LACE Projects

2008 -2010 overview

by RC LACE Management Group:

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- Data assimilation
- Physics
- Dynamics and Coupling
- Predictability

"Toward an operational implementation of the NH dynamics"

Responsible for the project: **CHMI, Prague**

Main objective: to deliver stable, accurate and efficient NH dynamics, ready for operational implementation in the model ALADIN.

Project results/Achievements

NH dynamics ready for an operational use

The smooth transition from the hydrostatic dynamics to the NH one

Affordable NH dynamics - additional 8% of CPU time in terms of ALADIN/CE

Implementation and results

parallel tests and specific case studies

the NH dynamics brings no extra benefit for the models with resolution between 4-5 km and +60 vertical levels.

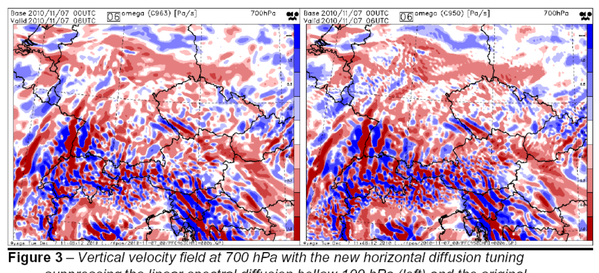


Figure 3 – *Vertical velocity field at 700 hPa with the new horizontal diffusion tuning suppressing the linear spectral diffusion bellow 100 hPa (left) and the original situation with the linear spectral diffusion complementing the SLHD scheme (right). Note specially the small scale noise nicely visible above central Germany.*

"Operational ALARO configuration at scales around 5km mesh-size"

Responsible for the project: **CHMI, Prague**

Main objective: good quality model forecasts at the scales around 5 km mesh-size

Efforts in ALARO development

- Turbulence scheme TOUCANS - to improve PBL processes
- Radiation -new fits of gaseous broad band transmission functions
- Cloudiness - tests and implementation convection scheme 3MT

Results ALARO 5km

Improvements of cloud cover, precipitation, radiative fluxes and temperature and humidity structure of the atmosphere

Implementation: ALARO 5km operative at Au, CZ, Ro, Si,Sk….

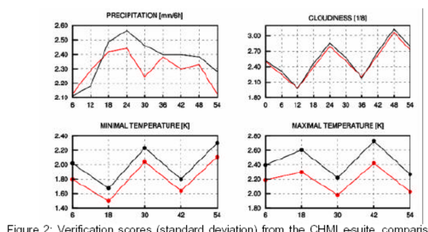


Figure 2: Verification scores (standard deviation) from the CHMI e-suite, comparison of forecasts at 9.6 km (black) and 4.7 km (red) for period between 26 August and 20 September 2010.

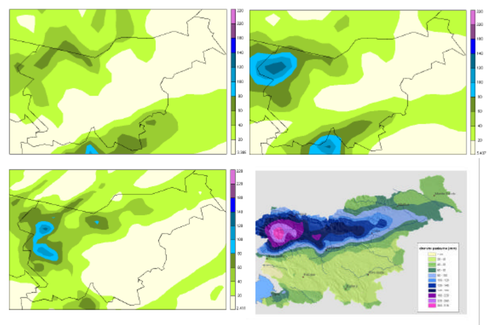


Figure 4: 24h precipitation amounts for the 18 September 2007, available forecast at that date at 9.6 km (top left), forecast with current model version at 9.6 km (top right) and at 4.4 km (bottom left) at EARS and analysis based on measurements (bottom right).

The results *of LACE Projects are elaborated in* ***one PhD theses*** *and published at* ***twenty two scientific papers***

Sharing the operative applications in

OPLACE – *Observation Pre-processing for LACE for Data Assimilation*

Operative meso-scale EPS system ***ALADIN-LAEF*** *for LACE*

Summary of means 2008-2010: 267 person.months R&D

"Development of an operational data assimilation system for LACE"

Responsible for the project: **HMS, Budapest**

Objectives: full NWP system with Data assimilation of local HR observations at each LACE Member

Aim: to improve the short-range weather forecast of the ALADIN model through the improvement of its initial conditions

Project results/Achievements:

- **Centralized pre-processing of observations OPLACE**
- **Installation of atmosph. (3DVAR) and soil (CANARI OI) analysis in LACE centers**
- **Enhanced use of high frequency observations**
- **Use of high resolution observations, local observations**

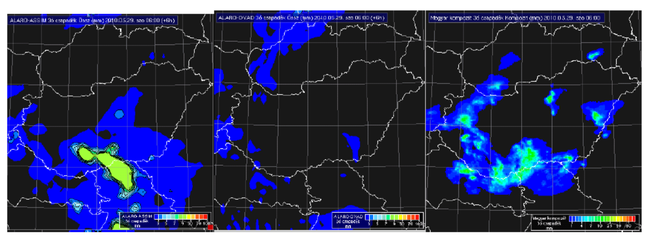


Figure 2: A case study (29.05.2010) demonstrating the improvement of the short-range (+6 h) precipitation forecast (3 hour accumulation) by data assimilation. Left: run with assimilation, Middle: run without assimilation, Right : Radar

"ALADIN-LAEF research and application for LACE"

Responsible for the project: **ZAMG, Vienna**

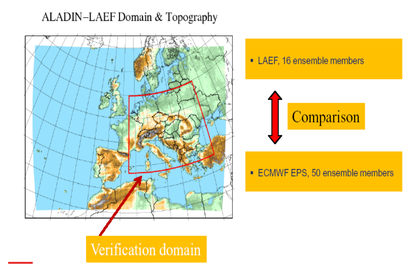
Objectives: to improve LAEF ALADIN dynamical downscaling of the first 16 perturbed ECMWF EPS members for having initial condition perturbations and lateral boundary perturbations.

Project results/Achievements:

Quality **Research** on BBSM (Blending/Breeding, Surface perturbation with non-Cycling Surface Breeding (NCSB), Multi-physics for model perturbation), implementation of BBSM in LAEF, and post-processing.

Reliability: SMS , Time critical Application II, monitored ECMWF staff.

Availability: LAEF forecast in MARS/ECMWF and LAEF probabilistic charts on LACE WEB, operationally available for all the LACE partners.



LAEF: Limited Area Ensemble Forecasting

Ensemble Size	16 +1
horizontal resolution	18 km
Vertical resolution	37 levels
Runs/day	2 (00,12UTC)
Forecast range	60h
Time step	720s
Coupling-model	ECMWF SV EPS
Coupling-update	6h

Atmosphere perturbation: Blending ALADIN Bred + ECMWF SV

Surface perturbation: Non-Cycling surface Breeding

Model perturbation: multi-physics

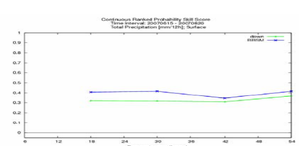


Figure 1. Comparison of Continues Ranked Probability Skill Score of 12h accumulated precipitation between LAEF in 2010 (BBSM, in blue) and LAEF in 2008 (DOWN, in green); averaged CRPSS statistics over central Europe and a two-month summer period.