

Preparation of MF's assimilation systems to higher resolution

C. Fischer

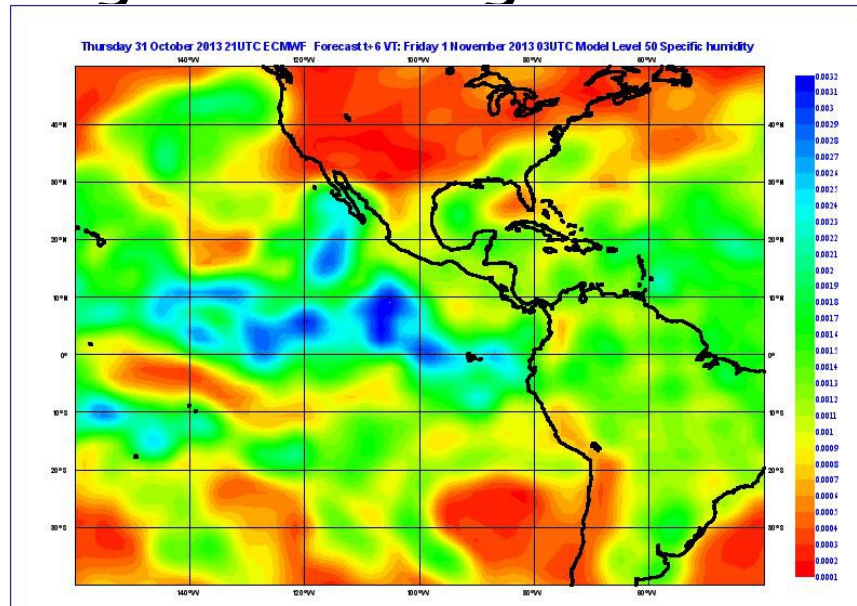
Some aspects of the expected content of the HR E-suite (**Arpège**)

- **CY40_op1; first scientific E-suite on BULL**
- **T1198C2.2L105**
- **4D-Var:**
 - 2 outer loops
 - T149C1.0L105 ; 40 iterations in the minim; dry simplified physics
 - T399C1.0L105 ; 40 iterations in the minim; moist large scale precipitations added
- **AEARP:**
 - 25 members (*instead of 6*)
 - T479C1.0L105
 - 4D-Var with T149C1.0L105 and 40 iterations
- **σb of the day, with objective filtering à la Raynaud *et al.* (per network)**
- **Wavelet-space correlations averaged over 1 ½ day (Varella *et al.*)**
- **Handover to Operations starting in June 2014, for an E-suite official testing from September through 1st quarter of 2015**

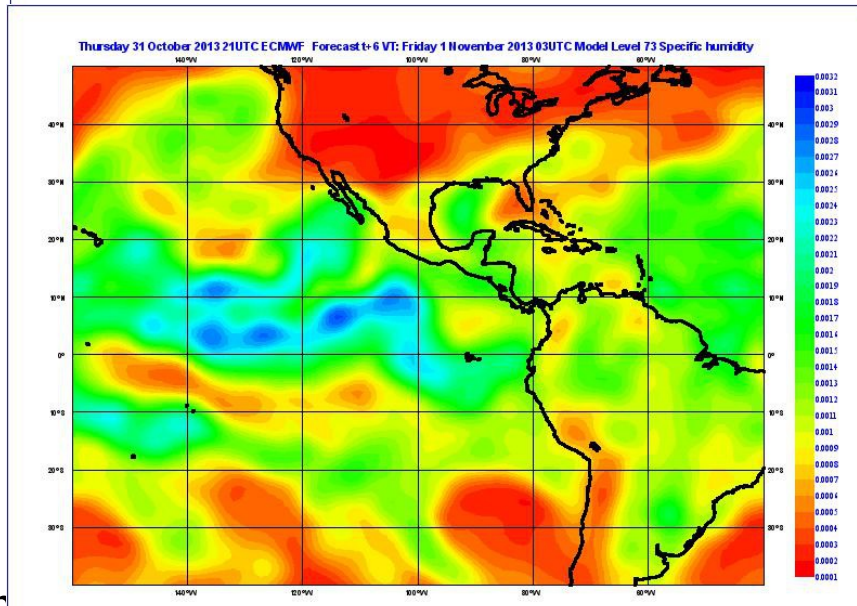
6 -> 25 members in AEARP: reduction of sampling noise in bg error variances

q background error σ^b
at 700 hPa

6 members



25 members



L. Berre &
G. Desroziers

CY40_op1 E-suite: LAMs

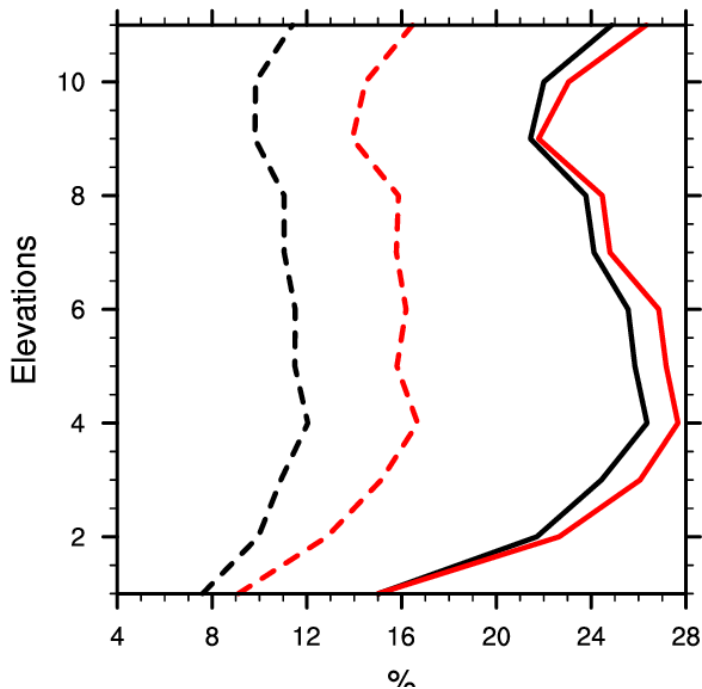
- **Aladin-Overseas models:** minor adaptations only (mostly to obs handling); no PCMT scheme
- **Arome-France:**
 - 1.3km, 90 levels, first level at 5m
 - Model top decreased from 1.3 hPa to 13 hPa (in particular, in order to avoid numerical explosions in very strong wind conditions in the stratosphere)
 - Use GMTED2010 physiographic database for orography in clim files
 - 1h cycling

AROME-France 1.3km L90 : assimilation experiment (P. Brousseau)

- New channel selection and VARBC predictors (due to change of model top)
- New gpssol whitelist
- Rms of obs-guess and obs-analysis for radar observations over a 2-week convective period

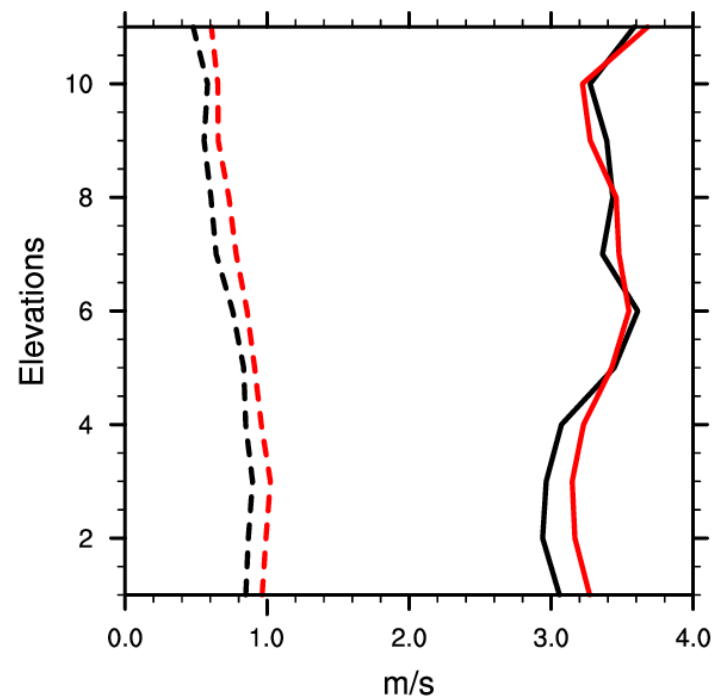
Relative humidity from reflectivity

RMS(RH)



Doppler winds

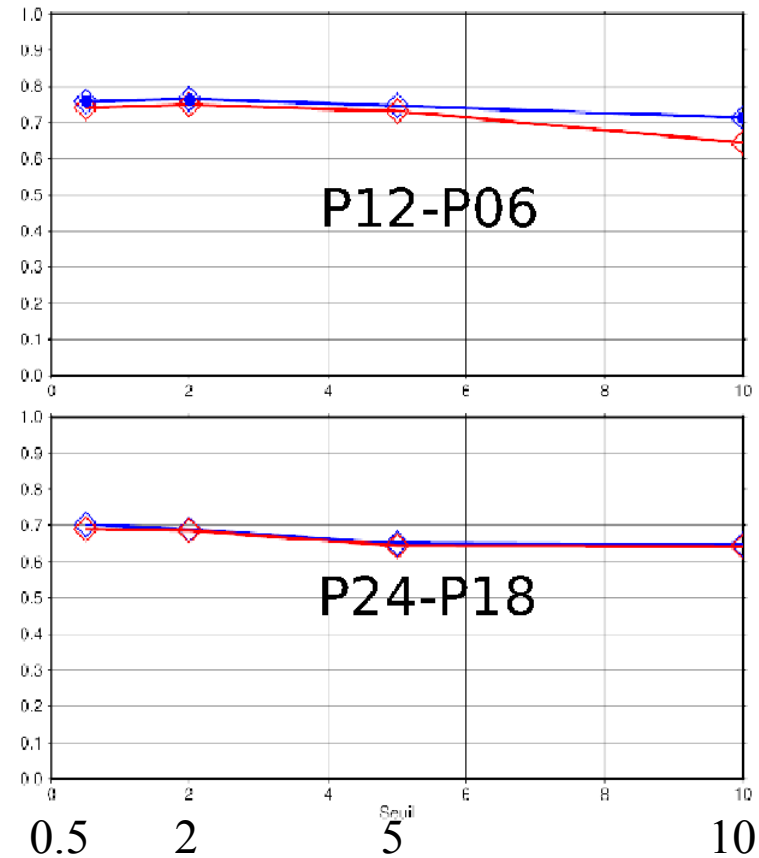
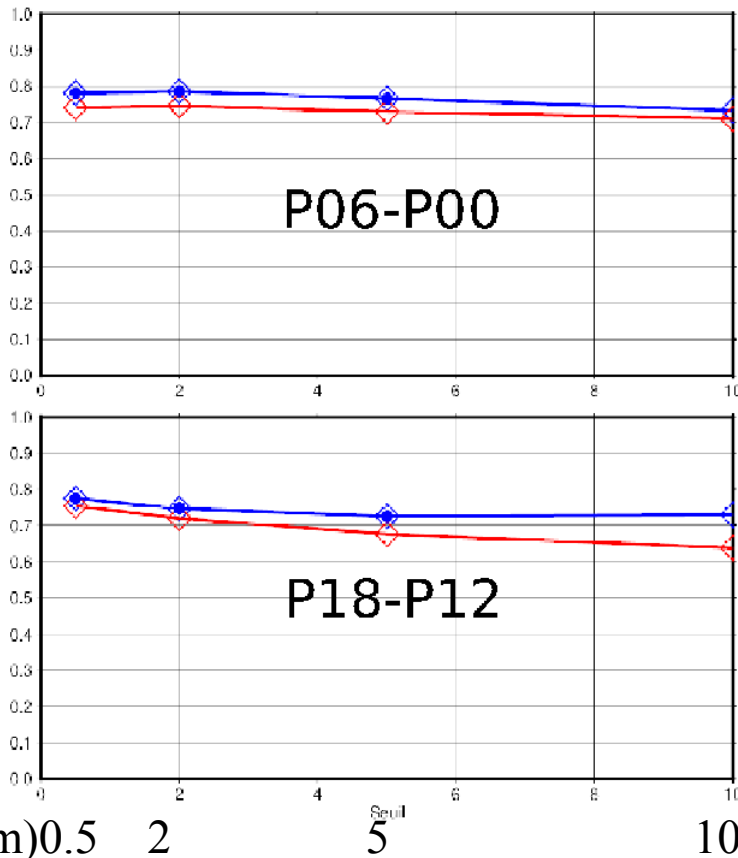
RMS(DOW)



--- obs-analysis
— obs-guess

1-h assimilation cycle (P. Brousseau)

- 3-h cycle B matrix with REDNMC=0.5 (versus 1.2 in the 3-h cycle)
- No initialisation technique (IDFI or IAU) requested w/r to spin-up
- 2.5 months assimilation experiment (2.5 km)
- Brier Skill Scores for 6-h cumulative precipitation, neighbourhood of 50 km (15/07/2013-30/09/2013)

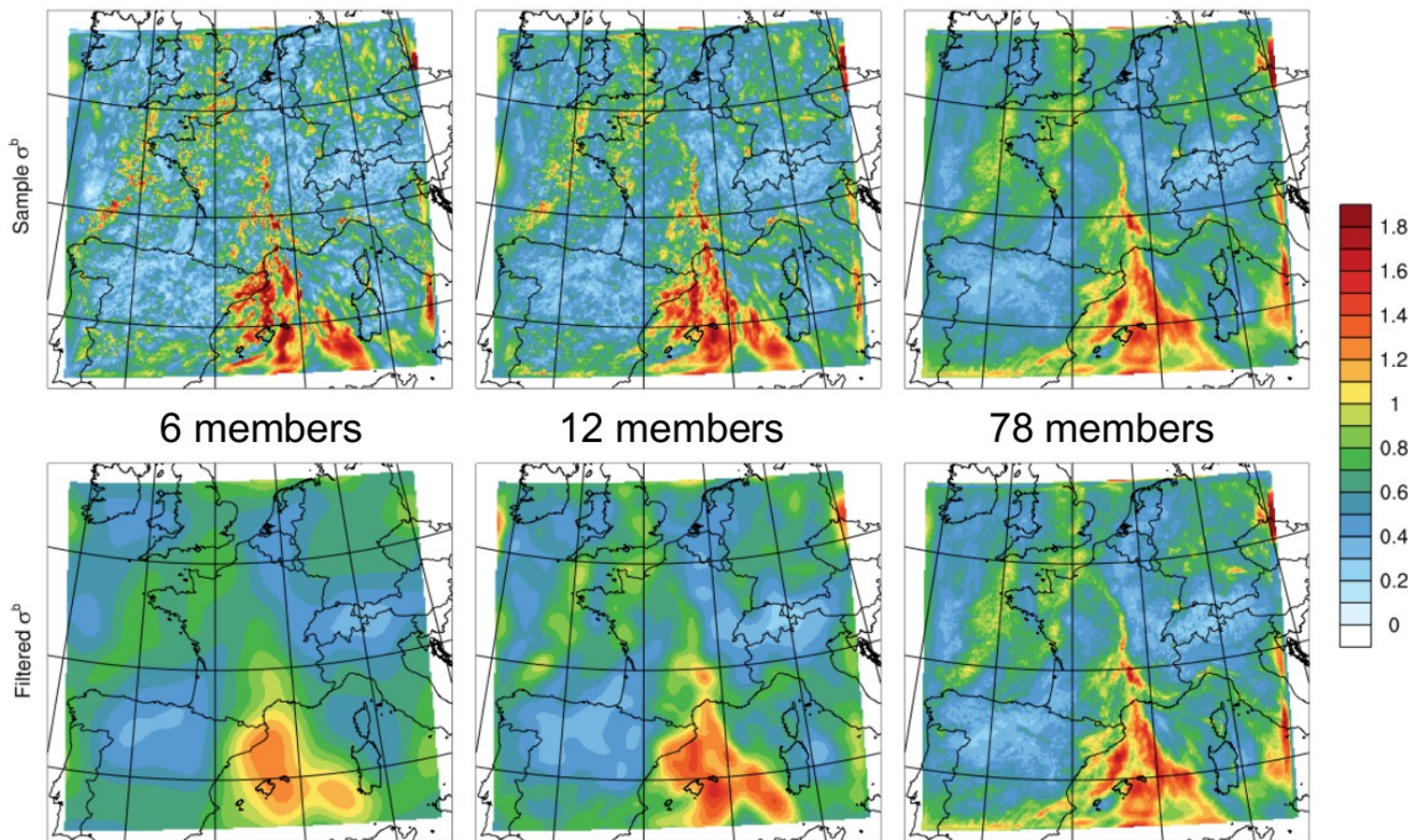


Plans in overview: NWP and DA evolutions

- **Arome nowcasting (aka Arome-PI)** and SESAR applications (Arome-airport): mid- or 2nd half of 2015
- **Arome EPS**: daily experimental tests under OLIVE in 2015; operations in 2016
 - 10 members; BC from PEARP (clustering); IC = Arome analysis + PEARP pert. (later from EnDA); surface pert = specific surface and physiographic fields; model error by SPPT
- **Arome EnDA**: pert of obs (3D-Var); model error by time varying inflation; 2.5km; 6 members (at present)
- Spatial objective filtering of error variances; filtering of localization function lengthscales (Ménétrier – PhD -, Michel, Montmerle, Berre)
- Daily varying (spatially homogeneous) background error variances derived from the Arome EnDA

Optimal filtering of forecast error variances from ensembles (Benjamin Ménétrier PhD)

Raw (top) and filtered (bottom) variances for q at 950 hPa



L_f decreases with number of members and varies with height

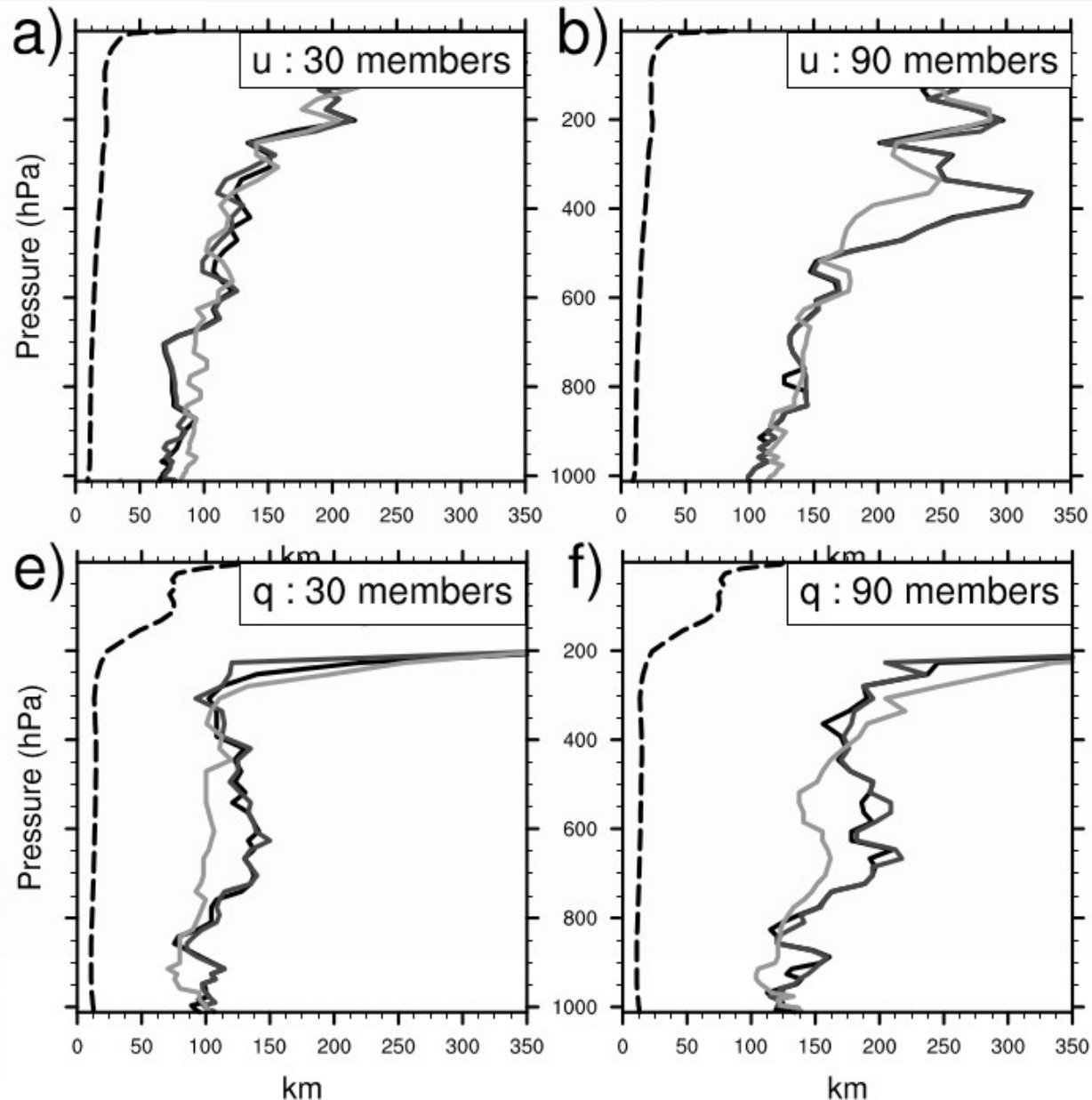
Optimal filtering of forecast error parameters from ensembles

(B. Ménétrier)

Vertical variations of fitted localization functions length-scales for AROME, computed using different formulations.

(fitted correlation function length-scales are plotted in dashed lines)

⇒ Important vertical variations for wind (and T)



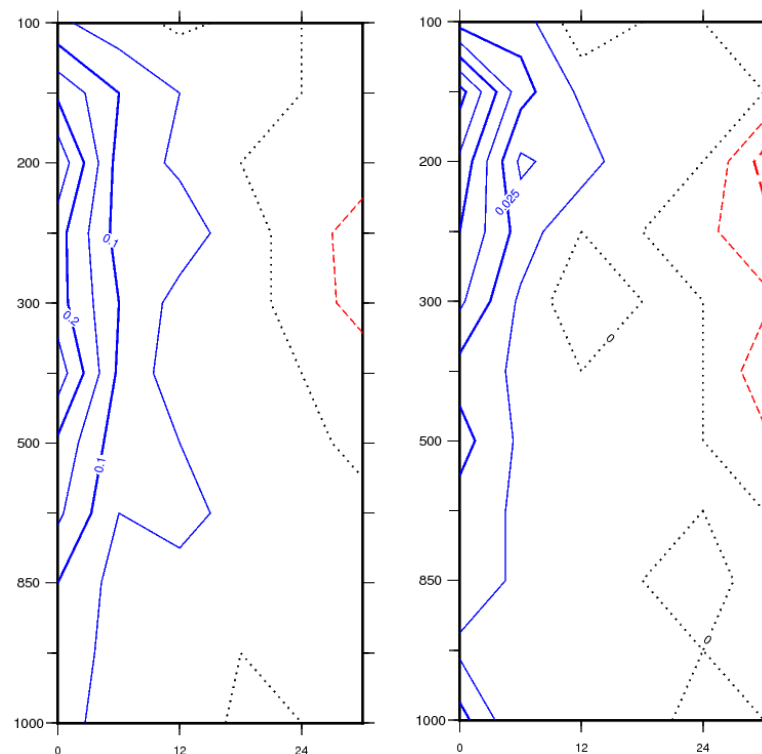
Adding flow dependencies in climatological B

(Benjamin Ménétrier PhD)

- An AEARO has been run for 6 weeks (HyMeX SOP1 period)
- optimally filtered variances « of the day » have been computed
- different refinements of flow dependency in B_r have been tested

• So far, positive scores have been obtained only when using homogeneous variances from the AEARO

• Using filtered variances has a detrimental effect currently, possibly because of questionable small scale structures of strong variances for (vor,div) and their interaction with associated scale changes with respect to mass and wind fields.



MSE against ECMWF analyses for wind and T

Plans in overview

- **Installation of BULL HPC clusters:**
 - Cluster 1: operational now (“*beaufix*”)
 - Cluster 2: operations planned for 15-22 April 2014 (“*prolix*”)
 - Phase 2: installation will start in August 2015
- **COPE project:** modernized obs pre-processing (IFS/Arpège/LAM). Planned in operations in IFS end of 2014.
- **OOPS project: object-oriented assimilation code; development of 4D-En-Var as an alternative to 4D-Var**

- acesta e sfârșitul discursului meu. Întrebările sunt binevenite.

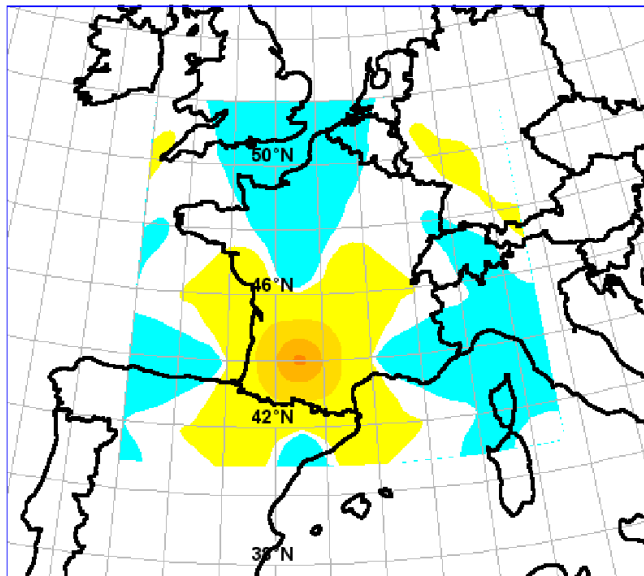
Topics under evaluation for 2014 and 2015

- **Re-adjust the use of satellite obs** in assimilation cycle and production analyses
- **Revisit tuning of some σ**
- **VarBC for GPS**
- More **band-X radars** in Arôme assimilation; assess potential of a new MF/CMR product of reflectivity filtered by the signal of windmills; assess potential impact of **OPERA extra radar data**
- **Preparations for new observations:** ADM-Aeolus, GPM, MTG/IRS, IASI-NG
- Continuous Obs Pre-processing Environment (COPE) triggered by ECMWF for IFS

AROME-France 3D-Var and OOPS

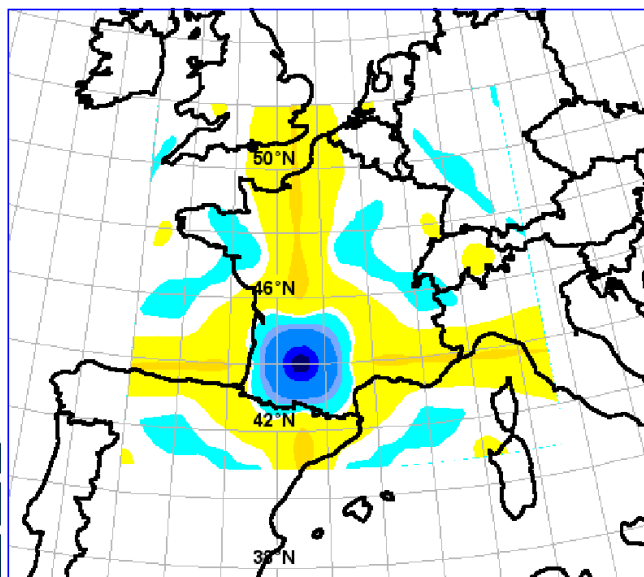
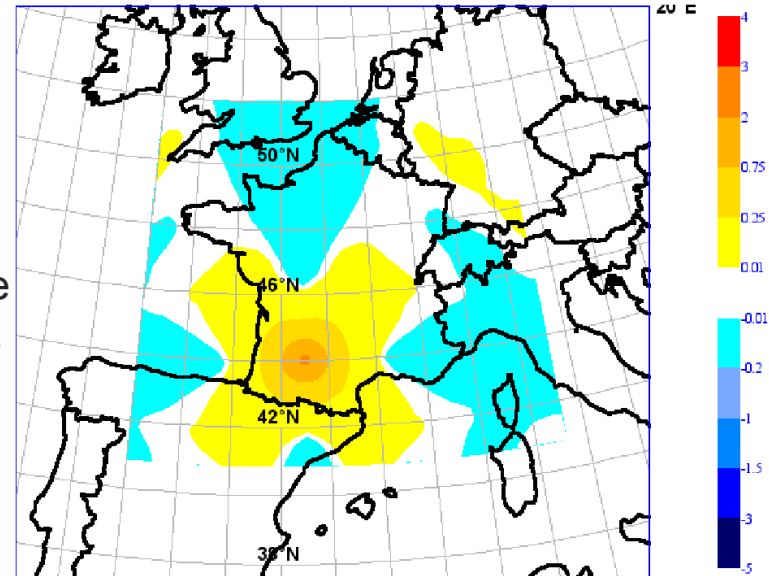
Single obs de Temp T à 800 hPa : innovation de 5 K

Arome 3D-Var



Incrément de
T à 800 hPa

Arome 3D-Var oops



Incrément de
q à 800 hPa

