REQUEST FOR A SPECIAL PROJECT 2012–2014

MEMBER STATE: Netherlands

Principal Investigator[1]: Dr.W.T.M.Verkley

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Dr. J. Barkmeijer, Dr. S. de Haan

Project Title:
Implementation and validation of radar data-assimilation in the HARMONIE mesoscale weather prediction model

If this is a continuation of an existing project, please state the computer project account assigned previously.	**SP** _____	
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 X	

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)	300000	300000	300000
Data storage capacity (total archive volume) (gigabytes)	400	400	400

*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):
29 April 2011

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: Dr. W.T.M. Verkley

Project Title: Implementation and validation of radar data-assimilation in the HARMONIE mesoscale weather prediction model

Extended abstract

The initialization of numerical models designed for mesoscale weather prediction is a task that requires both high-quality observations and sophisticated methods of data-assimilation. Weather phenomena of particular interest are those that involve convection and the associated precipitation. These phenomena are probed accurately by weather radars, both in terms of reflectivity and in terms of radial velocities. In the Netherlands two radars are producing these data on a continuous basis: one in De Bilt and another in Den Helder.

The weather research and development department of KNMI is involved in mesoscale weather prediction by participating in HARMONIE (HIRLAM ALADIN Regional Mesoscale Operational NWP in Europe); the mesoscale model that is developed in this project will become part of ECMWF's IFS (Integrated Forecast System). A recent version of the model is run semi-operationally at ECMWF on a domain slightly larger than the Netherlands and is initialized by first guess fields and boundary values from the HIRLAM synoptic scale weather prediction model. Conventional data are assimilated by means of 3D variational data-assimilation; Mode-S data have been added recently (see de Haan, 2011, for a recent publication on Mode-S data).

This project is a request for computer resources, needed to add radar data to the set of observations. The project aims at implementing the technique that is already used by Meteo France, in which radar reflectivities are assimilated by 1D+3D variational assimilation (Caumont et al., 2010). Reflectivities are transformed into pseudo-observations of humidity by a 1D inversion method and subsequently assimilated by 3D variational data-assimilation. It is intended to study the impact of the newly assimilated radar data on the analysis and forecast by performing parallel runs with and without these additional data. In the course of the work it will be investigated whether alternatives to the 1D+3D method, based directly on the microphysical parameterization scheme of the model, can be used as well.

References

Caumont, O., Ducrocq, V., Wattrelot, E., Jaubert, G. and S. Pradier-Vabre, 2010 : 1D+3DVar assimilation of radar reflectivity data : a proof of concept, Tellus, **62A**, 173-187, doi:10.1111/j.1600-0870.2009.00430.x

De Haan, S., 2011: High resolution wind and temperature observations from aircraft tracked by Mode-S air traffic control radar, accepted for publication in Journal of Geophysical Research – Atmospheres, see also http://www2.knmi.nl/knmi-library/knmipubWR/WR2009-07revised.pdf