The operational suite

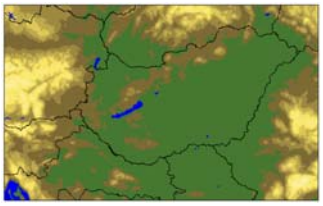
There were 4 important changes in the operational version of the ALADIN/HU model during the year 2010:

- The operational system was moved from CY33T1 to CY35T1 (December 2010)
- AROME is used operationally (December 2010)
- The above systems were moved to our new computer (IBM Linux cluster 500PE)
- The LAMEPS system is coupled to the PEARP2 global EPS system

The main characteristics of the recent deterministic operational suites:

ALADIN/HU:
- cycle: CY35T1
- Horizontal resolution: 8 km
- Vertical levels: 49
- Grid: linear
- Lateral boundary conditions: ECMWF
- Data assimilation: 3d-var with 6h cycling, Canari (OI) at the surface
- Observations: SYNOP (geopotential, humidity, temperature), TEMP (temperature, wind components, humidity, geopotential), AMDAR (temperature, wind components), ATOVS:AMSU-A and AMSU-B radiances, MSG/GEOWIND (AMV), SYNOP SHIP, WINDPROFILER, SEVIRI.
- Observations for OI: SYNOP (T2m, RH2m)
- Production is performed 4 times per day: 0 UTC (+54h), 6 UTC (+48h), 12 UTC (+48h), 18 UTC (+36h).

AROME:



- cycle: CY35T1
- Horizontal resolution: 2.5 km
- Vertical levels: 60
- Grid: linear
- Lateral boundary conditions: ALADIN/HU
- Data assimilation: no (interpolated analysis from ALADIN/HU)
- Production is performed 4 times per day: 0 UTC (+36h), 6 UTC (+30h), 12 UTC (+24h), 18 UTC (+18h).

The main characteristics of ALADIN EPS model version are as follows:

- Downscaling of the first 11 members of PEARP2 (later PEARP3)
- Horizontal resolution: 12 km
- Domain covering continental Europe (LACE domain)
- Vertical resolution: 46 levels
- Integration once per day to 60h starting from the 18 UTC data
- 6 hours coupling frequency

Parallel suites during the period:

- CY35T1 for assimilation and production

- ALARO physics + IDFI in assimilation and production
- RUC (3h frequency) with VARBC

Developments

The main scientific developments for 2010 can be summarized as follows:

- DATA ASSIMILATION:

1. Three sampling methods were compared for the background error structure function computation. The operational 3DVAR uses structure functions sampled by downscaling the ARPEGE ensemble assimilation system (EnVar). It was first compared with the downscaling of the ECMWF ensemble assimilation system (EDA). As a next step local analysis perturbations were added, completing the downscaled EDA system. Two ways of generating local analysis perturbations were compared, namely LAM ET (Ensemble Transform) and LAM EDA (random perturbation of the observations used in the analysis similarly to EnVar and EDA in the global models). The local analysis perturbations are found to be useful, improving the structure functions.

2. An ALADIN RUC (3h frequent) system was under comparison with respect to the operational 6h frequent cycling. It was found that a 3h frequent update of the variational bias correction coefficients degrades the RUC results, so rather a daily update is used finally even in the 3h cycling.

3. The surface assimilation in ALADIN SURFEX (OI MAIN) was tested over a summer period with respect to an ALADIN reference running with SURFEX but without surface assimilation (both experiments were run with 3DVAR assimilation for the atmospheric part). The OI MAIN assimilation reduced the T2m, RH2m bias, improved the precipitation forecast but degraded the scores of higher levels.

- AROME:

1. The LBC coupling of AROME was tested with different driving models, namely the ALADIN/HU and the ECMWF model. First results show that the coupling to ALADIN gives better scores up to 18-24 hours but for longer lead times the coupling to ECMWF performs better. This may come from the effect of the local assimilation in ALADIN, which implies that these experiments might be repeated once AROME will have its own assimilation suite. Subjective comparisons are also done (they are under evaluation).

2. Tests with the EDKF shallow convection scheme were done (comparing it with the presently operational KF scheme). EDKF improves the precipitation patterns in terms of visual comparison (less spotty pattern).

- LAMEPS:

1. The effect of the PEARP upgrade (PEARP1.5 to PEARP2) on the LAMEPS system was studied. The study consisted of EPS score comparisons between the downscaled PEARP1.5 and PEARP2 systems, in order to get an idea how the operational LAMEPS performance changed by the upgrade of the global system. The main result found is that the spread for the short lead times is increased

when downscaling PEARP2, still keeping a good spread-skill comparison.

2. The downscaling of the PEARP system was completed by local surface perturbations. The surface perturbations are based on random perturbation of observations in local OI (CANARI) assimilation runs in each member of LAMEPS. As a result, the spread is further increased (mostly for short lead times) but the rmse as well (except for some levels near the surface).