REQUEST FOR A SPECIAL PROJECT 2010–2012

MEMBER STATE: Denmark

Principal Investigator[1]: Wilhelm May

Affiliation: Danish Meteorological Institute

Address: Lyngbyvej 100

2100 Copenhagen

Denmark

E-mail: wm@dmi.dk

Other researchers: Marianne Sloth Madsen

Project Title: Numerical experimentation with the EC-Earth system with special focus on the Mediterranean region

If this is a continuation of an existing project, please state the computer project account assigned previously.	**SP** DKMEDC_____	
Starting year: (Each project will have a well defined duration, up to a maximum of 3 years, agreed at the beginning of the project. For projects started before 2009, please state 2009 as the start year.)	2009	
Would you accept support for 1 year only, if necessary?	YES ☐	NO ☒

Computer resources required for 2010-2012: (The maximum project duration is 3 years, therefore a continuation project cannot request resources for 2012.)	**2010**	**2011**	**2012**
High Performance Computing Facility (units)	800000	800000	
Data storage capacity (total archive volume) (gigabytes)	10000	10000	

*An electronic copy of this form **must be sent** via e-mail to:* *special_projects@ecmwf.int*

Electronic copy of the form sent on (please specify date): 29th April 2009

Continue overleaf

[1] The Principal Investigator will act as contact person for this Special Project and, in particular, will be asked to register the project, provide an annual progress report of the project's activities, etc.

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Extended abstract

It is expected that Special Projects requesting large amounts of computing resources (500,000 SBU or more) should provide a more detailed abstract/project description (3-5 pages) including a scientific plan, a justification of the computer resources requested and the technical characteristics of the code to be used. The Scientific Advisory Committee and the Technical Advisory Committee review the scientific and technical aspects of each Special Project application. The review process takes into account the resources available, the quality of the scientific and technical proposals, the use of ECMWF software and data infrastructure, and their relevance to the Centre's objectives. - Descriptions of all accepted projects will be published on the ECMWF website.

The aim of the special project is to tune and use the EC-Earth system for investigating climate variability and change in the Mediterranean region. Because of various kinds of teleconnections with other parts of the globe a global coupled atmosphere-ocean model has to be applied in order to properly describe the climate in the Mediterranean region. The climate in the Mediterranean region is not only linked to the tropical and the extratropical Atlantic Ocean but is also affected by the Asian summer monsoon or the El Niño/Southern Oscillation. On the other hand, the climate in the Mediterranean region is characterized by various small-scale phenomena such as small-scale cyclones. The realistic simulation of such phenomena requires a rather fine resolution of the model system.

The project applies the EC-Earth system, which is based on ECMWF's Seasonal Forecast SYSTEM 4. It consists of the IFS atmospheric GCM and the NEMO ocean GCM, coupled by OASIS3. In the project a high-resolution version of this model system is used: the IFS atmospheric GCM at a horizontal resolution of T255 and 62 vertical levels and the NEMO ocean GCM at a horizontal resolution of about 2 degrees with equatorial refinement and 31 vertical layers or possibly at a horizontal resolution of about 1 degree with equatorial refinement and 42 vertical layers. This resolution is a good compromise allowing for extended climate simulations of up to 100 years with a rather good representation of regional details of climate.

In the beginning of the project (2009 and first half of 2010), the high-resolution version of the EC-Earth model needs be tuned in order to ensure a stable simulation of the global climate. In the further course of the project an extended simulation with time-varying climate forcing (second half of 2010) will be performed. Finally, sensitivity experiments for testing some of the teleconnection mechanisms affecting the climate in the Mediterranean region may be performed (2011).

Our best estimate for running this model system is about 10,000 system billing units of the hpc per simulated year. Thus, the 800,000 billing units for 2010 will be used for about 80 years of simulation with time-varying climate forcing. The 800,000 units in 2011 will be used for a number of sensitivity experiments for several decades each.