Norwegian Meteorological Institute
met.no

HIRLAM EPS work at the Norwegian Meteorological Institute

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HIRLAM/ALADIN All-Staff Meeting 2007, 23 -26 April 2007

The ensemble systems at met.no

TEPS – Targeted EPS

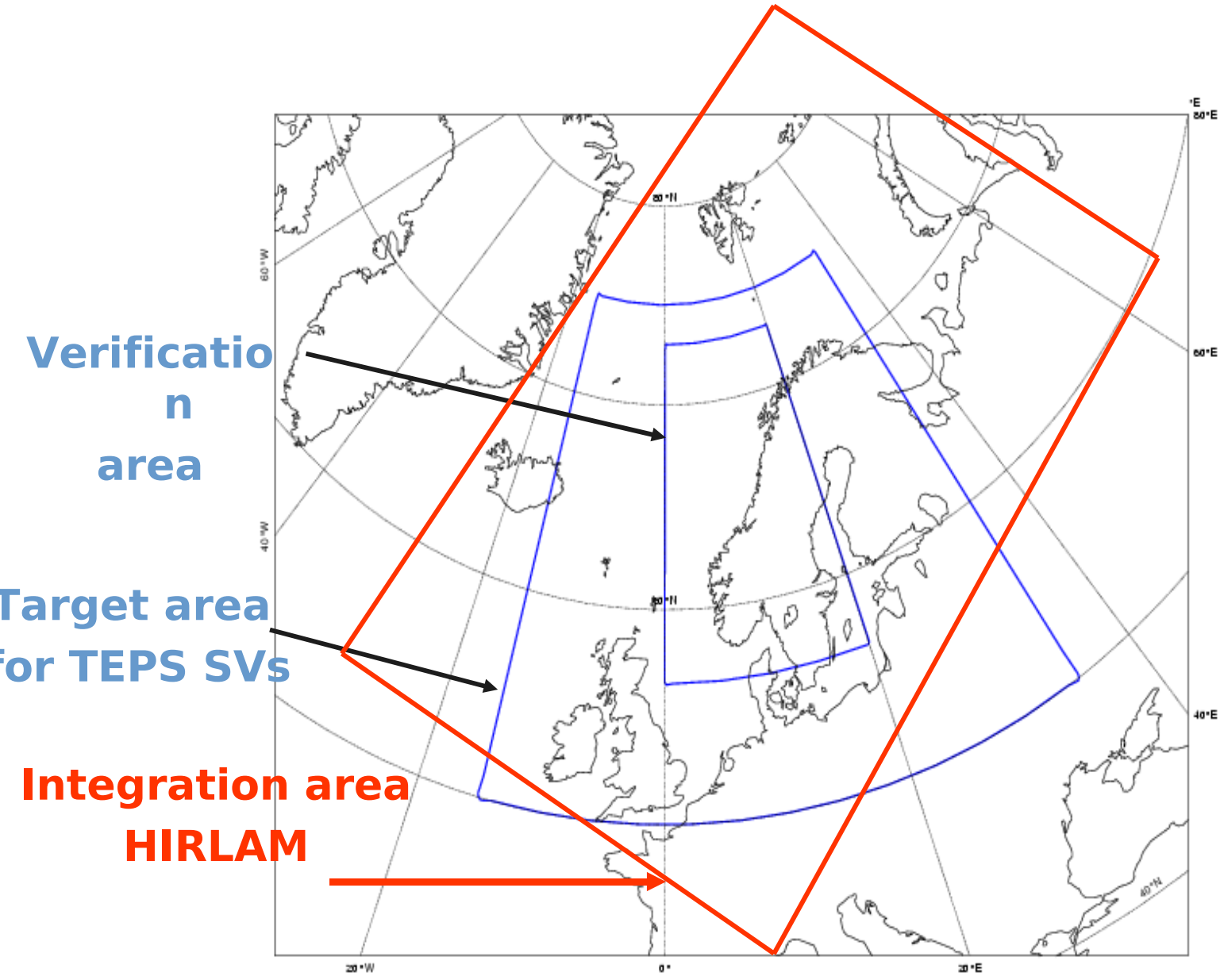
- A dedicated version of ECMWF EPS. Runs at ECMWF
  - 20 + 1 ensemble members, as opposed to 50 + 1 for EPS
  - Target area Northern Europe and adjacent sea areas, as opposed to NH north of 30°N(*)
  - Starts at 12 UTC every day
  - Runs to +72h, as opposed to +240h for EPS
- T399L62 (~55km)

LAMEPS

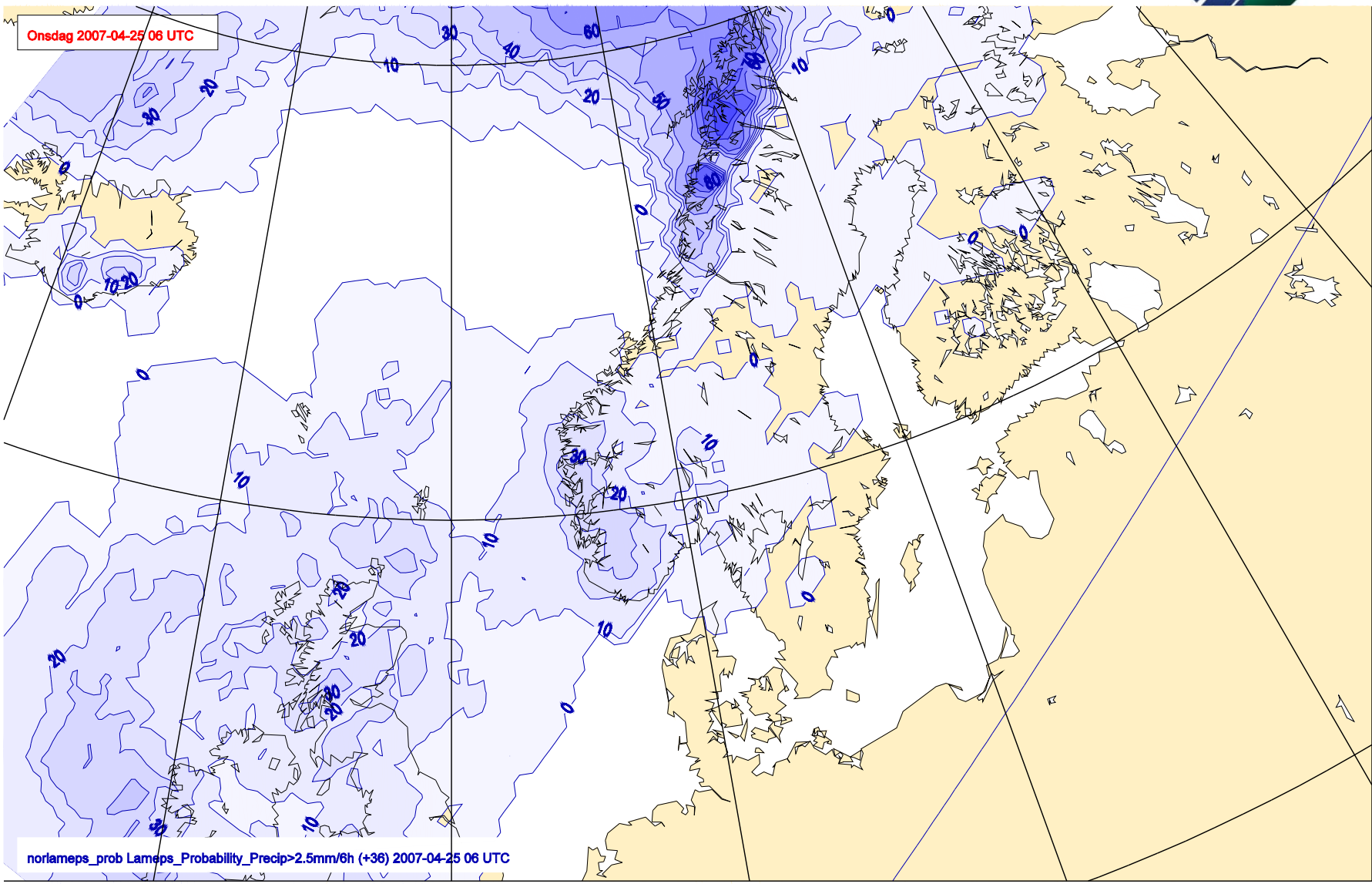
- HIRLAM in ensemble set-up (6.4 -> 7.1)
- Quasi operational at met.no since 14 February 2005
- 20 members + control
  - Control based on Norwegian HIRLAM analysis
  - 20 initial and open boundary perturbations from TEPS, hence the perturbations are consistent
  - Starts at 18 UTC every day (fresh HIRLAM analysis), i.e. a 6 hour delay compared to TEPS and EPS
  - Forecast range: +60h
- Resolution: 0.2° (~20 km), 40 levels

NORLAMEPS

- Combines simply IFS TEPS and HIRLAM LAMEPS
  - A simple “multi”-model, multi-initial-state ensemble
  - 41 + 1 ensemble members


Verification area
Target area for TEPS SVs
Integration area HIRLAM

SOME PRODUCTS FROM NORLAMEPS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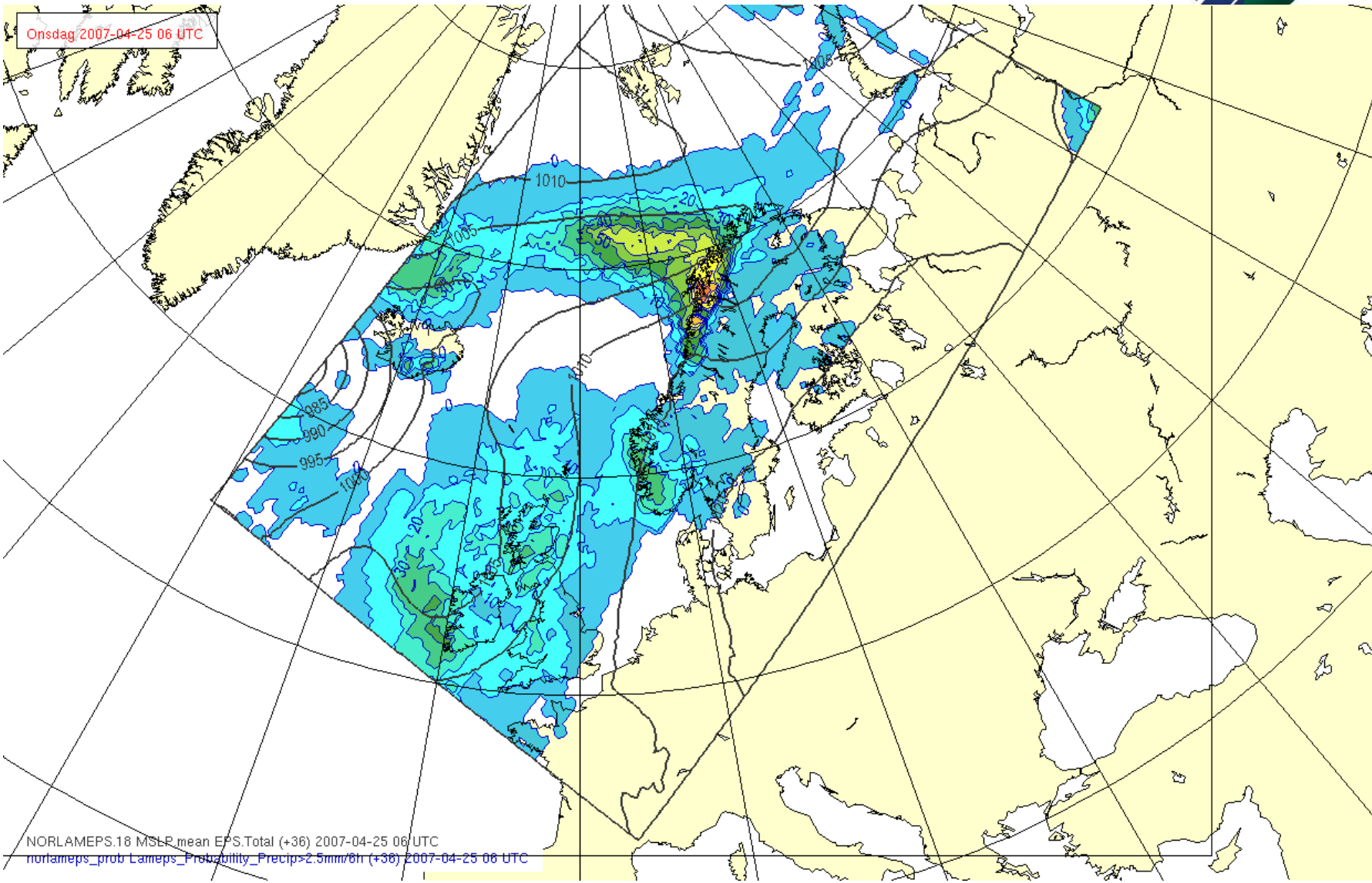
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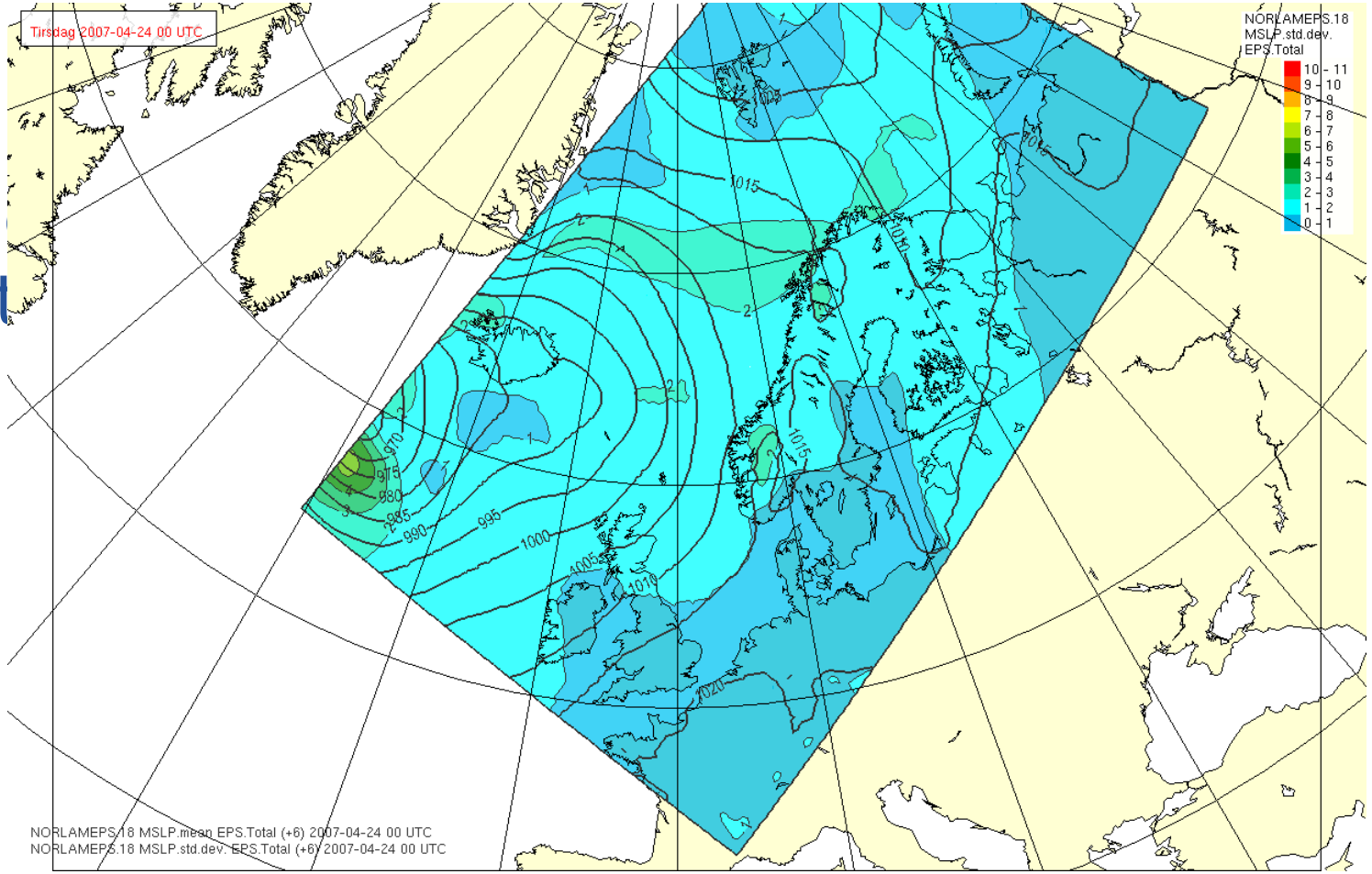
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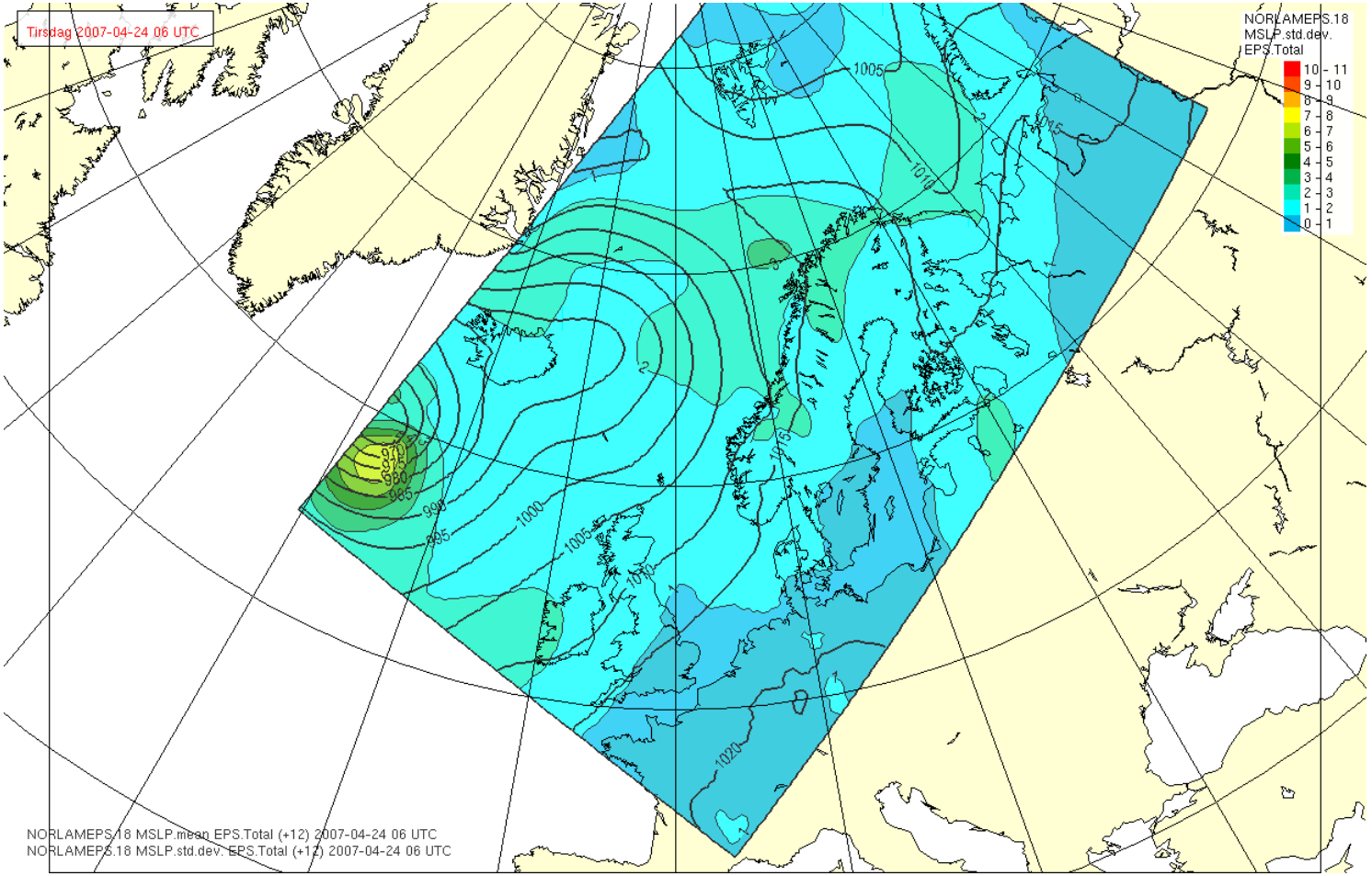
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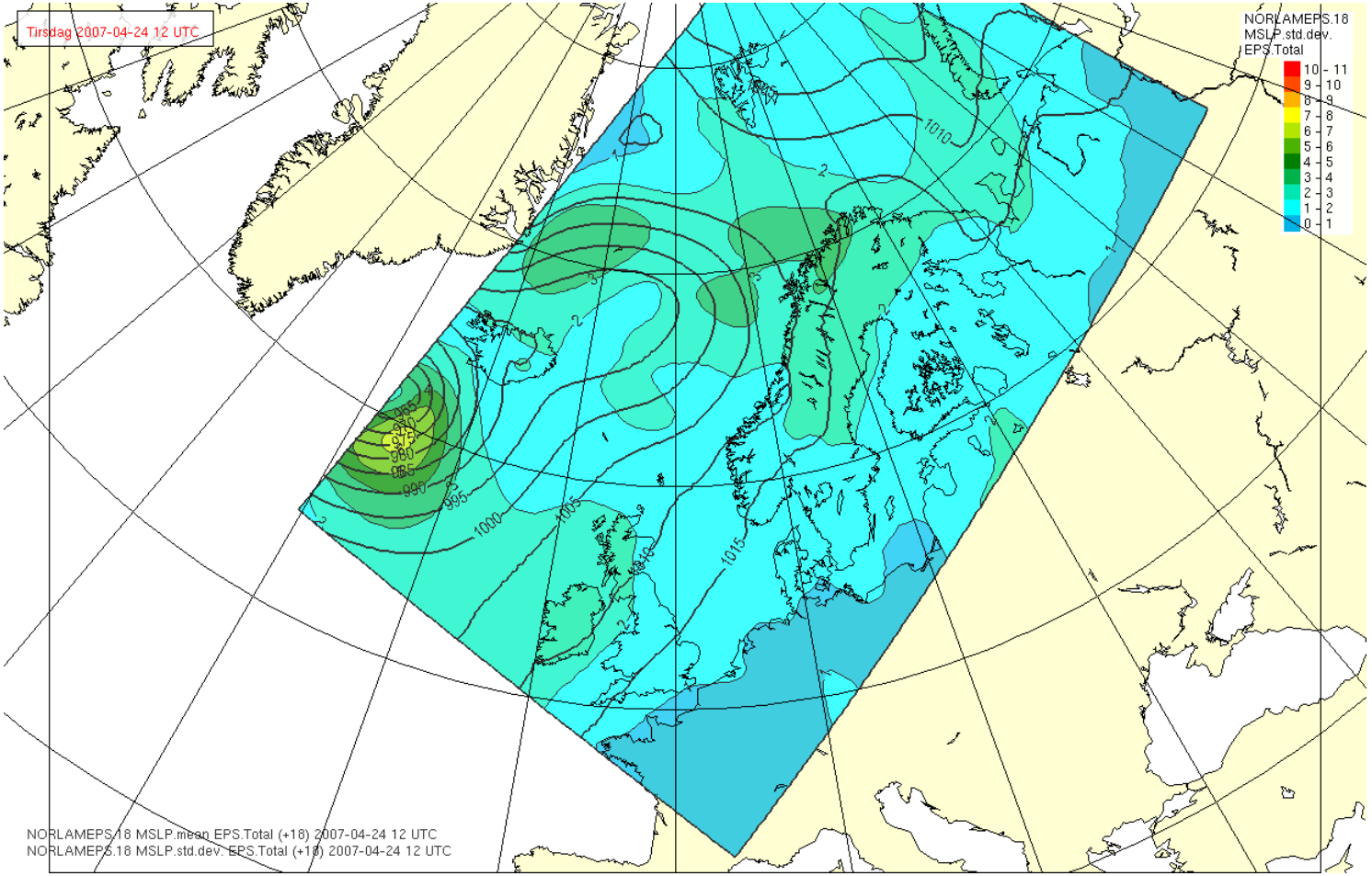
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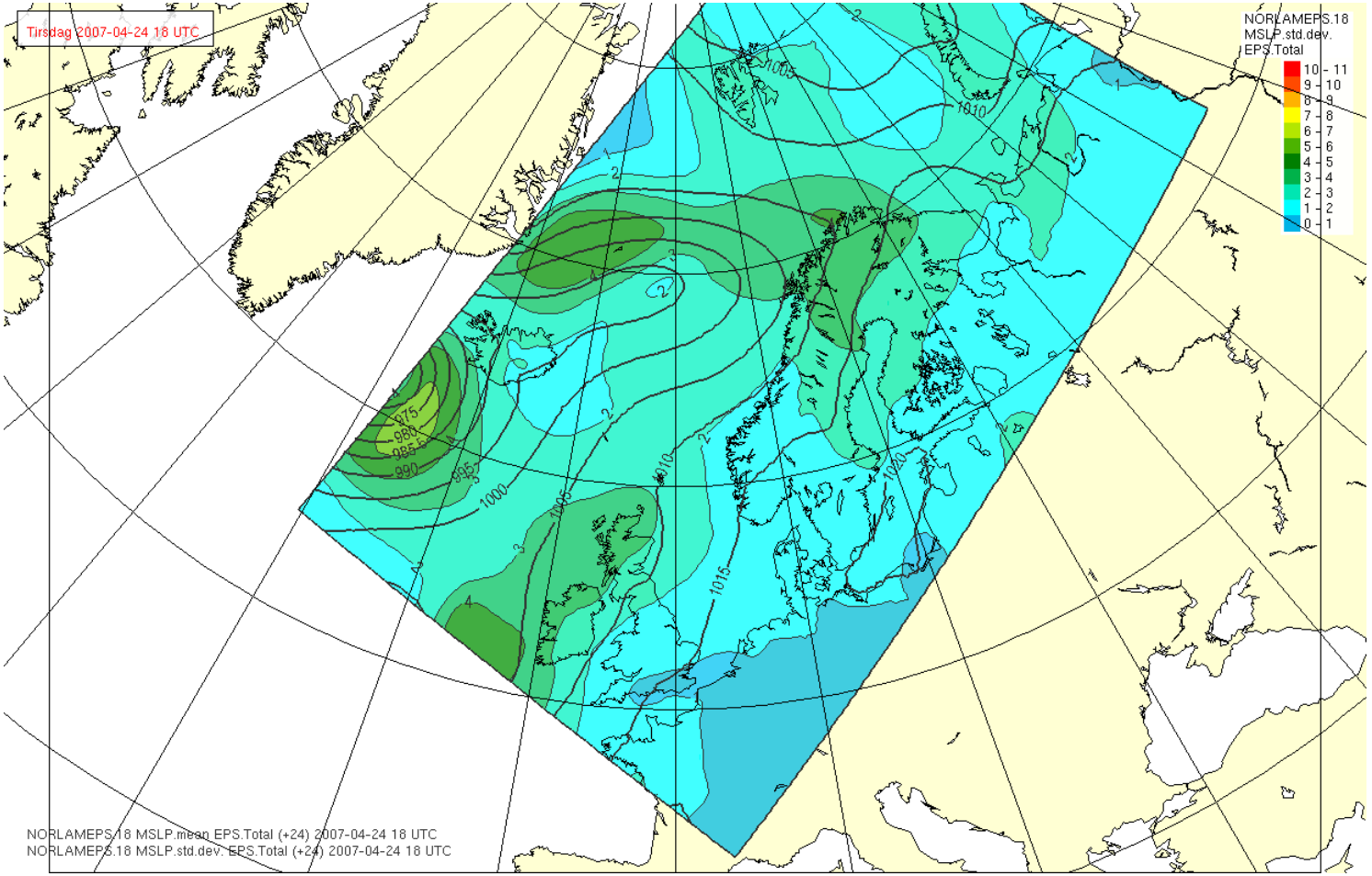
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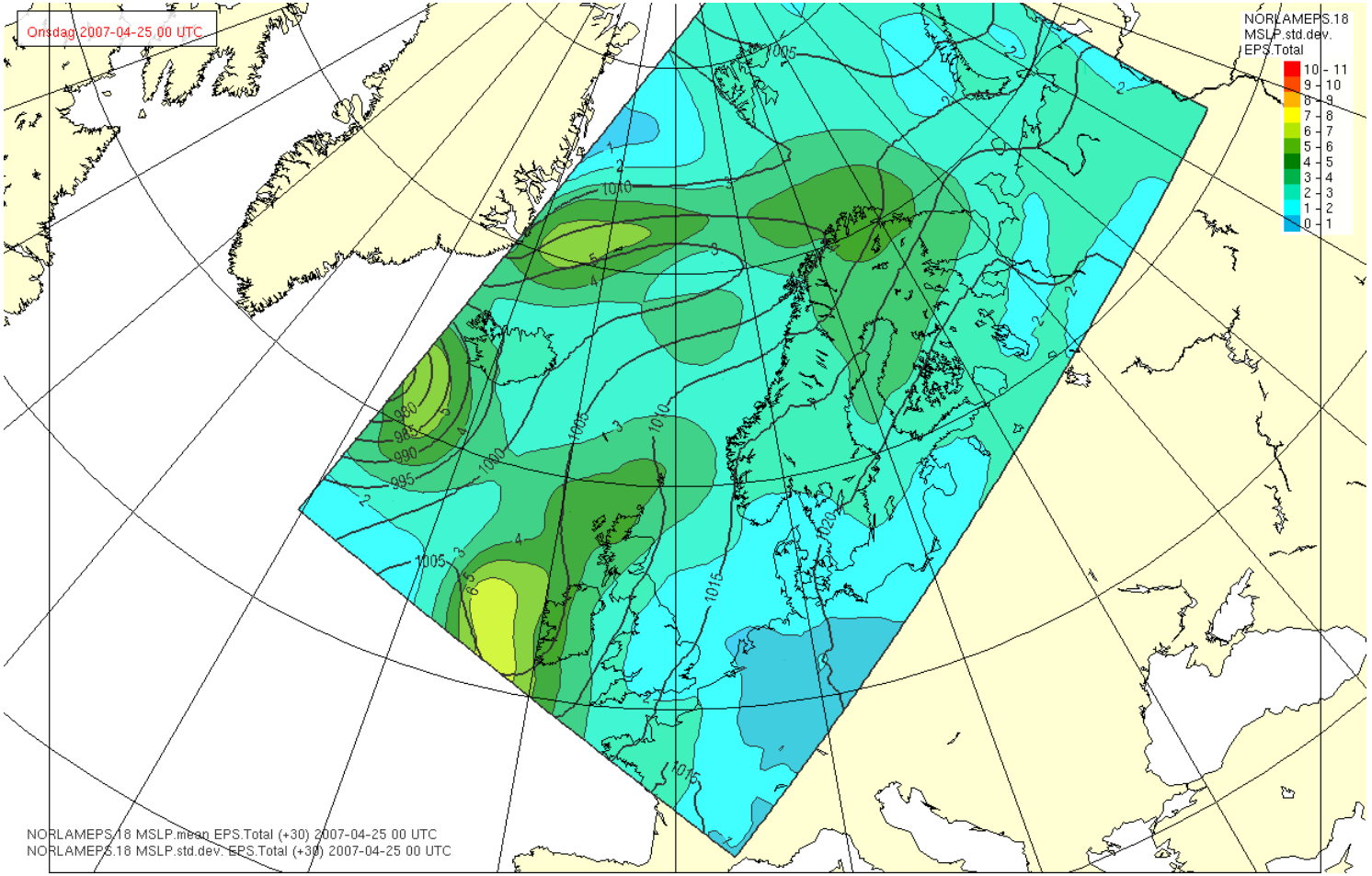
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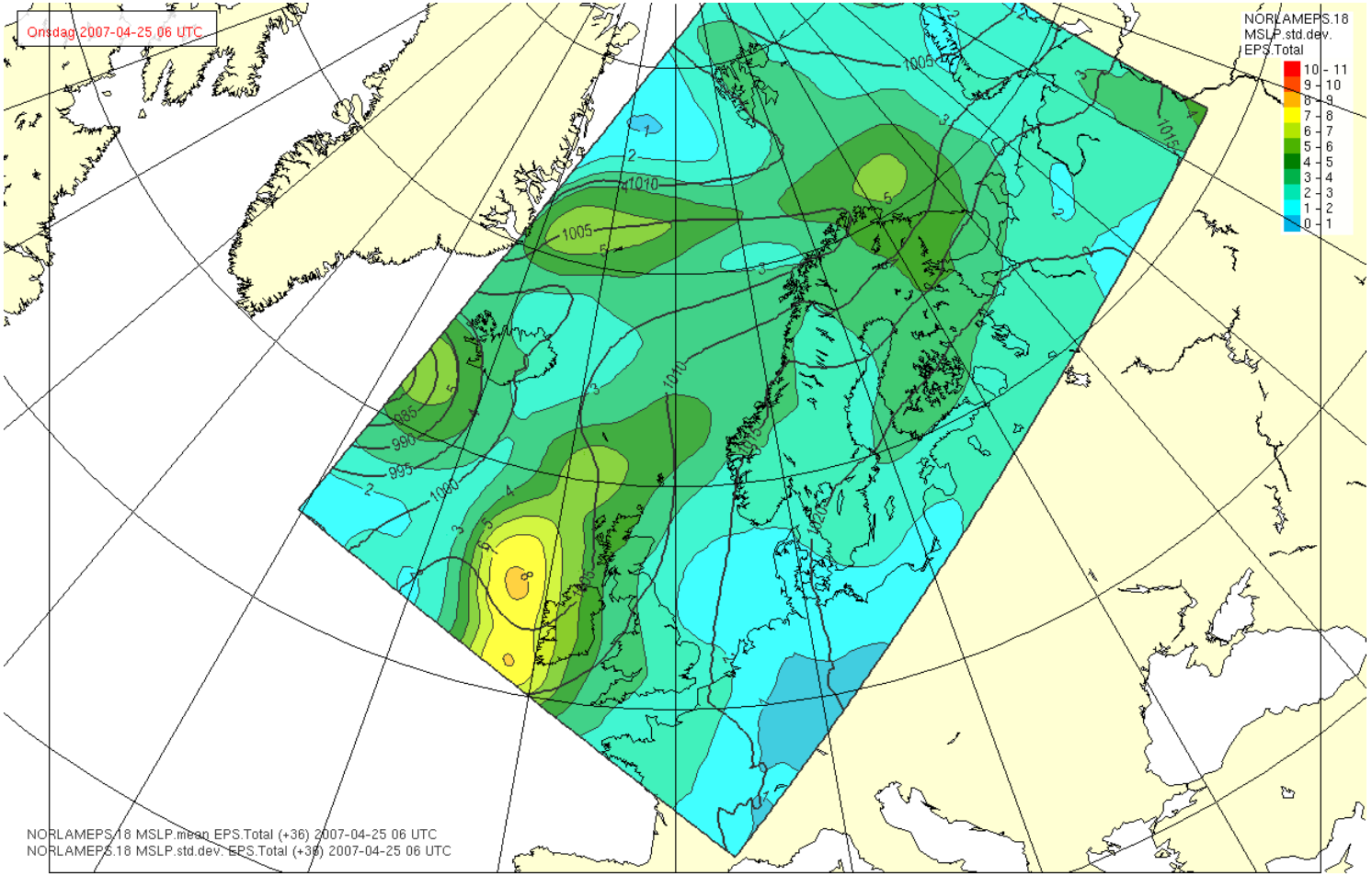
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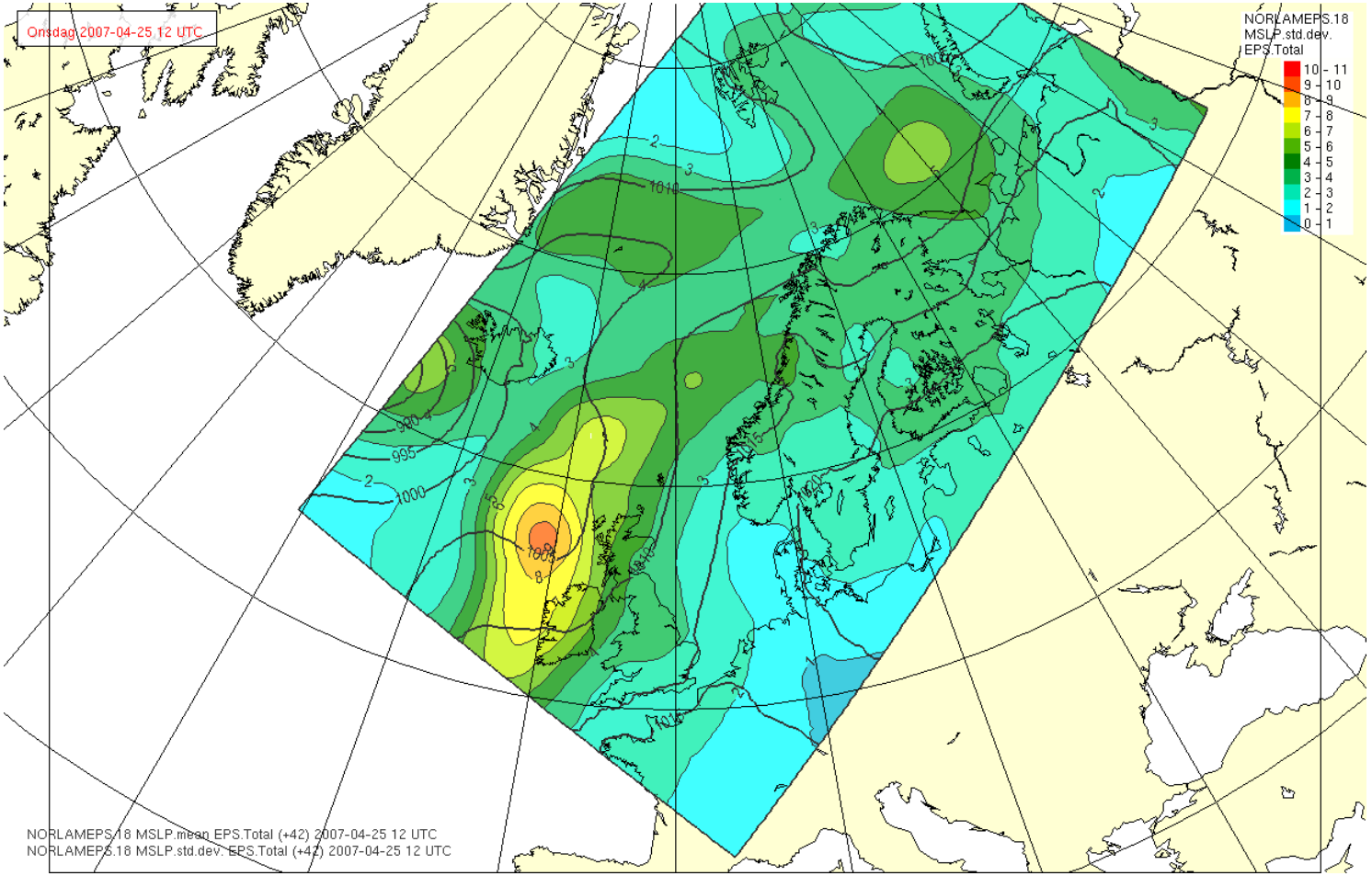
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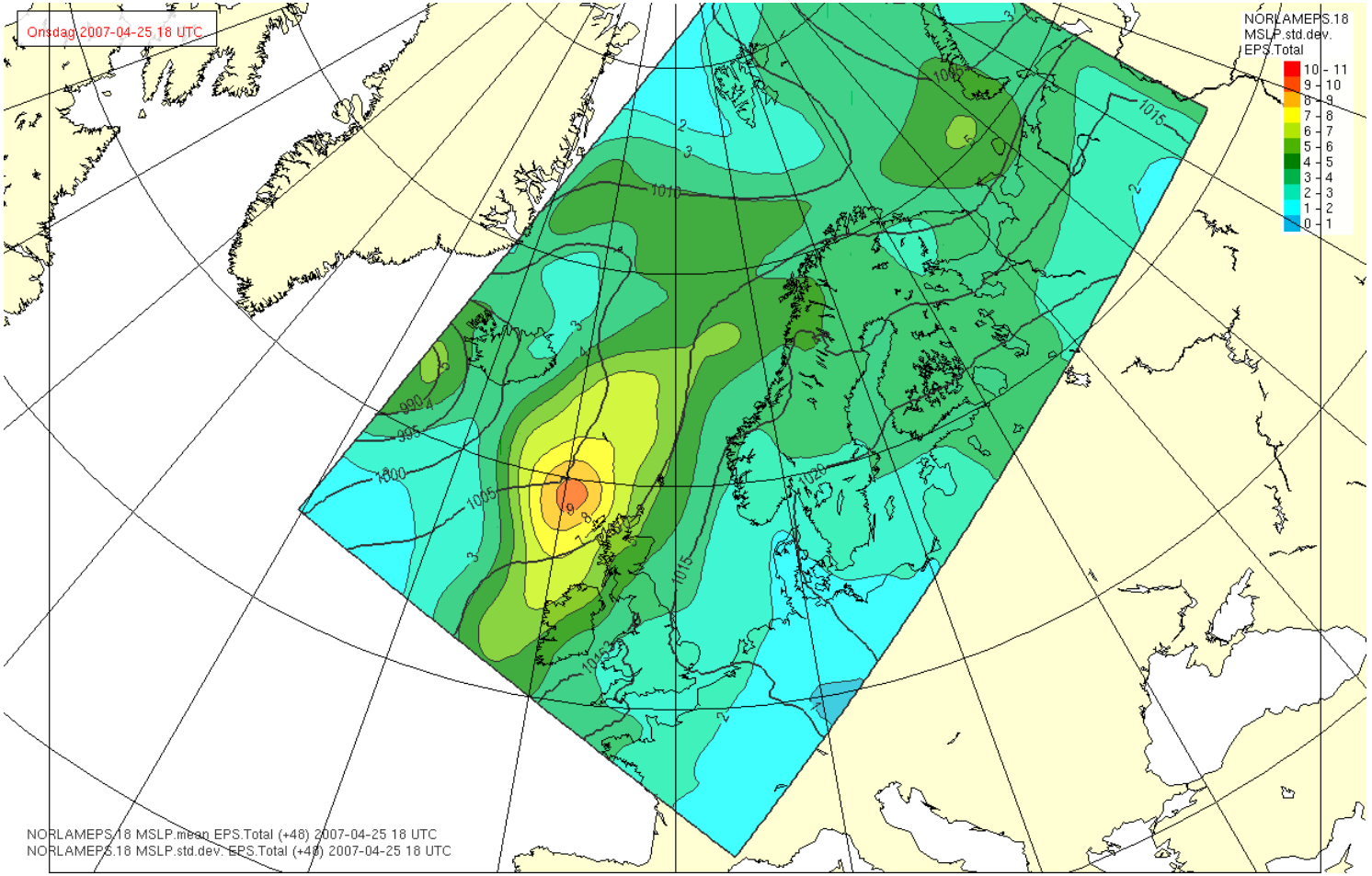
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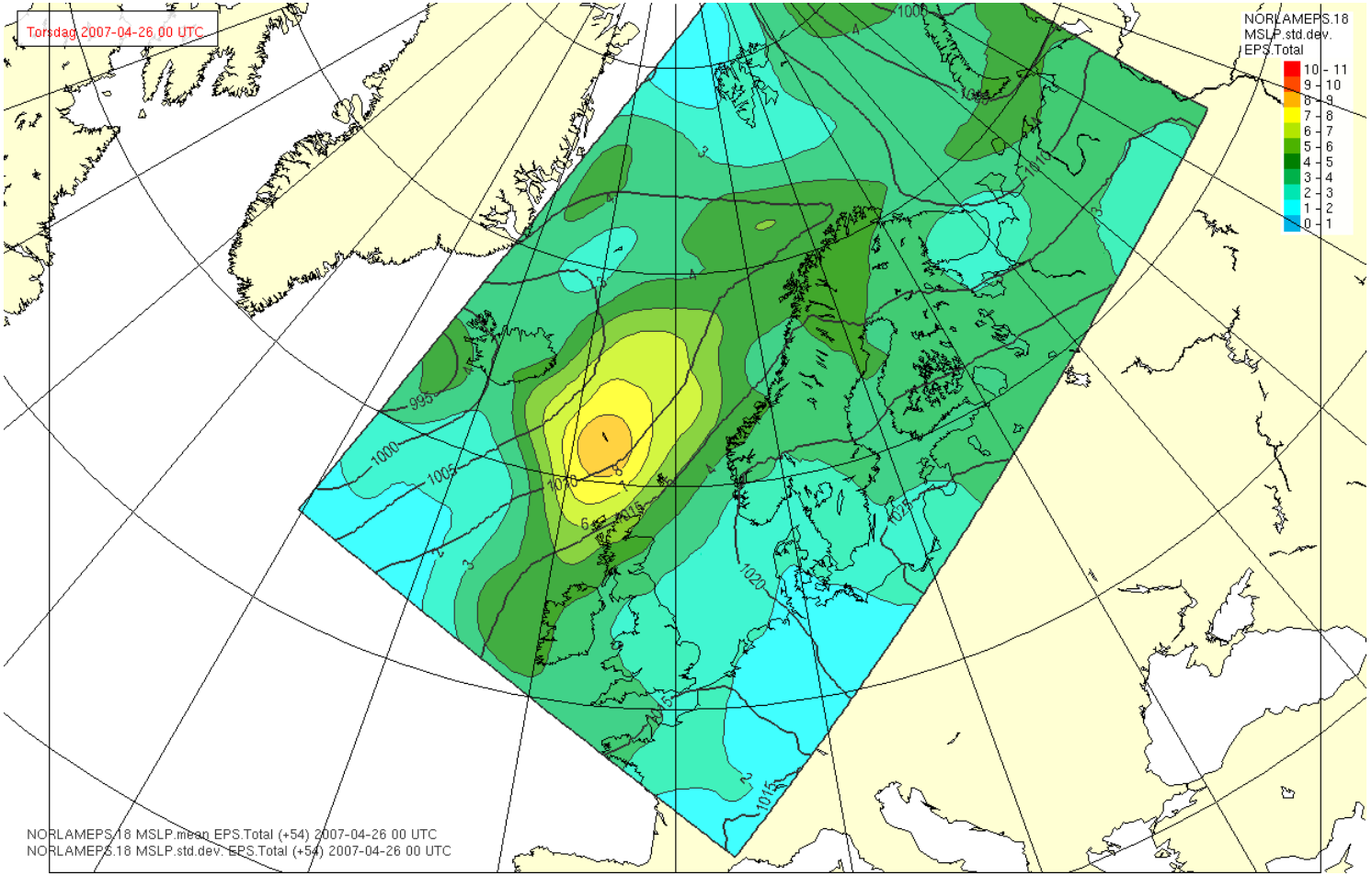
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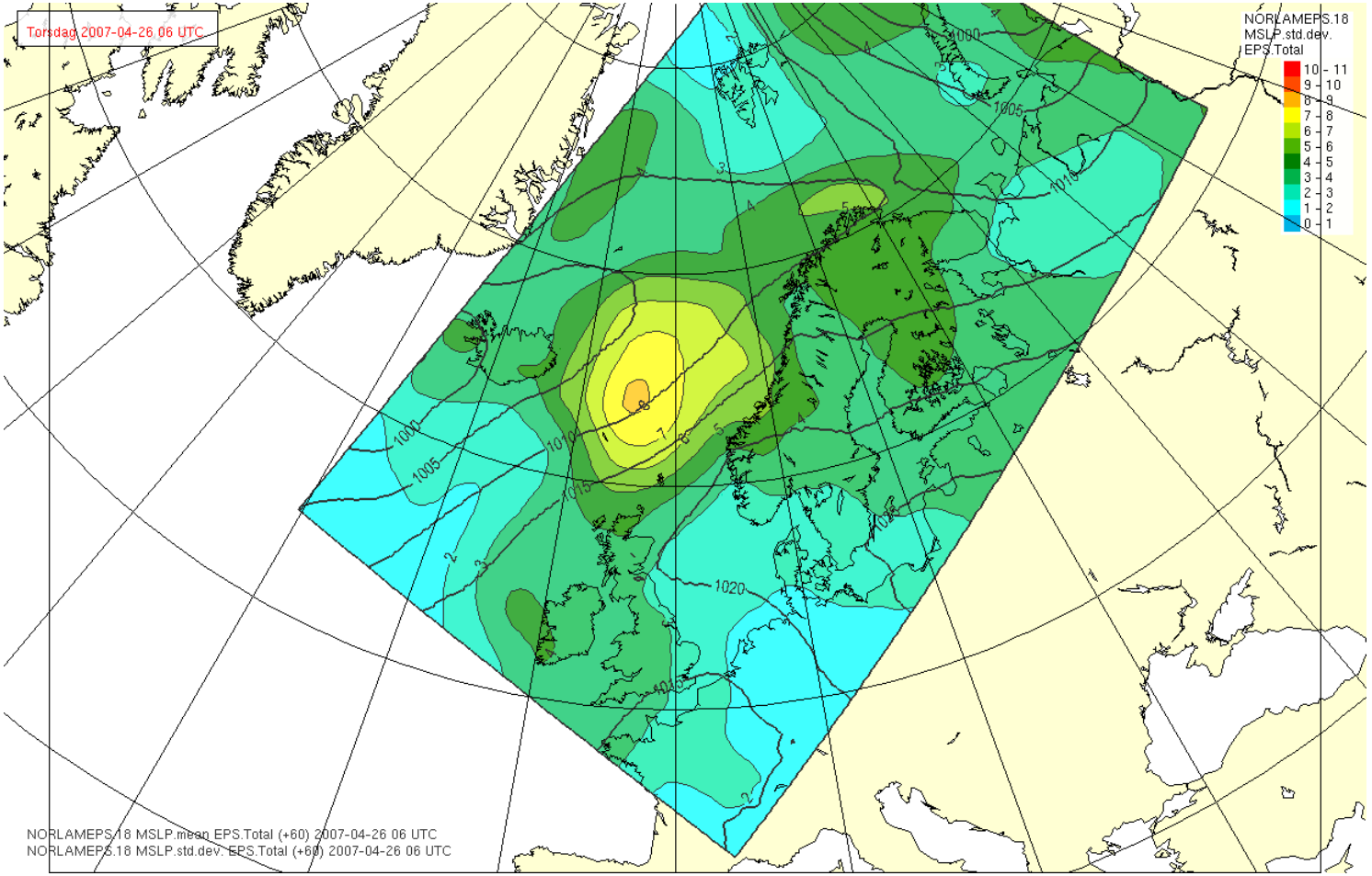
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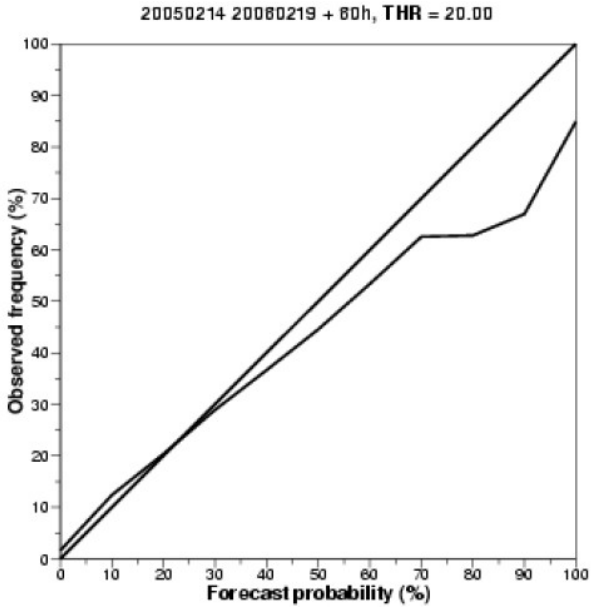
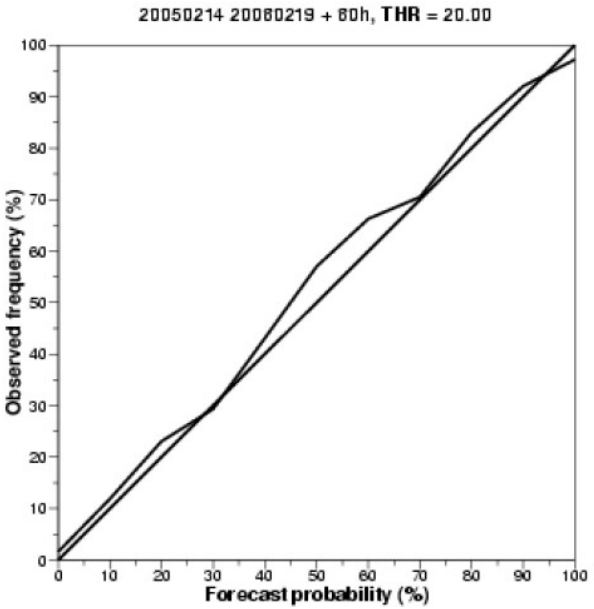
VERIFICATION

Reliability diagrams, 20mm, 60h

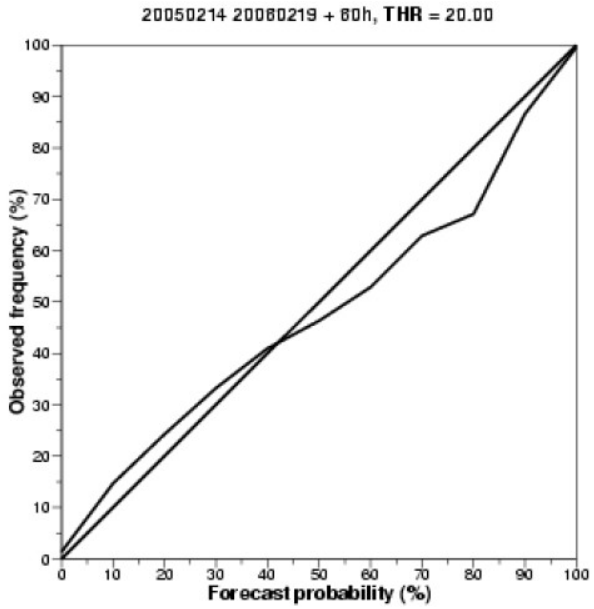


LAMEPS

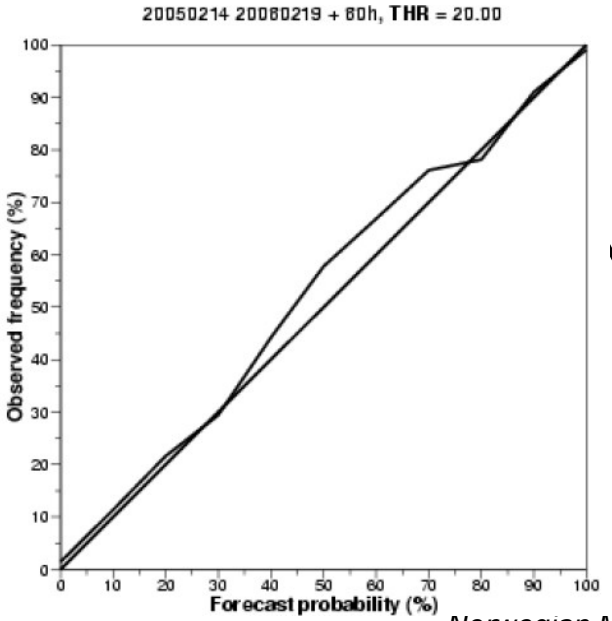


TEPS

Annual
Feb05-Feb06

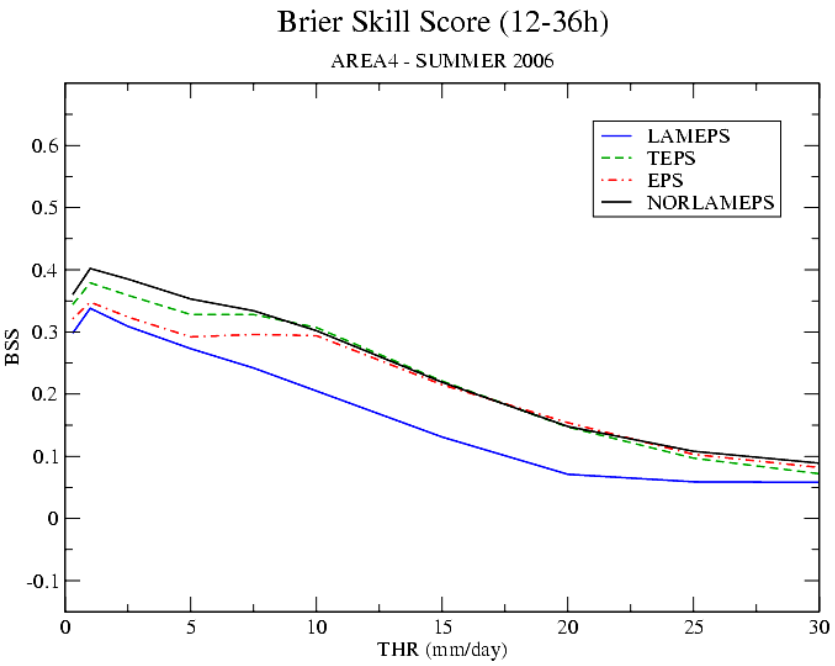


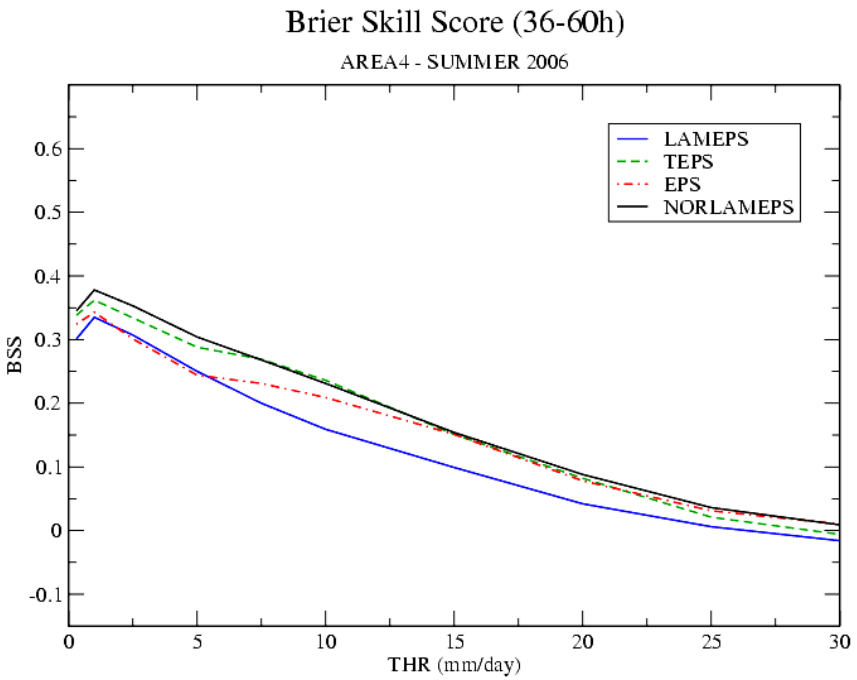
EPS



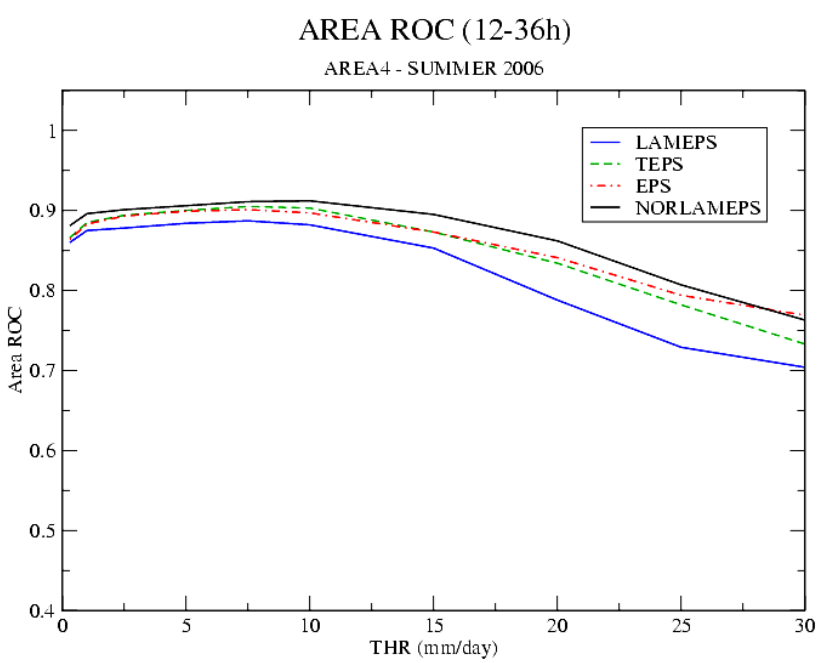
NORLAMEPS

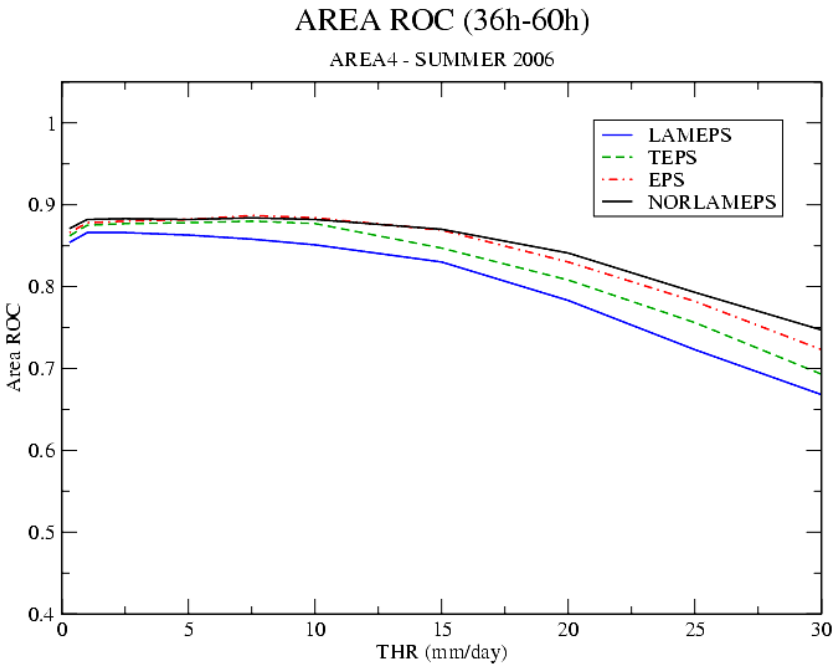
Brier Skill Score
Summer 2006
(april – september)





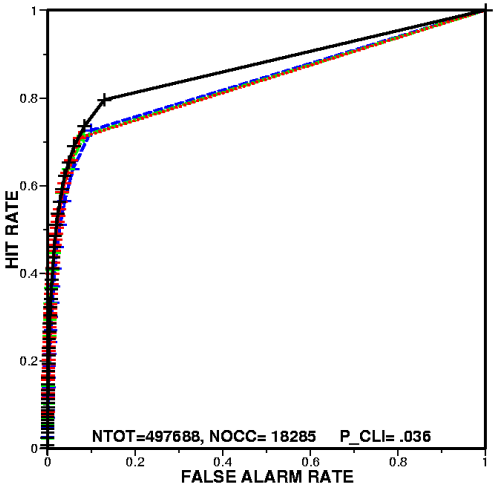
Area under ROC-curve
All three regions
Summer 2006





ROC and Value(C/L), all three regions

20 mm/24h



PRECIP, + 36h, THR = 20.00

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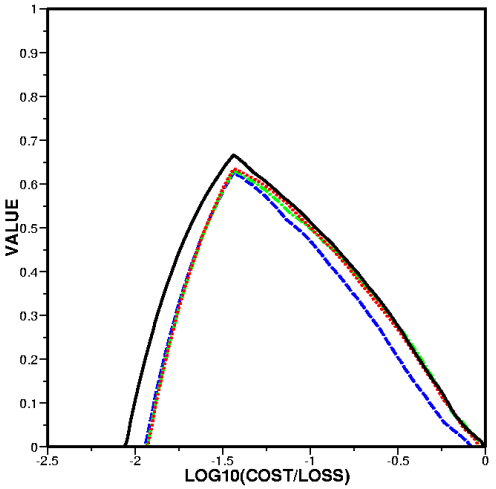

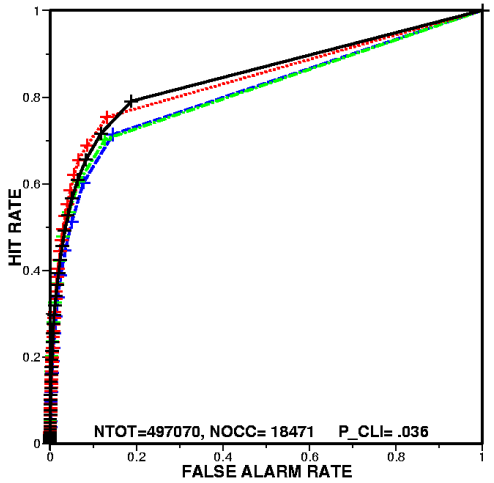

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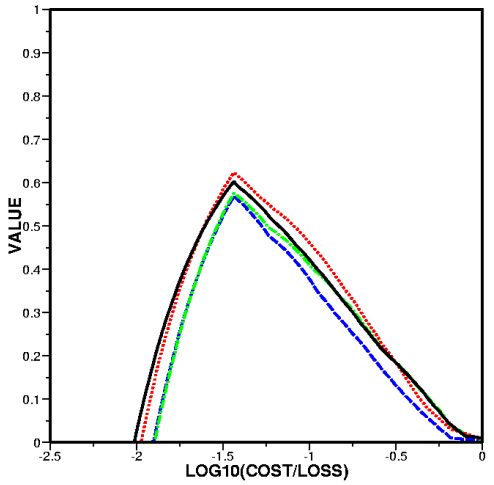


Annual

Feb05-Feb06

LAMEPS

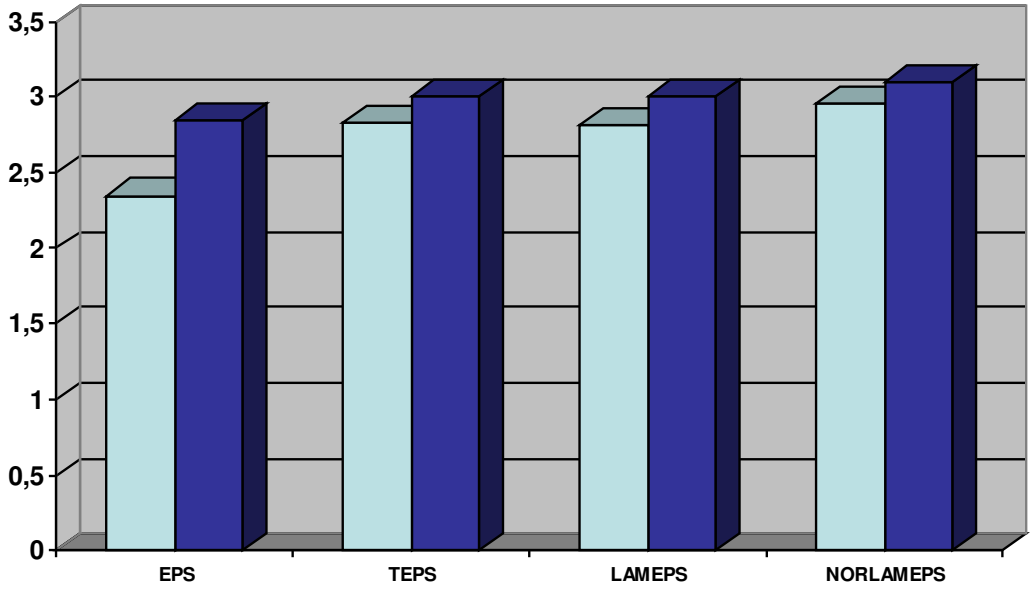
TEPS

EPS

NORLAMEPS

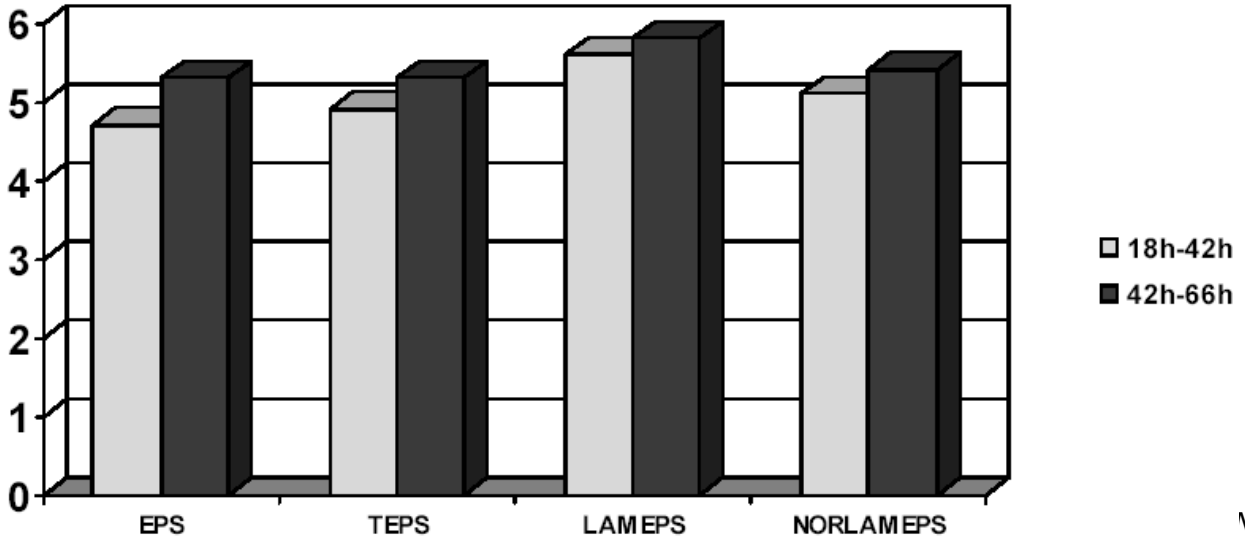
SPREAD/SKILL

Rms Spread around ensemble mean and rms error of ensemble mean for the 45-days



PRECIP.

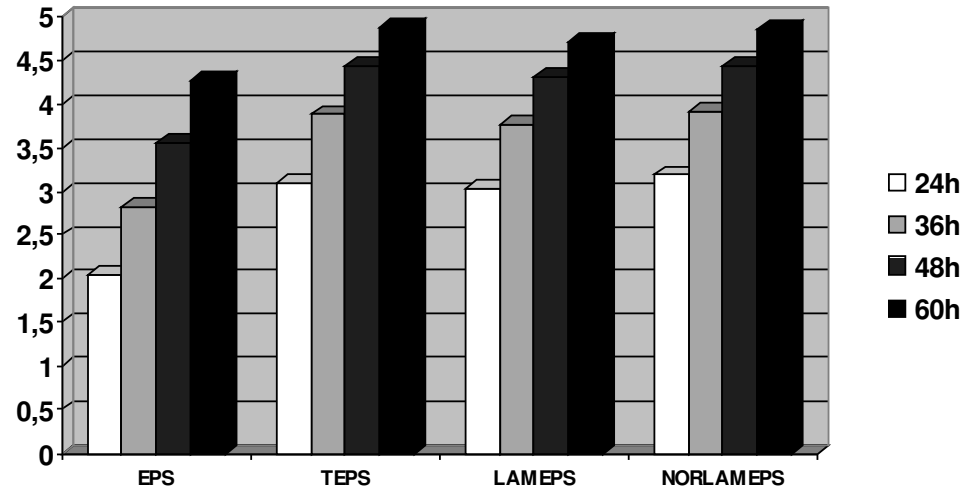
Spread



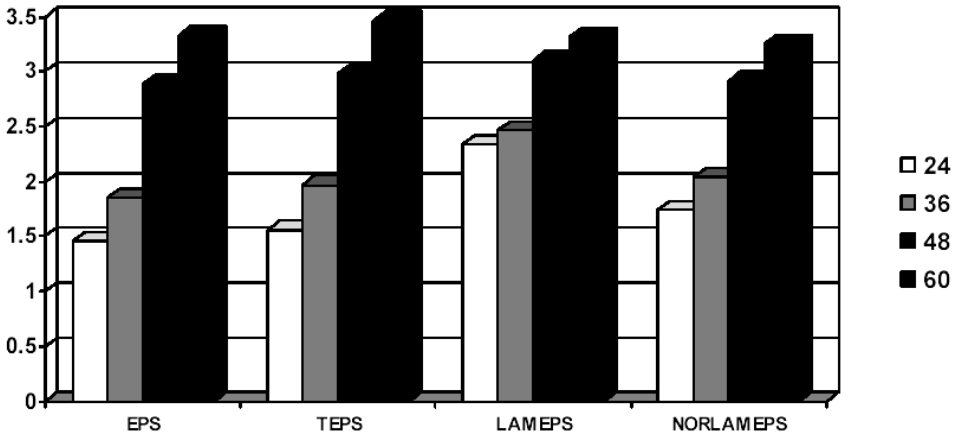
Error

Rms Spread around ensemble mean and rms error of ensemble mean for 45-days Feb-July 2005

MSLP



Spread

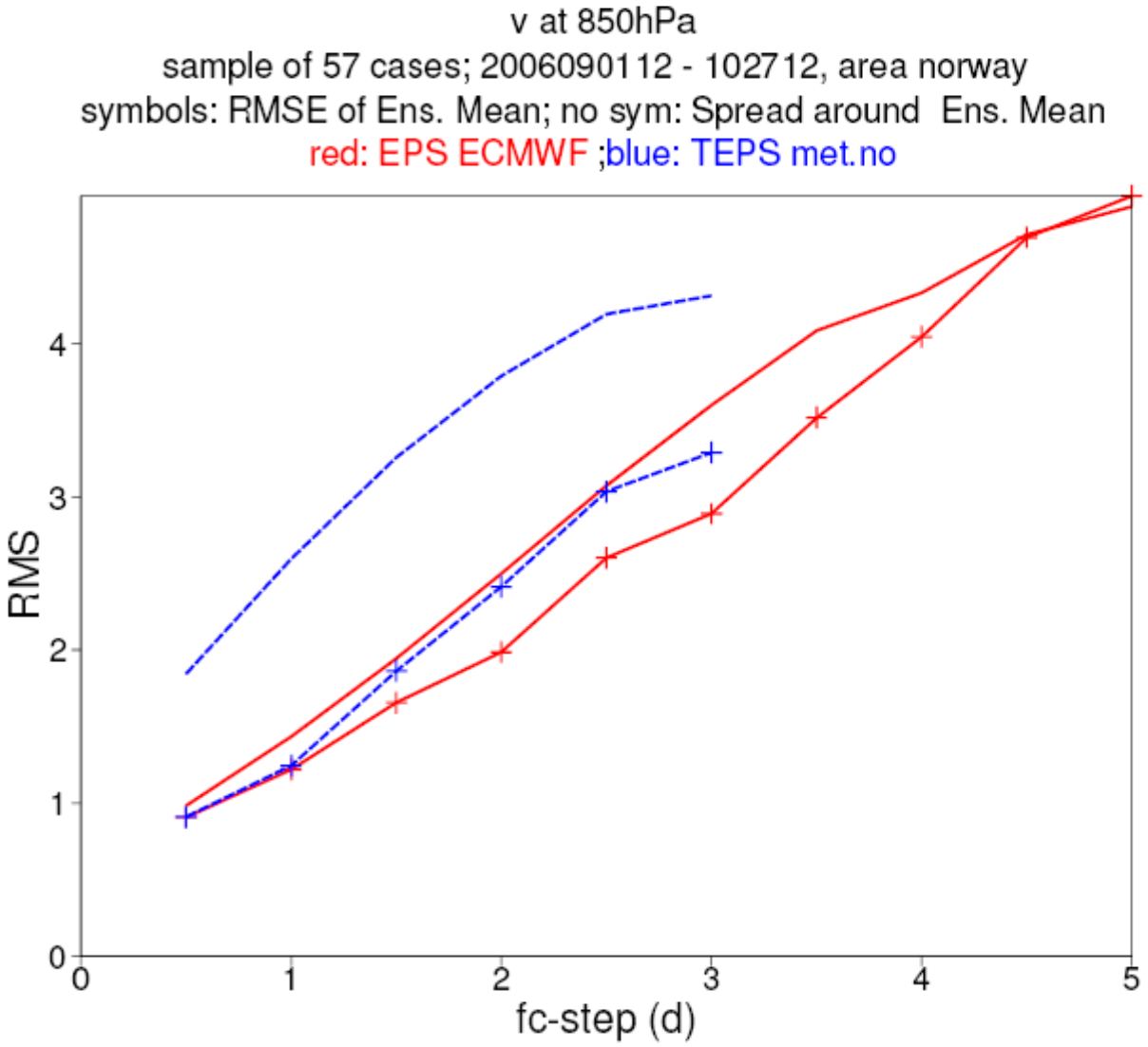


Error

Spread and RMS error — v at 850 hPa, "Norway"

--- spread around ens. mean

* * * RMSE of ens. mean



Options for improving TEPS:

- Reduction of initial amplitude by about 30-50%
- Larger optimisation region and more SVs
- Higher resolution and shorter optimisation time
- Combination of targeted SVs with hemispheric SVs. (Targeted SVs orthogonal to hemispheric SVs.)
  - It permits to reduce the optimisation time for the targeted SVs

- Twice a day?
- What about SBUs?

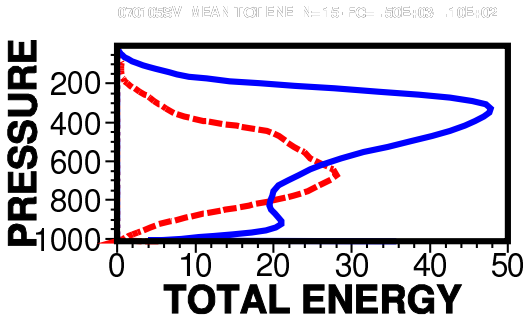
SOME RESULTS FROM TESTING OF TSVs ORTHOGONAL TO EC SVs

Red: initial SVs

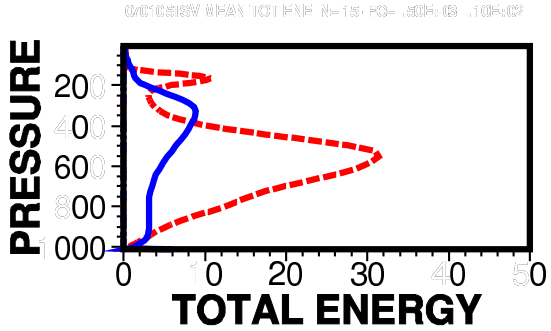
Blue: evolved SVs

21 days in 2007

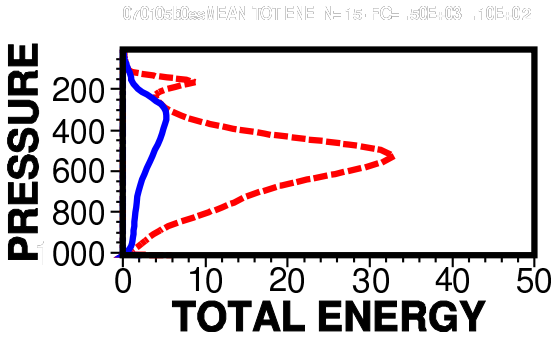
ENERGY



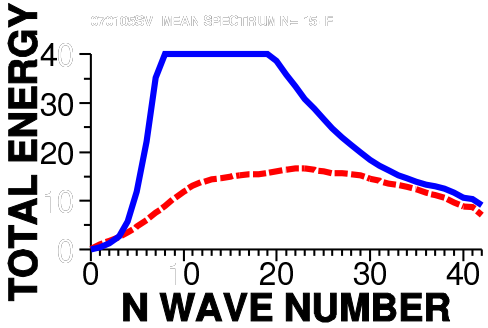
SV

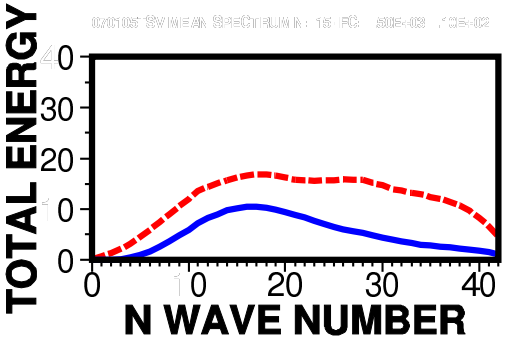


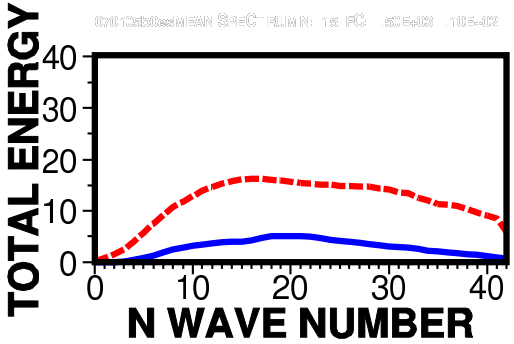
TSV



Orthogonal TSV





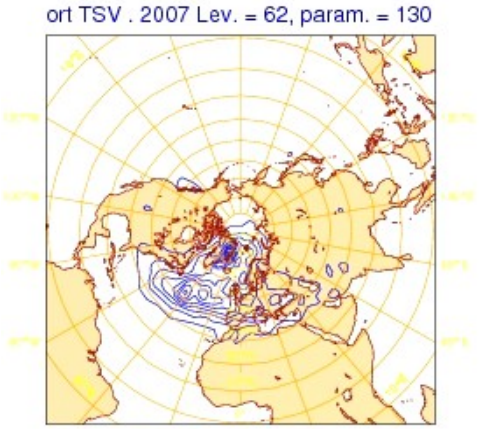


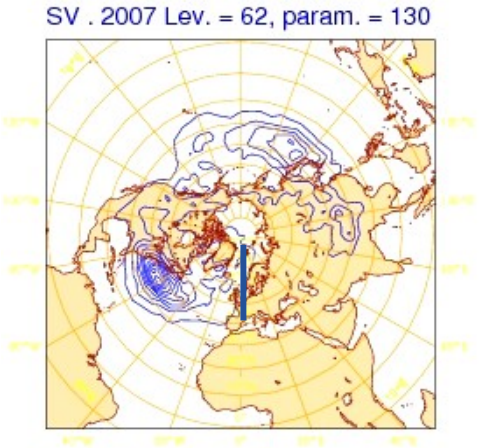
21 days in 2007, TEMPERATURE.
LOWEST LEVEL

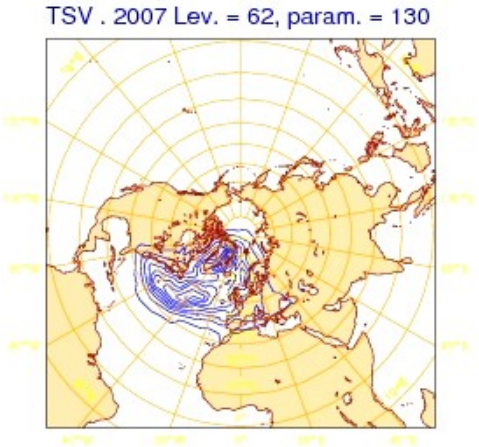
Orthogonal TSV

Operational SV

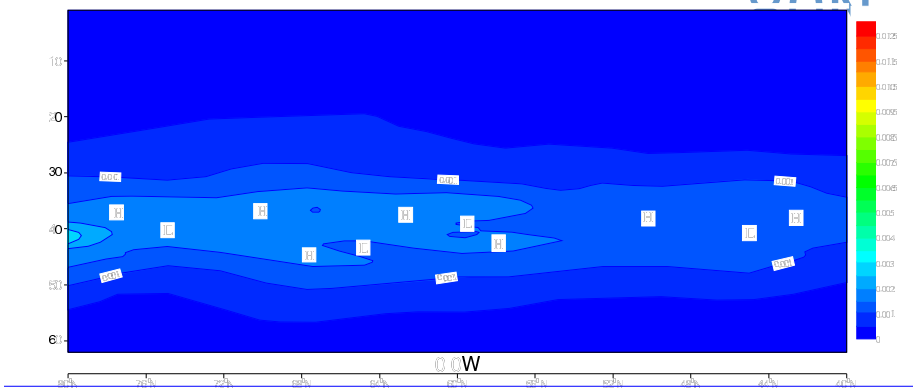
Operational TSV



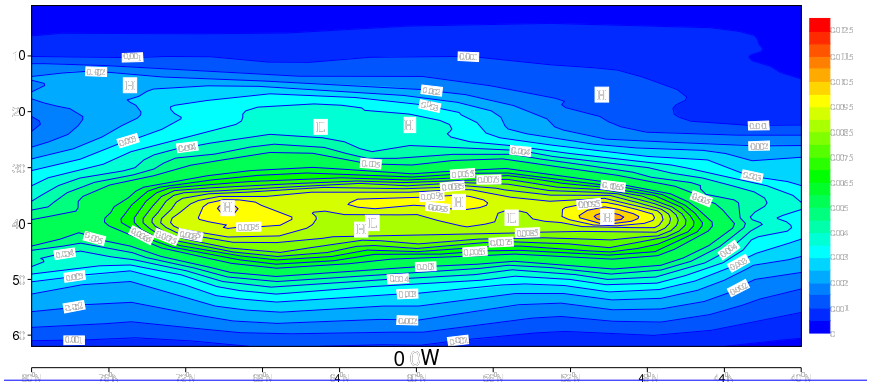




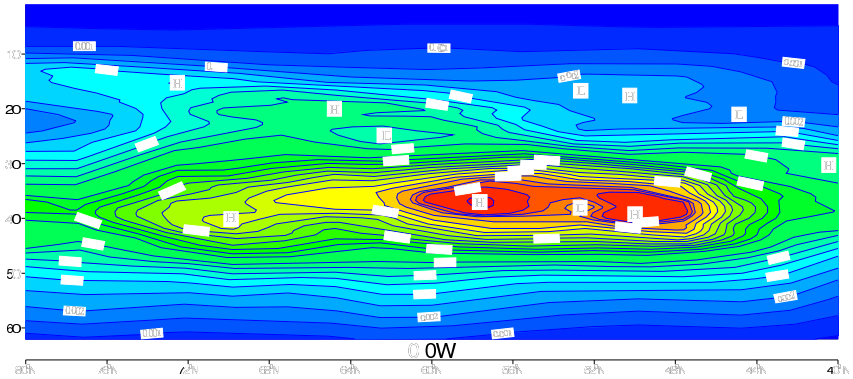
CROSS SECTIONS, TEMPERATURE, 40N to 80N, 0W



Operational SV



Operational TSV



Orthogonal SV

Future developments for LAMEPS

- Include perturbations of model physics in LAMEPS
- Increase the time resolution of the boundary fields (now every 6 hour)
- Increase resolution

- Hopefully these changes in TEPS and LAMEPS will lead to an improved in the two individual systems and in the combination ensemble NORLAMEPS

Thank you for your attention