

Short range ensemble forecasting at Météo-France status and plans

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Outline

- ☛ **Global ensemble description**
- ☛ **T358c2.4 vs T199c3.5**
- ☛ **Operational configuration**
- ☛ **LAMEPS experiment**
- ☛ **Future plans**

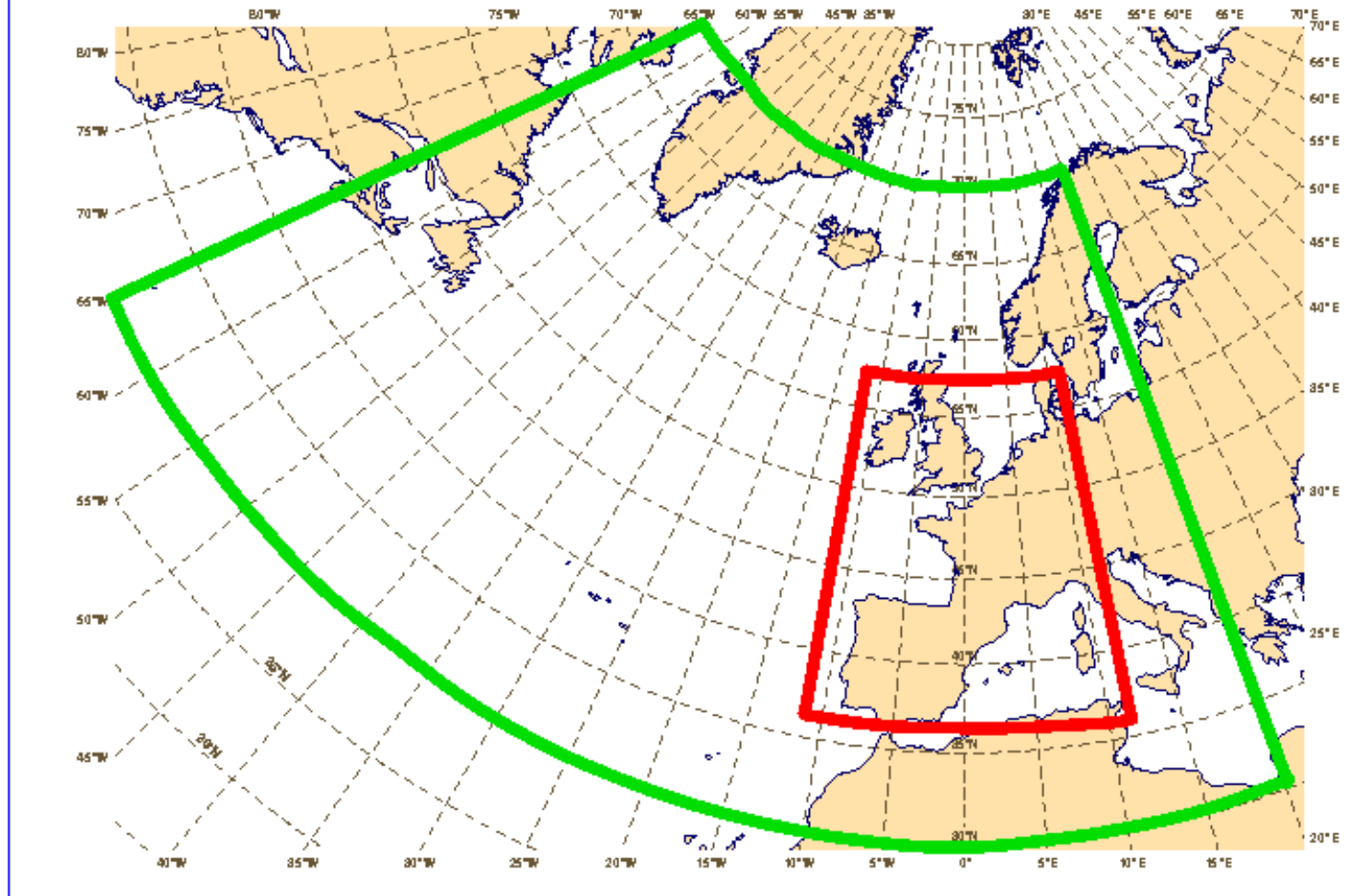
Ensemble description

- ☛ **Detection of storms over the Western Europe**
- ☛ **Ensemble based on Météo-France operational global model ARPEGE (variable mesh) → PEACE (Prévision d'Ensemble A Courte Échéance)**
- ☛ **Initial state uncertainties with SVs**
- ☛ **11 members (1 control + 10 perturbed members)**
- ☛ **2 versions : T199 C3.5 ; T358C2.4 (~20 km over France)**
- ☛ **Tested over a sample of 85 cases**

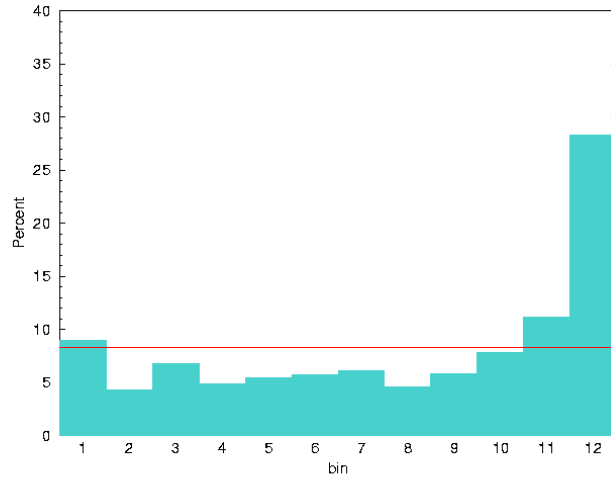
Targetted Singular Vectors

- ☛ **Targetting over Atlantic Ocean and Western Europe**
- ☛ **Optimization time window : 0-12h**
- ☛ **Total Energy norm (initial and final)**
- ☛ **16 first SVs**
- ☛ **No physics**
- ☛ **SV computation with a T63 regular truncation**

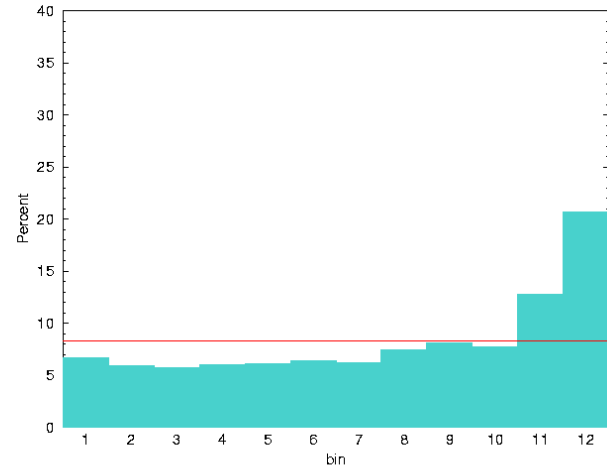
SVs targetting area



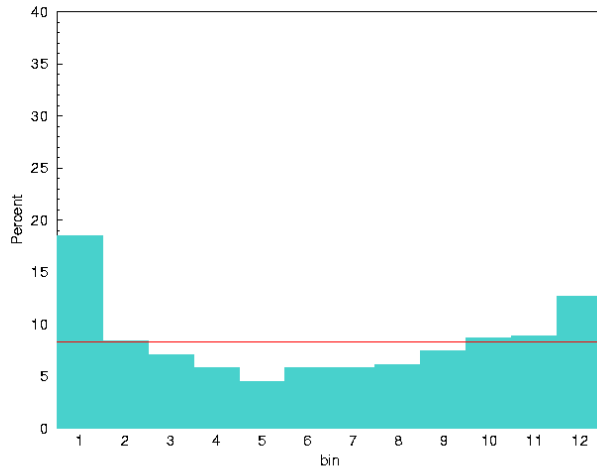
Rank diagram – T199 - MSLP – 48h



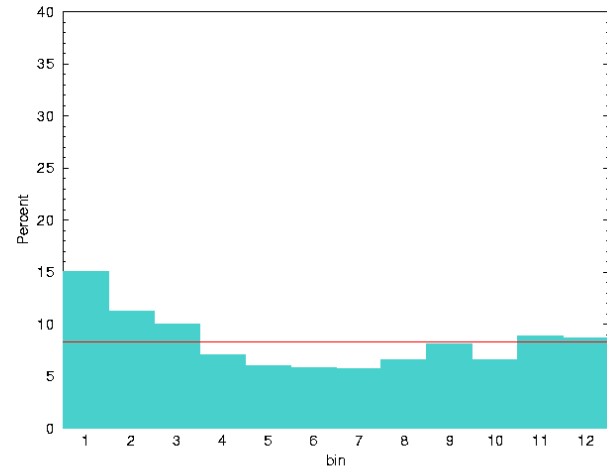
Rank diagram – T358 - MSLP – 48h

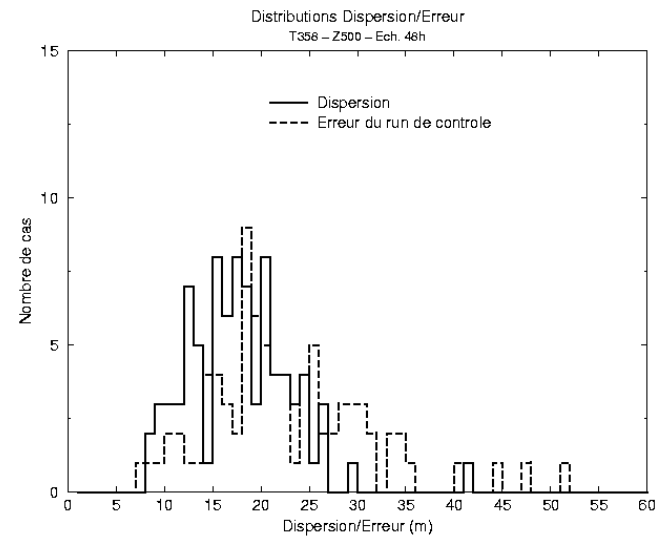
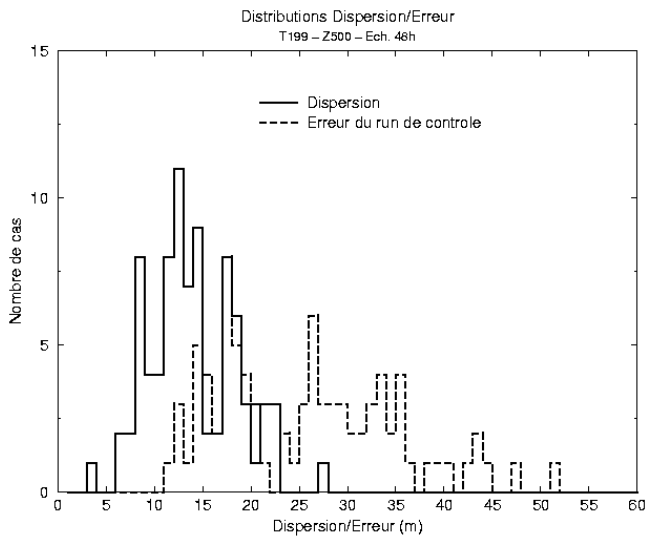
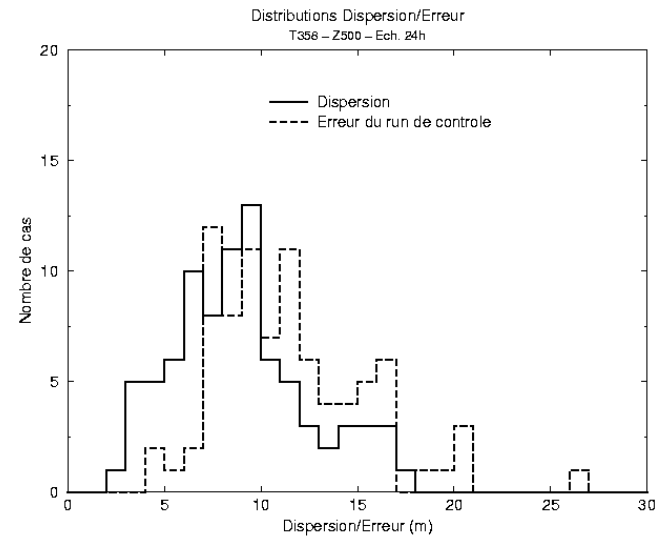
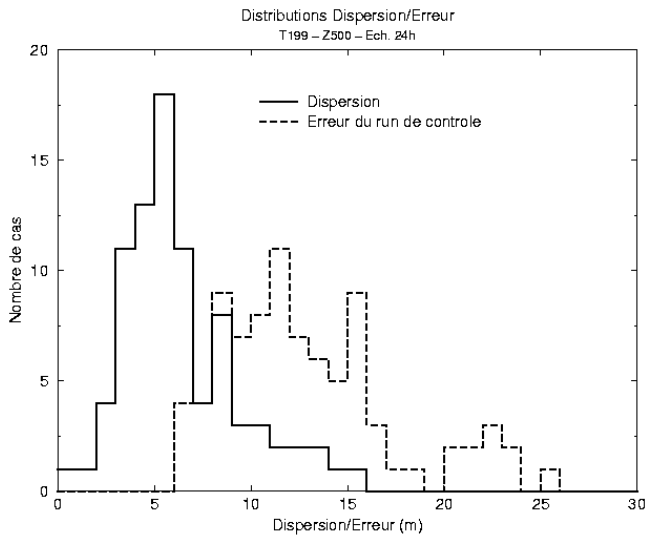


Rank diagram – T199 - Z500 – 48h



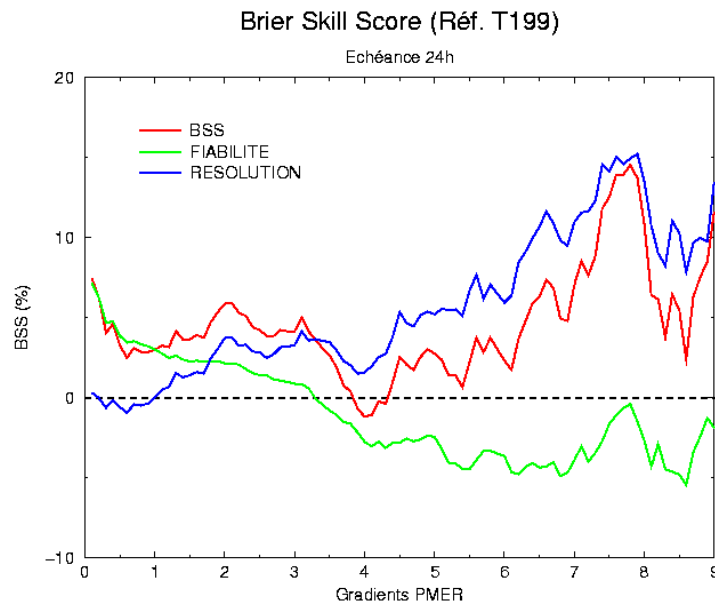
Rank diagram – T358 - Z500 – 48h



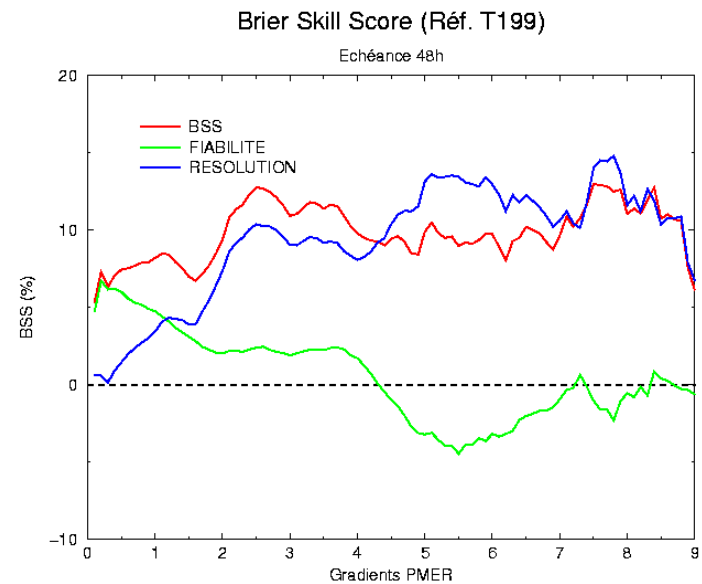


Mean Sea Level Gradient Pressure BSS

$$PS = \frac{\sum (F_{ij} - O_{ij})^2}{N}$$

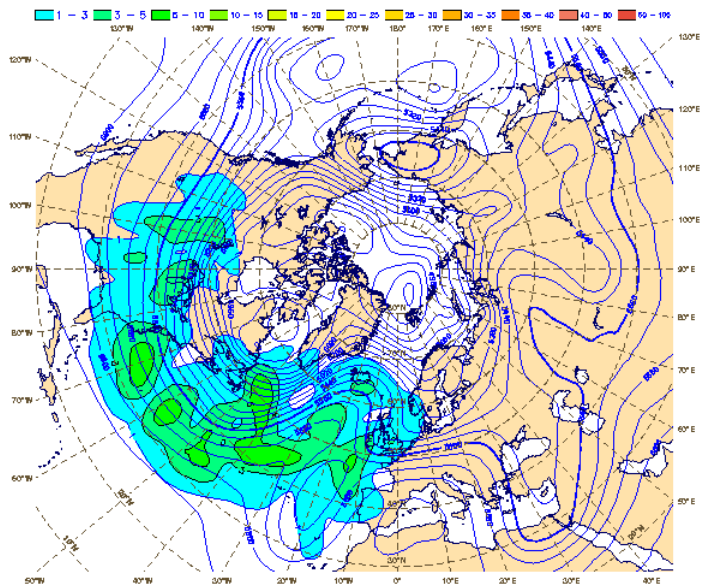


$$BSS = (PS - PS_{ref}) / PS_{ref}$$

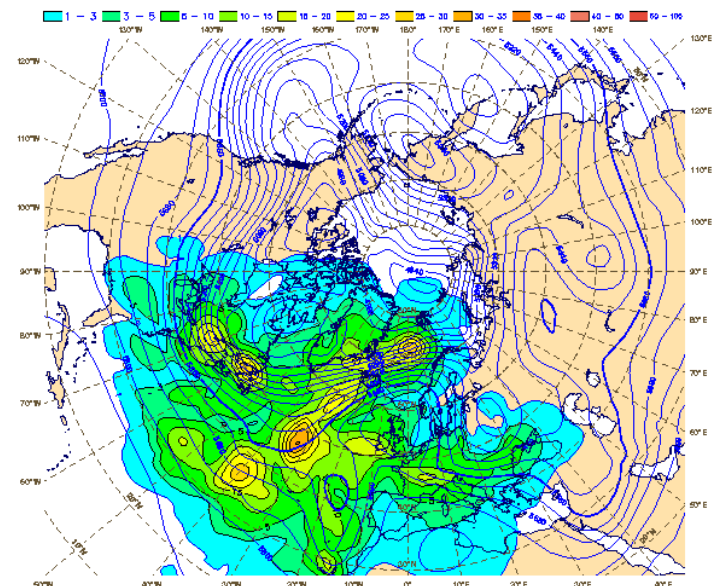


Operational configuration

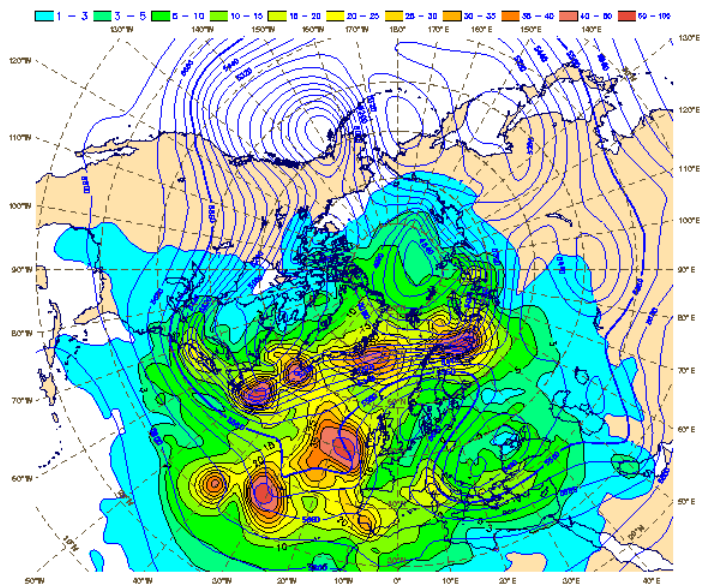
- ☛ T358c2.4 version (operational ARPEGE resolution)
- ☛ 11 members (ARPEGE operational + 10 perturbed members)
- ☛ 1 run/day (18H)
- ☛ Up to 60h



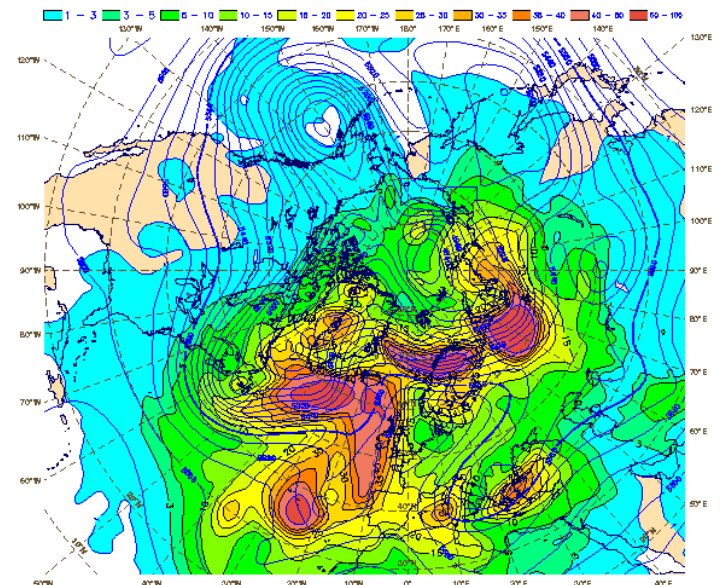
0H



24H



48H



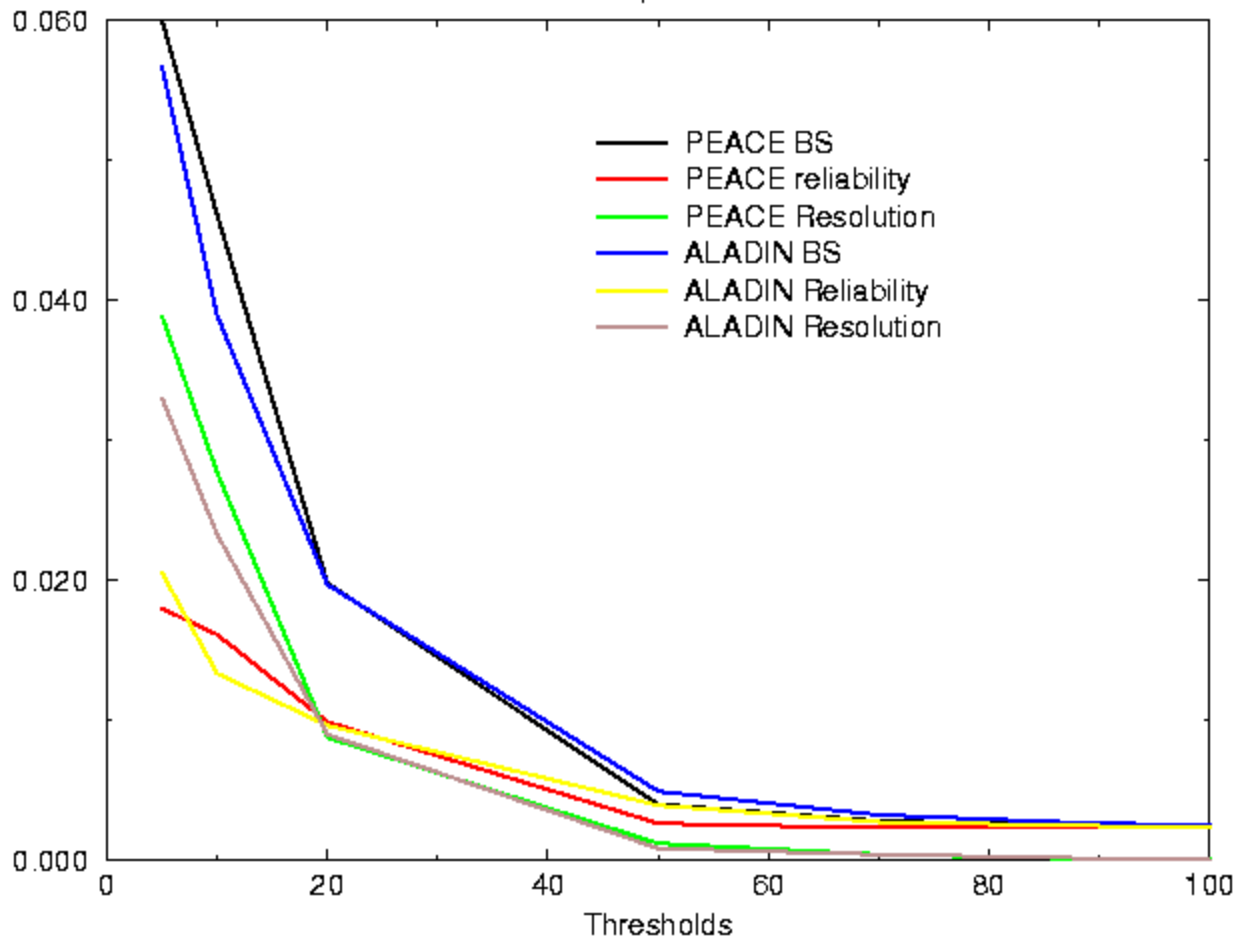
72H

LAMEPS

- ☛ Detection of heavy precipitations over France
- ☛ PEACE vs PEACE coupled with ALADIN
- ☛ 48H forecasts
- ☛ 10km mesh grid
- ☛ 20 cases
- ☛ Compared to observations data (~1100 rain gauges over France)
- ☛ Perturbation of the physics

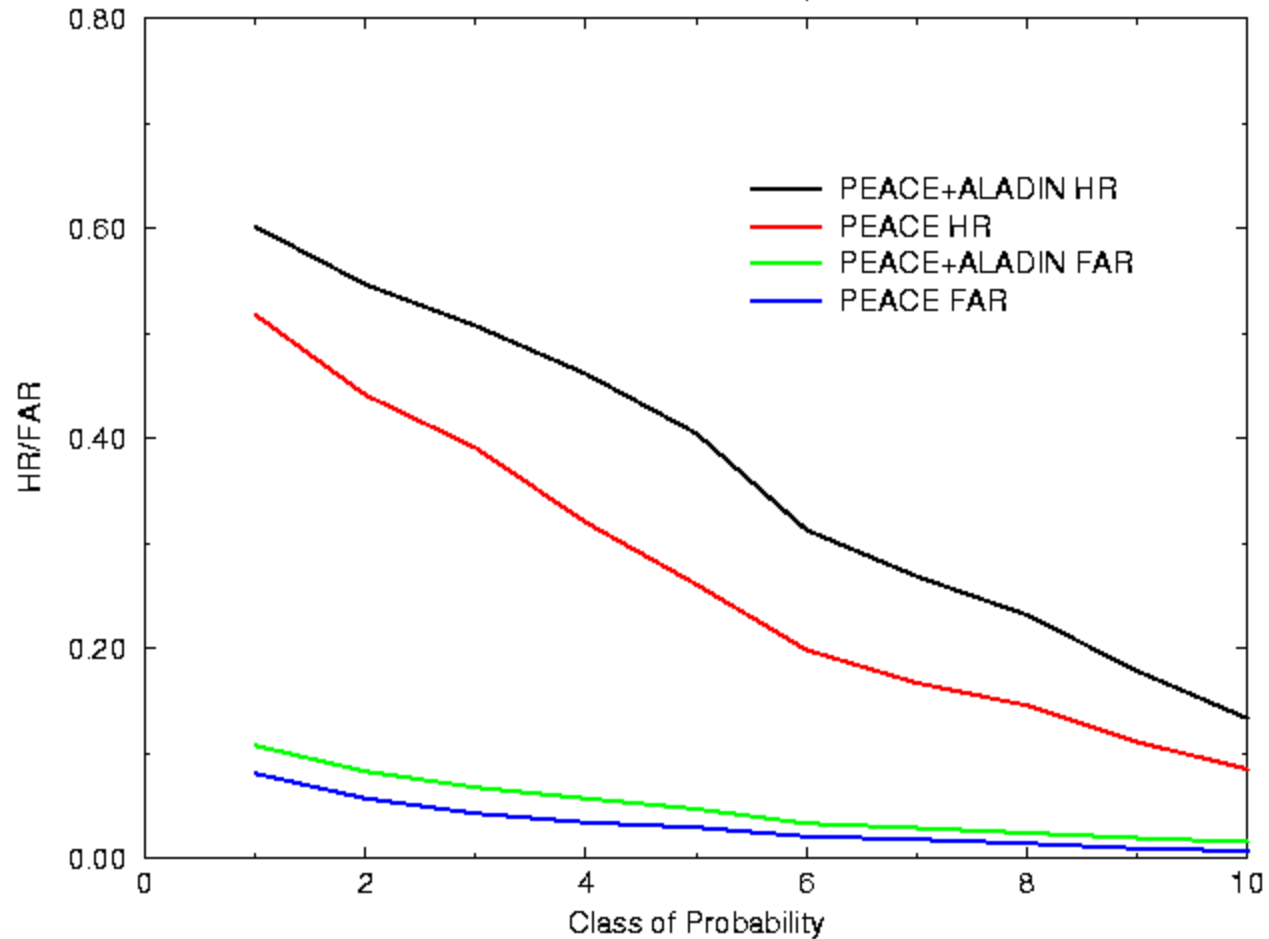
Brier Score – 12H Prec Accumulation

Step 24H



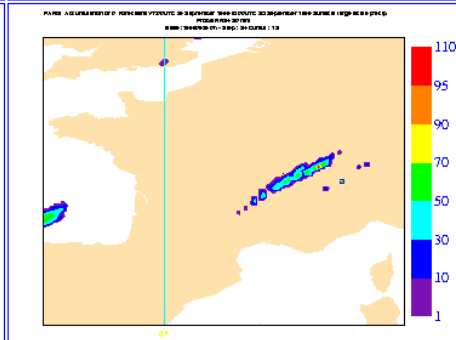
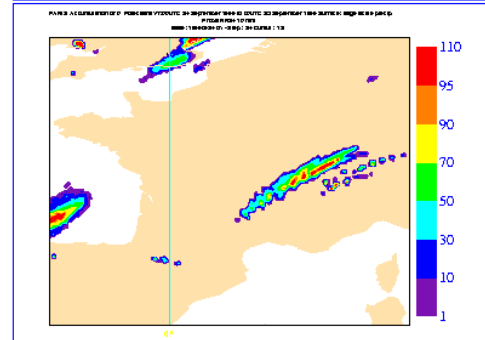
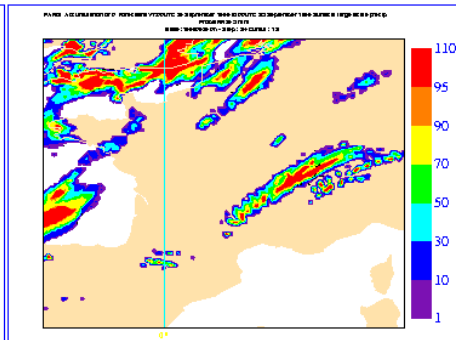
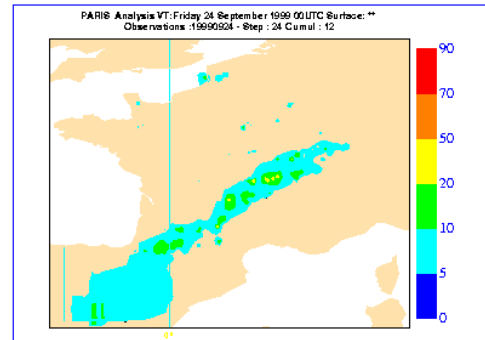
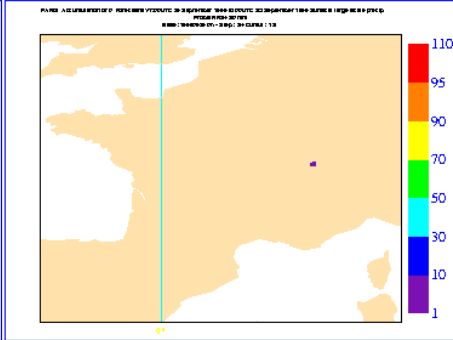
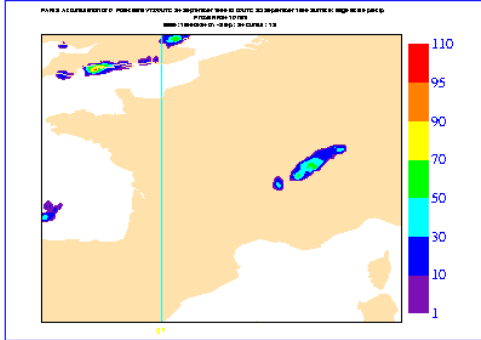
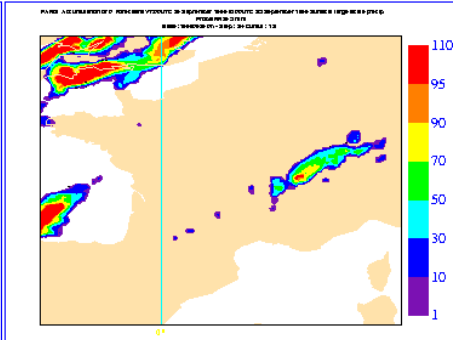
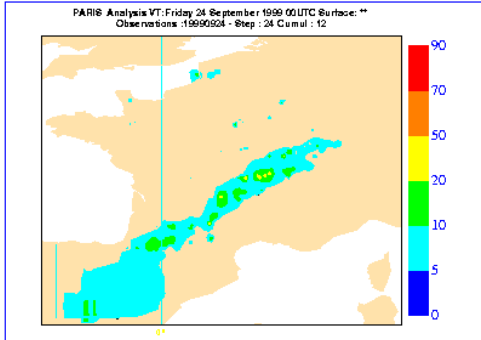
Hit rate / False Alarm Ratio – 12H Prec Acc.

20mm threshold – Step 24H



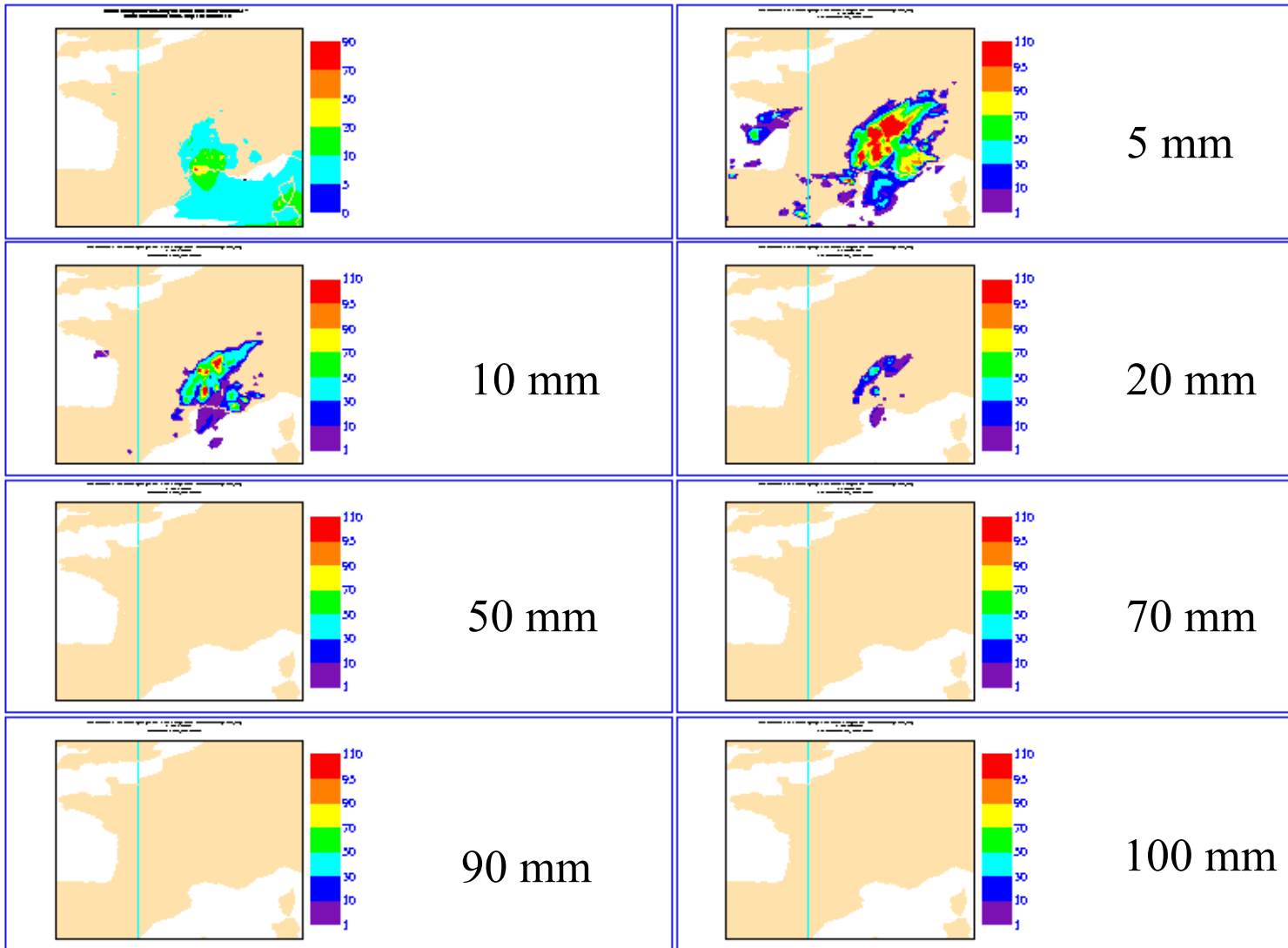
19990924

← PEACE

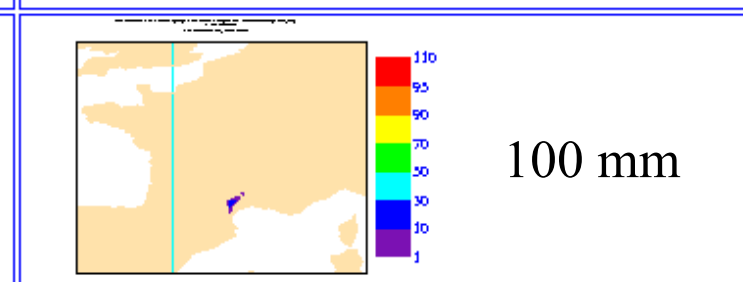
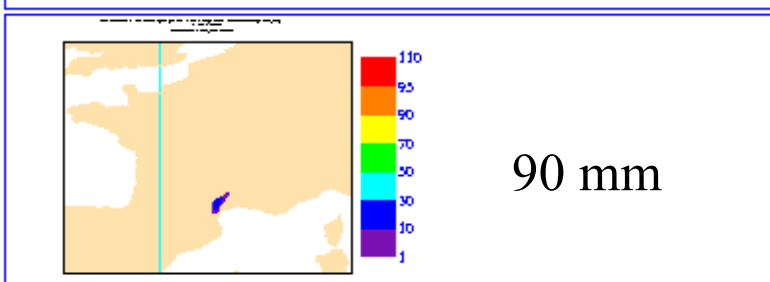
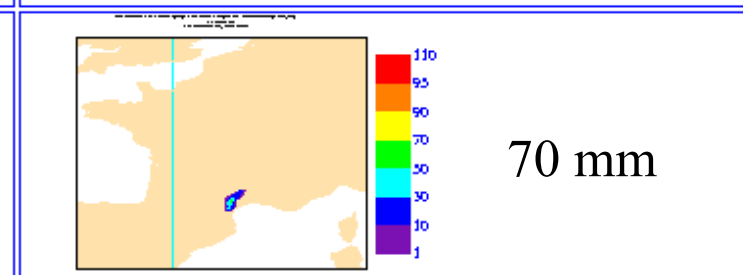
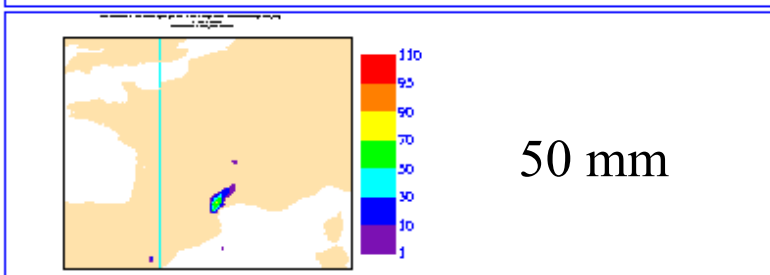
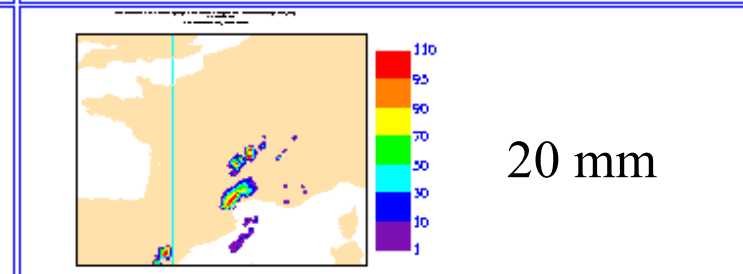
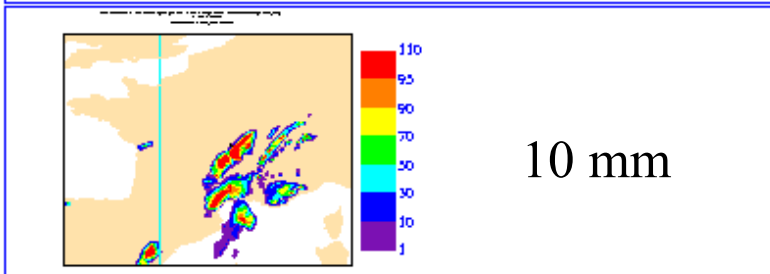
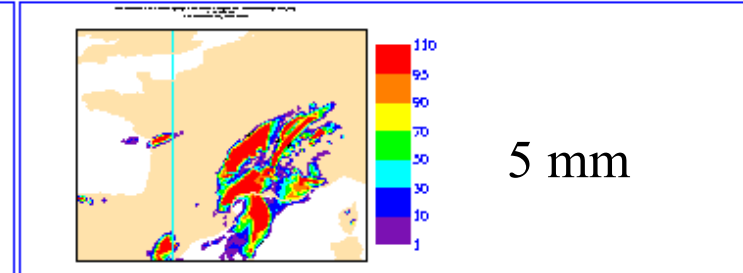
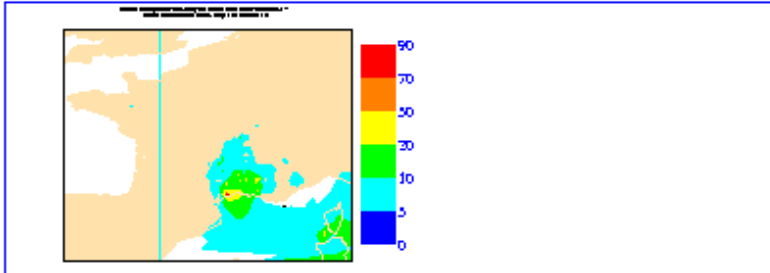


PEACE+ALADIN →

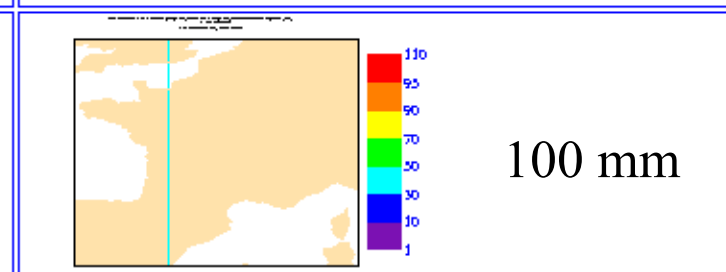
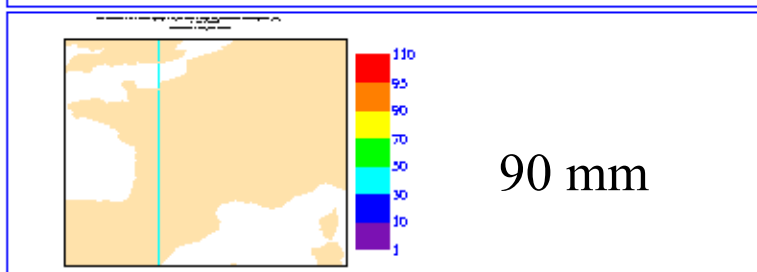
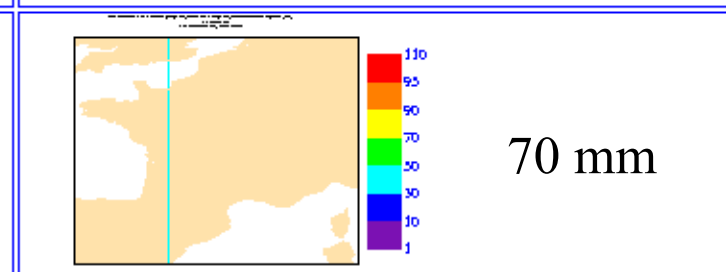
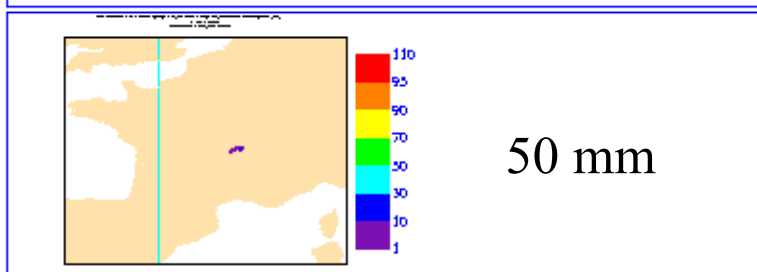
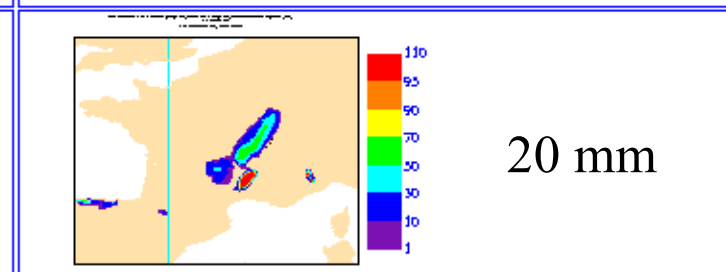
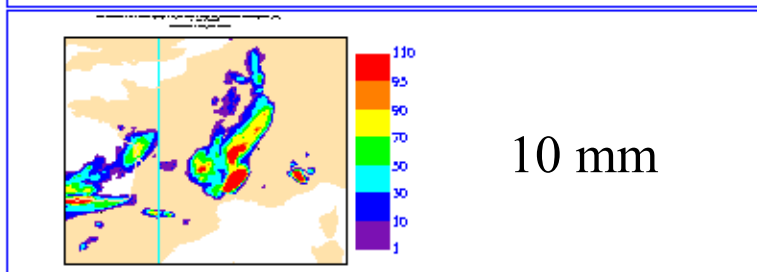
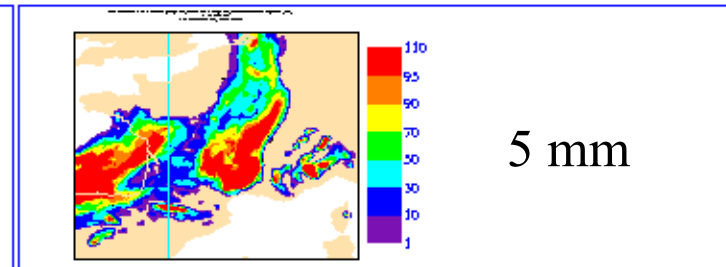
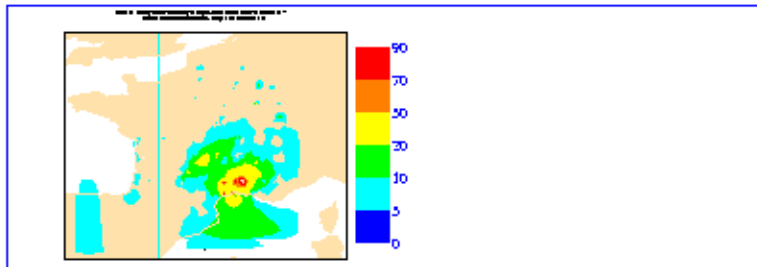
PEACE 20011109



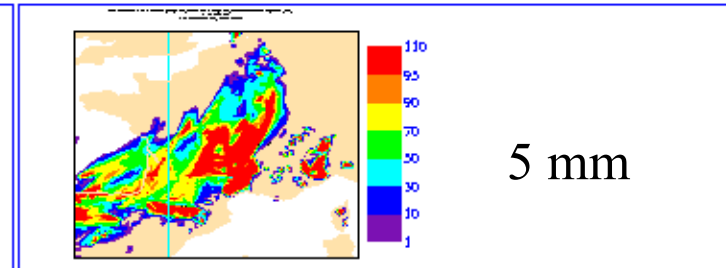
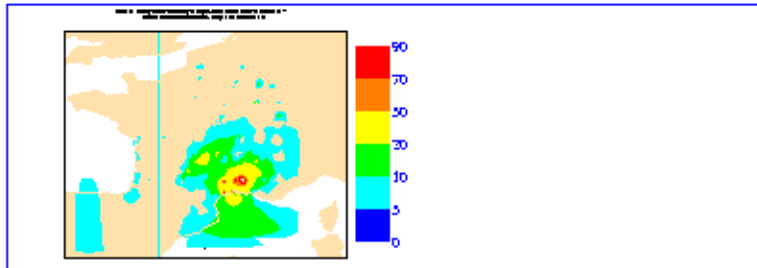
PEACE+ALADIN 20011109



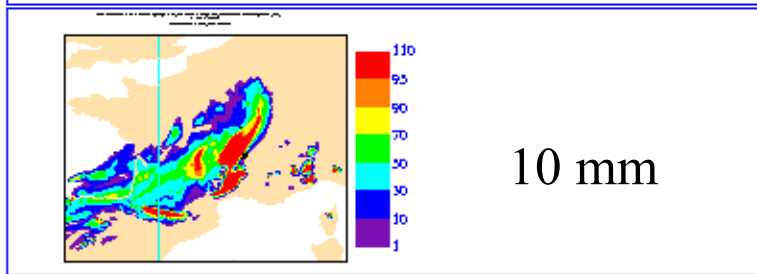
PEACE 20020908



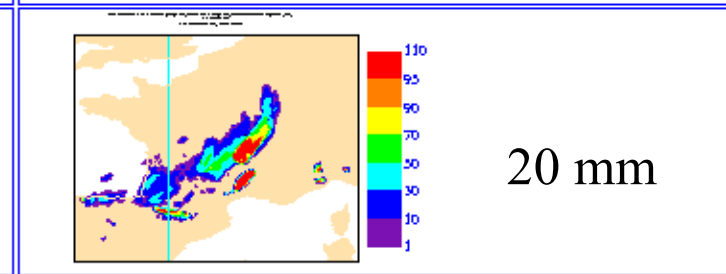
PEACE+ALADIN 20020908



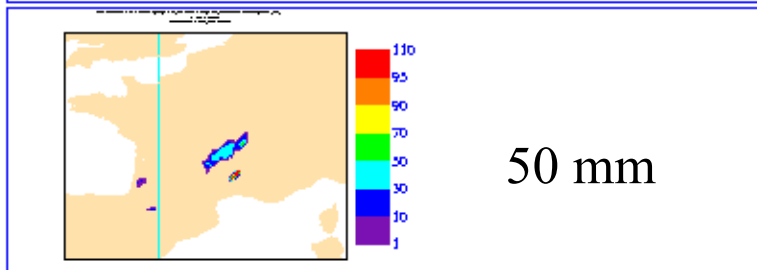
5 mm



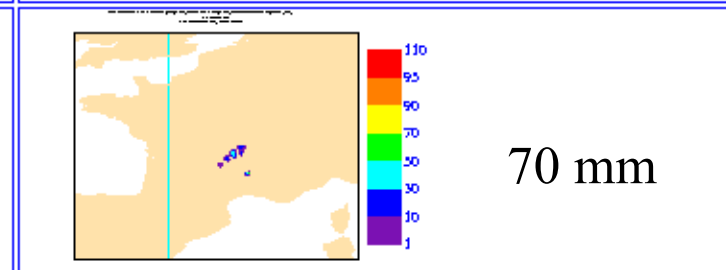
10 mm



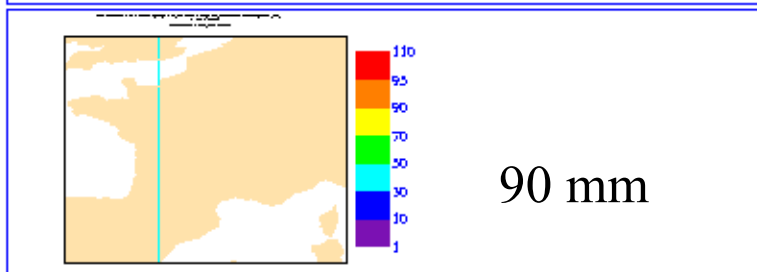
20 mm



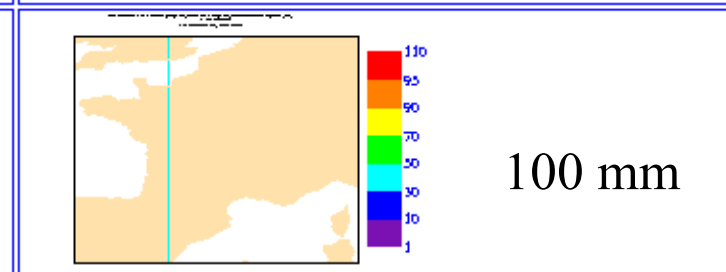
50 mm



70 mm



90 mm



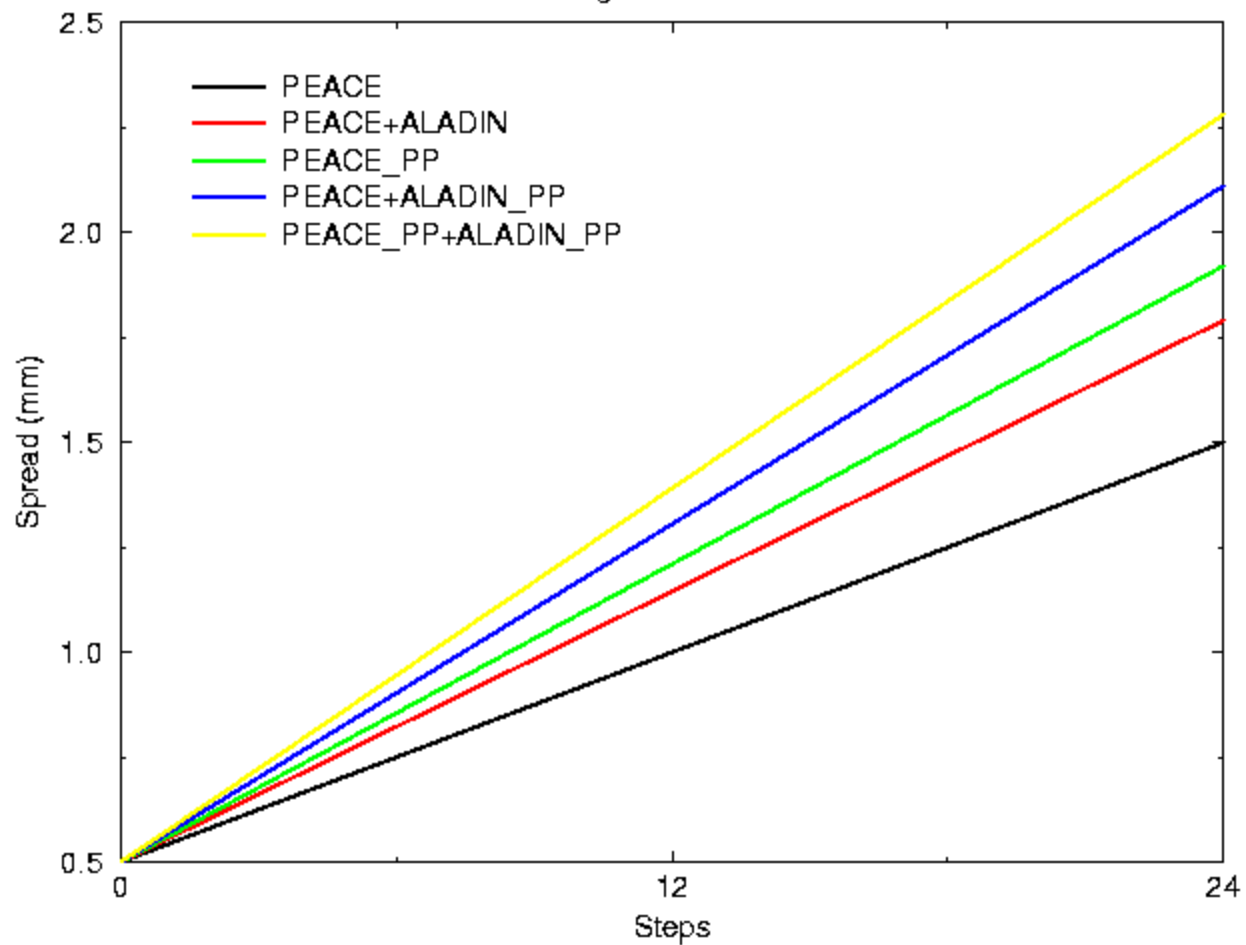
100 mm

Physics perturbations

- ☛ ARPEGE-CLIMAT stratiform precipitations and turbulence schemes
- ☛ Resolved precipitations in the deep convection
- ☛ Dynamical humidity convergence weighting according to the horizontal resolution
- ☛ Radiative scheme (with a new nebulosity tuning)
- ☛ variation of the lateral training ratio in the convective cloud
- ☛ variation of the minimum critical thickness of the raining cloud

12H Prec Acc. – Spread (mm)

Average over 20 cases



Future plans

☞ **Operational version (June) :**

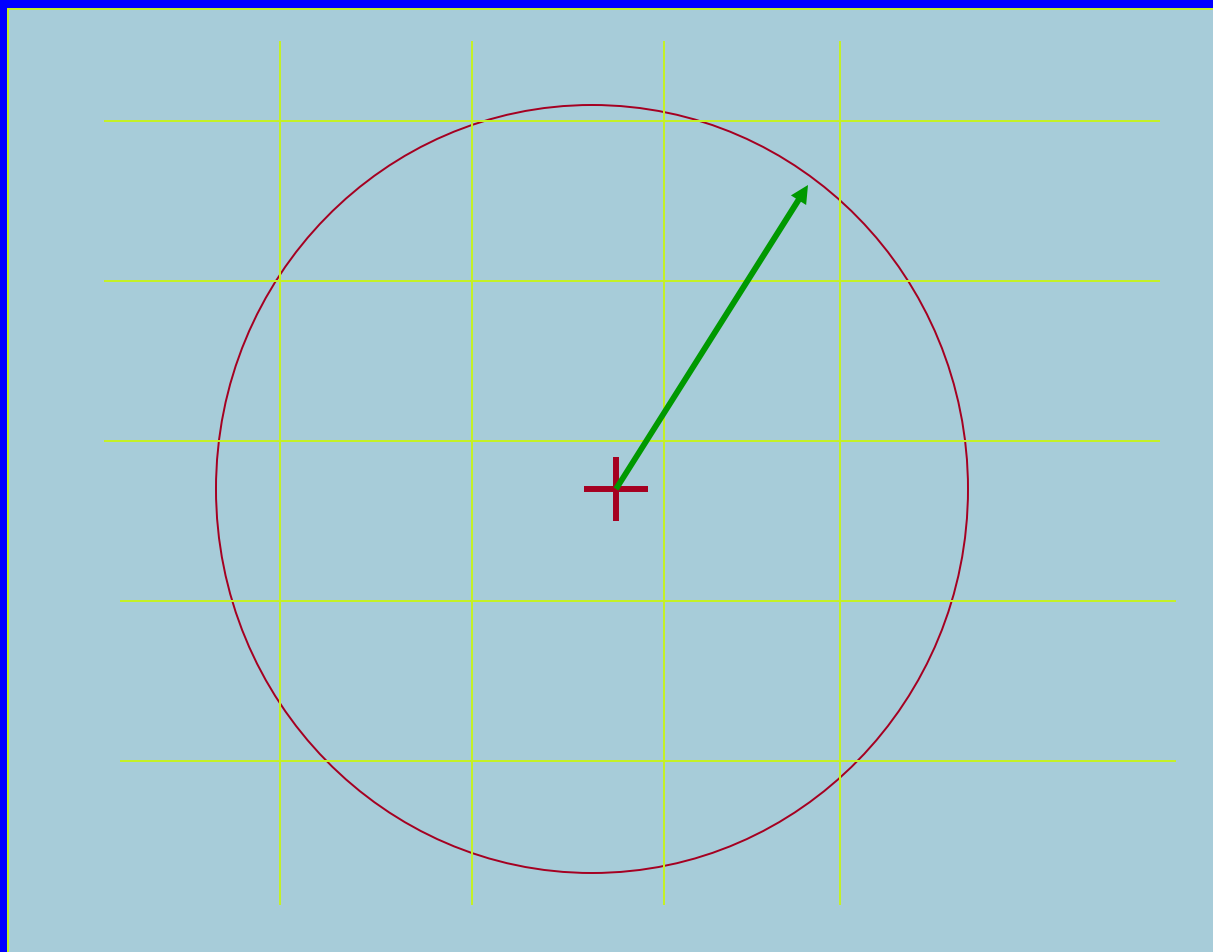
- **Subjective evaluation by the forecasters**
- **Development of probabilistic products**

☞ **GLOBAL EPS :**

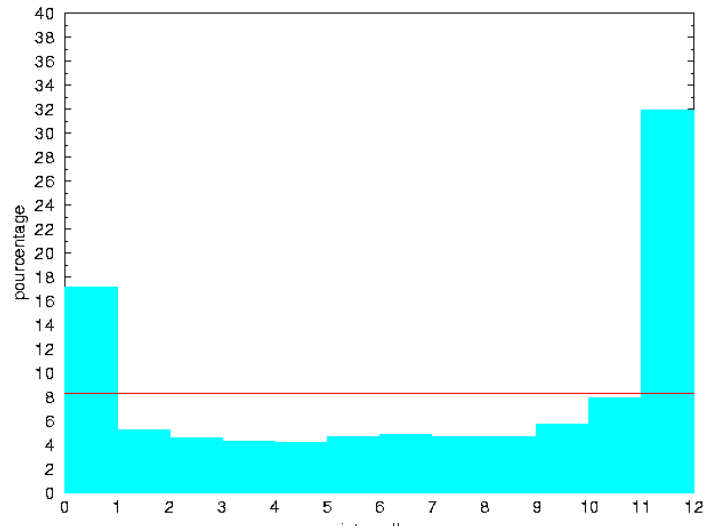
- **Stretched SVs**
- **Mixed Breeding+SVs (to catch past errors)**
- **EDA ? (expensive !)**

☞ **LAM EPS :**

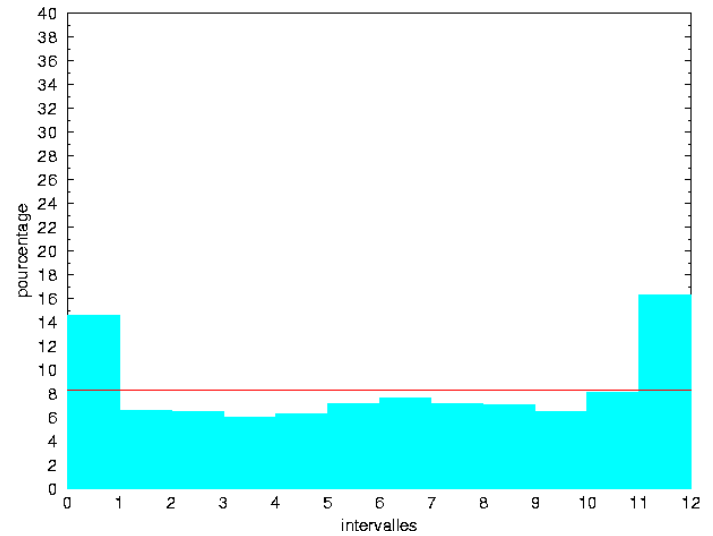
- **Physics perturbations**
- **Specific CI perturbations ?**
- **Problem of validation**



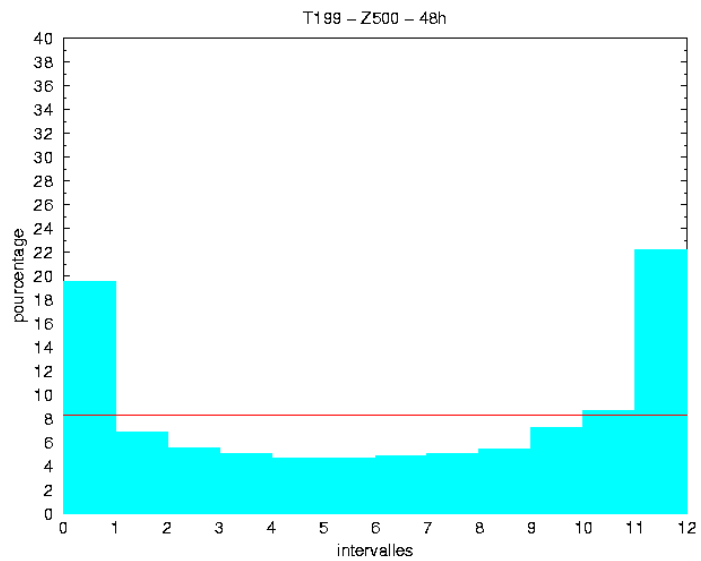
Rank diagram – T199 – Z500 – 24h



Rank diagram – T358 – Z500– 24h



Rank diagram – T199 - Z500 – 48h



Rank diagram – T358 - Z500 – 48h

