decision environments, which might ultimately enhance resilience or reduce vulnerability to observed or expected changes in climate. The array of potential adaptive responses available to human societies is very large, ranging from purely technological (e.g., sea defences), through behavioural (e.g., altered food and recreational choices), to managerial (e.g., altered farm practices) and to policy (e.g., planning regulations).
Adaptation and mitigation can be complementary but mitigation will always be required to avoid ‘dangerous’ and irreversible changes to the climate system. In fact adaptation alone is not expected to cope with all the projected effects of climate change, and especially not over the long term as most impacts increase in magnitude. The end product of CIRCE will be the Final Report - Regional Assessment of Climate Change in the Mediterranean (RACCM), a decision support system tool for adaptation and mainstreaming climate impacts into mitigation strategies, tailored specifically for the Mediterranean environment. The RACCM will be produced in close consultation with stakeholders, also through workshops, consensus conferences and focus groups, in order to take into account the different needs of the Mediterranean region.

The scientific architecture of the project

13 research lines compose the CIRCE project.


RL 0 Coordination and Communication
RL 2 - The Mediterranean Region and the Global Climate System
RL 3 – Radiation, clouds, aerosol and climate change
RL 4 – Scale Interactions and Feedback processes
RL 5 - Water Cycle
RL 1
Identification and present climate trends
RL 6 – Extreme Events
RL 7 - Impacts of Global Change on Ecosystems and the services they provide
RL 8 - Air Quality and Climate
RL 9 - Human Health
RL 10 - Economic Impacts of Climate Change
RL 11 - Integrating Case Studies
RL 12 - Relevant Societal Dynamics
RL 13 - Induced Responses and Policies

RL 0
WP0.1 Coordination, Management and Assessment Report
WP 0.2 Web Based Reporting and Management
WP 0.3 External and internal communication office
WP 04 Network of museums and science centers

RL 1
WP 1.1 Coordination
WP 1.2 Data collection and informational content of data
WP1.3 Detection of systematic changes, attribution of plausible causes

RL 2
WP 2.1 Global climate evolution scenarios including a detailed representation of the Mediterranean Sea
WP 2.2 Climate evolution scenarios from regional models for the Mediterranean area
WP 2.3 Impacts of global climate change on the Mediterranean climate
WP 2.4 Coordination on production of scenarios and distribution of datasets

RL 3
WP 3.1 Surface radiation from existing observations
WP3.2 Model reconstruction of recent and present conditions
WP 3.3 Impacts of future climate change on the surface radiation
WP 3.4 Coordination of RL 3

RL 4
WP 4.1 Atmospheric flow regimes in the Mediterranean Basin
WP 4.2 Rain regimes and precipitation components across the basin
WP 4.3 Land-Atmosphere-Oceanic interactions. Integrated regional studies
WP 4.4 Feedbacks within the Global Cycle
WP 4.5 Coordination

RL5
WP 5.1 Analysis of changes in Atmospheric water budget
WP 5.2 Variations in the precipitation component of the water cycle in the Mediterranean Region
WP 5.3 Variations in the terrestrial component of water cycle
WP 5.4 Changes in Mediterranean Sea water cycle and implications for water mass characteristics
WP 5.5 Coordination

RL 6
WP 6.1 Mediterranean extreme characterization and indices
WP 6.2 Diagnosis of trends/variability in extremes during the 20th century
WP 6.3 Extremes: causes and links to large scale patterns
WP 6.4 Extremes in future climate scenarios
WP 6.5 Data for the estimation of future impacts of weather and climate extremes
WP 6.6 Coordination

RL 7
WP 7.1 Coordination of RL7, data distribution and network consolidation
WP 7.2 Climate change impacts on forests, agriculture, food products and livestock production
WP 7.3 Fire and other disturbances
WP 7.4 Integration of ecosystem services at the regional scale
WP 7.5 Climate impacts on biogeochemical cycling

RL 8
WP 8.1 Emission inventories and scenarios
WP8.2 Observational data base and trend analyses
WP8.3 Integrated Limited Area Modeling System
WP8.4 Air Quality and Climate: Case Studies
WP8.5 High Resolution Reanalysis data set for the Mediterranean Region and the surrounding Areas
WP8.6 Coordination and Communication

RL 9
WP9.1 Methods, policy development and integration
WP9.2 Assessment of Health impact of extreme temperature and air pollution in the MedRegion
WP9.3 Risk assessment on infectious diseases
WP 9.4 Management of RL

RL 10
WP10.1 Coordination
WP10.2 Tourism
WP10.3 Migration
WP10.4 Extreme weather
WP10.5 Energy
WP10.6 Sea Level Rise
WP10.7 CGE Development and Interface
WP10.8 Valuation of Ecosystems
WP10.9 Agriculture

RL 11
WP11.1 RL11 Coordination
WP11.2 Common tools and central datasets
WP11.3 Urban case studies
WP11.4 Rural case studies
WP11.5 Coastal case studies
WP11.6 Synthesis and wider implications of the case-study work

RL 12
WP12.1 Coordination
WP12.2 Patterns of economic growth
WP12.3 Development policies
WP12.4 Unemployment disparities
WP12.5 Risk Management

RL 13
WP13.1 Coordination
WP13.2 Identification and screening of adaptation options
WP13.3 Integrated management of vulnerability in agriculture and health
WP13.4 Integrated management of the vulnerability to climate change in touristic coastal zones