Recent progress with the MF global and LAM EPS

C. Labadie, P. Cébron, L. Descamps, F. Bouttier, L. Raynaud

Météo-France/CNRM
Contact : claude.fischer@meteo.fr

3.10.2018

EWGLAM/SRNWP annual meeting, Salzburg

Outline of my talk

1. **ARPEGE global EPS (PEARP) : operational status and preparation towards higher horizontal resolution**

2. **AROME-France EPS (PEARO)**

Das Notwendigste und das Härteste und die Hauptsache in der Musik ist das Tempo. [Briefe, an den Vater, 1777]

Figures about the ARPEGE global EPS (C. Labadie, P. Cébron, L. Descamps)

- **Operational configuration :**
  - 10km / 60km hor. Resol.
  - 90 vertical levels (14m => 50km)
  - Dt=514s
  - 35 members init. From the ARPEGE EDA (25) and from SV (10)
  - 4 networks per day
- **E-suite version (Sept-Beg. Of 2019):**
  - 7.5km / 37km
  - 90 vertical levels (unchanged)
  - Dt=360s
  - 35 members (unchanged)
  - Probabilistic forecasting of visibility
  - ARPEGE deterministic changes included (dynamics – diffusion & SL iterations ; physics)
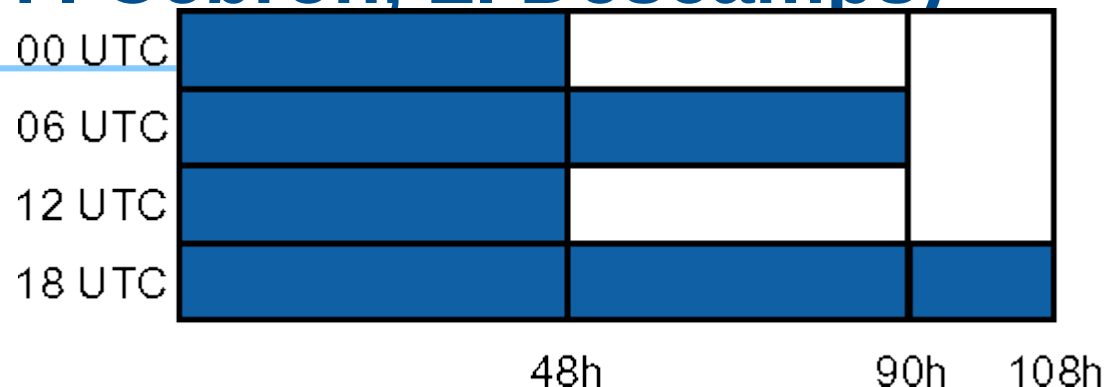
Figures about the ARPEGE global EPS (C. Labadie, P. Cébron, L. Descamps)

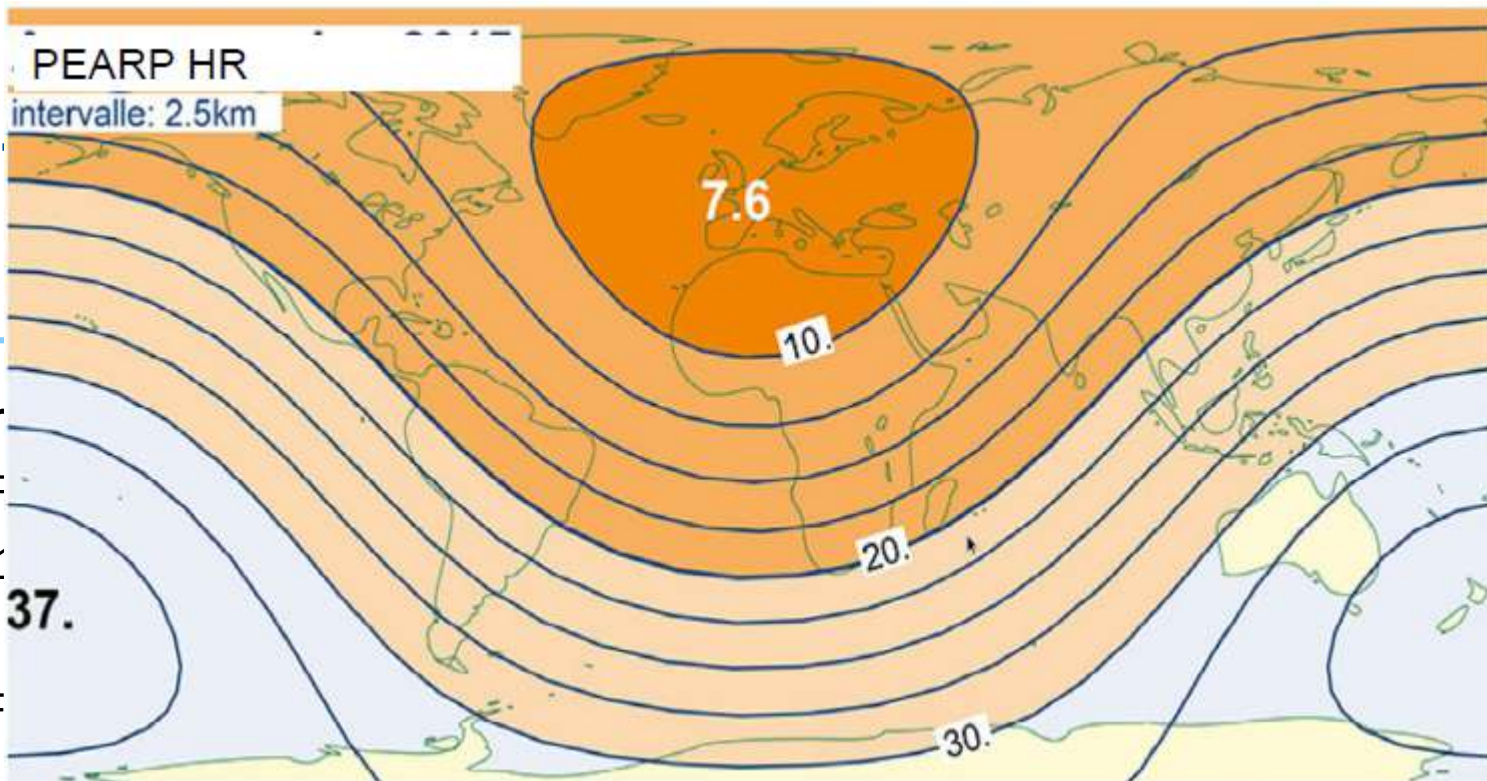- **Operational configuration :**
  — 10km / 60km hor. Resol.
  — 90 vertical levels (14m => 50km)
  — Dt=514s
  — 35 members init. From the ARPEGE EDA (25) and from SV (10)
  — 4 networks per day
- **E-suite version (Sept-Beg. Of 2019):**
  — 7.5km / 37km
  — 90 vertical levels (unchanged)
  — Dt=360s
  — 35 members (unchanged)
  — Probabilistic forecasting of visibility
  — ARPEGE deterministic changes included (dynamics – diffusion & SL iterations ; physics)

Figures about global EPS

- **Operational configur...**
  - 10km / 60km hor. F...
  - 90 vertical levels (1...
  - Dt=514s
  - 35 members init. F...
  - 4 networks per day

- **E-suite version (Sept-Beg. Of 2019):**
  - 7.5km / 37km
  - 90 vertical levels (unchanged)
  - Dt=360s
  - 35 members (unchanged)
  - Probabilistic forecasting of visibility
  - ARPEGE deterministic changes included (dynamics – diffusion & SL iterations ; physics)

Initial condition perturbations and model error representation

Initialization procedure

- using background states from the EDA of Météo-France randomly choosen :
  AEARP, 25 members, T399C1
  (L. Berre, G. Desroziers)

  next version   50 members
  (2019)   T499C1

- singular vectors computed over 7 areas (rescaled by σ_b)

area	OTI(h)	res.	norm
ATEUR	18	TI95	TE
HNC et HS	24	TI95	TE
4xTROP	18	TI95	KE

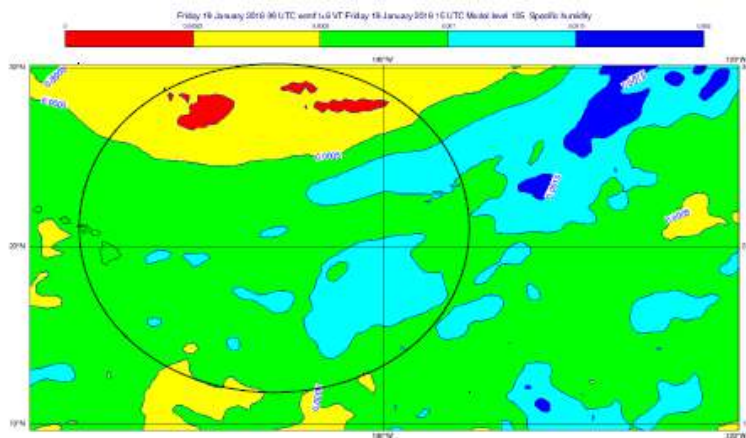- Initial perturbations are not symetric.

Model error

- using a set of 10 physical packages including that of operational ARPEGE model. Playing on different physical schemes :
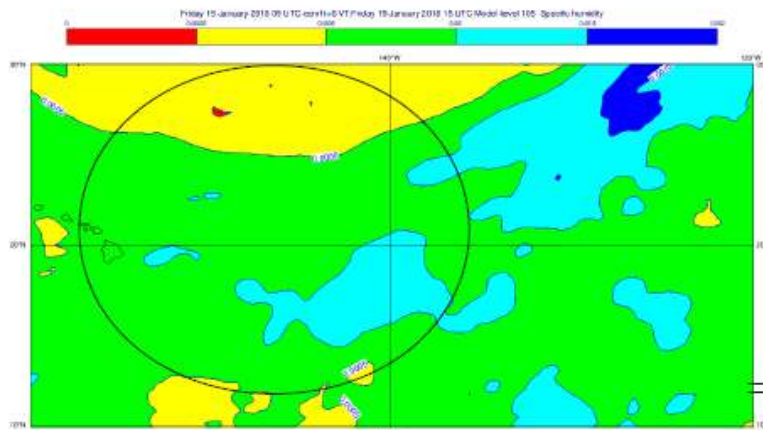 - sallow convection and deep convection
  - vertical diffusion
  - solar radiation
  - different types of cloud recovery

ARPEGE EDA (AEARP ; L. Berre, B. Ménétrier, O. Guillet)

- Increased hor. Resol., eg. Variances & Corr. are now computed at (T499 - 40km)

- Doubled size of ensemble (50 instead of 25) => fewer sampling noise, corr. Averaged over 12h, fully independent initialization of PEAR
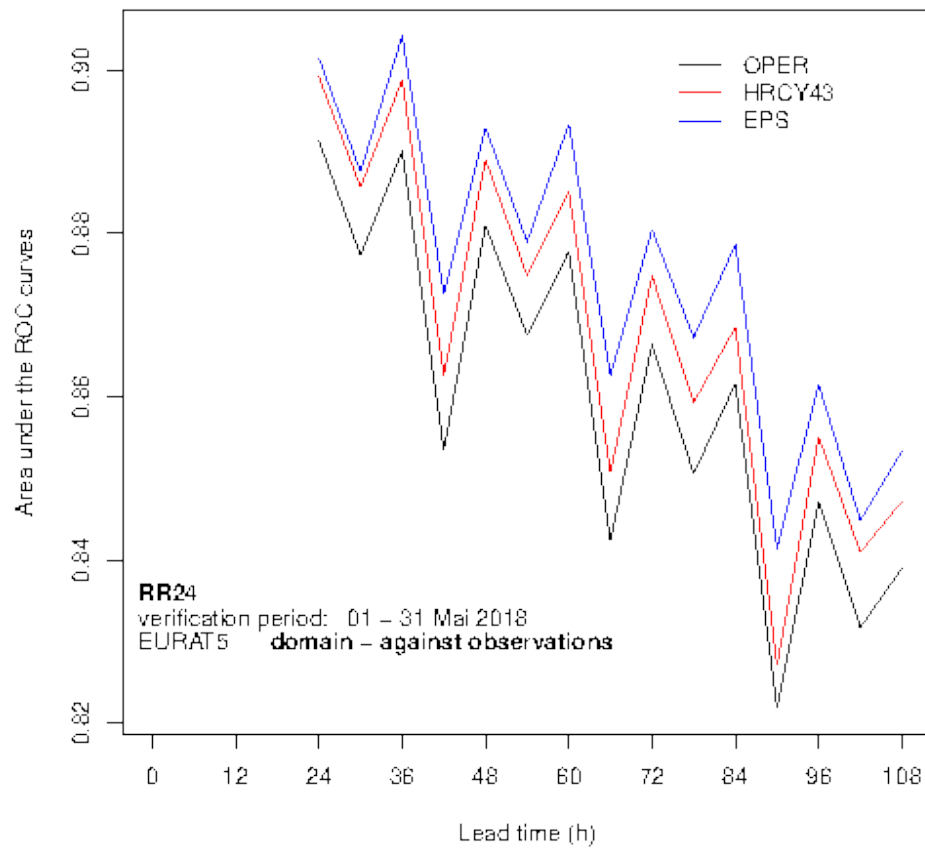
-

Ecarts types estimés
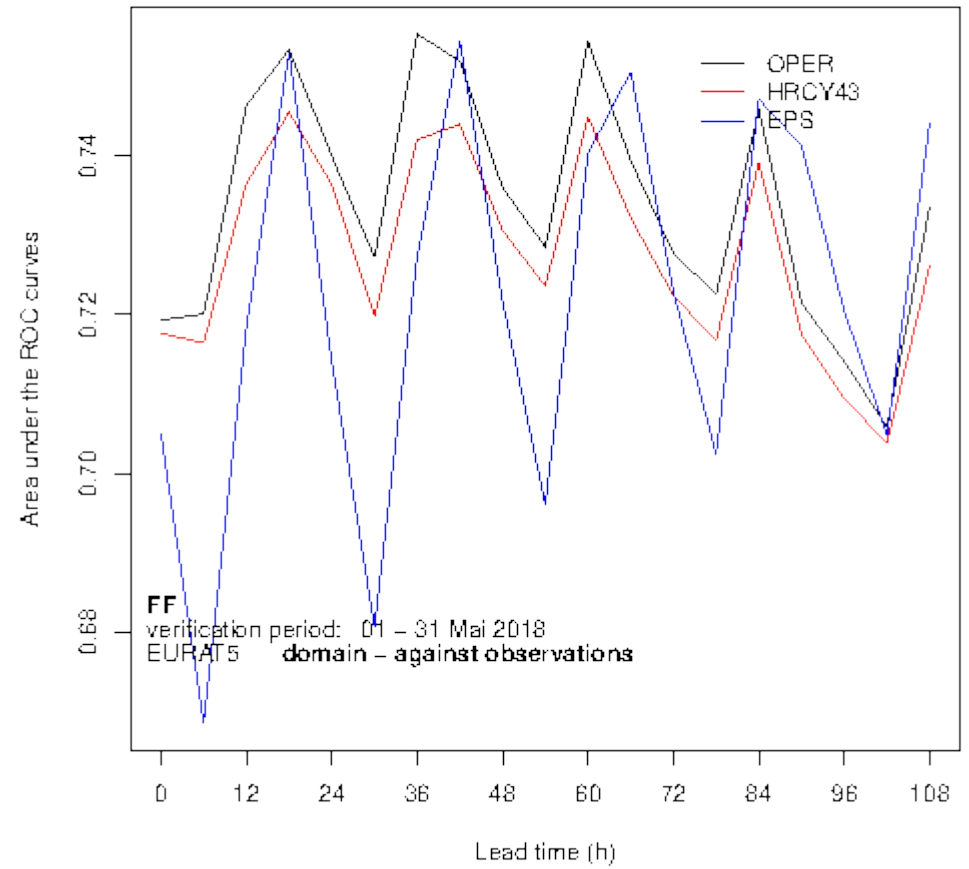(humidité spécifique, vers 1000 hPa)
sur 25 membres

Ecarts types estimés
(humidité spécifique, vers 1000 hPa)
sur 50 membres

=> Moins de petites structures artificielles
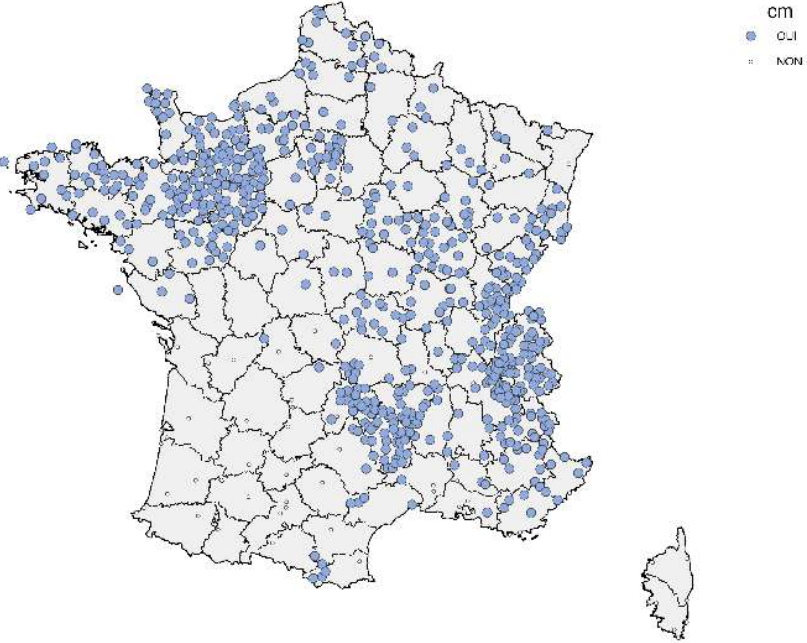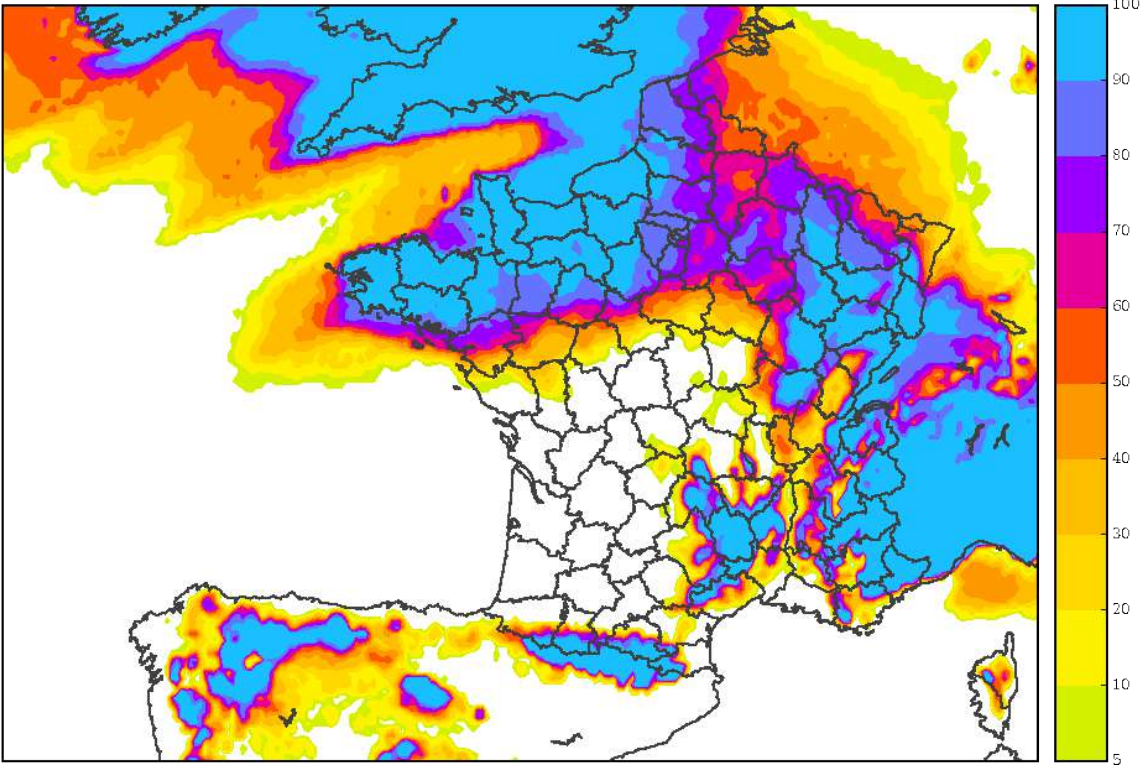
PEARP – ROC area

RR24 > 1 mm

FF > 5 m/s

PEARP – 24h snowfall – 60h fct range

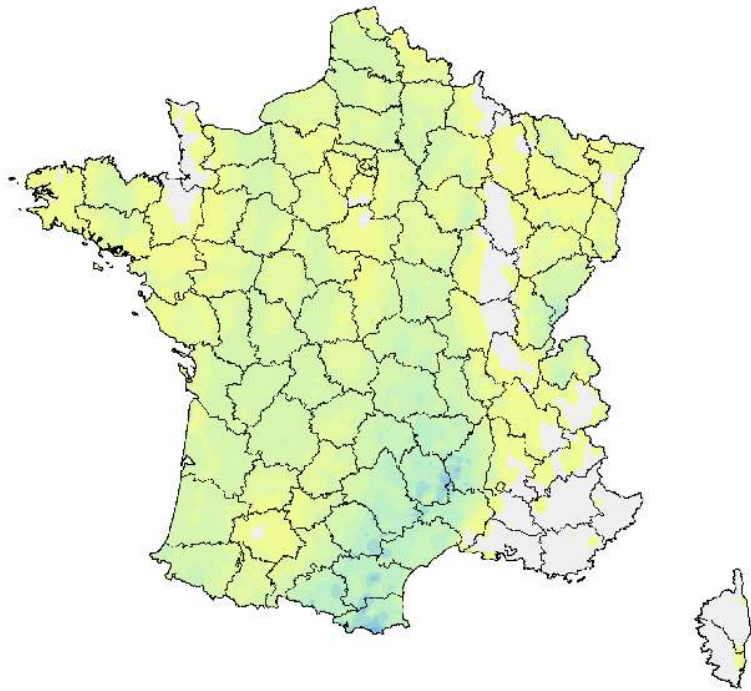snowfall observations 01/03/2018

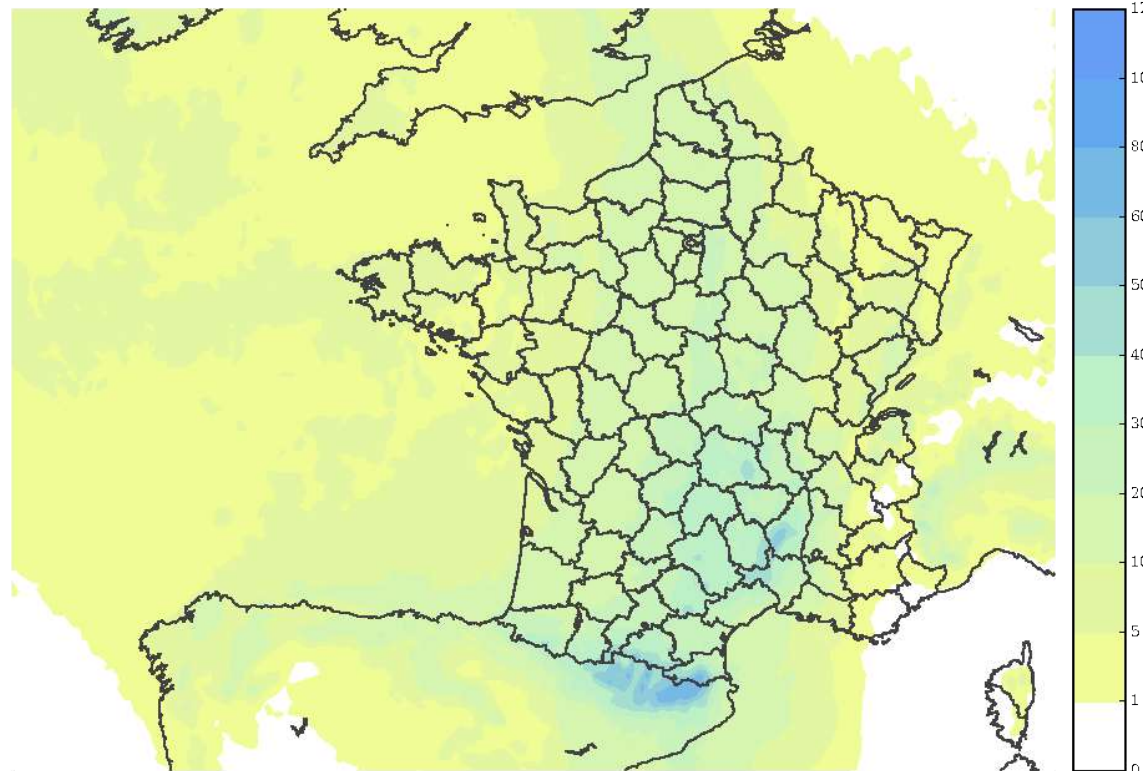PEARP DBL version - proba NEI sup 0.1 cm - Based on 27/02 18UTC

PEARP – 24h rainfall – 60h fct range

Observations 12/05/2018

PEARP DBL version - Q75 RR - Based on 10/05 18UTC
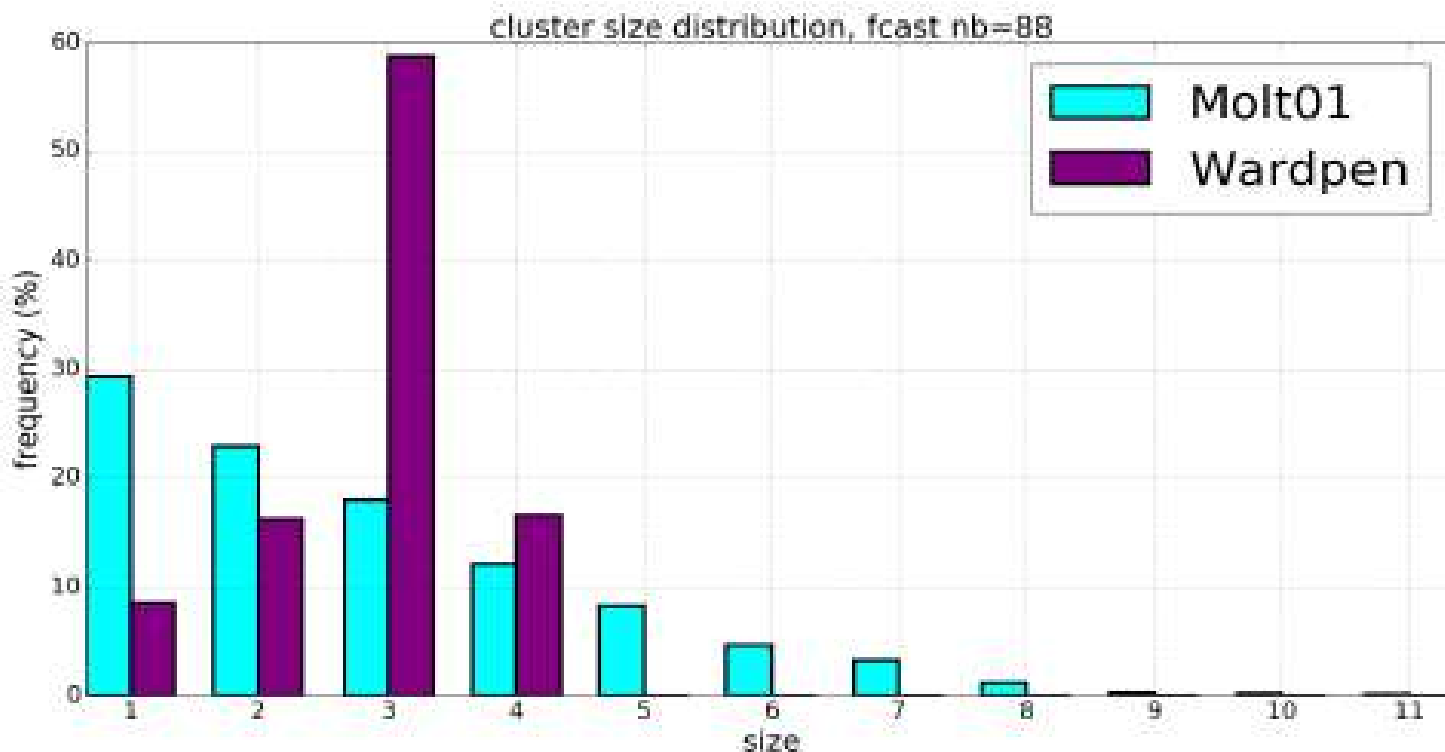
Ongoing work :

- Testing alternative approaches for the model perturbations :

    — SPPT : preliminary results are encouraging. However, tuning the soil water reservoirs is necessary in order to preserve the water/humidity budget at the surface

    — SPP : preliminary results show less spread than with SPPT. A sensitivity study on specific parameter values is in progress

- Testing the impact of perturbing sea surface temperature in the global EPS is planned

The AROME-France EPS (F. Bouttier, L. Raynaud)

- 12 members ; 4 times per day ; 2.5km hor.resol. ; 90 levels
- LBC from PEARP using a clustering technique
- IC from AROME-France 3D-VAR analysis + perturbations from PEARP
- Model error using stochastic perturbations on physics tendencies
- Surface perturbations on various fields : SST, Ts, Hum …
- Recent change : use IC perturbations from the AROME EDA (AEARO) instead of PEARP =>
  — reduces under-dispersion at short term ranges,
  — reduces spin-up
  — Significant improvements of scores at short term lead times
- Next change : new clustering algorithm leading to a more homogeneous definition of classes spanning over the set of PEARP forecasts =>
  — Reduces a little dispersion, without a significant deterioration of the usual probabilistic scores
  — Positive feedback from forecasters during experimental period

The AROME-

cluster size distribution, fcast nb=88

- 12 members ; 4 times
- LBC from PEARP usi
- IC from AROME-Fran
- Model error using sto
- Surface perturbations
- Recent change : use
  — reduces under-dispersion at short term ranges,
  — reduces spin-up
  — Significant improvements of scores at short term lead times
- Next change : new clustering algorithm leading to a more homogeneous definition of classes spanning over the set of PEARP forecasts =>
  — Reduces a little dispersion, without a significant deterioration of the usual probabilistic scores
  — Positive feedback from forecasters during experimental period

Servus,
und weitere Fragen jetzt oder später bei Melange und Golatsche !

Météo-France

claude.fischer@meteo.fr

Www.umr-cnrm.fr/