Future AROME Overseas

Figure 11: demonstration of the AROME-IFS capabilities for heavy rain events and accurate local effects (not shown here).

Specification:
- Ocean is preponderant
- Many tropical cyclones
  ⇒ need for an ocean coupling
- First with 1D Ocean Model (fig. 3)
  ⇒ promising results on Bejisa case (fig. 4)

AROME Ensemble Prediction system

The configuration:
- A high-resolution ensemble prediction system is being operational for experimental use (production will start in 2016). The model is the same as in the deterministic L90 AROME-France suite, except for the horizontal resolution (2.5km in the ensemble, 1.3km in AROME-France). There will be 12 members at up to 48h range. Ensemble perturbations come from clustered boundary conditions from the PEARP global ensemble, centered PEARP initial perturbations, SSPT stochastic model perturbations, comprehensive surface perturbations. Applications being developed include: choice of best model by human forecasters, decision aid for severe weather events (e.g. heavy precipitation, convection, gusts, winter conditions), probabilistic weather forecasts, forcing of flood models, air traffic management.

Recent research results:
- Extensive validation using HyMeX SOPI data (Sept-Nov 2012) shows that it not important to have consistent initial and lateral boundary perturbations. This makes it attractive to use ensemble data assimilation (EDA) initial perturbations. A cheaper alternative to EDA is to add small-scale random noise to the initial conditions: it improves over the simple downscaling of initial perturbations from a large-scale ensemble.
- Surface perturbations improve the ensemble performance; most of this improvement comes from perturbing soil moisture, soil temperature, and SST. Explicit surface perturbations are necessary, even if an EDA is used to perturb the atmospheric analyses, because EDA lacks surface dispersion.
- The spatial correlations of ensemble forecasts are highly sensitive to the correlations of surface perturbations, at low levels. The correlation sensitivity to SSPT correlation structures, or to correlations in the initial perturbations, seems to be negligible after a few hours.

The introduction of a tolerance in space and time when computing the precipitation probabilities, can be proven to improve the forecast scores, by filtering small-scale noise and increasing the apparent ensemble size.

ARPEGE-ALADIN-AROME experimental suite

CY40-op1 High Resolution ARPEGE-AROME configurations (switch to op1 expected in spring 2015)
- ARPEGE-F, T1198 with a stretching factor of 2.2 and 105 levels. First level at 10m (17m in present operational configuration). This gives a resolution of 7.5km over France. The proposed time step is 360s. The 4DVAR experimental suite will use 2 outer loops. The first one is 40 iterations at T149 C+1 with a time step of 130s, the second one 40 iterations at T599 C+1 with a time step of 90s.

ARPGE-ALADIN-AROME time and space (IFS) resolution:
- 1 day every 24h (horizontal: 0.15 – 12.0; vertical: 15.0 – 50.0+)
- 1.5 day every 24h (horizontal: 0.15 – 12.0; vertical: 15.0 – 50.0+)
- 7 day every 24h (horizontal: 0.15 – 12.0; vertical: 15.0 – 50.0+)

APEX-AROME-airport configuration
- A new configuration, AROME-airport has been set up. It is a 50m model dynamical adaptation of AROME-NWC on strategic areas such as airports. If needed some dedicated observations can be included in the preceding AROME-NWC analysis. The usefulness of such forecasts has been assessed during an observation campaign during which additional wind profilers were proven to have some impact (fig. 14).

The WNP systems at Météo-France
25th ALADIN Wk & HIRLAM ASM 2015, Elsinore, 13-16 April 2015

New nowcasting activities at Météo-France

AROME-NWC:
- A new nowcasting configuration based on the meso-scale model AROME-FRANCE has been set up. The goal is to cover the nowcasting short time ranges 0-6 hour with an analysis using the most recent observations followed by a forecast. In spite of the short cut-off time (10 minutes) a majority of observations relevant for nowcasting are available; the radiosondes and gpr observations are completely missing, but the impact on the overall system performance is small. The hourly forecasts are not cycled (fig. 12), that ensures less spin-up and a better resilience of the overall system. The system performs better compared to AROME-FRANCE mostly because of the use of more recent observations (see fig. 13 for rain scores).

Nowcasting activities at Météo-France

AROME-airport:
- A new nowcasting configuration is being prepared for operational use (production will start in 2016). The model is the same as in the deterministic L90 AROME-France suite, except for the horizontal resolution (2.5km in the ensemble, 1.3km in AROME-France). There will be 12 members at up to 48h range. Ensemble perturbations come from clustered boundary conditions from the PEARP global ensemble, centered PEARP initial perturbations, SSPT stochastic model perturbations, comprehensive surface perturbations. Applications being developed include: choice of best model by human forecasters, decision aid for severe weather events (e.g. heavy precipitation, convection, gusts, winter conditions), probabilistic weather forecasts, forcing of flood models, air traffic management.

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The introduction of a tolerance in space and time when computing the precipitation probabilities, can be proven to improve the forecast scores, by filtering small-scale noise and increasing the apparent ensemble size.

A new version of AFARP is also in test with 25 members, a resolution of T479 C+1 and a time step of 720 s.