

REQUEST FOR A SPECIAL PROJECT 2013–2015

MEMBER STATE: Germany

Principal Investigator¹: Univ.-Prof. Dr. Ulrich Cubasch, Dr. Ingo Kirchner

Affiliation: Institut für Meteorologie

Address: Freie Universität Berlin
Institut für Meteorologie
Carl-Heinrich-Becker-Weg 6-10
D-12165 Berlin

E-mail: cubasch@zedat.fu-berlin.de
ingo.kirchner@met.fu-berlin.de

Other researchers:

Dr. Stefan Polanski

Project Title:

Analysis of the coupling between the ocean and atmosphere large scale circulation regimes from annual to decadal time scales

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>	2012	
Would you accept support for 1 year only, if necessary?	YES <input type="checkbox"/>	NO <input type="checkbox"/>

Computer resources required for 2013-2015: <small>(The maximum project duration is 3 years, therefore a continuation project cannot request resources for 2015.)</small>	2013	2014	2015
High Performance Computing Facility (units)	20000	20000	
Data storage capacity (total archive volume) (gigabytes)	4000	5000	

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):
25/April/2012

Continue overleaf

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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.

Extended abstract

Teleconnection patterns are associated with the large scale dynamics in mid-latitudes. The coupling between atmosphere and ocean is important for understanding the mechanism behind the temporal development of the amplitudes of such large scale circulation patterns. In addition the interaction between the lower and the middle atmosphere modulates the behaviour of the planetary waves, e.g. due to the formation of stratospheric warmings. Also the weak and strong polar vortex regimes are connected with blocking situations. On the other hand the formation of Rossby waves in the stormtrack regions over the North Atlantic and the North Pacific, which influences the strength of the Brewer-Dobson circulation, is dependent on the atmosphere-ocean interaction. But also anomalies of the Indian monsoon and climate irregularities over Siberia and the Himalayas can be related to the tropospheric circulation in mid-latitudes over Europe. The time scale of these interactions ranges from weeks to decades.

Global and regional models are used in many projects at FUB to study different aspects of these interactions, the coupling of stratosphere, troposphere and ocean, the interaction of Indian monsoon and extreme events in Europe, the evolution of Rossby waves and its interaction with planetary waves. The combination of our model data with reanalysis and observations (e.g. ERA40, ERA-INTERIM), which are available at the ECMWF archive system, will help to analyse the processes behind the climate variability over Europe. The aim is to include observation based data sets into a framework for the standardised evaluation of the used model system. This will enable a direct and comprehensive evaluation of simulations. The integrated application of the evaluation system within the model system will guarantee the efficient use of computer resources. Furthermore, the use of standardised evaluation methods will support the development process and optimisation of the used model system.

Related ongoing scientific projects

- HIMPAC (Himalaya: modern and past climate) funded by DFG
- CADY (Central Asia climate dynamics) funded by BMBF

Related planned scientific projects

- MiKlip (Medium range climate prediction) funded by BMBF

Related references

Bothe, O. (2010): Teleconnections for precipitation. PhD-thesis. University of Hamburg, 172 pp.

Bothe, O. et al. (2010): Large-scale circulations and Tibetan Plateau summer drought and wetness in a high-resolution climate model. *International Journal of Climatology*, 2010, 15 pp.

Emanuel, K. A. et al. (1994): On large-scale circulations in convecting atmosphere. *Quarterly Journal of the Royal Meteorological Society*, 120, 1111-1143.

Fennessy, M. J. et al. (1994): The Simulated Indian Monsoon: A GCM Sensitivity Study. *Journal of Climate*, 7, 33-43.

Held, I. M. et al. (2002): Northern Winter Stationary Waves: Theory and Modeling. *Journal of Climate*, 15, 2125-2144.

Zhu, X. et al. (2010): *Summer atmospheric bridging between Europe and East Asia: Influences on drought and wetness on the Tibetan Plateau. Quaternary International*, 2010, 7 pp.