

REQUEST FOR A SPECIAL PROJECT 2010–2011

MEMBER STATE: France (in association with other Member and Associated States)

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Project Title: Investigation of coupling the ALADIN and AROME models to boundary conditions from ECMWF and ERA model data

Computer resources required for 2010-2012:	2010	2011	2012
High Performance Computing Facility (units)	30K	30K	---
Data storage capacity (total archive volume) (gigabytes)	800Gb	800Gb	---

Is this a continuation of an existing project?	YES	
If YES, please state the computer project account assigned previously	SPFRCOUP	
Would you accept support for 1 year only, if necessary?		NO

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): 7 April 2009

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: Claude Fischer

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Extended abstract

(It is expected that Special Projects requesting large amount of computer resources should provide a more detailed abstract/project description including a scientific plan and a justification of the computer resources requested)

Coupling of ALADIN and AROME models to boundary conditions from ECMWF and ERA model data

(F. Bouttier and collaborators, July 2005;
updated by C. Fischer, April 2009)

Météo-France and the other meteorological services of the ALADIN consortium (see <http://www.cnrm.meteo.fr/aladin/>) have developed the ALADIN and AROME limited area models, with the help of the IFS/ARPEGE software cooperation agreement with ECMWF. The purpose of this project is the investigation of the option to couple ALADIN and AROME to large scale model data, namely, the IFS operational archive and the ERA archives on MARS. This is of scientific and technical interest to all ALADIN participants, as well as to the HIRLAM consortium (see <http://hirlam.org/>) who plans to test the ALADIN/AROME software coupled to the ECMWF boundary conditions data products.

HIRLAM and Météo-France have already set up a simplified technical environment, called hiral, on the HPCF in order to facilitate joint work on the ALADIN software. HIRLAM and ALADIN have jointly started another ECMWF S.P. on the construction of a "Grand LAM EPS" system for which coupling and the use of a variety of lateral boundary conditions will be of importance (GLAMEPS). The SPFRCOUP project plans to explore the following questions:

- technical issues when coupling ALADIN/AROME to ECMWF model data: file preparation, data compression and telecommunication issues
- relative merits of coupling ALADIN/AROME to IFS v/s ARPEGE models for NWP
- impact of the large-scale model resolution on the quality of limited-area modelling
- desirable resolution and archiving policy of future reanalysis datasets for downscaling using ALADIN and/or AROME
- coupling issues linked to the representation of the surfaces
- coupling issues linked to the differences in physical packages, e.g. cloud physics
- optimisation of an intermediate coupling model for running at kilometric scales using AROME

The intention also is to allow scientists from some selected (Cooperating and Non-Member) States access to resources on the HPCF, in order to perform boundary condition file preparation at ECMWF before sending it to their own sites for running the LAMs. The planned activities of this project are:

1. installation and maintenance of the ARPEGE/ALADIN scripts (IFS configurations 901/923) on the HPCF to convert IFS non real time model data on MARS into ALADIN/AROME coupling files
2. development and testing of new software to resolve model inconsistencies e.g. related to the surface initialization. An important aim of this project is to provide a unified, well-maintained environment for preparing LAM experiments.
3. preparation, by the Special Project participants, on the HPCF, and storage on ECFS of ALADIN/AROME coupling files for chosen test periods and geographical

domains. This item is dimensioning for the Special Project, as it requires HPCF access for all listed participants, and some HPCF and storage resources.

4. local LAM experimentation to investigate model performance sensitivity to the coupling technique. Some LAM runs may be performed on the HPCF as well for testing purposes. This is where the scientific evaluation of the boundary condition quality will be performed.

This project will be used for scientific experimentation only. The real-time sending of ECMWF boundary conditions, or the routine execution of LAM applications on the HPCF, are explicitly outside its scope. The list of scientists involved in the project may be extended to other scientists from ALADIN cooperating services during the lifetime of the project.

In April 2007, item "1" has been completed, and scripts and binaries are available for all potential partners within the S.P. Most of the activity over 2006-2007 has been devoted to the technical implementation and the production of downscaled ERA-40 analyses (addressing partially points "3" and "4" above). During 2006 and 2007, downscaling of EPS members ("LAEF" system developed in Austria by the LACE group) and testing of an Aladin 3D-VAR assimilation coupled with IFS boundary conditions (Hungary) have been realized. Downscaling of EPS members also has been implemented in Belgium (R&D mode for the time being) and there is a joint effort between ALADIN (Belgium) and HIRLAM (Norway) in order to extend the ALADIN-model EPS downscaling to the GLAMEPS system (over 2008-2009).

Item "2", as concerns surface initialization, has been addressed in the course of 2008, by testing the interpolation of the Soil Wetness Index field given by IFS/Tessel for use in the Aladin surface scheme (presently ISBA, soon its extended successor SURFEX). There is an ongoing collaboration between Météo-France and Portugal on this topic.

The efforts within SPFRCOUP also have some common ground with the SRNWP/Interoperability project, triggered by Eutmetnet, in which ALADIN, HIRLAM and ECMWF are participating. This project runs over 2009-2011.

A specific request, formulated by the LACE countries participating in SPFRCOUP, was to redirect some resources from this Special Project towards a test installation of a reference LACE NWP system, in R&D mode. Although this effort does not specifically address coupling issues, I (the P.I.) have accepted to leave some of the S.P. resources to that exercise, as it falls under one general goal of the proposal ("provide Aladin non-full ECMWF member states access to HPCF facilities and resources"). It is understood that this configuration would not, in the frame of this S.P., become a real-time, operational or routine application. This project has however not been retained as a high priority one for RC-LACE, and is not dimensioning for the resource request or the duration of the S.P.

In line with the new regulation for Special Projects, the proposed continuation of SPFRCOUP runs over the next two years only (2010-2011), as a first prolongation has already been accepted (2009). Resource requests for the coming 2 years have been kept stable with respect to the previous three years.