

REQUEST FOR A SPECIAL PROJECT 2014–2016

MEMBER STATE: European Commission Joint Research Centre

Principal Investigator¹: Alessandro Dosio

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Other researchers:

Project Title: Land surface interaction and climate change over Africa by means of a coupled Regional climate Model to a biogeochemical land-surface scheme.

If this is a continuation of an existing project, please state the computer project account assigned previously.	SP _____	
Starting year: <small>(Each project will have a well defined duration, up to a maximum of 3 years, agreed at the beginning of the project.)</small>	2014	
Would you accept support for 1 year only, if necessary?	YES X	NO <input type="checkbox"/>

Computer resources required for 2014-2016: <small>(The maximum project duration is 3 years, therefore a continuation project cannot request resources for 2016.)</small>	2014	2015	2016
High Performance Computing Facility (units)	300000	400000	400000
Data storage capacity (total archive volume) (gigabytes)	100	100	100

*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):
...24/06/2013.....

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.

Principal Investigator:

Alessandro Dosio

Project Title:

Land surface interaction and climate change over Africa by means of a coupled Regional climate Model to a biogeochemical land-surface scheme.

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 ECMWF's objectives. - Descriptions of all accepted projects will be published on the ECMWF website.

Recently, a new initiative endorsed by the World Climate Research Programme has emerged in order to produce an improved generation of regional climate change projections world-wide: the Coordinated Regional climate Downscaling Experiment – CORDEX. Due to its vulnerability to climate variability, the significant impacts of projected climate change, and the general lack of climate projections based on Regional Climate Downscaling tools, Africa was selected as the first target region for the CORDEX activity.

It is very challenging for GCMs and RCMs to replicate the multitude of physical processes and the complexity of their feedbacks, which span multiple temporal and spatial scales, over such a large and heterogeneous continent.

The West African Monsoon (WAM) is one of the key elements of the African climate; basically, it consists in a seasonal change in atmospheric circulation associated to high variability (both temporal and spatial) in precipitation. The monsoon system is driven by a complex interaction of atmosphere, ocean, and land-surface, initiated by differential heating of the ocean and land surface. In this project, we plan to use the COSMO-CLM regional climate model to investigate the complex land-surface interaction that strongly influences the African climate system; for instance, the WAM extent and intensity is strongly related to soil moisture, as it controls the partitioning between the surface latent and sensible heat fluxes.

For so doing, COSMO-CLM version 4.8 (and in future, the new release 5.0) will be coupled to the Community Land Model 4.0 (and, eventually to the new release 4.5).

Contrary to the existing version of COSMO-CLM coupled to CLM (version 3.5), this new coupled system will be based on the OASIS coupler, which needs to be first installed and tested on the ECMWF hpcf.

This will be the aim of the first year of the project, which will also include a 20 year evaluation run with perfect boundary conditions (ERA-Interim) over the period 1989-2008, following the CORDEX guidelines.

Focus will be on the analysis of the differences between the new coupled model COSMO-CLM2 and the standard COSMO-CLM, on the reproduction of the present African climate.

The second and third year of the project will be devoted on the simulation of a 150 year climate change simulation by downscaling the results of the ECHAM6 GCM under the IPCC AR5 RCPs scenario and, eventually if resource will allow it, to study the impact of e.g. deforestation on the projected African climate.