REQUEST FOR A SPECIAL PROJECT 2012–2014

MEMBER STATE: Norway

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Other researchers: ……………………………………………………………….……

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Project Title:

High-resolution ensemble forecasts

If this is a continuation of an existing project, please state the computer project account assigned previously.	_____
Starting year: (Each project will have a well defined duration, up to a maximum of 3 years, agreed at the beginning of the project.)	2012
Would you accept support for 1 year only, if necessary?	YES	

Computer resources required for 2012-2014: (The maximum project duration is 3 years, therefore a continuation project cannot request resources for 2014.)	**2012**	**2013**	**2014**
High Performance Computing Facility (units)	450 000	450 000	450 000
Data storage capacity (total archive volume) (gigabytes)	2000	2000	2000

*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):

04/28/11

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.

     This form is available at:
http://www.ecmwf.int/about/computer_access_registration/forms/

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.

Aim of the project

The aim of the project is to start testing a convection-permitting ensemble prediction system with the Harmonie model, and possibly also produce input to this system by running a high resolution version of ECMWF's EPS.

Background

At the Norwegian Meteorological Institute (met.no) we have run a limited area ensemble prediction system (NORLAMEPS) since 2005 at a resolution of about ~12 km (Aspelien et al. 2011. Frogner et al. 2006), part of this ensemble has been run at ECMWF (TEPS, special project ending this year, spnoteps). Motivated by an increasing need for forecasting potential high impact weather, there is a growing demand to produce convection-permitting ensembles. At met.no we have some experience in this area using the Unified Model (Kristiansen et al., 2011). We are planning to start the development of a convection-permitting ensemble system using the Harmonie model. We are also involved in the FROST project (which is the forecast and research demonstration project for the Sochi 2014 winter Olympic games), where we also will set up an EPS system with Harmonie as a research topic.

Scientific plan

The development will have to be done step wise by first a simple downscaling of a global EPS. It is believed that a two-step nesting will be to time consuming. It is probably not sufficient to downscale the operational EPS from ECMWF, since the resolution will be to coarse for input in a Harmonie EPS (of about 2.5 km resolution in the envisaged Harmonie EPS), hence it may be necessary to run EPS for selected test periods with a higher resolution, probably the resolution used by the deterministic run.

After some initial tests with pure downscaling where basic properties of the system is investigated (like size of integration area necessary, lead time possible for this high resolution EPS where error saturates quickly, number of ensemble members ++), experiments involving data assimilation and perturbations specific for the Harmonie model can be tried out.

References

Aspelien, A., Iversen, T., Bremnes, J. B. and Frogner, I-L. 2011. Short-
range probabilistic forecasts from the Norwegian limited-area EPS.
 Long-term validation and a polar low study. Tellus 63A
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Frogner, I.-L., Haakenstad, H. and Iversen, T. 2006. Limited-area ensemble predictions at the Norwegian Meteorological Institute. Q. J.
R. Meteorol Soc. 132, 2785–2808. doi:10.1256/qj.04.178.

Kristiansen, J., Sørland, S. L. , Iversen, T., Bjørge, D. and Køltzow, M.
Ø. 2011. High-resolution ensemble prediction of a polar low development. Tellus 63A