

RECENT STATUS AND PLANS FOR LAMEPS RESEARCH AT THE ALADIN CONSORTIUM

Introduction

At the moment it is not very easy to construct a coherent and full planning on limited area ensemble prediction for the ALADIN project and it is due to the fact that on the one hand the manpower devoted to that project is still relatively small (but shows growing tendency) and on the other hand there are plenty of scientific issues to be addressed in the short and medium term, where prioritisation is needed together with efficient share and distribution of work. This document tries to make an attempt first, to summarise the recent ALADIN activities on LAMEPS and second, to give a list of topics of potential interest, where work might be shared between ALADIN and HIRLAM projects. Certainly all this would serve just a first guess with expected iterations afterwards arriving to a consensual common work plan for the end of the year.

Ongoing and planned work for 2005

Country	Ongoing work	Person(s) involved
Austria	Development of breeding algorithm, dynamical downscaling of ECMWF EPS, Ensemble Transform (ET), Ensemble Transform Kalman Filter (ETKF), posteriori bias correction for EPS	Alexander Kann, Yong Wang
Belgium	???	Stephane Vannitsem
Bulgaria	---	---
Croatia	Downscaling of ECMWF EPS forecasts	Cedo Brankovic, Stjepan Ivatek-Sahdan
Czech Republic	Familiarisation with recent activities on LAMEPS	Richard Mladek
France	Operational execution of the PEACE system in Toulouse, no manpower for development at the moment	Jean Nicolau
Hungary	Development of verification and visualisation package, sensitivity of global singular vector computation to the target domain and time interval, downscaling of ECMWF EPS forecasts, adaptation of breeding	Edit Hágel, Balázs Szintai
Moldova	---	---
Morocco	Multi-analyses and multi-guess system with 36 members (the evaluation of the first results is ongoing)	Rachida El Ouaraini
Poland	---	---
Portugal	---	---
Romania	Scaled Lagged Average Forecast (SLAF), identification of dynamically sensitive sub-regions	Mihaela Caian
Slovakia	Interest for running EPS system, but no development at the moment	---
Slovenia	---	---
Tunisia	---	---

Remarks:

- Several countries (Austria, Belgium, Croatia, Czech Republic, France, Hungary, Slovakia, Slovenia) are taking part in the SRNWP PEPS project for providing operational model outputs for a multi-model ensemble system (HIRLAM participants: Denmark, Finland, Ireland, the Netherlands, Norway, Spain).

Plans for short and medium term

Preamble: Ensemble forecasting is a very popular and modern field in numerical weather prediction, however we have to be very careful while planning, taking into account available resources and more importantly develop the necessary tools on a sound scientific basis (there is a real danger to follow a popular trend without considering the scientific details and understanding without sufficient care).

Objectives: to give a probabilistic guidance to the forecasters and end-users on top of the existing deterministic type of forecasts especially for high-impact severe weather situations

Questions: For the time being there are more questions than answers, therefore the main question is what manpower shall we devote for the LAMEPS project (so what is the relative importance on the work on predictability with respect to other emerging topics of the project) and what topics to be considered as priority ones for solution at the moment?

- How can we provide reasonable sampling of the initial uncertainties of the atmosphere on the mesoscale?
- How can we account for model deficiencies (formulation, physical parametrisations etc.)
- How can we consider the lateral boundary conditions, while producing ensemble forecasts on short range?
- What is the best way to evaluate and statistically correct the raw ensemble outputs?

Potential problems of interest: hereafter a brief, somehow voluntary (and surely not exhaustive) list of possible topics is shown (without any priority order).

- Validation, calibration, posteriori bias correction: the verification and special post-processing aspects are always forgotten or at least not considered as important scientific contribution. At the moment we do have some basis for visualisation and verification tools. Shall we make them as standard (inside the group) and moreover extend them for post-processing (calibration, bias correction) of the ensemble outputs?
- Targeting of global singular vectors: there were quite a few activities on that area providing very small improvements on the EPS system, therefore this topic is not considered as an emerging one for the future (one should rather concentrate on the computation of local perturbations for the LAM).

- Combination of different sets of global singular vectors using different targeting (space and time) for providing initial conditions for the LAM: the idea behind is that the global system's singular vectors are complemented by another additional set of global singular vectors, where the spatial and temporal targeting might be significantly different than in the original setting. The combination of the two sets would provide the initial conditions for the LAMEPS system and certainly the boundary conditions would come from the global system using just the first set of vectors. Some preliminary work on that field was already carried out.
- Direct dynamical downscaling of ECMWF EPS forecasts: there is ongoing work at the COSMO Consortium (COSMO-LEPS, Italy) and some preliminary trials are ongoing in the ALADIN one. These activities are rather concentrating on a bit longer range (than the short range) for providing an improvement for the ECMWF EPS products in the time ranges, where LAM-s are not yet fully determined by their boundary conditions.
- Stochastic physics
 - The use of different tuning parameters for some physical parametrisation schemes as for instance (some work was already carried out at Meteo France with the ARPEGE EPS system)
 - * stratiform precipitations and turbulence schemes
 - * resolved precipitations in the deep convection
 - *dynamical humidity convergence weighting according to the horizontal resolution
 - * radiation scheme parameters
 - * variation of the lateral training ratio in the convective cloud
 - * variation of the minimum critical thickness of the raining cloud
 - Using different physical parametrisation packages as for instance
 - * convection: Kain-Fritsch, Bougeault.....
 - * microphysics: Lopez, simplified Kessler-type.....
- Computation of (moist) singular vectors: it would seem natural to use the “singular vector approach” for limited area models as well, nevertheless there are plenty of scientific and technical problems to be solved for a successful work on that area: how to treat the “moist” processes, can the existing simplified parametrisation schemes (and their tangent linear and adjoint) be used for mesoscale applications, how the boundary conditions are treated etc. It is thought that it is worthwhile to devote manpower to this project only if a “critical mass” can be achieved with the promise of results on the longer time range.
- Breeding: the breeding method is a challenging choice due to its relative simplicity, however there are inconsistency problems to take over if we would like to insert a LAM system using breeding but coupled by a global system using singular vector-based EPS. Therefore this incompatibility problem needs very special care for investigations.

- Impact of different boundary conditions for the EPS integrations: investigation of the impact of the different lateral boundary conditions for the LAMEPS run (see also above)
- Ensemble Transform (ET) and Ensemble Transform Kalman Filter (ETKF): this procedure might explicitly take into account the analyses errors provided by the data assimilation algorithm into the EPS system and which provides some merging of data assimilation and EPS research. It is thought to be a future challenge, but is the time ripe to start to work on that in depth?
- Research demonstration project for Beijing Olympics (RDP/B08): this project is put to the forefront by ZAMG (Austria) with the following ideas:
 - Downscaling of ARPEGE EPS together with multi-physics approach for ALADIN
 - Downscaling of ECMWF EPS together with multi-physics approach for ALADIN
 - ALADIN breeding and Ensemble Transform (ET) with different boundary conditions (ARPEGE, ECMWF, NCEP)
 - ALADIN Ensemble Transform Kalman Filter (ETKF) coupled with ECMWF EPS and/or ARPEGE EPS
- THORPEX, EURORISK: how we can coordinate our possible common participation on big European projects (maybe under the EUMETNET/SRNWP umbrella?). It is believed that coordination will be a key issue for the future and it is also valid for overall European and maybe world level. At the moment inside SRNWP the coordination on LAMEPS is no satisfactory, shall we make an attempt to initiate stronger collaborative efforts inside Europe?
- Distributed exploitation of ensemble systems: shall we target a distributed exploitation of a common ensemble system? Is it the right time to discuss such issues?