Experiences with the ALADIN 3D-VAR system

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WHAT WE HAVE DONE

- Set-up of the ALADIN forecast model
- Computation of B matrix (NMC)
- Set-up of the ALADIN-3DVAR system
- Support to BUFR format for conventional observations
- 1-obs experiments
- Started full (conventional) observations experiments (last week!)

TECHNICAL ASPECTS

ASSIMILATION

PLATFORM: ECMWF HPCE

CYCLE: 30T1

CONFIGURATION: 1 processor , 1 ODB pool

FORECAST

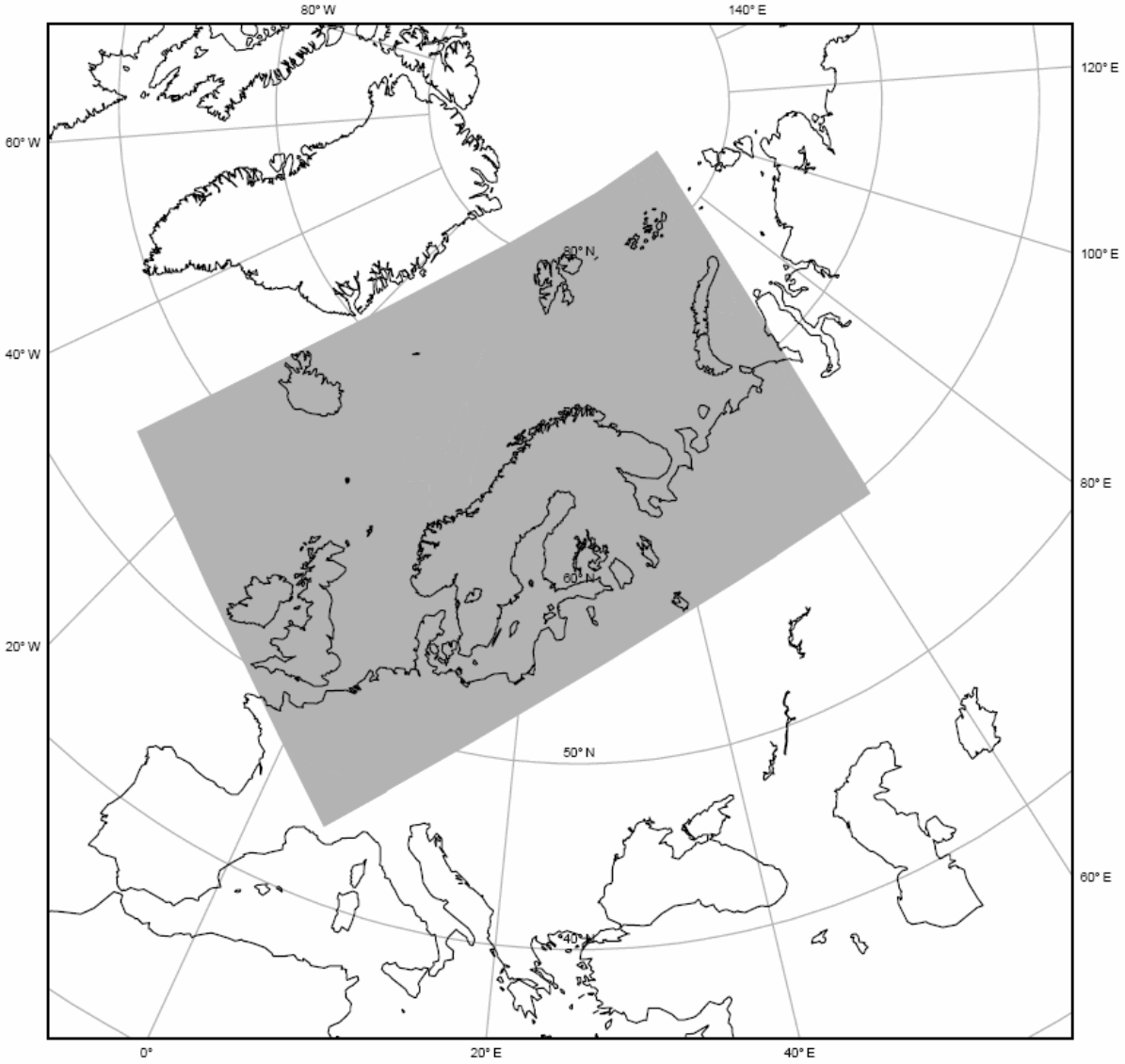
PLATFORM: ECMWF HPCE

CYCLE: 30T1

CONFIGURATION: 48 processors, 30 min for 48h forecast

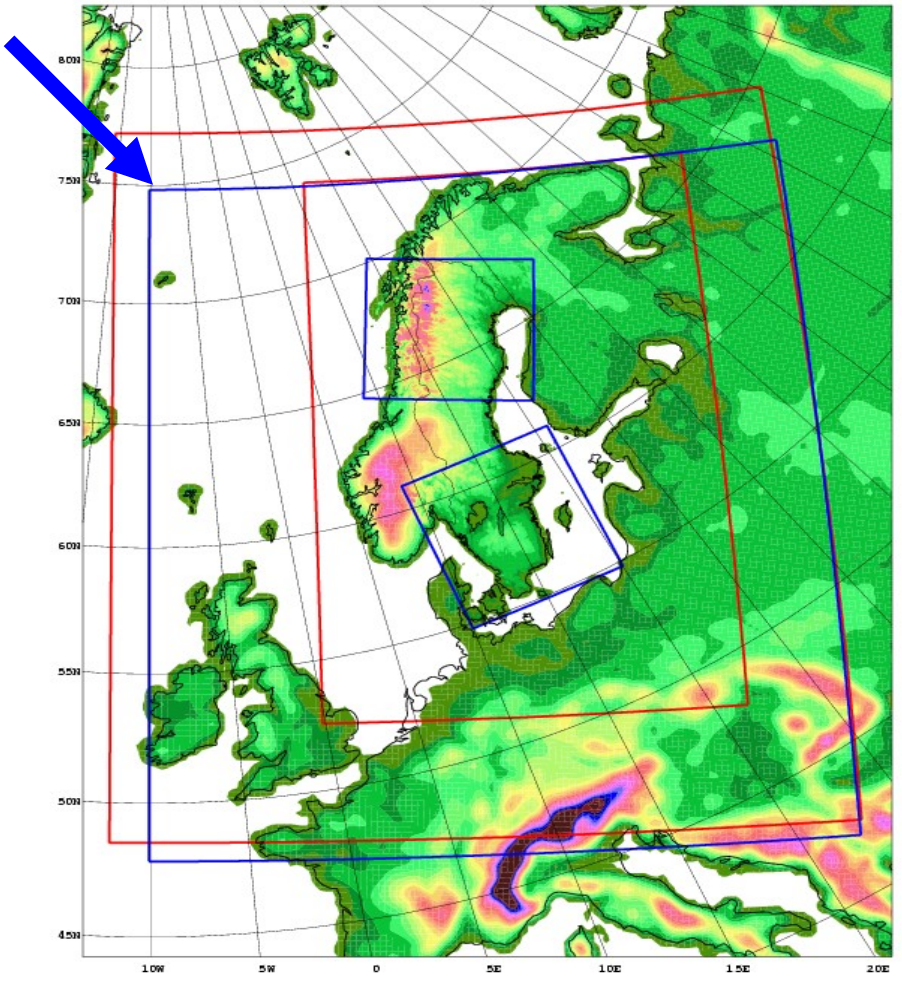
Domain Configuration at met.no (Forecast model)

- 11 km horizontal resolution, (270x405 nodes) and 40 vertical eta levels
- Domain centred over Norway, same as HIRLAM10
- Static data (physiographic and climatological) from Météo-France archive
- LBC and initial conditions from ECMWF analysis for the forecast model

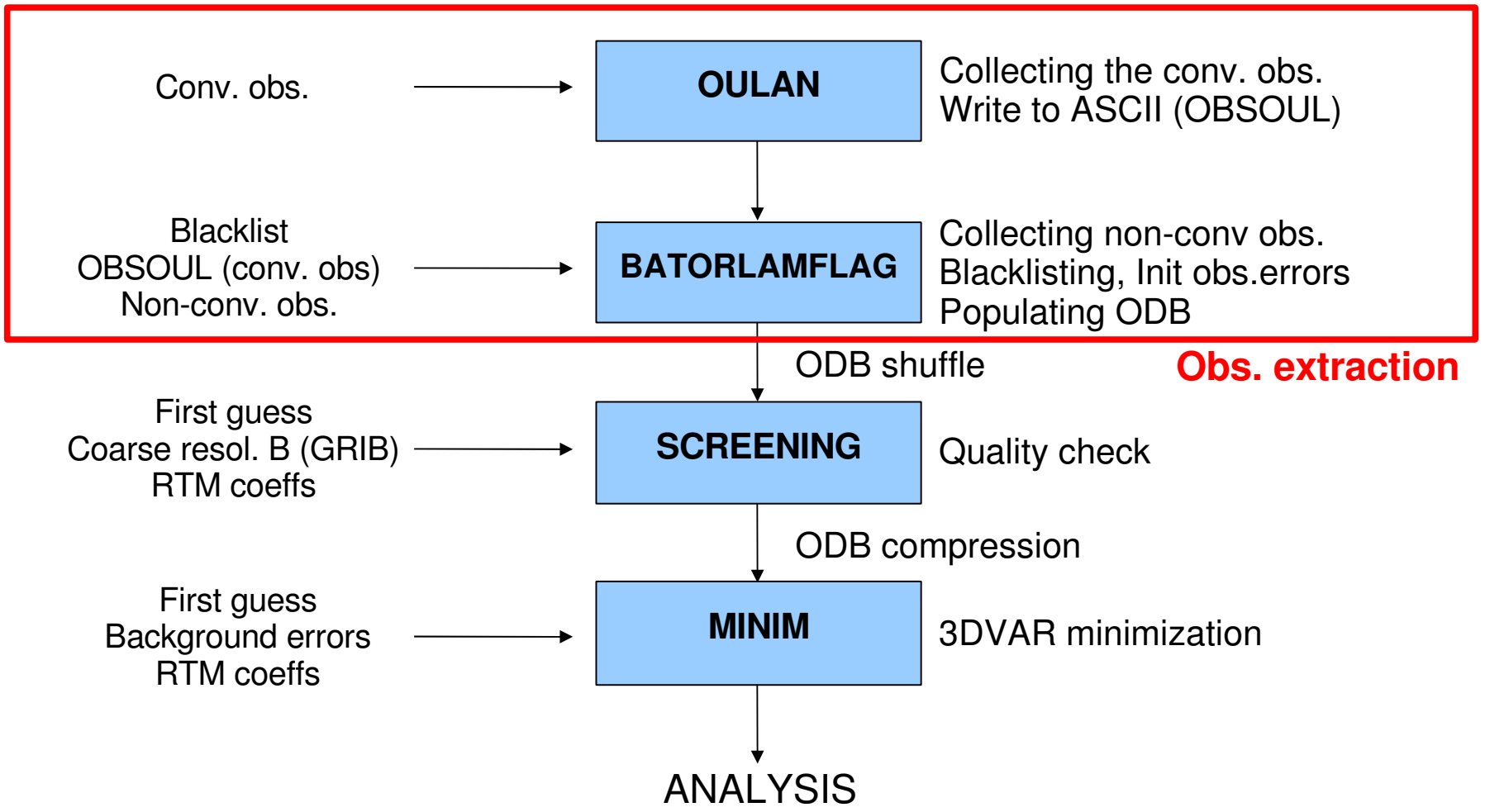


Domain Configuration at SMHI (Forecast model)

- 60 vertical levels, smaller domain (256x288 nodes)
- Same resolution 11km
- LBC and initial conditions from ECMWF analysis for the forecast model



ALADIN-3DVAR overview, cycle 30T1



OBSERVATIONS FORMAT (CY30T1)

EXPORT VERSION (Meteo-France)

OULAN ← BDM (French meteo database): conventional observations

BATOR ← BUFR : AIRS, AMSU-A, AMSU-B, GEOWIND, QSCAT
BATOR ← GRIB : SEVIRI

WHICH IS THE BEST STRATEGY TO ASSIMILATE
OBSERVATIONS IN BUFR FORMAT?
(as from MARS or HIRLAM)

NEW OULAN: added support to SYNOP, TEMP, PILOT, DRIBU in BUFR format

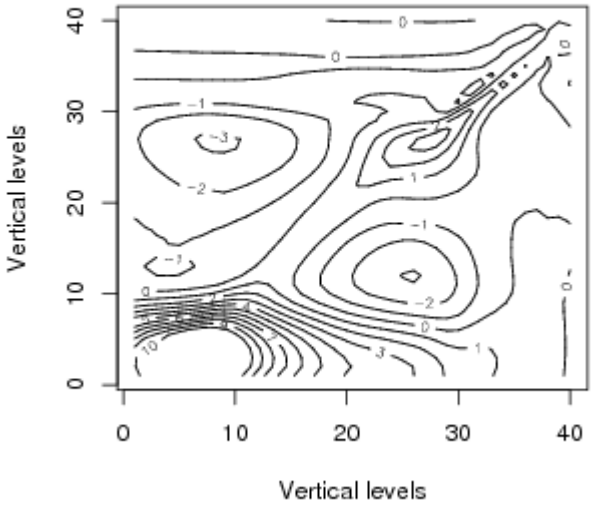
Instead of using BUFR2ODB or CMA2ODB or similar

**Because of independence from cycle,
and better observations check**

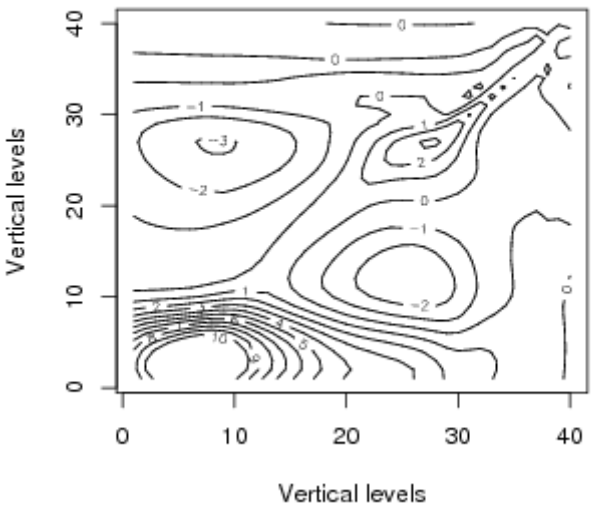
BACKGROUND ERROR STATISTICS (Norway)

NMC-method using 36-12hr ALADIN forecast differences on 90 daily runs from 20051201 to 20060228.
(Forecast initialized by ECMWF analysis)

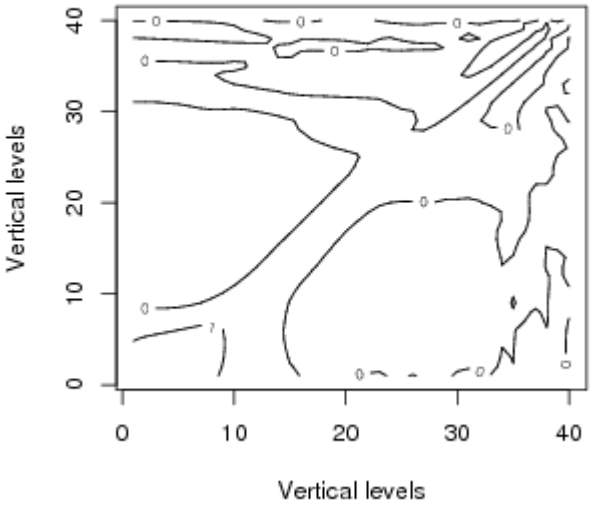
Coupling of divergence and balanced geopotential



Mean vertical crosscovariance



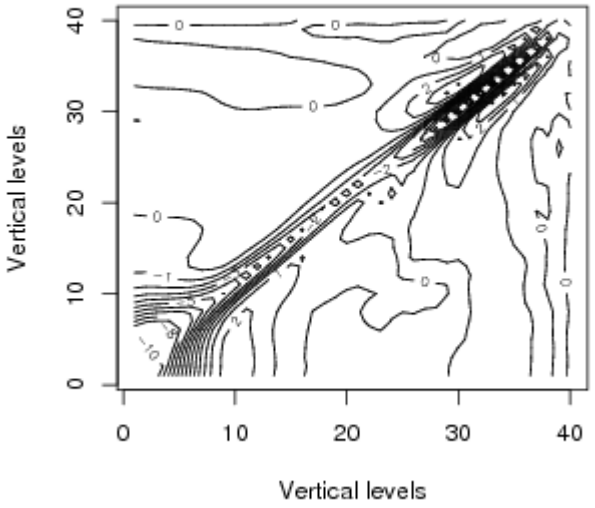
Mean vertical crosscovariance, scale 700 to 100 km



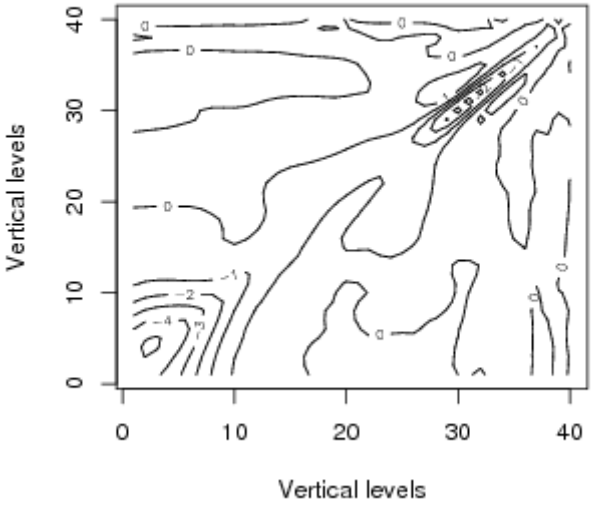
Mean vertical crosscovariance, scale 100 to 10 km

BACKGROUND ERROR STATISTICS (Norway)

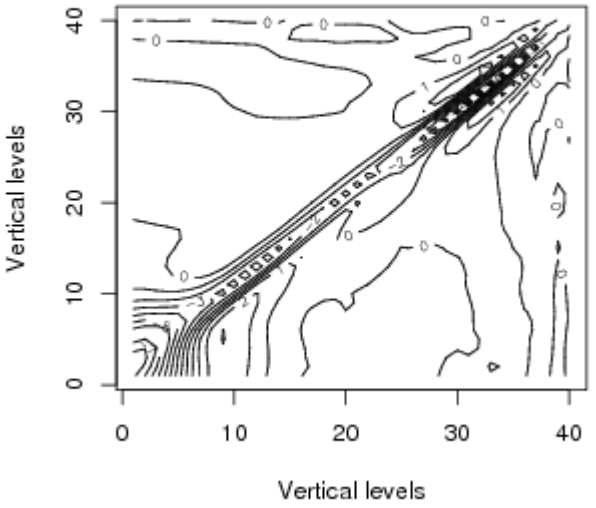
Coupling of temperature and unbalanced divergence



Mean vertical crosscovariance



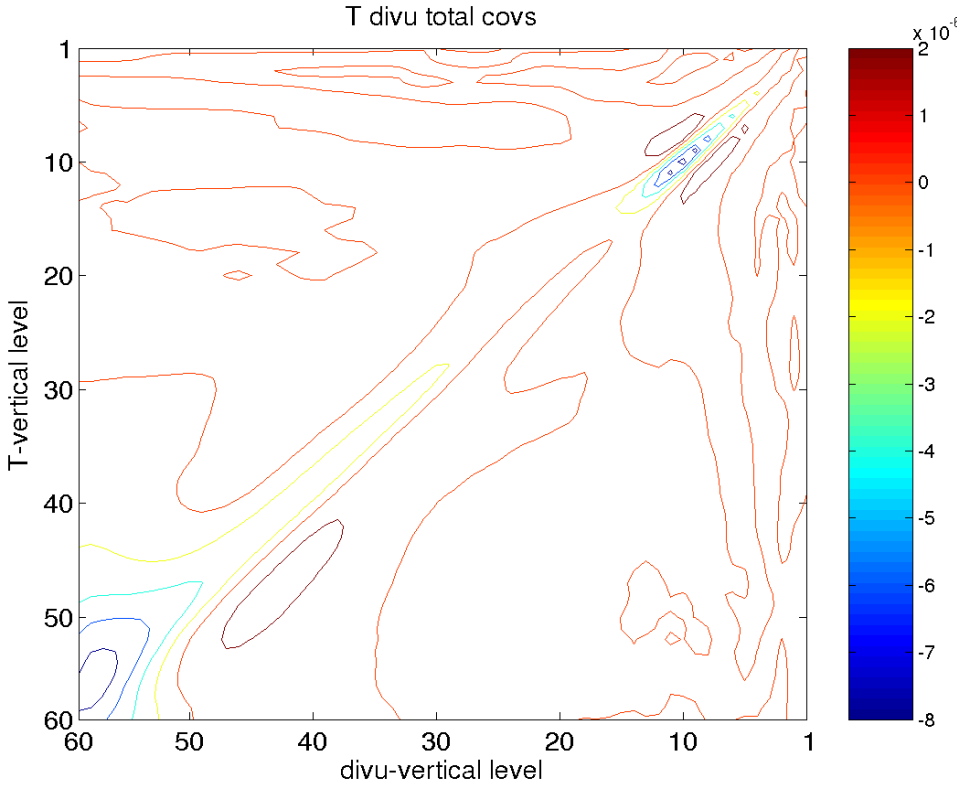
Mean vertical crosscovariance, scale 700 to 100 km



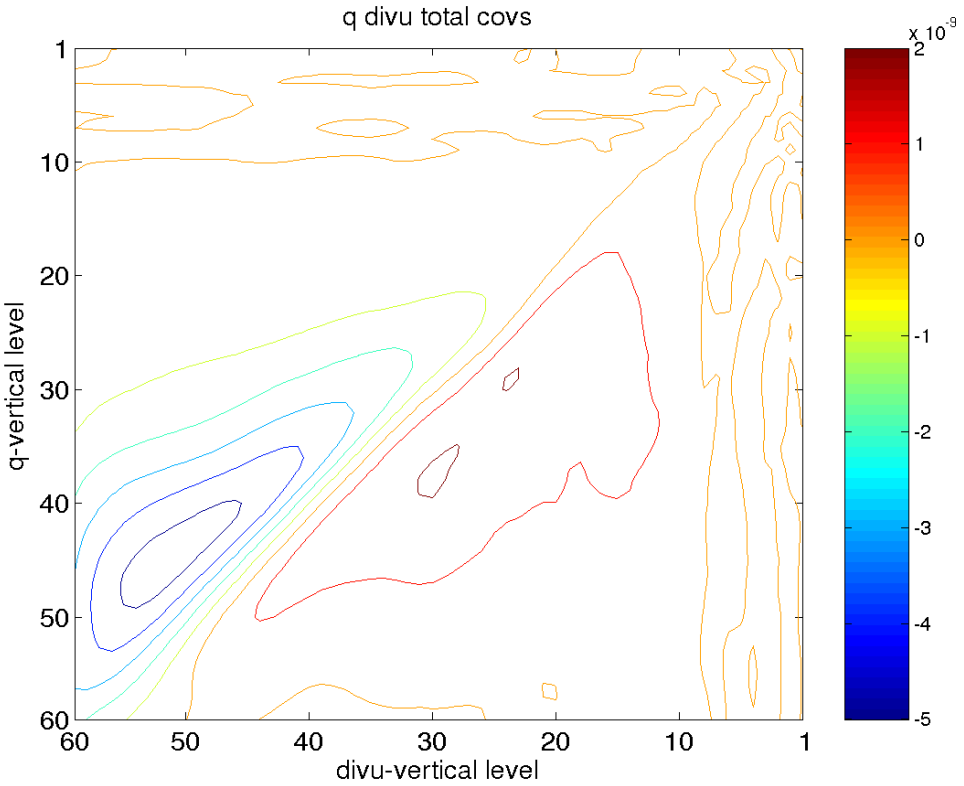
Mean vertical crosscovariance, scale 100 to 10 km

BACKGROUND ERROR STATISTICS (Sweden)

Coupling of temperature and unbalanced divergence

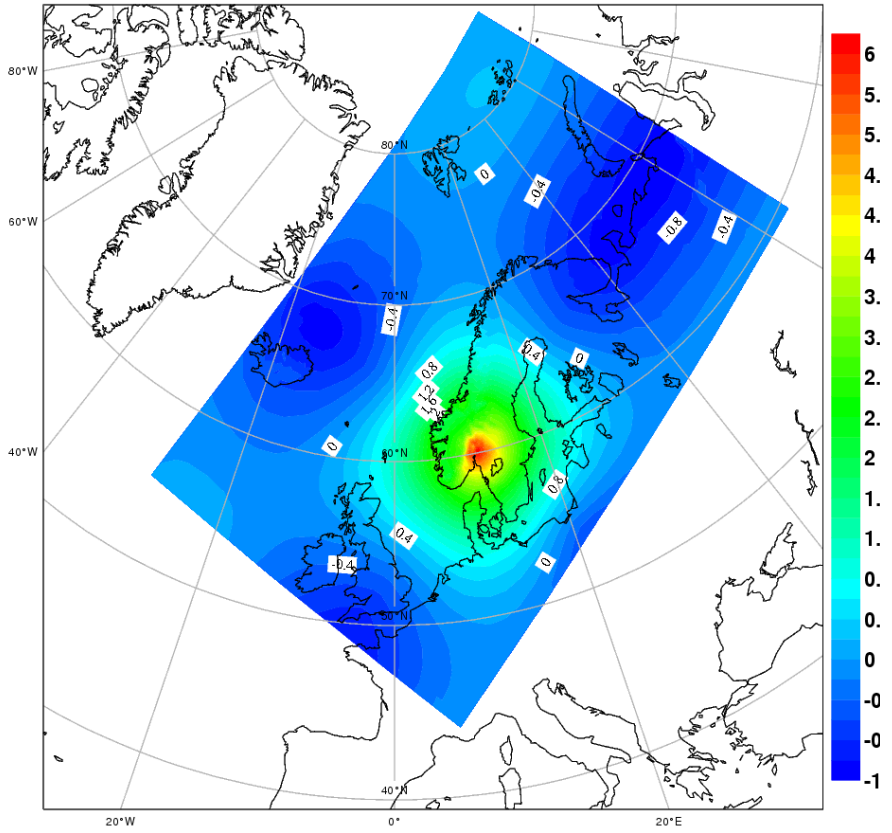


Coupling of humidity and unbalanced divergence

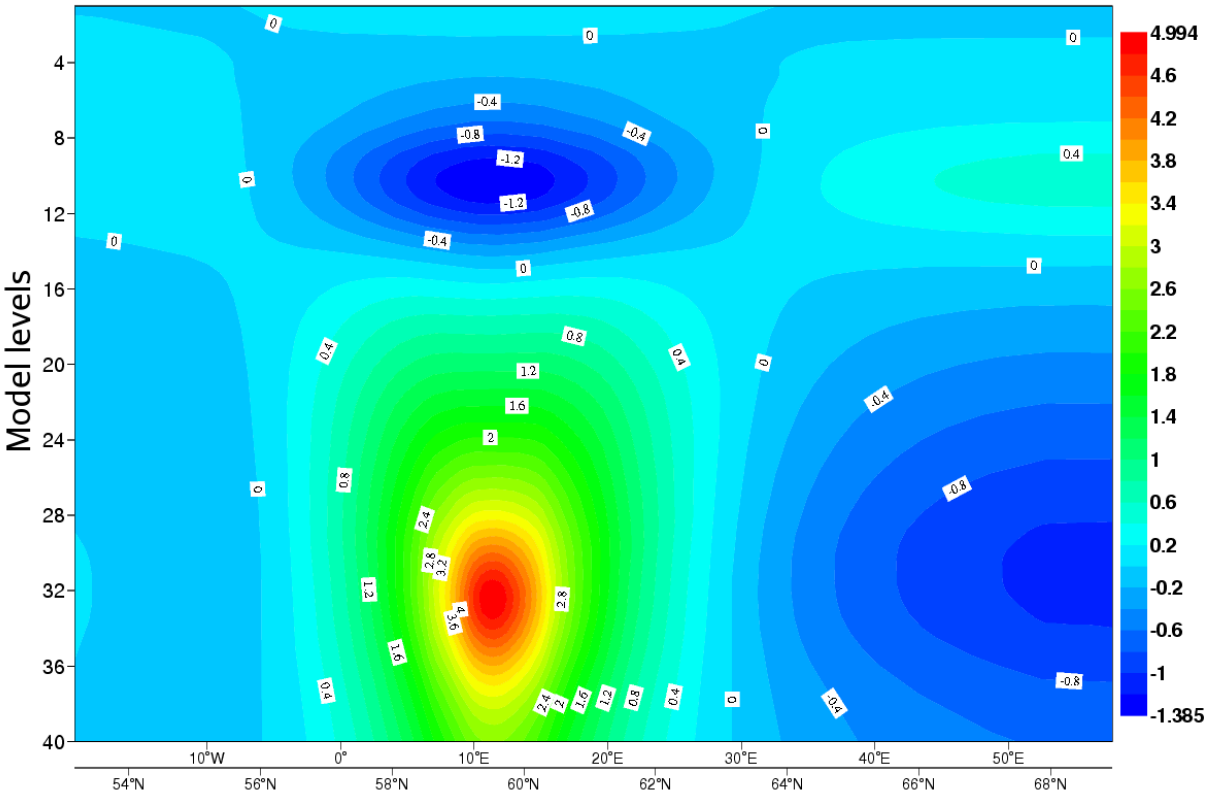


1-observation EXPERIMENT – Norwegian domain

1 temperature measurement (TEMP) at 850 mb, Innovation +6° C



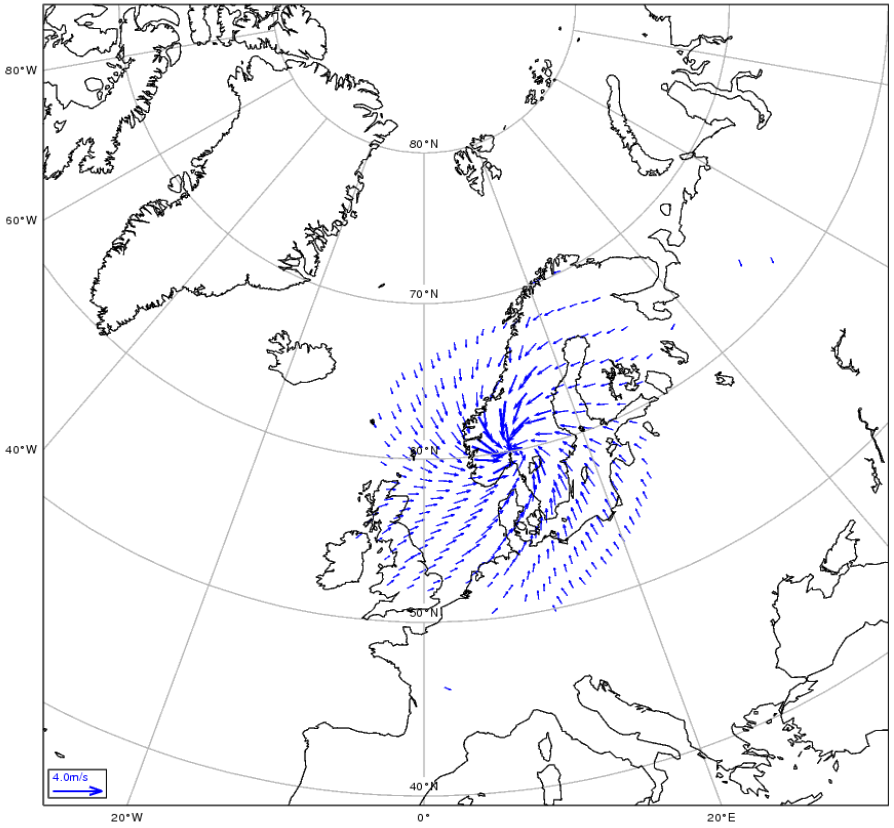
Analysis increment, temperature at 850 mb



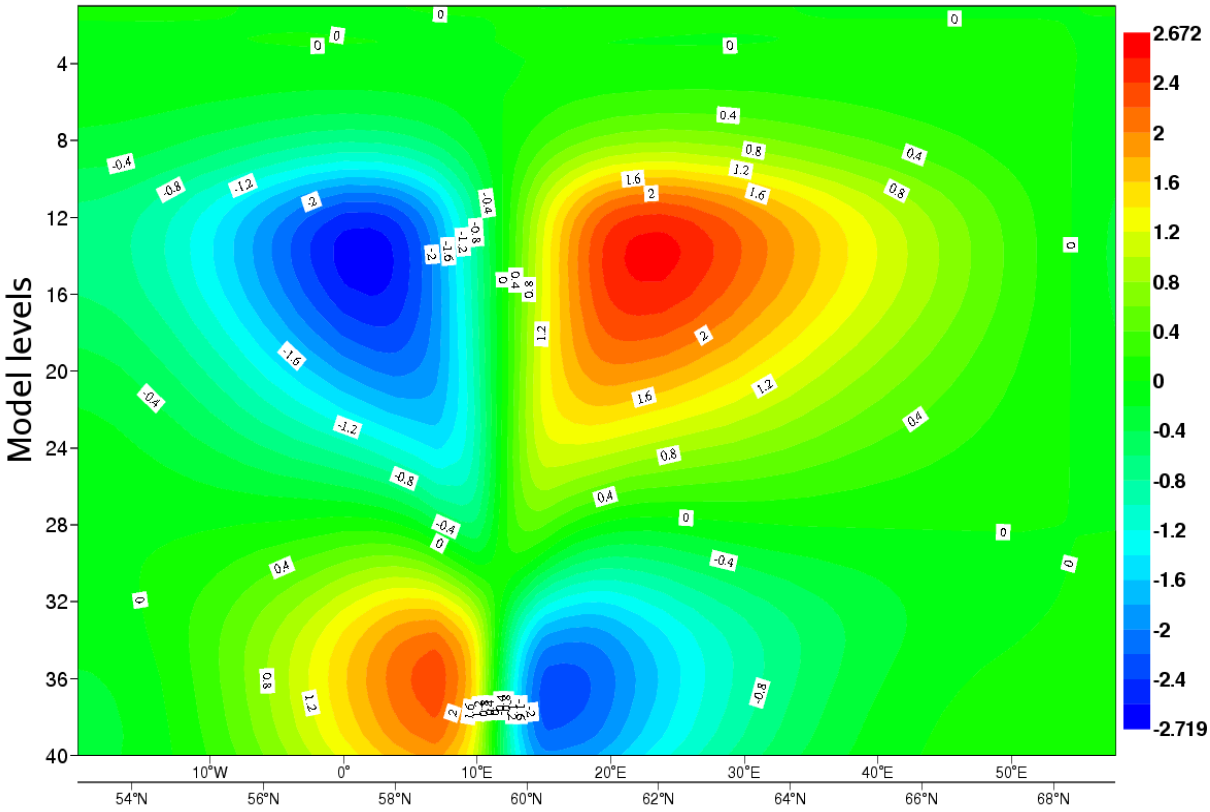
Analysis increment, cross-section, temperature

1-observation EXPERIMENT – Norwegian domain

1 temperature measurement (TEMP) at 850 mb, Innovation +6° C



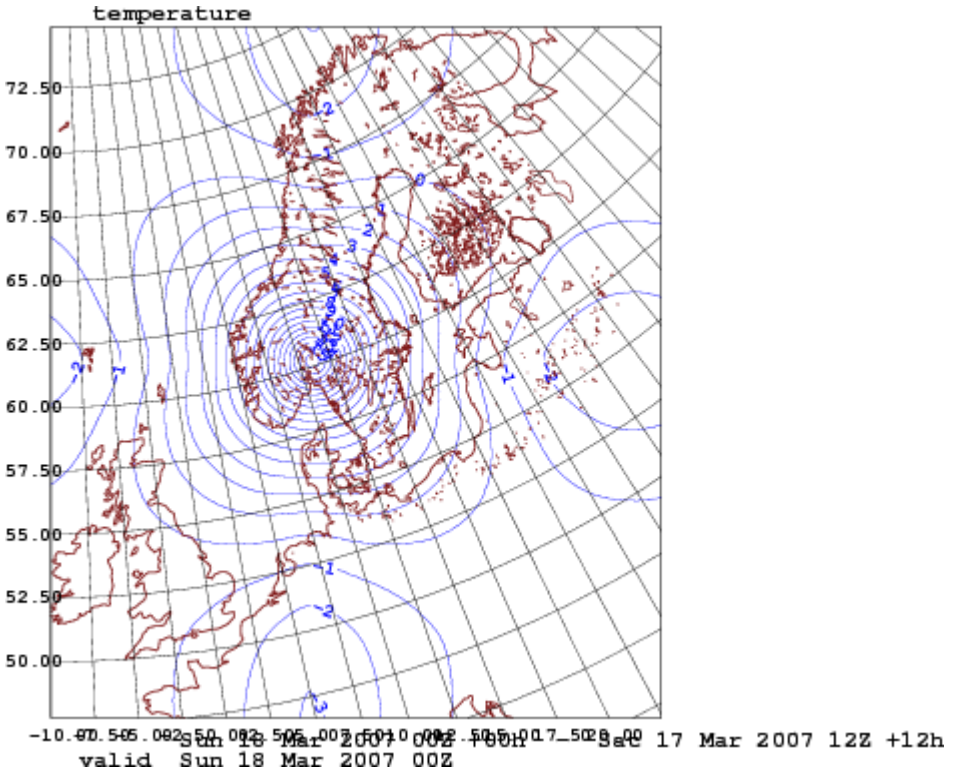
Analysis increment, wind at 850 mb



Analysis increment, cross-section, parallel wind intensity

1-observation EXPERIMENT – Swedish domain

1 temperature measurement (TEMP) at 500 mb



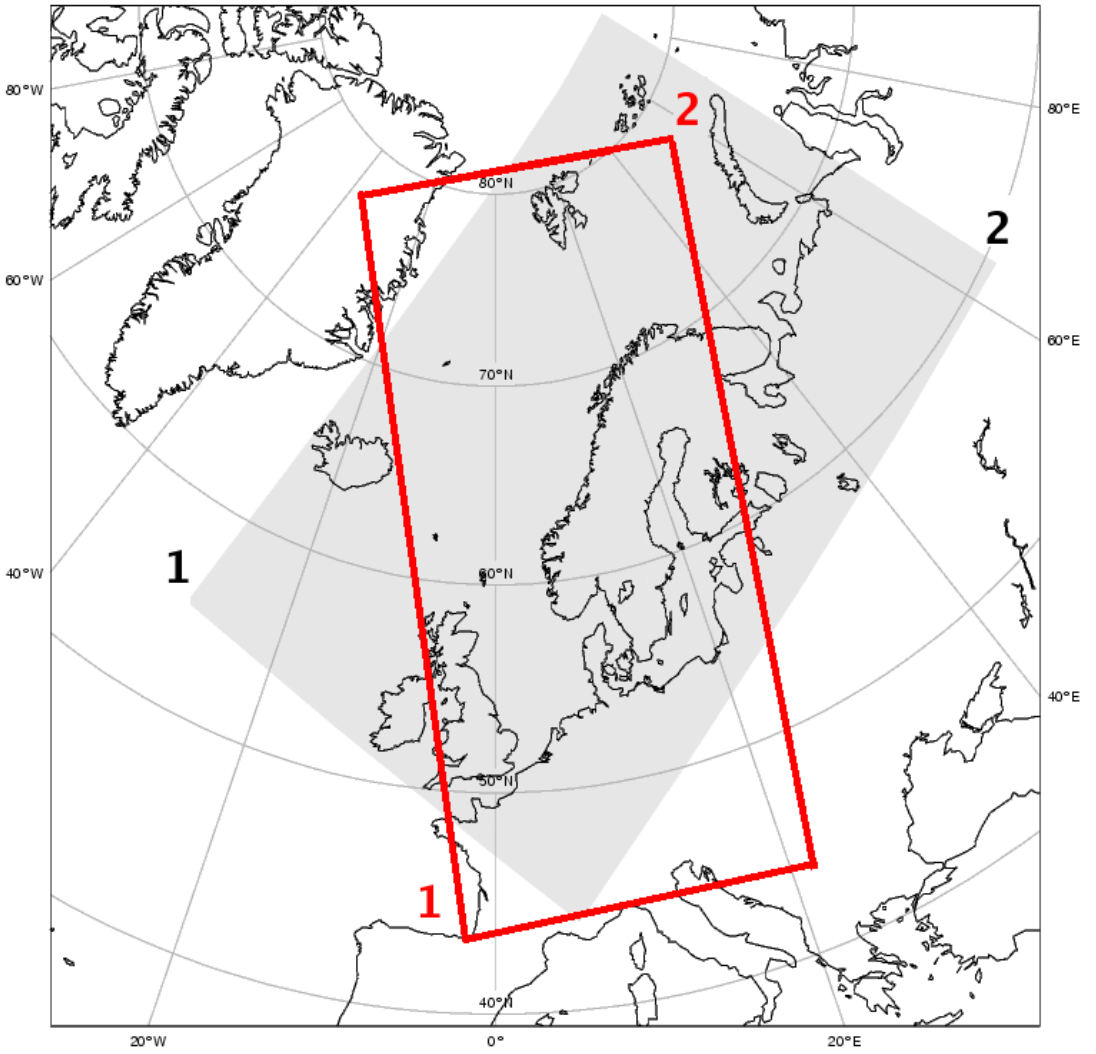
Analysis increment,
temperature at 500 mb

PROBLEMS WITH SCREENING...

Screening crashed because of the wrong counting of observations.

There were some observations discarded by the domain check in the SCREENING task (OBATABS), even if accepted by LAMFLAG (domain check before ODB feeding)

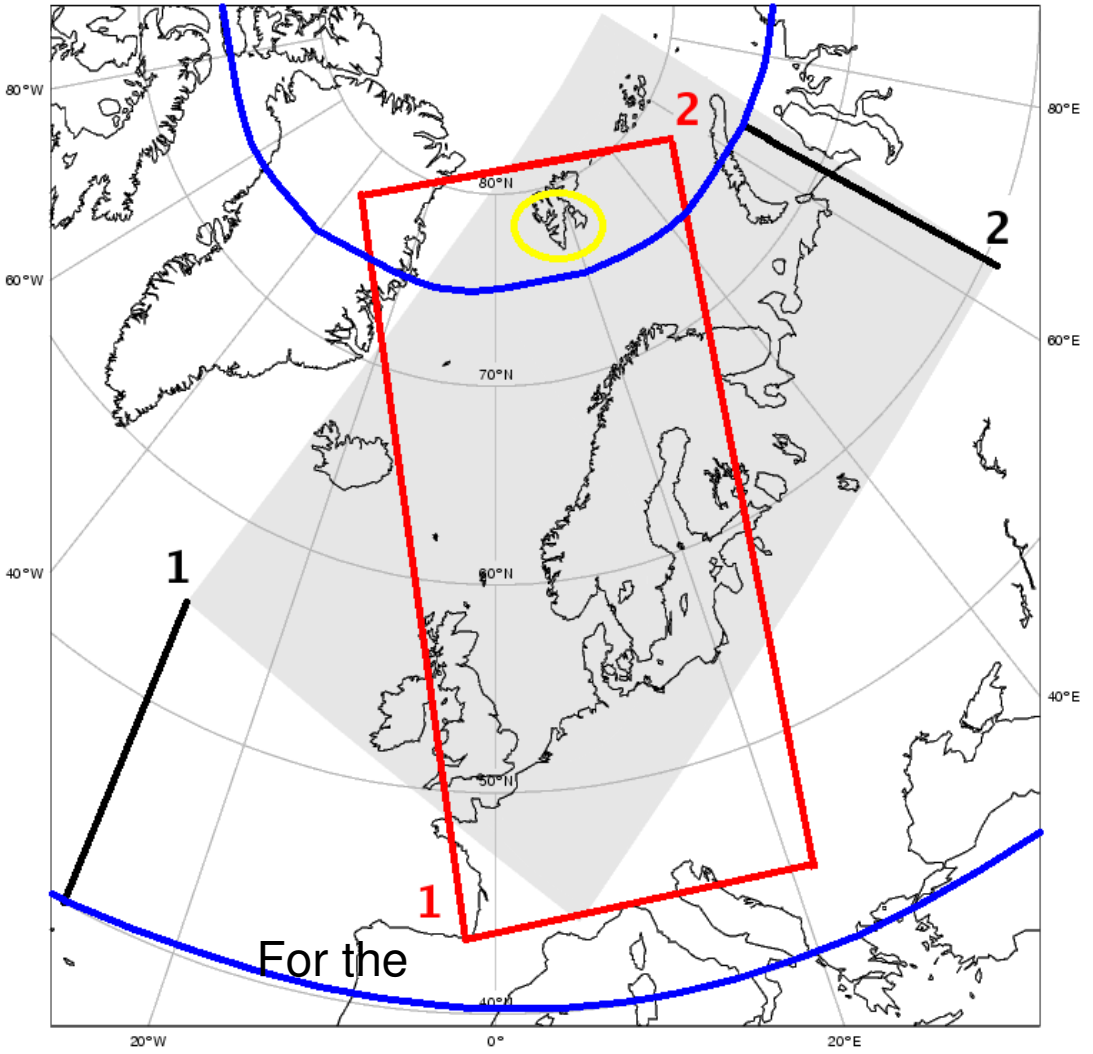
Norwegian domain has his central meridian parallel to the -40º meridian (very rotated domain) in order to be comparable to the HIRLAM10 model



PROBLEMS WITH SCREENING...

The rough latitude check caused a crash (only obs whose latitude was > LAT1-15^{o} and < LAT2+15^{o} were taken).

By using this domain, SYNOP obs in Svalbard Islands (>74^{o} N) were not taken into account in SCREENING.

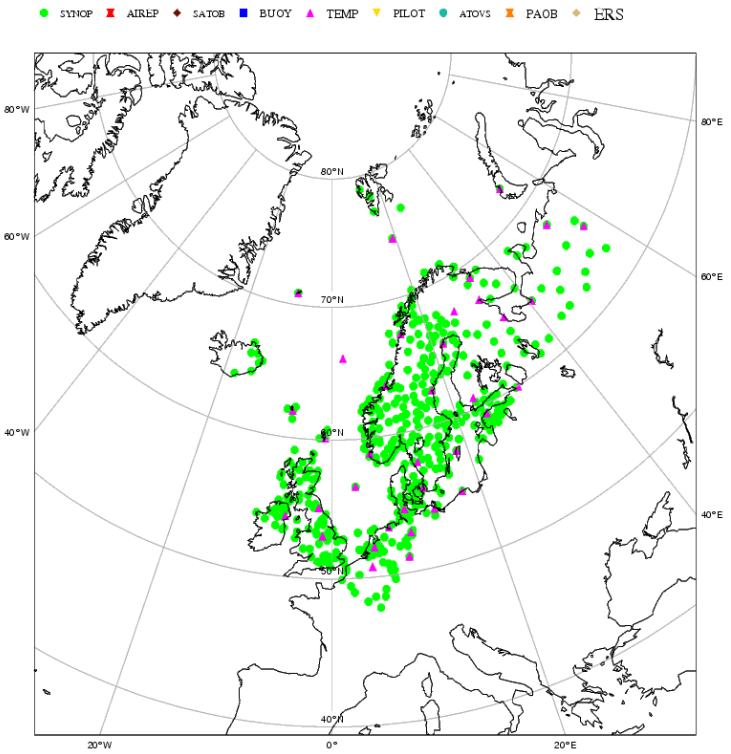


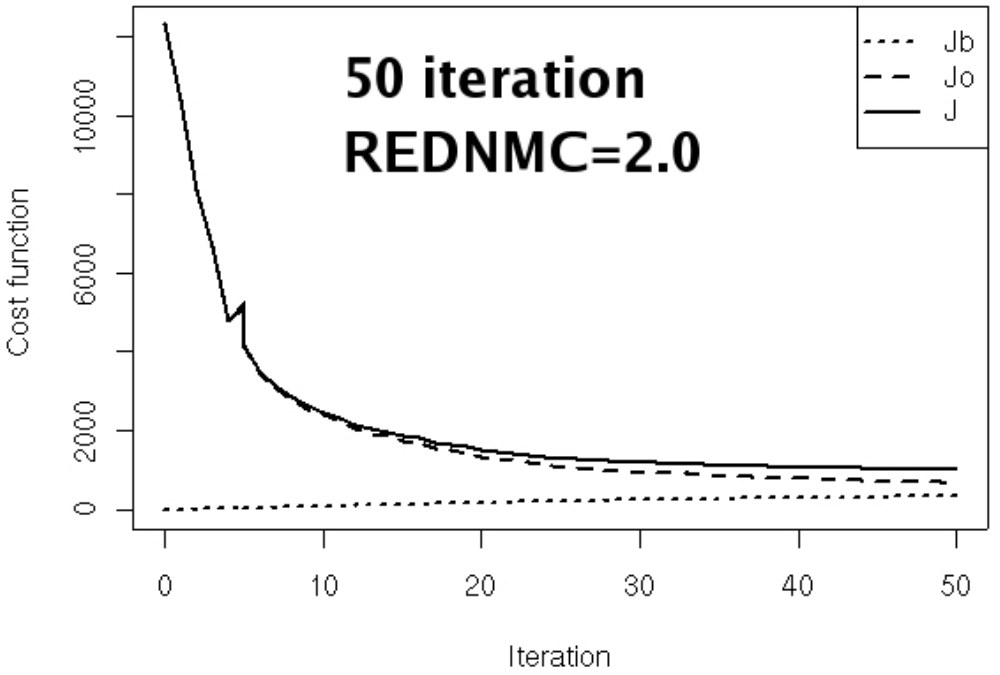
For the

A FIRST 3DVAR EXPERIMENT

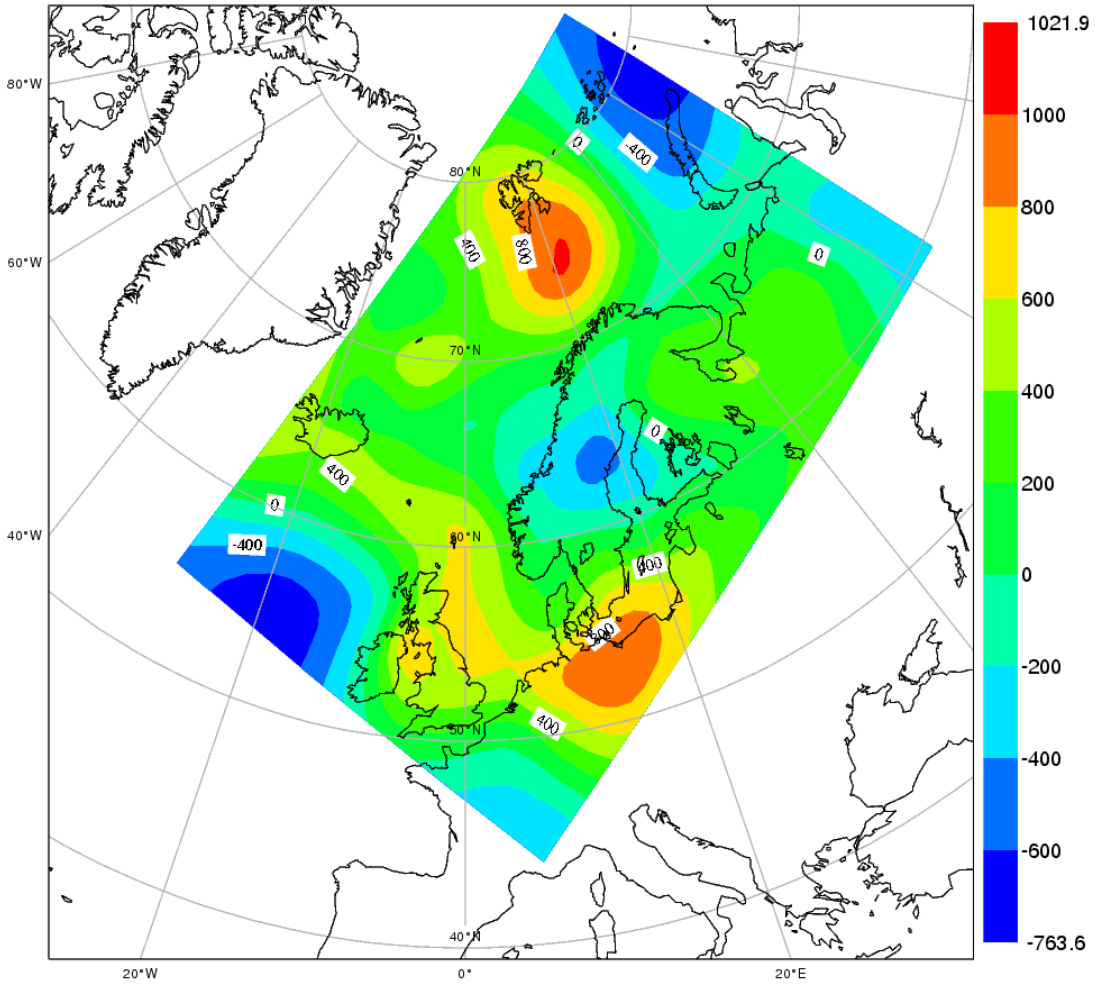
Observations:

SYNOP	p
TEMP	T, q, u, v

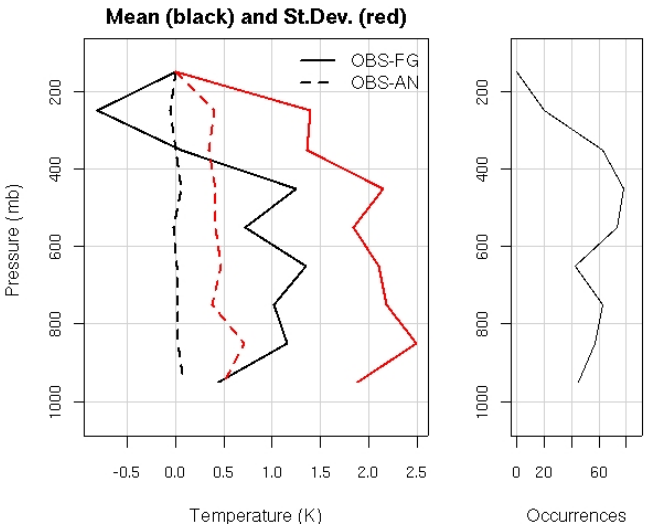


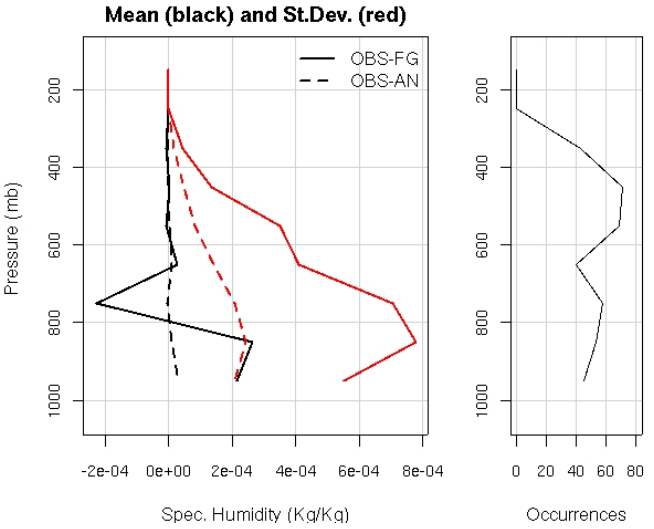


A FIRST 3DVAR EXPERIMENT



ANALYSIS INCREMENT -- MSLP





FUTURE PLANS

SHORT-TERM

- Cycling with SYNOP, SHIP, TEMP, PILOT
- Comparison of 3DVAR/ALADIN10 against ECMWF/ALADIN10 and HIRLAM20/HIRLAM10
- Recomputation of B matrix
- Add support for EUROPROFILER and AMSDAR/AIREP

LONG-TERM

- Introduction of satellite data (?)
- Move to FGAT (?)

THANK YOU!