



*Climate Change*

## **SPECS**

### **At a glance**

**Title:** Seasonal-to-decadal climate Prediction for the improvement of European Climate Services

**Instrument:** Collaborative Project large scale integrating project

**Total Cost:** 11,785,694.40€ €

**EC Contribution:** 8,224,862€ €

**Duration:** 51 months

**Start Date:** 1<sup>st</sup> November 2012

**Consortium:** 20 partners, 9 countries

**Project Coordinator:** Fundació Institut Català de Ciències del Clima (IC3), Spain

**Project Web Site:** [www.specs-fp7.eu](http://www.specs-fp7.eu)

**Key Words:** climate prediction, climate services, climate modelling, forecast reliability, forecast quality, initialisation, calibration, downscaling, impact assessment, operational prediction.

### **The challenge:**

**Deliver a new generation of European climate forecast systems with improved forecast quality and efficient regionalisation tools to produce reliable, local climate information over land at seasonal-to-decadal (s2d) time scales, while providing an enhanced communication to address the needs of a wide range of both public and private stakeholders.**

### **Project Objectives:**

- **Evaluation of the forecast quality of current climate forecast systems.**
- **Test specific hypotheses for the improvement of s2d predictions.**
- **Integrate the best observational data of the climate system as initial conditions.**
- **Improve forecast quality by better initialization and by increasing the spatial resolution of the forecast systems.**
- **Achieve a best assessment of the uncertainties in climate prediction.**
- **Perform reliable and accurate local-to-regional predictions via the combination and calibration of the information from different sources and a range of state-of-the-art regionalisation tools.**
- **Illustrate the usefulness of the improvements for climate services and better communicate actionable climate information.**

- **Support the European contributions to WMO research initiatives on s2d climate prediction.**

## Methodology

Six European dynamical climate forecast systems will be used to advance climate prediction on s2d time scales. A climate forecast system takes existing models used in either weather forecasting or climate modelling and adapts them to the climate forecasting problem. This requires adding an initialization module to give initial conditions to the forecasts. A forecast system also includes a) an adequate system to generate an ensemble of forecasts, b) a statistical model to create reliable probabilistic predictions by combining the data from different forecast systems and other sources like statistical predictions, and c) a downscaling solution that can deal with the multi-forecast system ensemble source of forecasts to offer climate information at a local scale. All the steps used in current operational systems, when they exist, need updating and merging in with the knowledge generated in the weather forecasting and climate-change projection communities. In addition, these updates will be motivated by an increased knowledge about the sources of climate predictability in a climate-change context. As a project like SPECS aims at contributing to the development of climate services, the new forecast systems require appropriate documentation at all knowledge levels and a data dissemination strategy that offers a seamless access to climate information. SPECS brings together, for the first time, several of these elements in a systematic way and with the aim of applying the results in an operational context where climate information based on climate predictions is produced and released at regular time intervals.

## Expected Results

SPECS will be the origin of a new generation of European climate forecast systems, with improved forecast quality including better reliability, higher resolution, a simpler access to their data and an exhaustive documentation. This will result in more actionable operational seasonal forecasts and the advancement towards a better understanding of the usefulness of decadal predictions.

The processes responsible for s2d climate predictability will be better understood, including those linked to the changes in both natural and anthropogenic forcings. This knowledge will be used to interpret an ambitious set of coordinated global forecast experiments that aim to assess the role of the appropriate initialization of different components of the climate system (sea ice, continental surfaces, atmospheric composition) and of the necessary model improvement (increased resolution, atmospheric chemistry, vegetation, ocean-atmosphere coupling).

A set of functions in the R language with standardized input-output will be created to perform statistical downscaling in a climate-prediction context. They will be merged with existing and new forecast verification functions to be publicly released as the first tool of its kind. This will provide a long-lasting response to the demand of local climate predictions for specific services.

SPECS will also provide a coordinated European response to and leadership in the different international initiatives in climate prediction, as well as a set of case studies illustrating the socio-economic benefits of climate prediction.

At the end of the SPECS project, climate predictions and climate-change projections will be brought closer together for the benefit of both climate services and the advancement of climate adaptation.

## Project Partners

Fundació Institut Català de Ciències del Clima (ES)	University of Leeds (GB)
Instituto Nacional de Pesquisas Espaciais (BR)	University of Exeter (GB)
Max-Planck-Institut für Meteorologie (DE)	Meteorologisk Institutt (NO)
Het Koninklijk Nederlands Meteorologisch Instituut (NL)	Vortex Factoria de Calculs S.L. (ES)
Atmospheric, Oceanic and Planetary Physics, University of Oxford (GB)	Met Office (GB)
Météo-France (FR)	Sveriges Meteorologiska Och Hydrologiska Institut (SE)
Centre Européen de Recherche et Formation Avancée en Calcul Scientifique (FR)	Institut Pierre et Simon Laplace, Centre National de la Recherche Scientifique (FR)
Norsk Institutt for Luftforskning (NO)	University of Reading (GB)
Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile (IT)	Agencia Estatal Consejo Superior de Investigaciones Científicas (ES)
Universität Hamburg (DE)	European Centre for Medium-Range Weather Forecasts (DE)