

35th EWGLAM & 20th SRNWP meetings Antalya, 30 September – 3 October, 2013

THE NWP SYSTEMS AT METEO-FRANCE with contributions from the CNRM/GMAP staff Météo-France





New HPC at MF





ARPEGE-ALADIN operational suites

Recent operational changes to the ARPEGE/ALADIN suite Current cycle CY38T1 op1 that became operational on the 2nd of July 2013

Observations

- satellite data from new instruments : Suomi-NPP/ATMS + CriS radiances, Oceansat-2/OSCAT winds, CSR from GOES-13 and GOES-14, METOP-B instruments (IASI, AMSU-A, MHS, GRAS, ASCAT) - Additional observations from current instruments : METOP-A/GRAS, METOP-A/IASI WV channels, Aqua/AIRS, SSMI/S sounding channels, METOP-A/MHS

4D-Var ARPEGE assimilation system : wavelet approach for a flow dependent B matrix from an ensemble data assimilation ensemble

<u>ARPEGE and ALADIN models</u> : changes to the shallow convection scheme, improved description of surface properties over ice caps (thermal inertia, albedo, roughness length)

Over sea 101 LW-T channels + 9 WV channel





AROME Ensemble Prediction system

PEAROv1 (will be operational by end 2014) :

- AROME-France model running every 6 hours to ~40-h range
- -~10members at 2.5km resolution (vs 1.3km for the deterministic AROME-France in 2014)
- Perturbations :
- *initial upper-air: rescaled & centered perturbations from global PEARP ensemble (with 8km local resolution)
- *initial surface: correlated random perturbations of SST, soil moisture/humidity, snow, physiographies
- *lateral boundary conditions: 10 members selected from the 35-member PEARP ensemble (by clustering)
- *model error: SPPT (stochastic perturbation of physics tendencies), similar to ECMWF EPS
- Future plans:
- * increase ensemble size
- * initial perturbations using AROME ensemble data assimilation



Mean Zrefl850(mm/h) 2012072618+21



Figure 4: ensemble mean prediction of 850hPa reflectivity on a

AROME operational suite

CY38T1-op1, oper since 2nd July 2013 :

- 750x720 points per 60 vertical levels, with 2.5km horizontal gridmesh. The model time step is 60s. On 48 processors of the NEC SX9, 30h forecasts can be produced in 2400s elapse. AROME is hourly coupled with ARPEGE and is running on 5 daily production runs (0,3,6,12,18), for a 30 h range (except r12 +36h). Its assimilation is based on a 3 hourly RUC including radar data (reflectivity and doppler winds)

Compared with previous CY37T1 op1 suite :

- More satellite observations used as in ARPEGE (cf ARPEGE-ALADIN section)
- Specific observations for the AROME 3D-Var :
- additional AMSU-A radiances.
- METEOSAT-10/SEVIRI radiances over land. Doppler winds from one X-band radar (Mt Maurel)
- surfex v7.2, SBL scheme switch off over sea.
- new clim files for post-processing domain (orography).



Figure 7 : T2M EQM scores, 03 TU forecasts between 20130426 and 20130606

Preparation of 2014 AROME-France-1.3km configuration :

- Horizontal and vertical grids are chosen (1440x1536x90), with dt=45s (PC iterative scheme used)
- Dayly experimental runs (without data assimilation) since June 2012 with encouraging results (no numerical pbs, more realistic convective cells, precipitation scores improved ...):





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Figure 3: fog probabilities derived from a lagged (10+10 members) PEARO ensemble.

thundery day, spatially smoothed by pooling together the neighbouring forecast PDFs within a 25-km radius. This alleviates the inability of the ensemble to sample all possible cloud location errors, due to the small ensemble size.

0.2

0.3

0.4



Figure 5: left, (raingauge+radar) analysis of precipitation accumulated over 48h during Medicane Rolf. The pink area delineates precipitation larger than 100m. Right, forecast probabilities predicted by a 48h-run of the PEARO ensemble. There also are high probabilities of exceeding 100mm (not shown) over the relevant area.

Figure 6: ROC diagram for 3-h precipitation, compared between PEARO (red) and DWD's COSMO-DE-EPS (green), over a common ensembles exhibit similar Both area. performance.

0.5

FAR

0.6

ROC diagram - event: prec03(mm) > 001 5cases 03UTC / file prec03:001 e1 GlobRoc (higher is better

