



Hungarian Meteorological Service(HMS)
Division for Numerical Modelling and Climate Dynamics

Status and Developments of ALADIN LAMEPS at the Hungarian Meteorological Service (HMS)

Máté Mile(mile.m@met.hu), ***Mihály Szűcs***(szucs.m@met.hu)
(***Edit Hágel***(hagel.e@met.hu))



Outlines

- **Introduction of the ALADIN LAMEPS system at HMS**
 - **PEARP global ensemble system**
 - **Characteristics of the LAMEPS**
 - **Verification results**
- **Research areas**
- **Plans and opportunities**

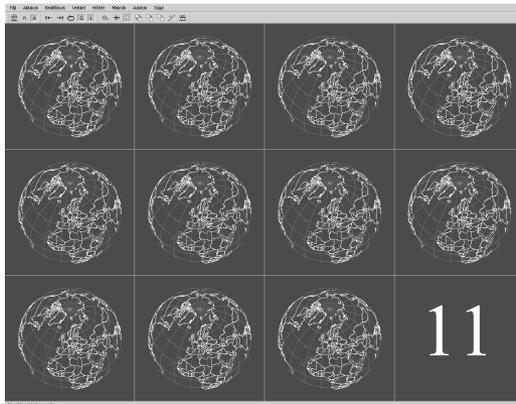


The evolution of the PEARP and the LAMEPS

	2008	2009	2010-
LAMEPS(Hu)	Quasi-operational phase	Operational phase	Operational phase
PEARP	PEARP1.5 edition	PEARP1.5 edition (PEARP upgrade 8th Dec. 2009)	PEARP2.0 edition

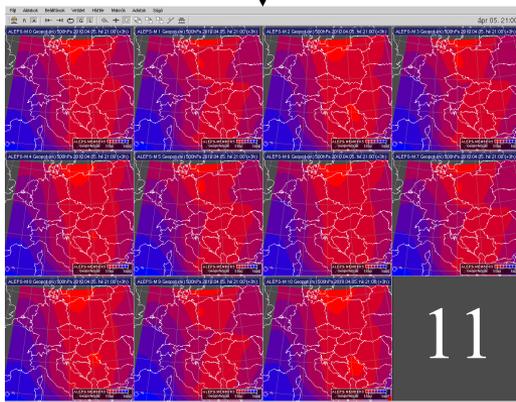


The evolution of the PEARP and the LAMEPS



PEARP 1.5

- ARPEGE model
- Perturbations: Targeted SV
- Ensemble members: 11
- Runs: 18 UTC up to 108h



LAMEPS(Hu)

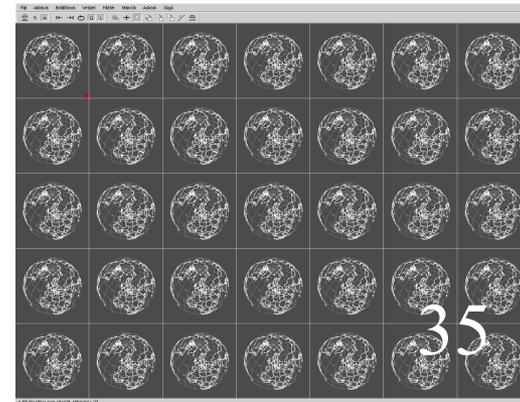
- ALADIN model
- Perturbations: - (simple downscaling)
- Ensemble members: 11
- Runs: 18 UTC up to 60h



The evolution of the PEARP and the LAMEPS

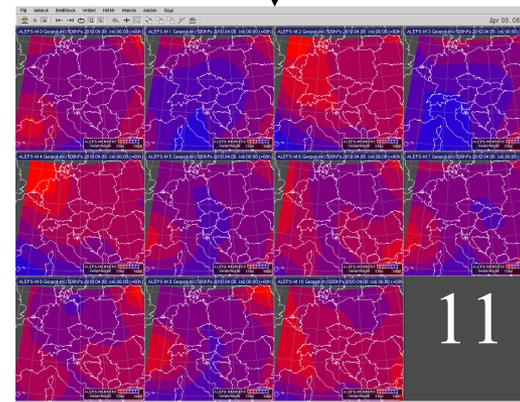
PEARP 2.0

- ARPEGE model
- Perturbations: EDA & Targeted SV
- Ensemble members: 35
- Runs: 06; 18 UTC up to 108h



LAMEPS(Hu)

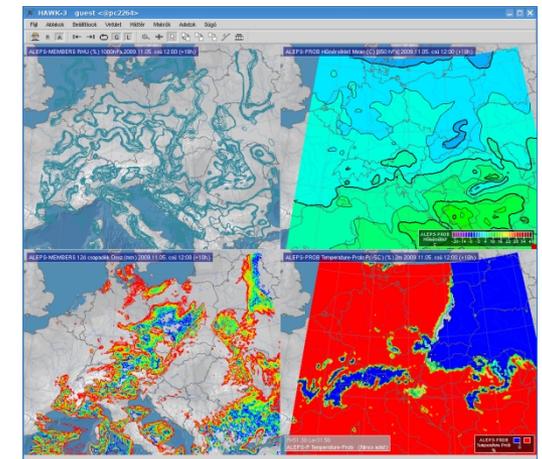
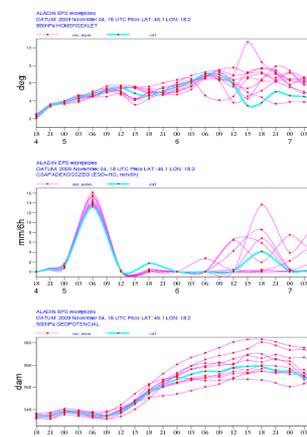
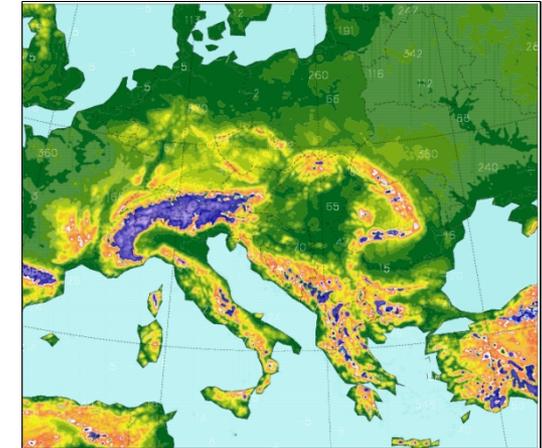
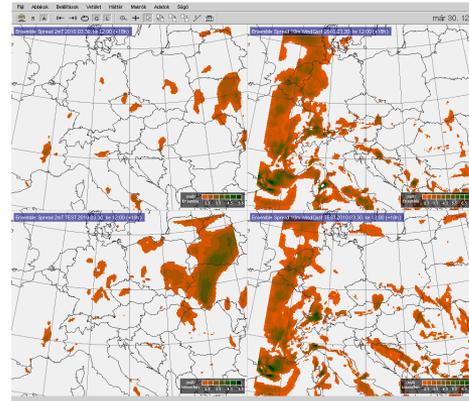
- ALADIN model
- Perturbations: - (simple downscaling)
- Ensemble members: 11
- Runs: 18 UTC up to 60h





The characteristics of the LAMEPS

- ALADIN model
- simple downscaling of the PEARP without local perturbations
- Ensemble members: 11 (first 11 members of PEARP2.0)
- Runs: 18 UTC up to 60h
- Horizontal resolution: 12 km
- Vertical levels: 46
- Integration domain: LACE domain (fig.)
- Visualisation (Main parameters, probability charts, plume diagrams)





Verification of the LAMEPS

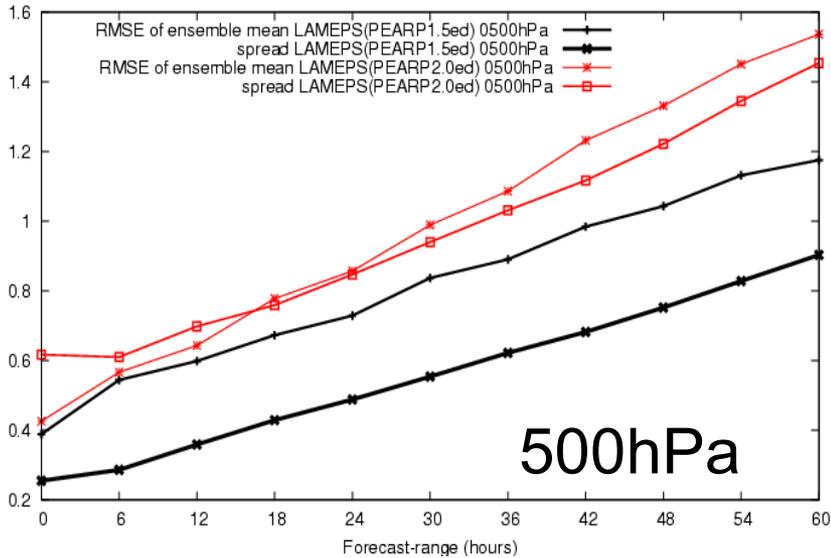
- Verification time intervals:
 - LAMEPS(PEARP1.5) – 01/01/2009-07/12/2009 (black curves)
 - LAMEPS(PEARP2.0) – 08/12/2009-07/03/2010 (red curves)
- Parameters: Geopotential; Temperature; Wind speed
- Levels: 500; 700; 850 and 1000 hPa
- Verification against ECMWF analysis
- LACE Common Verification Package



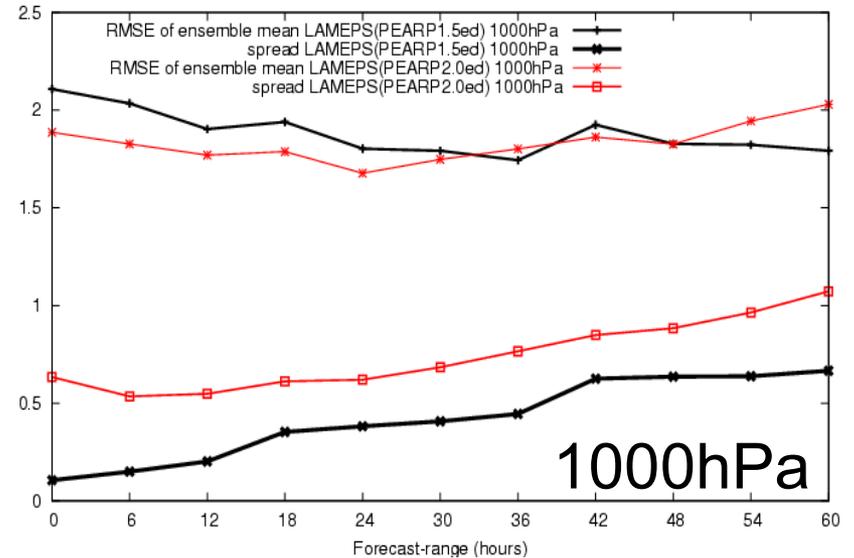
Verification of the LAMEPS (Temperature)

RMSE-Spread relationship

RMSE - SPREAD, ALADIN LAMEPS(Hu)
Time interval:
LAMEPS(PEARP1.5ed): 01/01/2009 - 07/12/2009
LAMEPS(PEARP2.0ed): 08/12/2009 - 07/03/2010
Parameter: Temperature ; Level: 0500hPa



RMSE - SPREAD, ALADIN LAMEPS(Hu)
Time interval:
LAMEPS(PEARP1.5ed): 01/01/2009 - 07/12/2009
LAMEPS(PEARP2.0ed): 08/12/2009 - 07/03/2010
Parameter: Temperature ; Level: 1000hPa

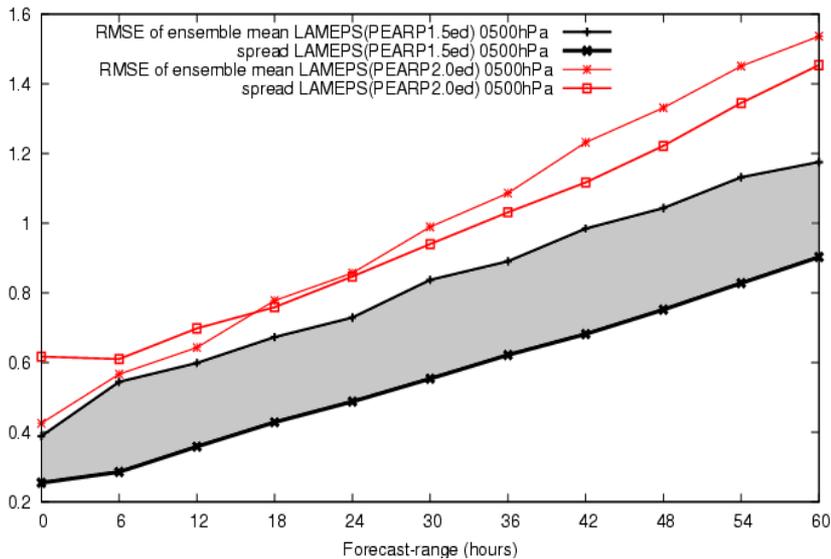




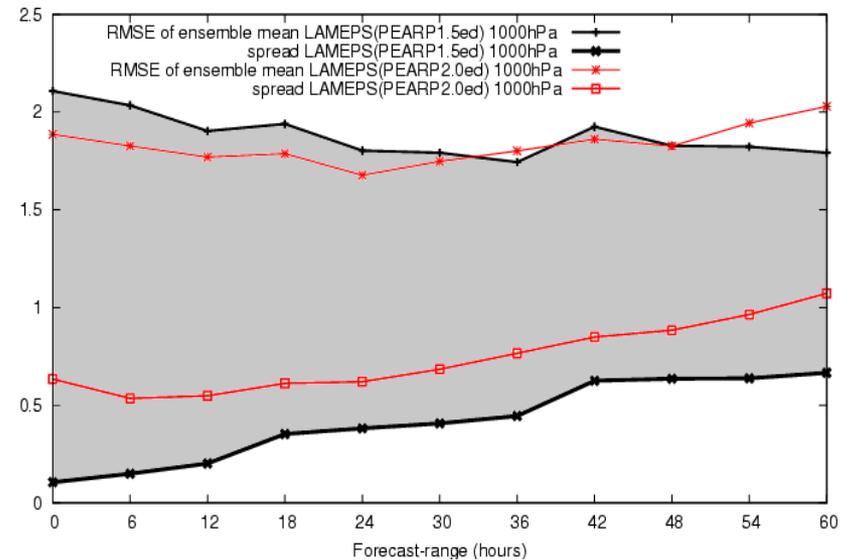
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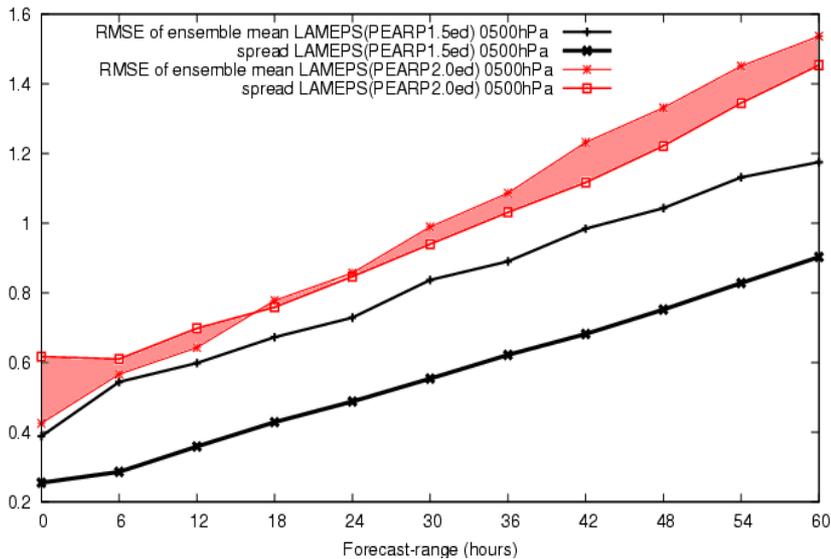




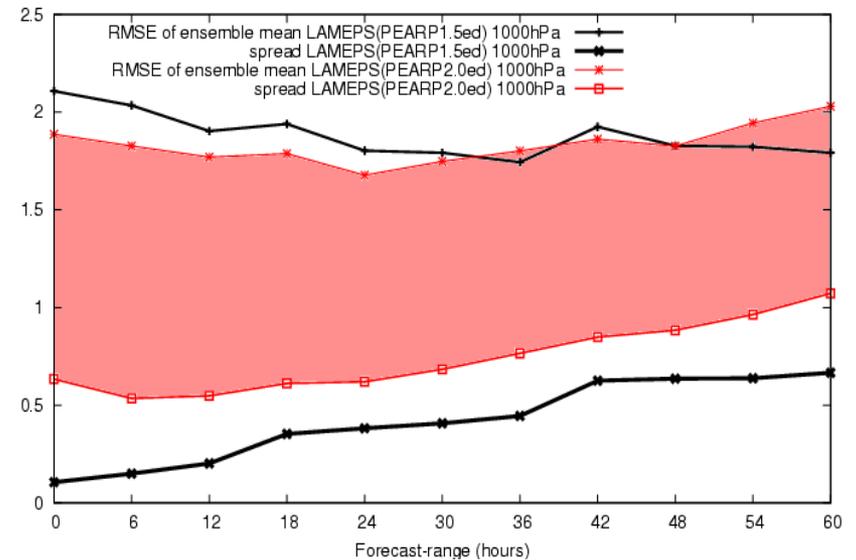
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RMSE-Spread relationship

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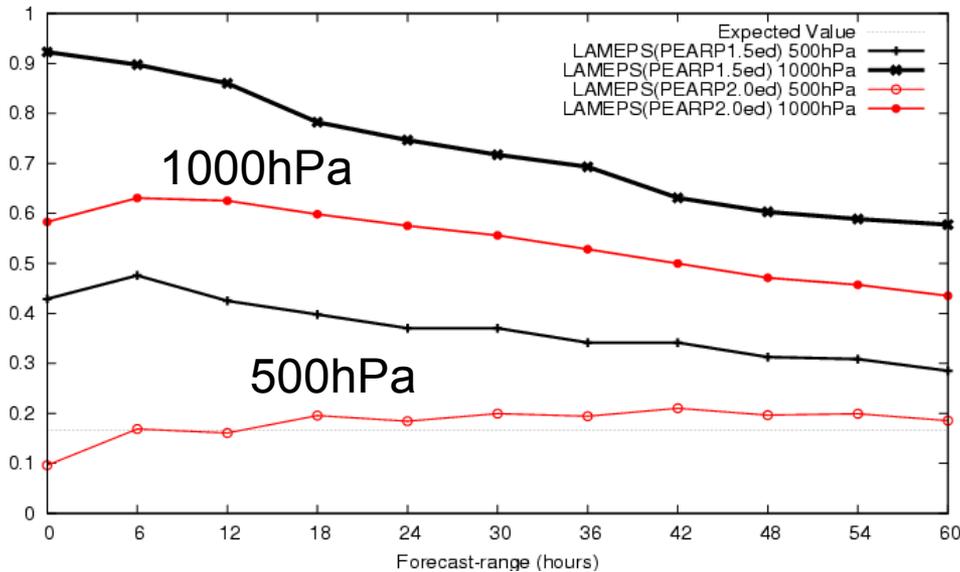
RMSE - SPREAD, ALADIN LAMEPS(Hu)
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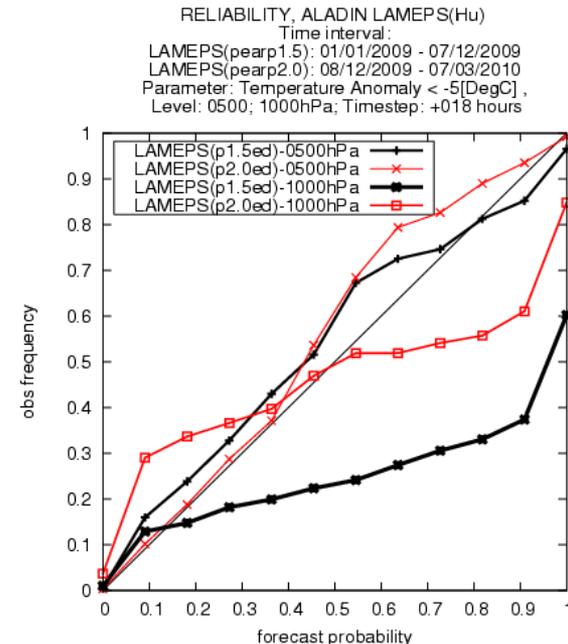


Verification of the LAMEPS (Temperature)

Percentage of outliers, ALADIN LAMEPS(Hu)
 Time interval:
 LAMEPS(PEARP1.5ed): 01/01/2009 - 07/12/2009
 LAMEPS(PEARP2.0ed): 08/12/2009 - 07/03/2010
 Parameter: Temperature; Levels: 500;1000 hPa



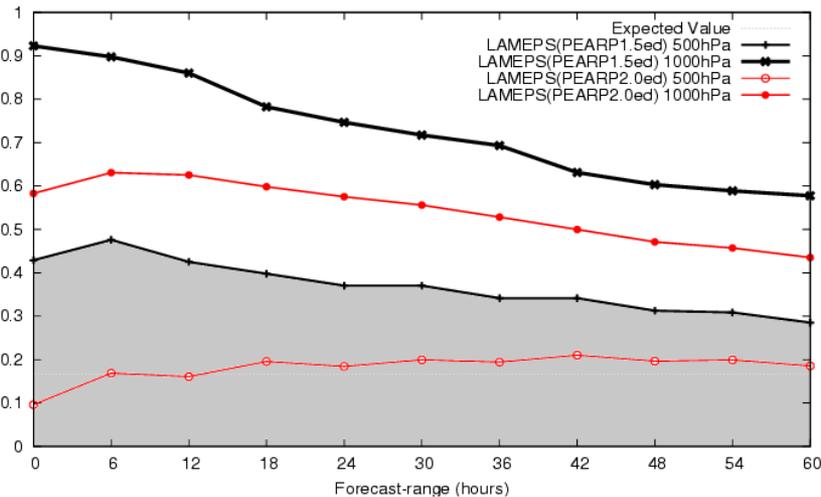
Per. of Outliers; Reliability



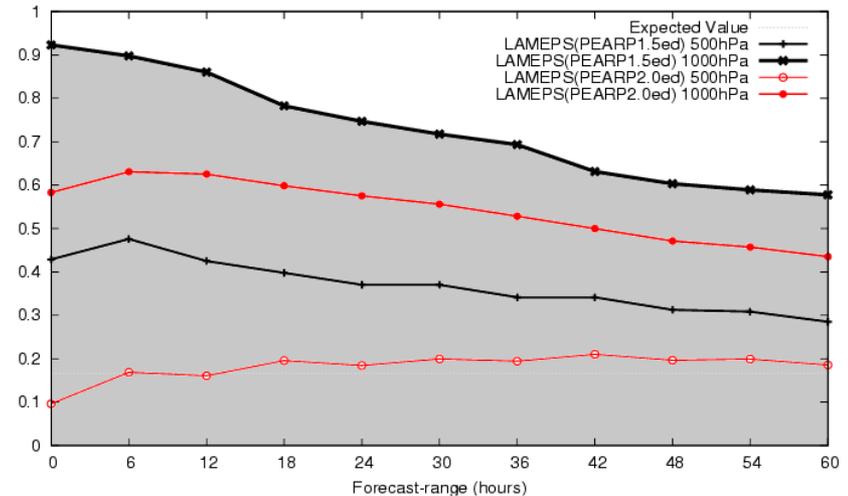


Verification of the LAMEPS (Temperature)

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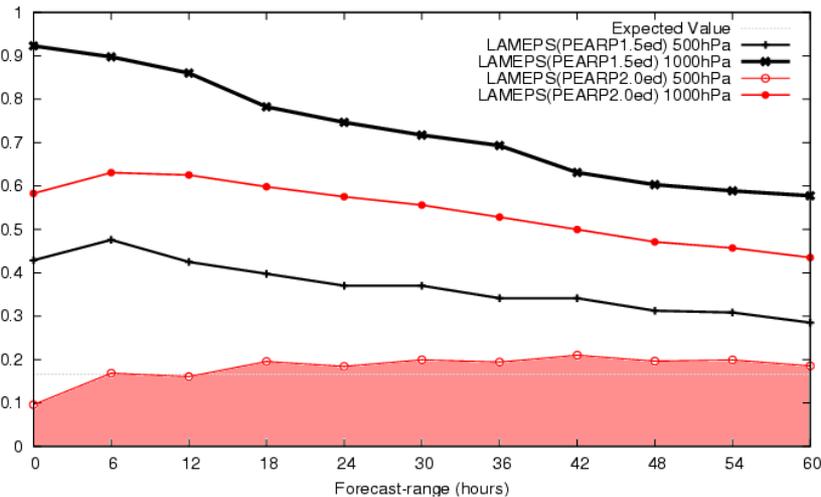


Per. of Outliers; Reliability

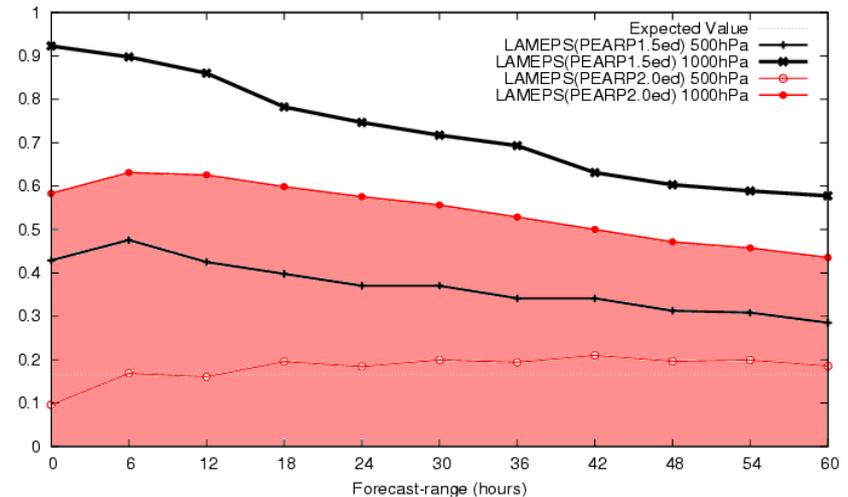


Verification of the LAMEPS (Temperature)

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Percentage of outliers, ALADIN LAMEPS(Hu)
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Parameter: Temperature; Levels: 500;1000 hPa



Per. of Outliers; Reliability



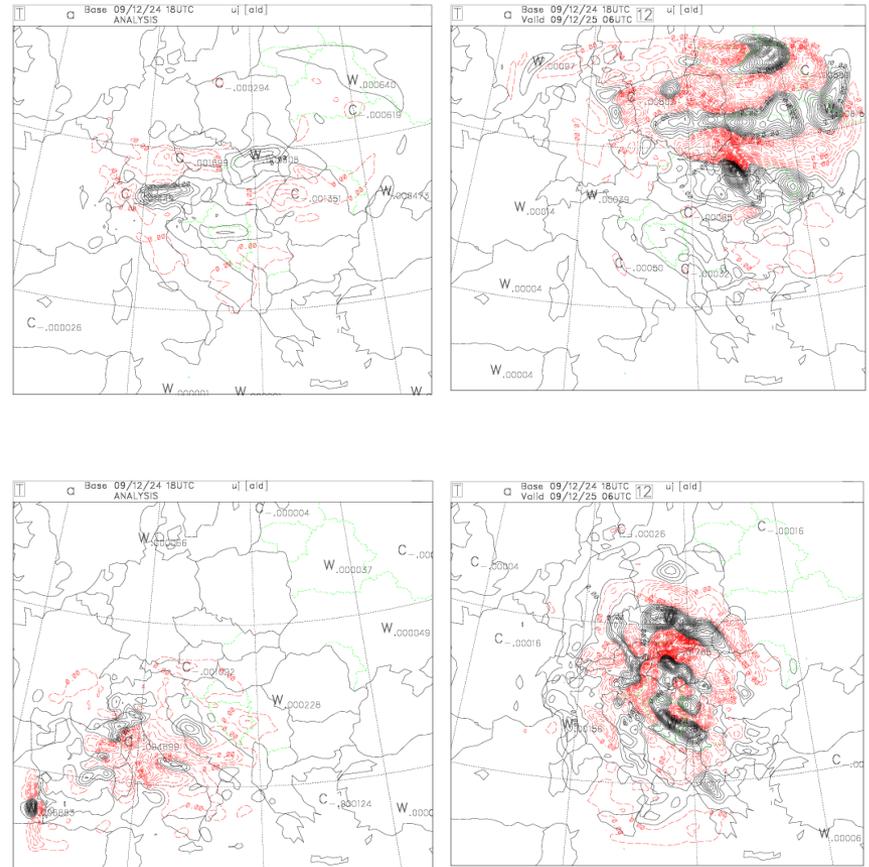
Developments & Researches

- Generation of local perturbations:
 - ALADIN singular vector experiments
 - CANARI Surface Perturbation



ALADIN singular vector experiments

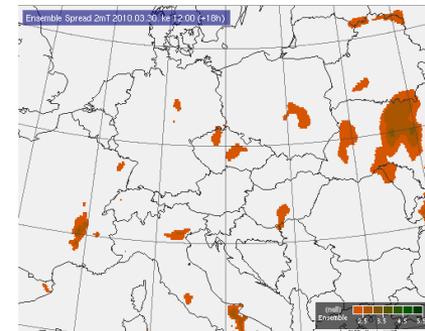
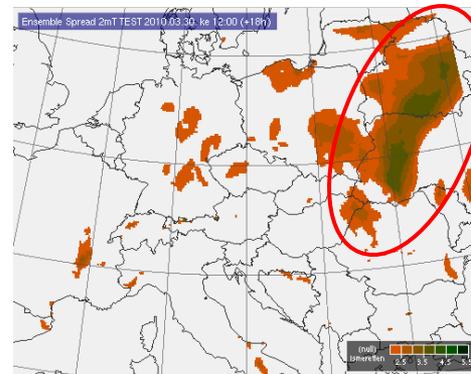
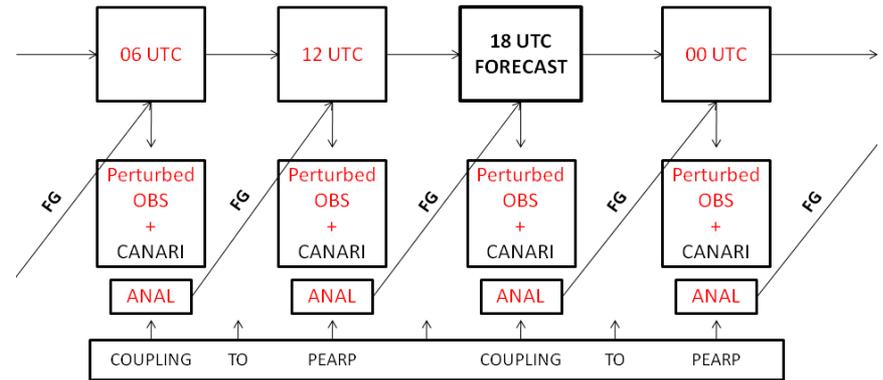
- Sensitivity studies of the singular vector regarding to the optimization domain
- Optimal scaling of the perturbation amplitudes
- Examining the effect of the lateral boundary conditions





Surface Perturbation

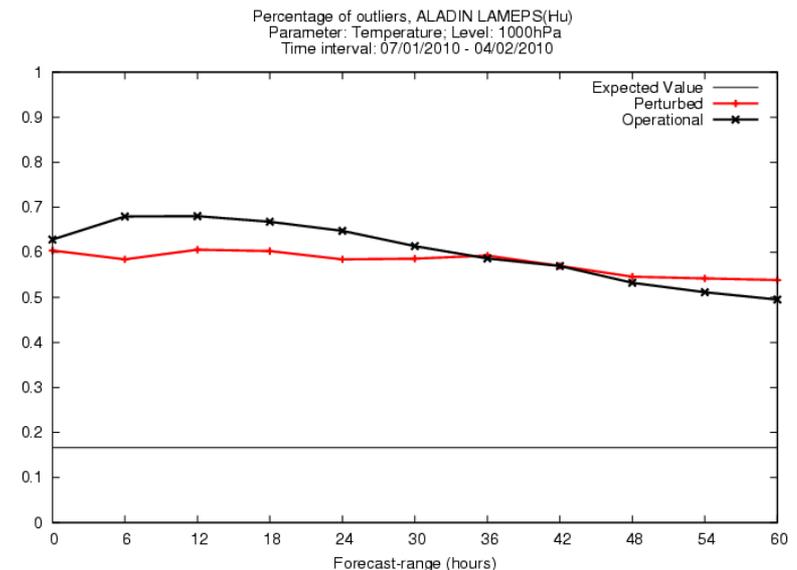
- 6 hours CANARI OI data assimilation cycle
- Perturbation of the input observations
- Amplitude of the perturbation represents the observation errors





Surface Perturbation

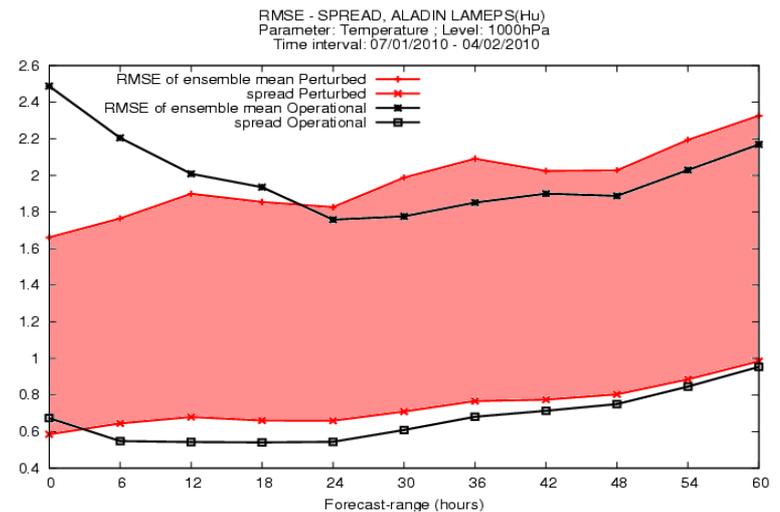
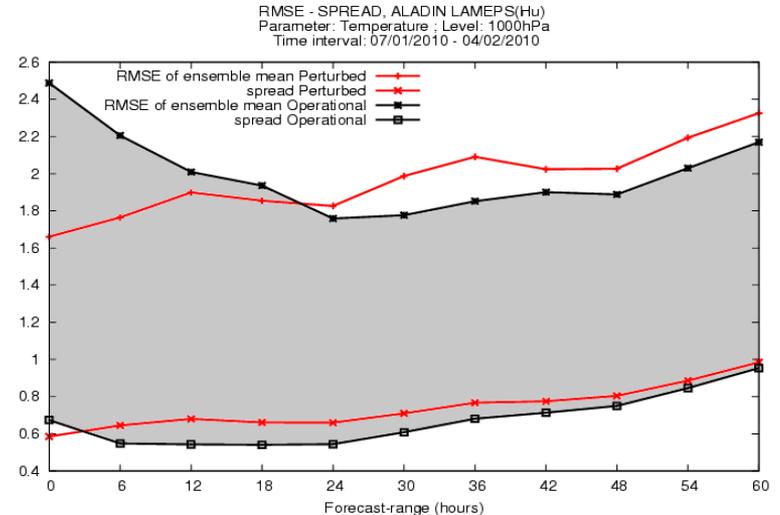
- Experimental LAMEPS runs with perturbed initial conditions: 07/01/2010-04/02/2010
- Preliminary verification results





Surface Perturbation

- Small improvement in lower levels and initial forecast ranges
- Bigger error in extended forecasts





Further Plans

- Tests with the downscaling of PEARP 2.0 (clustering)
- Tests with the downscaling of ECMWF/EPS
- GLAMEPS cooperation
- Further developments with ALADIN singular vectors and CANARI surface perturbation



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Thank you for your attention!
Thanks to the colleagues!
Questions?