

REQUEST FOR A SPECIAL PROJECT 2013–2015

MEMBER STATE: Germany.....

Principal Investigator¹: Dr. Doris Anwender.....

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Other researchers: Prof. Sarah Jones, Dr. Julia Keller, Ms. Aurelia Müller, Mr. Julian Quinting.....

Project Title: Impact of blocking and tropical-extratropical interactions on predictability in the Atlantic-European Sector.....

If this is a continuation of an existing project, please state the computer project account assigned previously.	SP DEET _____	
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>	2013	
Would you accept support for 1 year only, if necessary?	YES	NO

Computer resources required for 2013-2015:

(The maximum project duration is 3 years, therefore a continuation project cannot request resources for 2015.)

	2013	2014	2015
High Performance Computing Facility (units)	420000	420000	450000
Data storage capacity (total archive volume) (gigabytes)	4000	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):
.....19.04.2012.....

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

The German Research Foundation (DFG) research unit PANDOWAE (Predictability and Dynamics of Weather Systems in the Atlantic-European Sector – www.pandowae.de) focuses on the dynamic processes that limit the predictability of weather systems responsible for high impact weather in Europe. This research unit makes a major contribution to the THORPEX Predictability and Dynamical Processes working group. The special project proposed here would contribute to two of the PANDOWAE projects in Karlsruhe: the predictability of atmospheric blocking in global ensemble prediction systems (PANDOWAE-BLOCK) and the impact of tropical – extratropical interactions on downstream predictability (PANDOWAE-TROP). These projects will work with the ECMWF ensemble prediction system, the TIGGE dataset, the special ECMWF fields provided as a part of the Year of Tropical Convection (YOTC), and the ECMWF Data assimilation system.

Specific tasks of the projects are:

- To investigate the dynamical processes in the onset, the decay and for the intensity, the scale, the lifetime, the track, the predictability and the impact of blocking using the EOF / cluster analysis (Harr et al., 2008, Anwender et al., 2008, Keller et al., 2011) and the new ECMWF clustering applied to the ECMWF ensemble and the TIGGE multi model ensemble and with ensemble sensitivity analysis (ESA, Hakim and Torn, 2008, Torn, 2009).
 - To conduct a statistical investigation of the ECMWF EPSs on a seasonal scale, investigate the skill scores during blocking episodes and compare with non-blocking episodes, and assess the change of blocking characteristics with seasons.
 - To quantify the mechanisms that determine the structural changes of a tropical cyclones during ET and their relation to the downstream impact based on the observations made during the THORPEX Pacific Asian Regional Campaign (T-PARC) along with modelling and data impact studies
- Assess to what extent the structural changes are represented in the ECMWF analyses and forecasts; use object-oriented adaptivity applied to diabatic terms from YOTC as well as other fields.
- Perform and analyse data denial experiments for Typhoon Sinlaku
- To investigate the impact of tropical convection (e.g. tropical cyclones and their extratropical transition, Madden-Julian Oscillation, African easterly waves, monsoon convection) on midlatitude predictability for an extended time period using YOTC data, TIGGE data, and experiments with the ECMWF EPS
- Develop and apply object-oriented techniques to identify and quantify the structure of tropical convection in ECMWF analyses and forecasts for the YOTC period.
- Correlate EPS spread in midlatitudes at extended range with presence and variability of tropical convection in the short-range forecast period.
- Use ensemble sensitivity analysis applied to TIGGE data to relate tropical and extratropical variability.

- For a small number of cases rerun ECMWF ensembles outputting “YOTC” diabatic terms; compare with results from deterministic forecast and apply ESA
- Analyse relative role of initial perturbations (EDA and SVs) and 2 forms of stochastic physics in ECMWF EPS experiments

Substantial computing resources are needed (computing time and data storage capacity) to conduct new EPS forecasts, calculate YOTC fields for selected deterministic and ensemble forecasts, and perform data denial / data impact experiments. Since we use the ECMWF Integrated Forecast System these experiments can only be carried out at ECMWF.

The two PANDOWAE projects have been recommended for funding from 2011 – 2014. As Ph.D. Students will be working on these projects it is very important to have access to ECMWF archive and computing facilities during the 3 years of their research.

These projects will be carried out in collaboration with Martin Leutbecher, Carla Cardinali and other ECMWF scientists.

References

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