



Strategy: EPS and predictability

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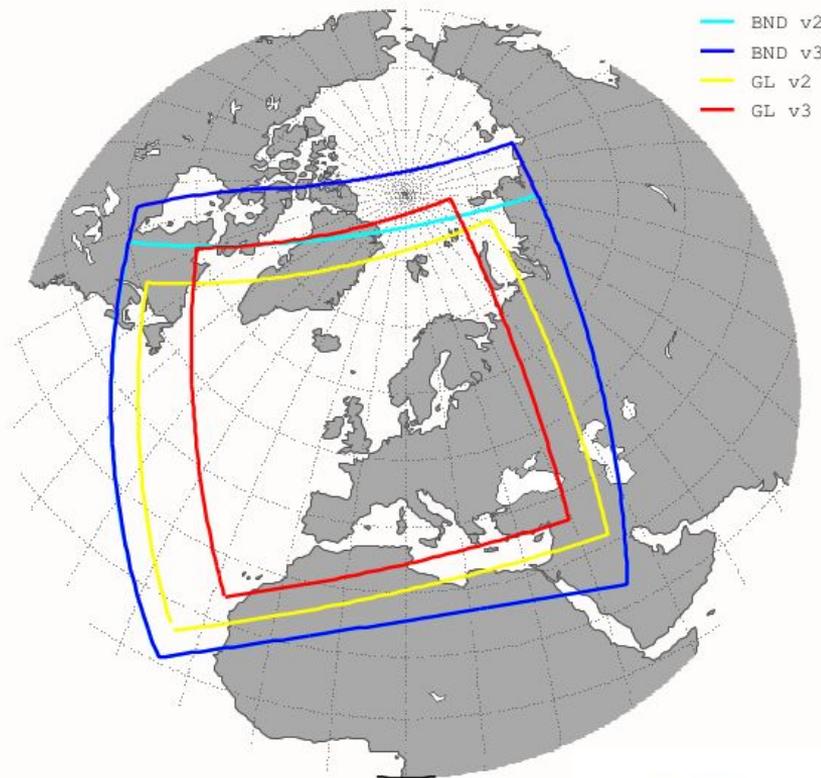
Toulouse, 2016

GLAMEPS (Operational since 2011)

(version 3, tests ongoing)



- 4 sub-ensembles:
 - Two HIRLAM ensembles with 3D-Var for controls
 - Two Alaro ensembles (downscaling) with SURFEX or ISBA for surface
- Forecast range: 54h
- Hourly output, four times a day
- Increased resolution - from ~8km to 0.05 deg. (Hirlam) / 6 km Alaro
- 36 members (4+1)
- Inflation of the initial perturbations coming from IFS ENS
- Include CAPE SVs in Hirlam
- Changes for ALARO:
 - Upgrade from cy37 to cy38
 - Perturb observations
 - CA?
 - Implement perturbation in horizontal diffusion?
 - Adding inflation factor to ALARO boundary?
- Parallel run ~ May. Aim: replace v2 ~ August



**Do not plan more major upgrades to GLAMEPS.
Research on GLAMEPS is limited, except calibration**



HarmonEPS

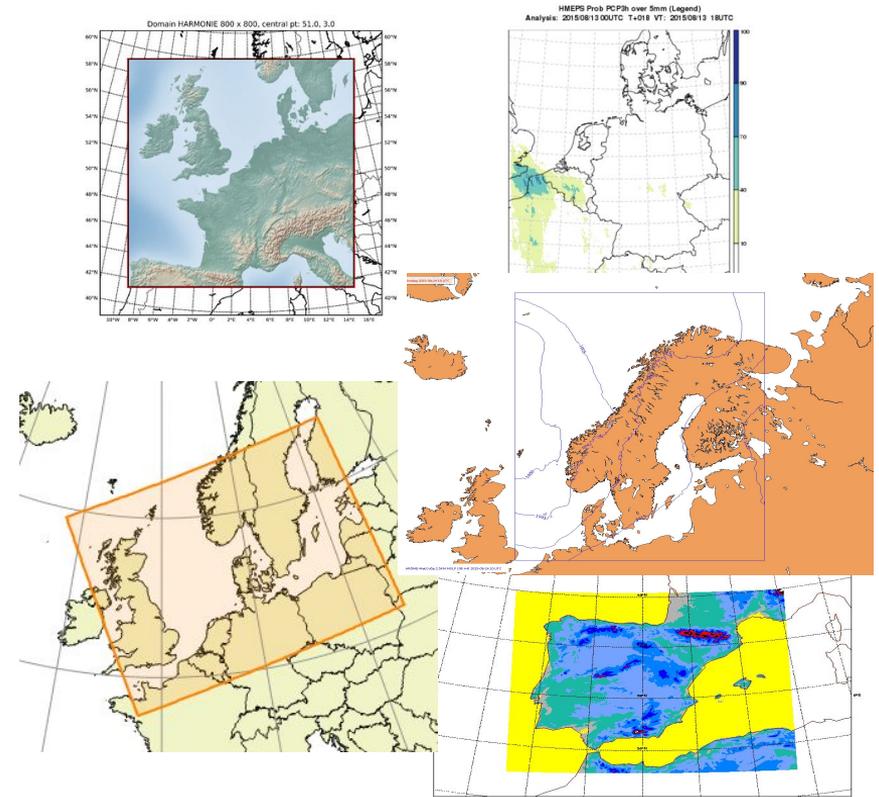
Experimental – first operational versions expected in 2016

For European areas

- Configurations vary, but typically between 10+1 and 20+1 members
- Arome and Alaro
- 2.5 km
- 3D-Var
- SURFEX
- +36h
- All members have their own surface assimilation cycles

Nested in IFS ENS or IFS high res.

Experiments with perturbations in initial conditions, lateral boundary conditions, model physics and surface are ongoing.



LBC's

- LBC's are important to perturb for our relatively small domains
- Random perturbations or perturbations from lagged, high res forecasts (SLAF) seems to do as well, or better, than using ENS - why?

Initial state

Short term:

- Current default is to use perturbations from IFS ENS / SLAF
- Compare 3D-Var EDA with LETKF and 4D-Var

Longer term:

- Towards consistent design of DA and ensemble prediction - > 4DEnVar ?

Model error

Present status:

- .Multi-physics with Arome and Alaro
- .SPPT: will still be in the tool-box for some time
- .Multi-physics the “LAEF-way”
- .Cellular Automata (CA)

Heading for:

- .Stochastic perturbations in parameterizations / processes

Surface uncertainty

- .Thanks to MF and F. Bouttier for providing surface perturbation code -> implemented in HarmonEPS
- .Perturb surface parameters, like soil moisture, albedo, SST, ...
- .Perturb surface physics: study perturbations in momentum, heat and moisture flux parameterizations

Post-processing and HARP EPS developments

HARP:

- Continue updating and improving HARP
- Work on new formulation of spread/skill and deeper understanding of the practice of centering the ensemble round control

Post processing:

- Neighborhood methods
- Calibration

Calibration

Aim: Make well-calibrated forecasts at all model grid points based on (recent) historical data of

- synop measurements
- forecasts
- orographic and (model) climate information

Operational in GLAMEPS (T2m, S10m, Pcp). To be tested in HarmonEPS

Future work: better modeling of spatial variations, include more parameters, test new methods

Key scientific issues/questions to consider jointly



We can cooperate on all the mentioned areas, sharing ideas and learning from each other

BUT: would benefit greatly if we could work in the same technical environment

EPS as an integrated part of the system, in all aspects.

How to work together?

Working weeks
Video meetings

Build (small) teams to work on the different topics?