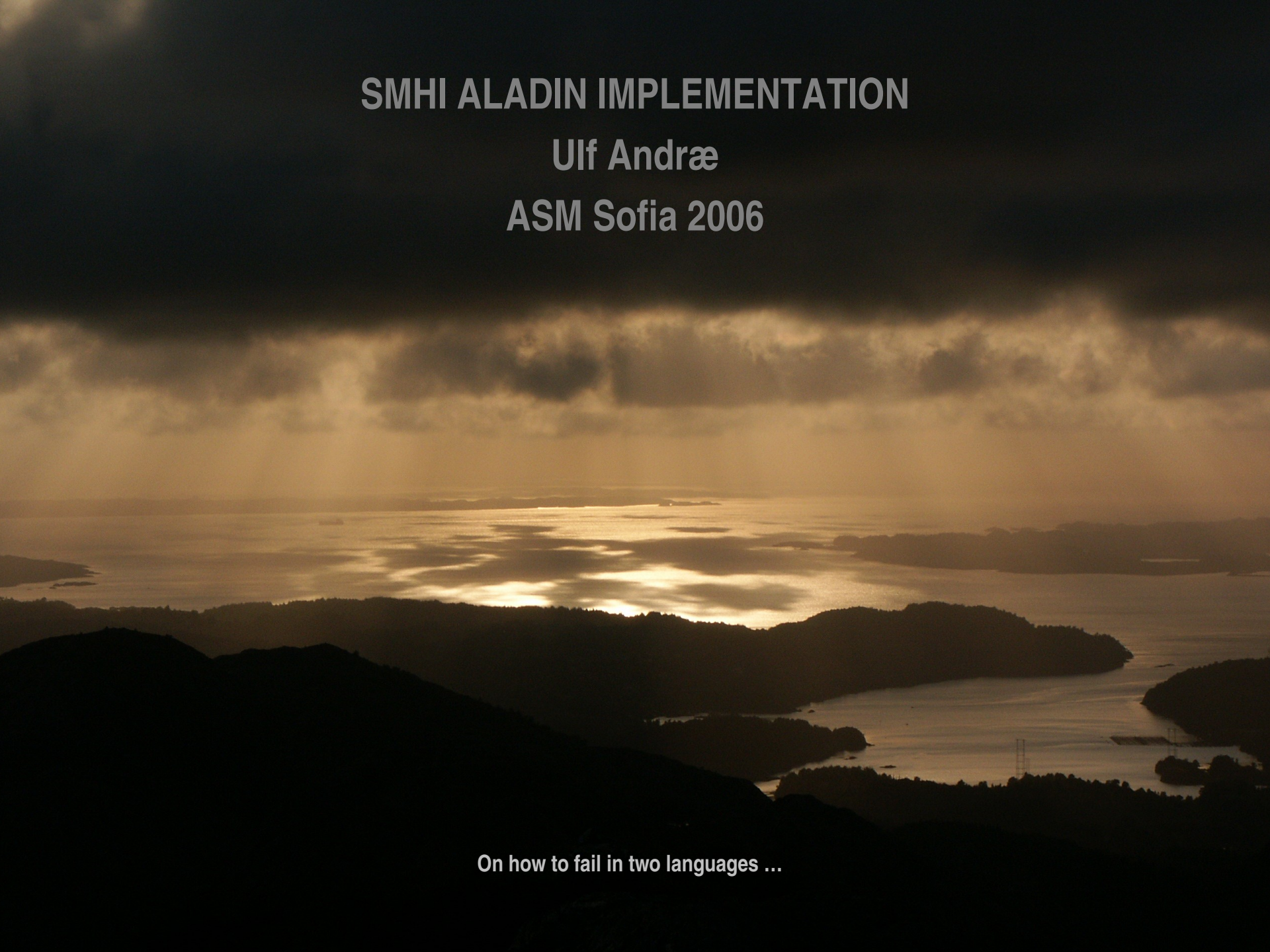


SMHI ALADIN IMPLEMENTATION

Ulf Andræ

ASM Sofia 2006

On how to fail in two languages …

SMHI

A brief history of time ….

- Started with 28t3 autumn 2004 on HPCX at ECMWF
- Own interpolation (no fullpos), FA/lfi -> GRIB
- Running ALADIN with HIRLAM during spring 2005. Daily “icy” runs during summer.
- 29t2 used since August 2005. Daily runs on a 10km area in August, 2.5km NH from November
- HIRLAM Newsletter No. 49. Physics settings mess clarified
  - –Two physics paths: Meteo France, Central Europe in December
- 30t1 since February 2006. AROME!
- Missing pointers, compilation problems, f90 types. Unsolved problem with GRIB packing inside fullpos
- Running AROME since mid April

SMHI

HIRLAM

Operational assimilation cycles

C22 22 km 40 levels

E11 11km 60 levels

G05 5.5km 60 levels

ALADIN / AROME

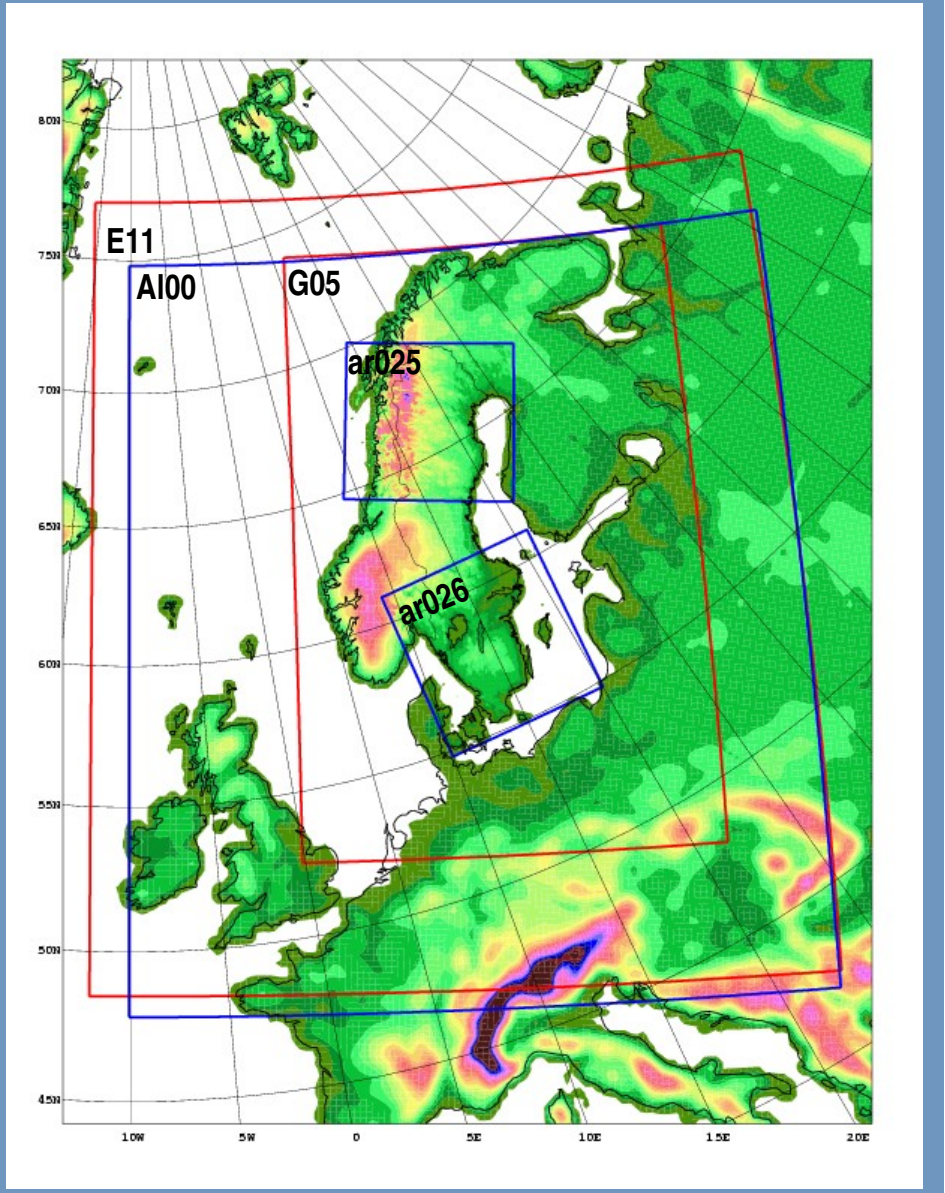
Daily runs without assimilation
"Cold start" every time

al00 11km, 60 levels forced by C22.

One with MF and one with CE physics

ar025, ar026 2.5km **NH** 60 levels

Forced by al00



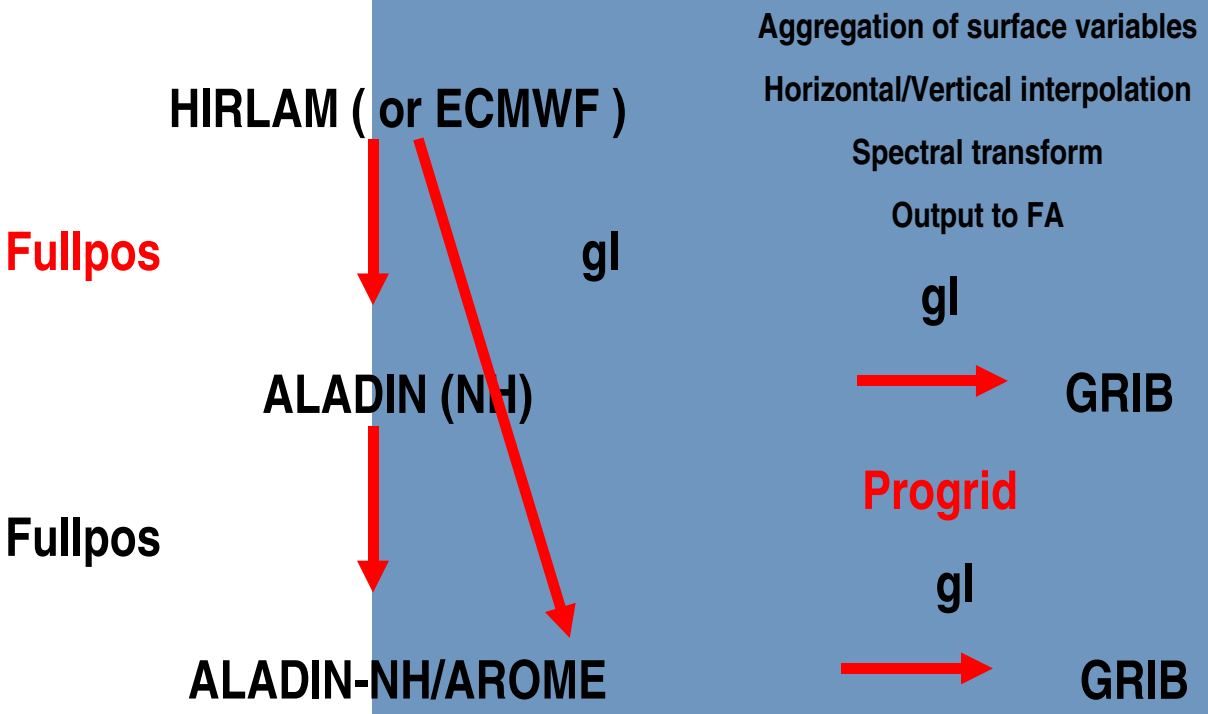
Running on Dunder : 50 node,64-bit Dual Intel Xeon EM64T CPU @ 3.40GHz, InfiniBand

SMHI

From HIRLAM to ALADIN

The aim is to be able to run AROME directly from HIRLAM

Via Fullpos or something external



Small code changes in ALADIN to make it run with HIRLAM

Skip “Mount Everest test” when using the SMHI 60 levels

Relax some geographical checks

SMHI

ALADIN	HIRLAM
Spectral	Gridpoint/Spectral
Polarstereographic, Mercator,Lambert	Rotated Lat-Lon
Non-hydrostatic SI -SL	Hydrostatic SI-SL
No prognostic cloud water, non- tiled ISBA, Louis vdiff, ECMWF radiation	Prognostic cloud water, tiled- ISBA, CBR, HIRLAM radiation

Difference CE/MF @CY29t2

ACRANEB / ECMWF RADIATION

SLHD and SPECTRAL HD

CLOUDINESS

GWD

Stable case mixing length

SMHI

We are eating CPU units .....

At the moment AROME takes about 10 times more than ALADIN – H

This is unoptimized but it is still a huge difference

SMHI

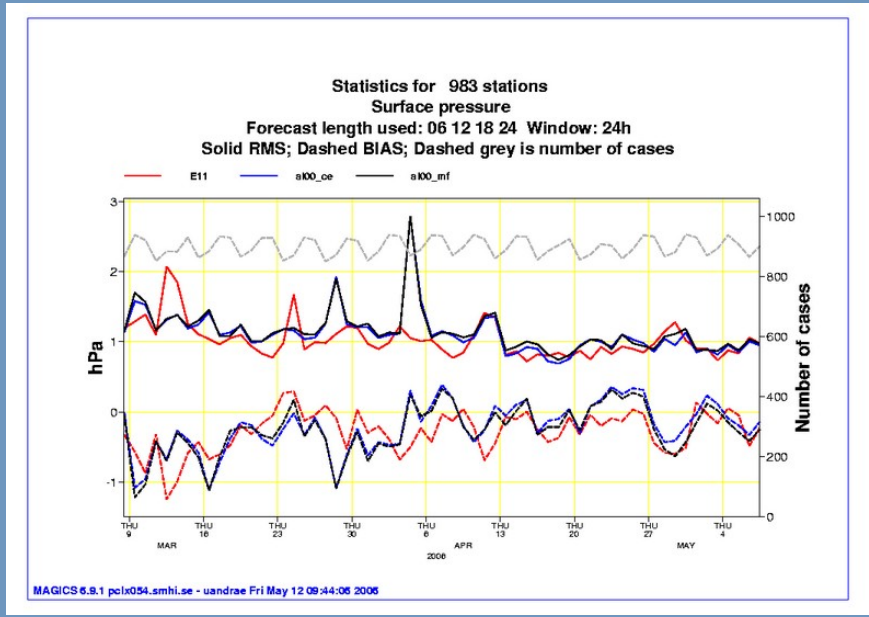
The general feeling from the autumn was that ALADIN and HIRLAM behaves very similar.

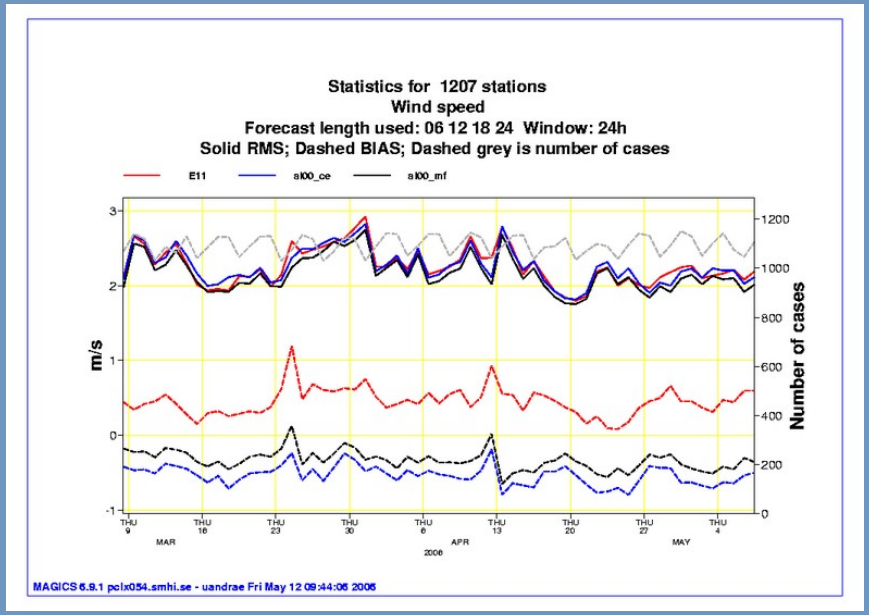
ALADIN had a better precipitation pattern and better near surface winds and a better diurnal near surface temperature cycle.

In the following we will look at the 10km resolution where:

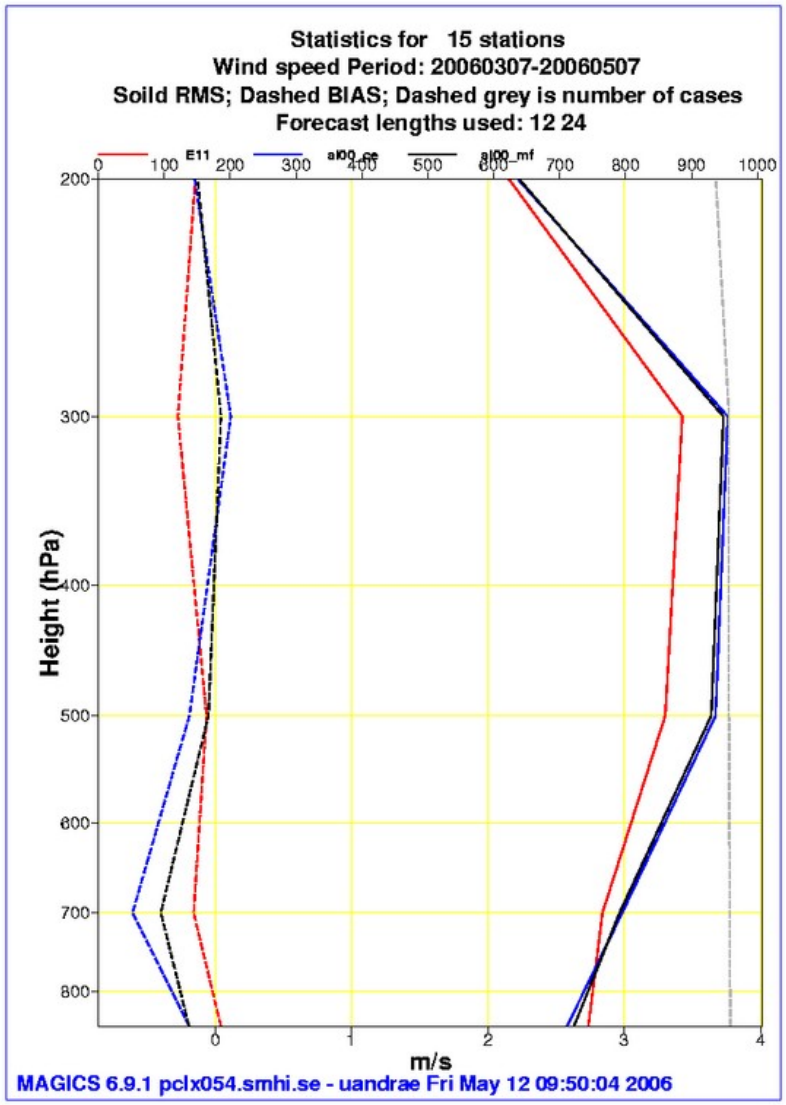
- E11 is HIRLAM
- Al00_mf is ALADIN Meteo France
- Al00_ce is ALADIN Central Europe

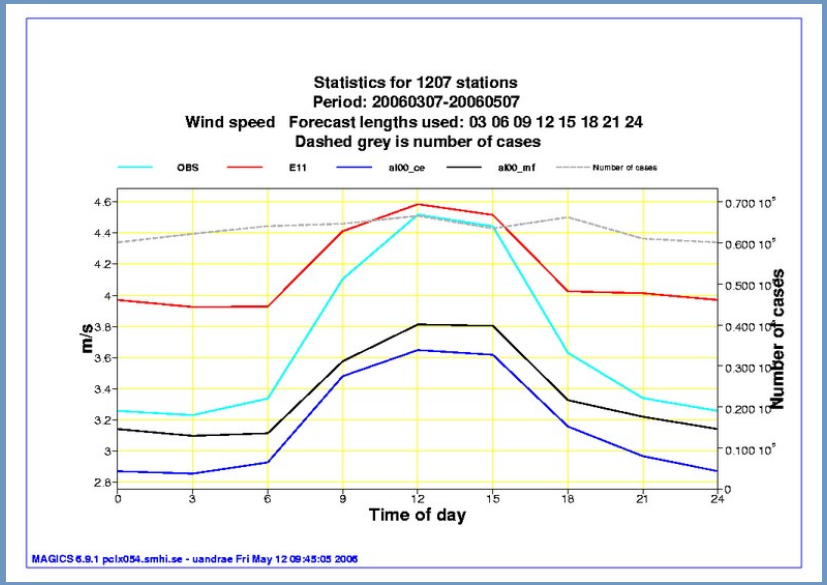
Using ALADIN CY30t1

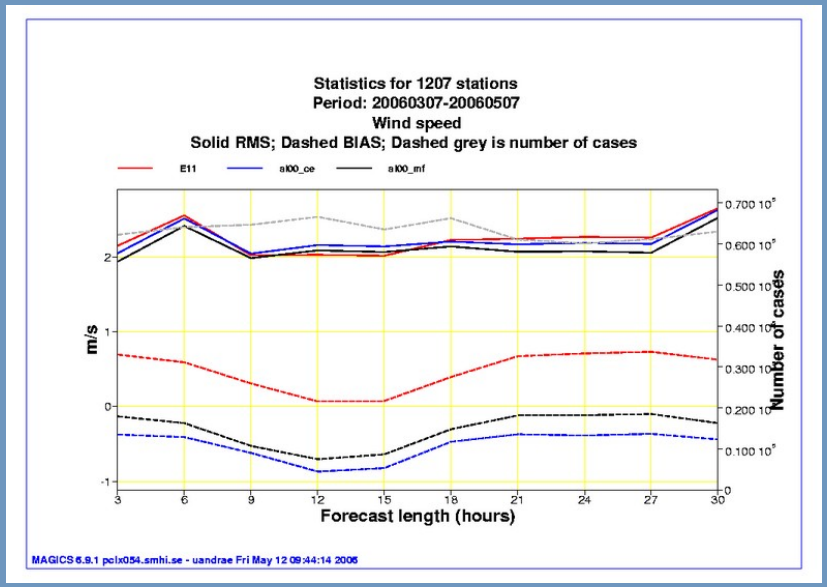




About winds

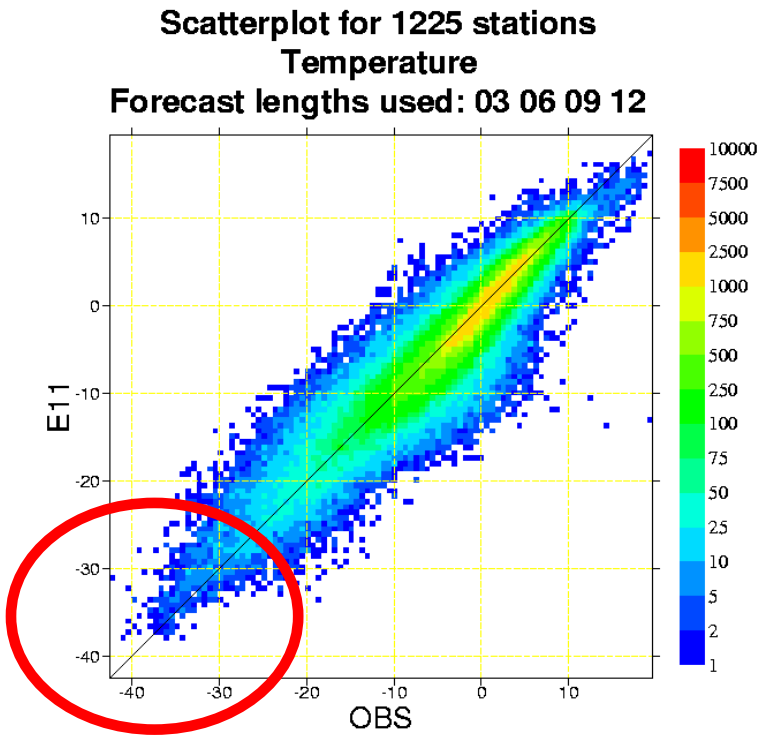

Statistics for 15 stations
Wind speed Period: 20060307-20060507
Solid RMS; Dashed BIAS; Dashed grey is number of cases
Forecast lengths used: 12 24
E11
al00_ce
al00_mf
Height (hPa)
m/s
MAGICS 6.9.1 pclx054.smhi.se - uandrae Fri May 12 09:50:04 2006


Statistics for 1207 stations
Period: 20060307-20060507
Wind speed Forecast lengths used: 03 06 09 12 15 18 21 24
Dashed grey is number of cases
OBS
E11
al00_ce
al00_mf
Number of cases
m/s
Number of cases
Time of day
MAGICS 6.9.1 pclx054.smhi.se - uandrae Fri May 12 09:45:05 2006

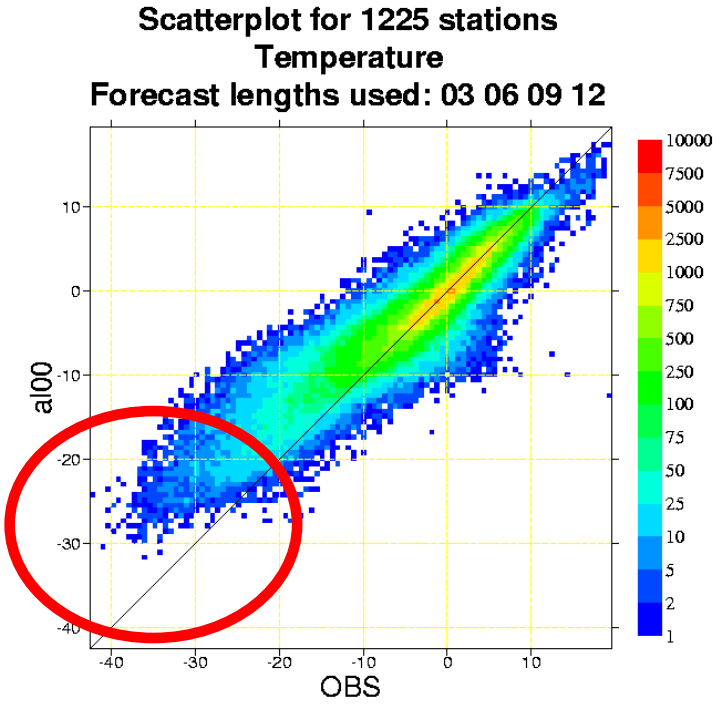

Statistics for 1207 stations
Period: 20060307-20060507
Wind speed
Solid RMS; Dashed BIAS; Dashed grey is number of cases
E11
al00_ce
al00_mf
m/s
Number of cases
Forecast length (hours)
MAGICS 6.9.1 pclx054.smhi.se - uandrae Fri May 12 09:44:14 2006

About temperature

Statistics for 15 stations
Temperature Period: 20060307-20060507
Soild RMS; Dashed BIAS; Dashed grey is number of cases
Forecast lengths used: 12 24



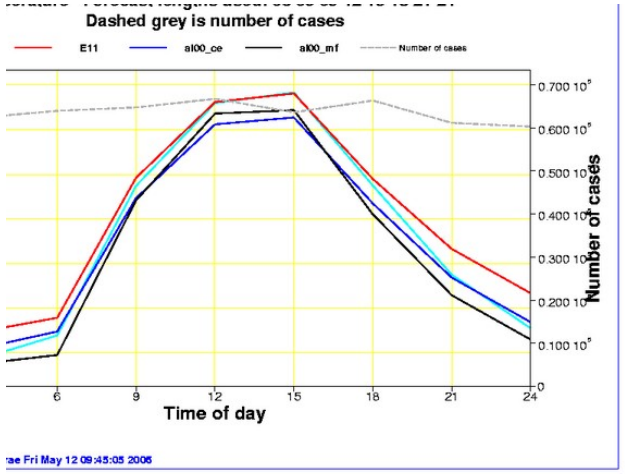
MAGICS 6.9.1 pclx054.smhi.se - uandrae Fri May 12 13:51:32 2006



MAGICS 6.9.1 pclx054.smhi.se - uandrae Fri May 12 13:51:32 2006

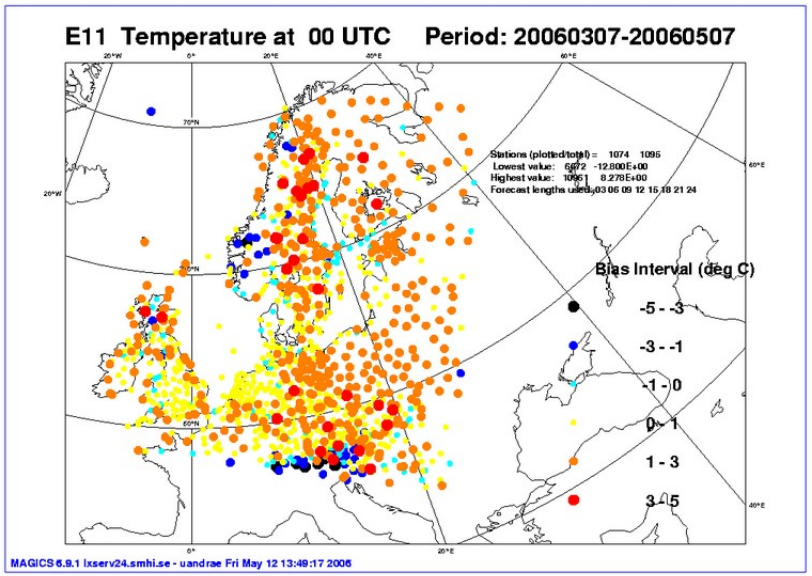
Number of obs = 226053

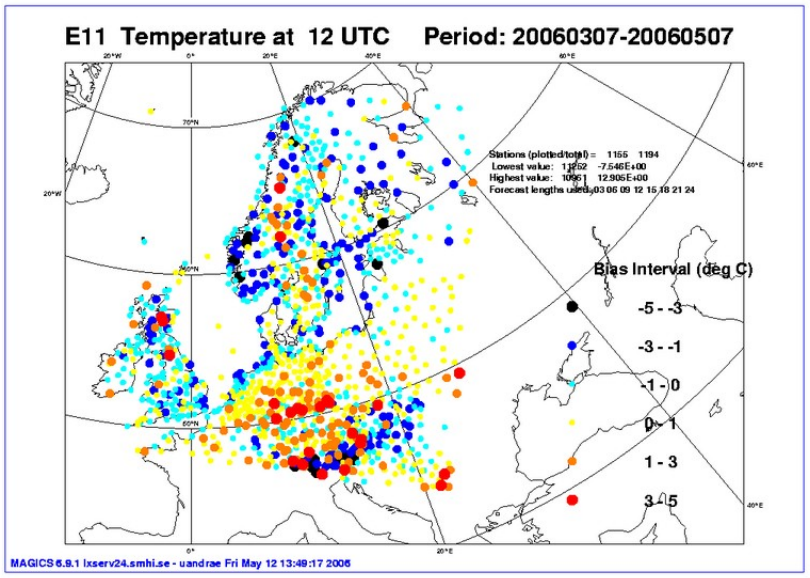
y mean = -2.6 y stdev = 6.9
x mean = -2.2 x stdev = 6.9
BIAS (y-x) = -0.41
RMS = 2.47
corr. coef. = 0.938



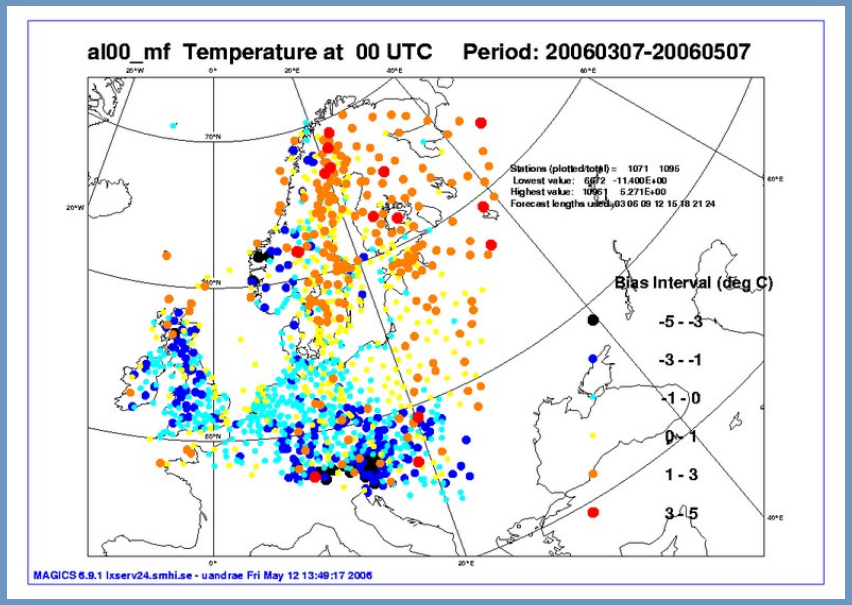
SMHI

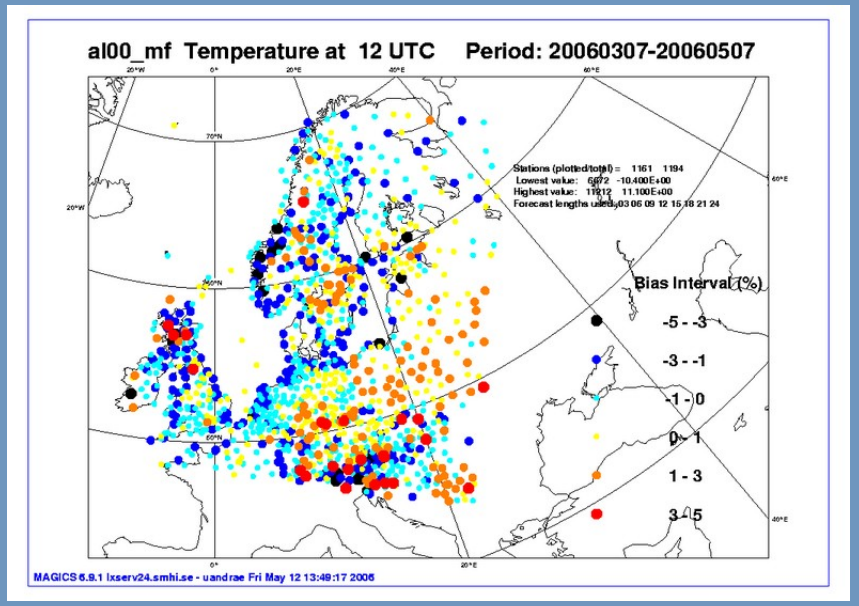
HIRLAM





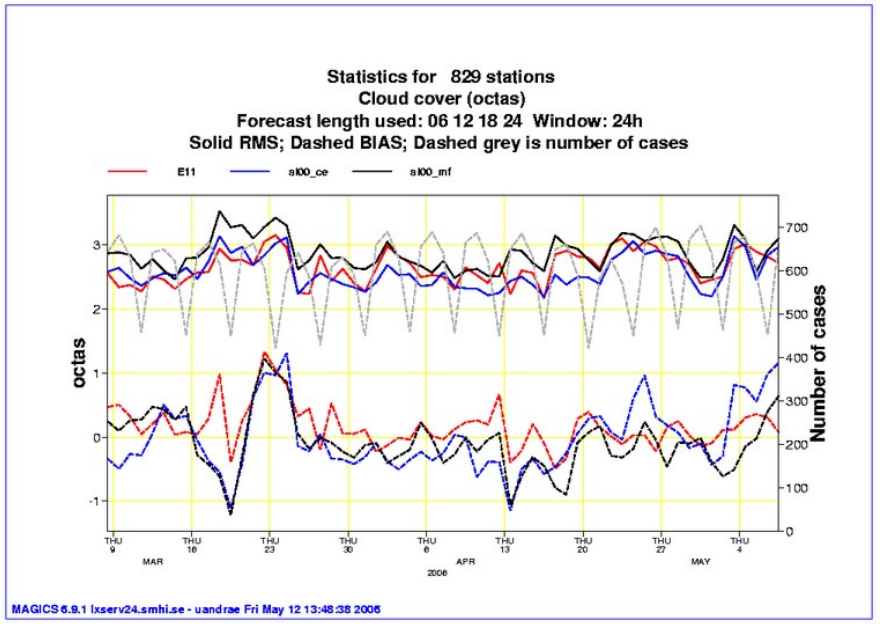
ALADIN

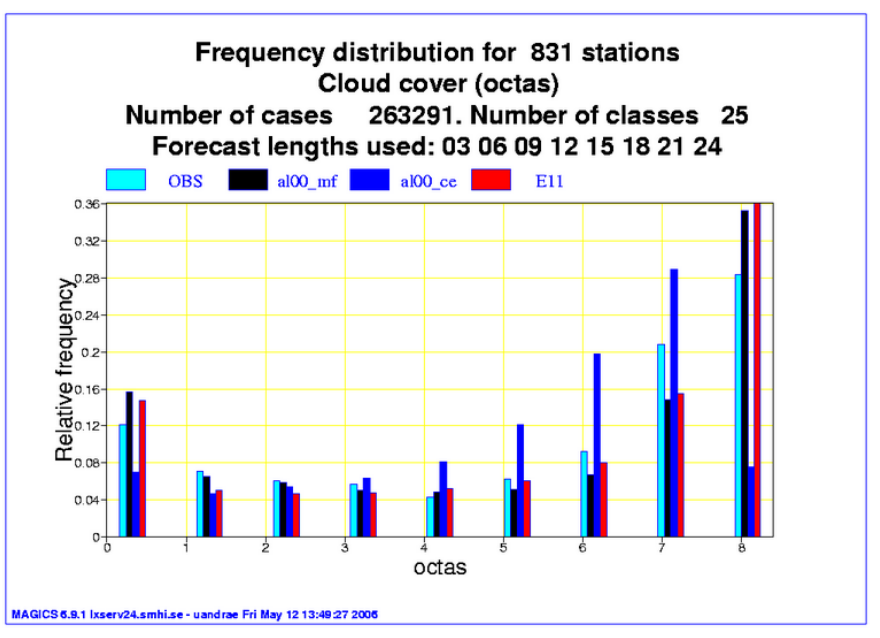




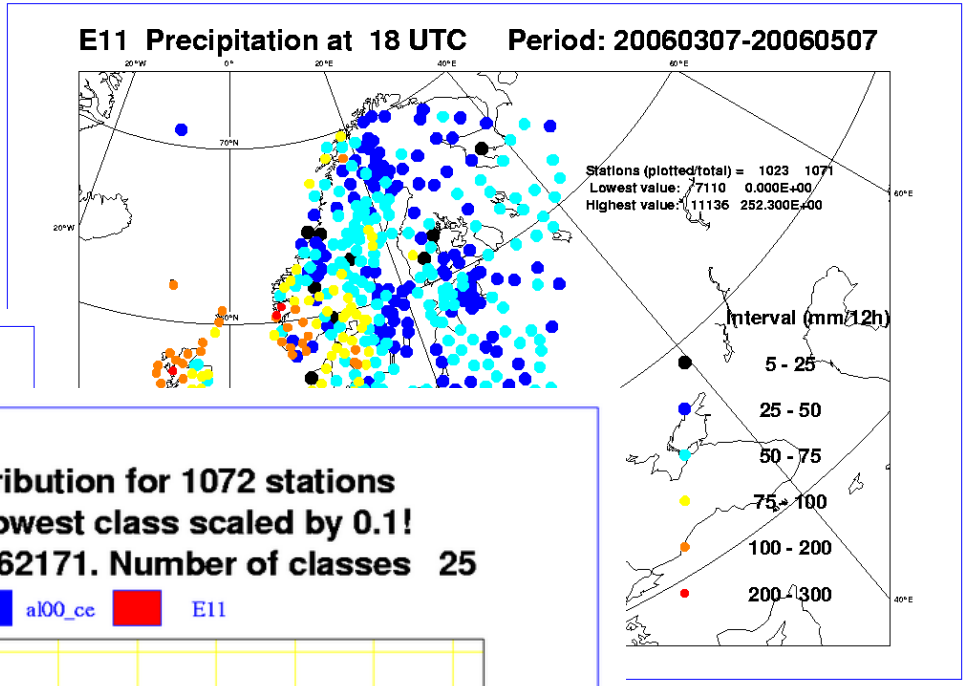
SMHI

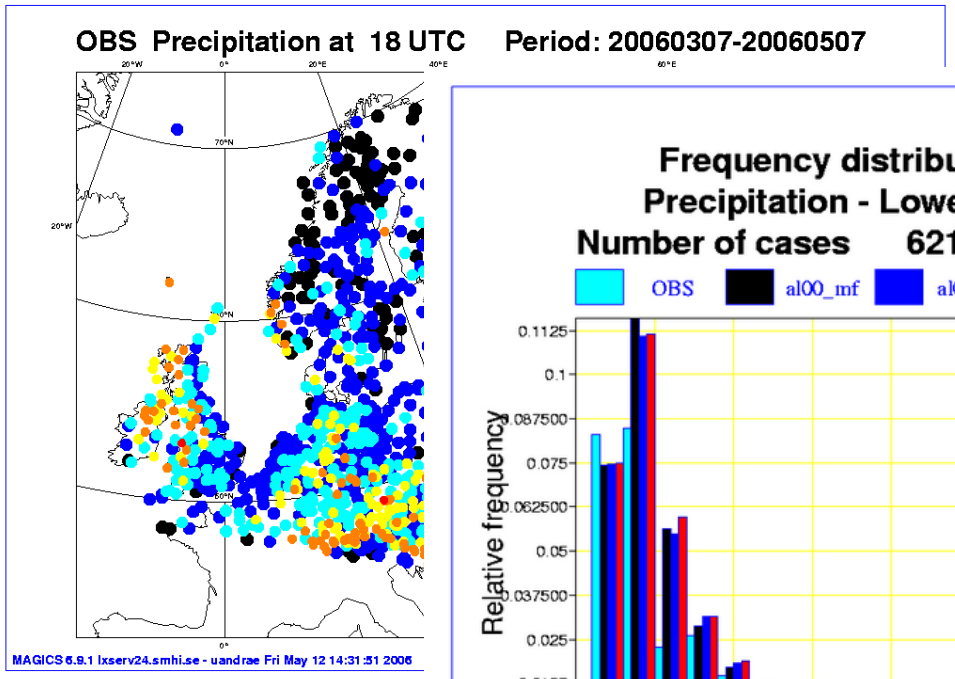
The earlier problem with excessive diagnostic cloud cover is not present any more

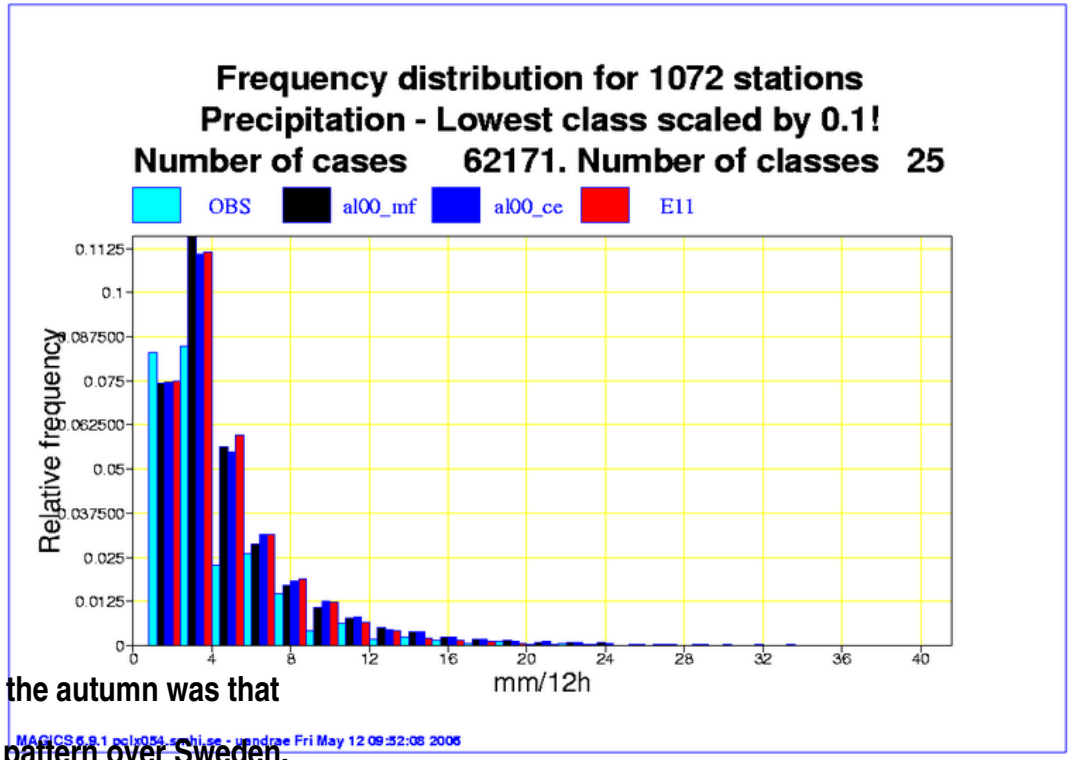


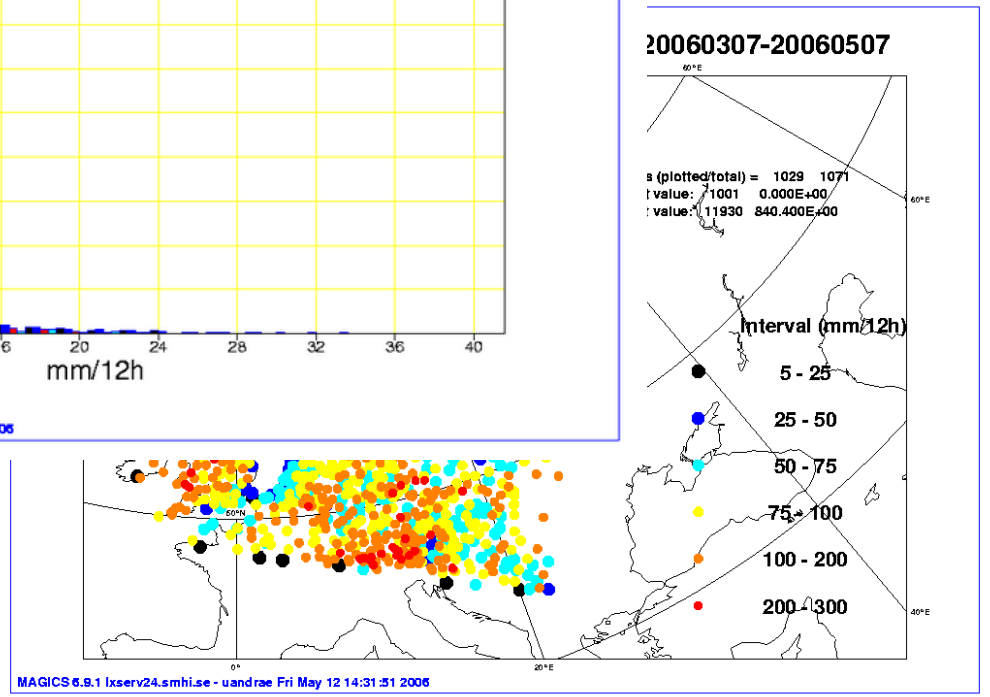


Precipitation as accumulated over two months









The experience from the autumn was that

ALADIN had a better pattern over Sweden.

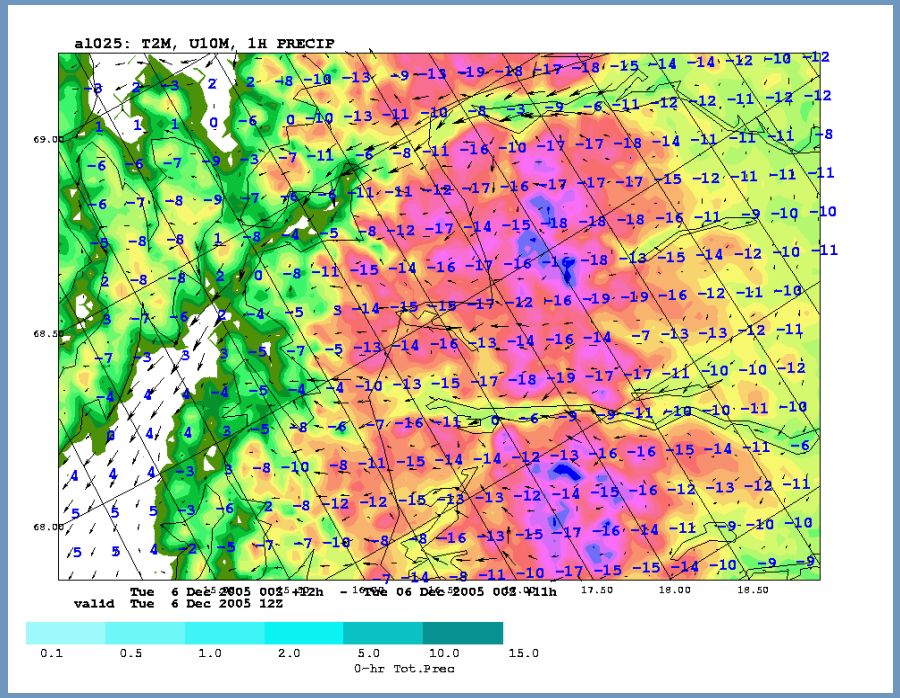
Remember SMHI HIRLAM is not reference HIRLAM

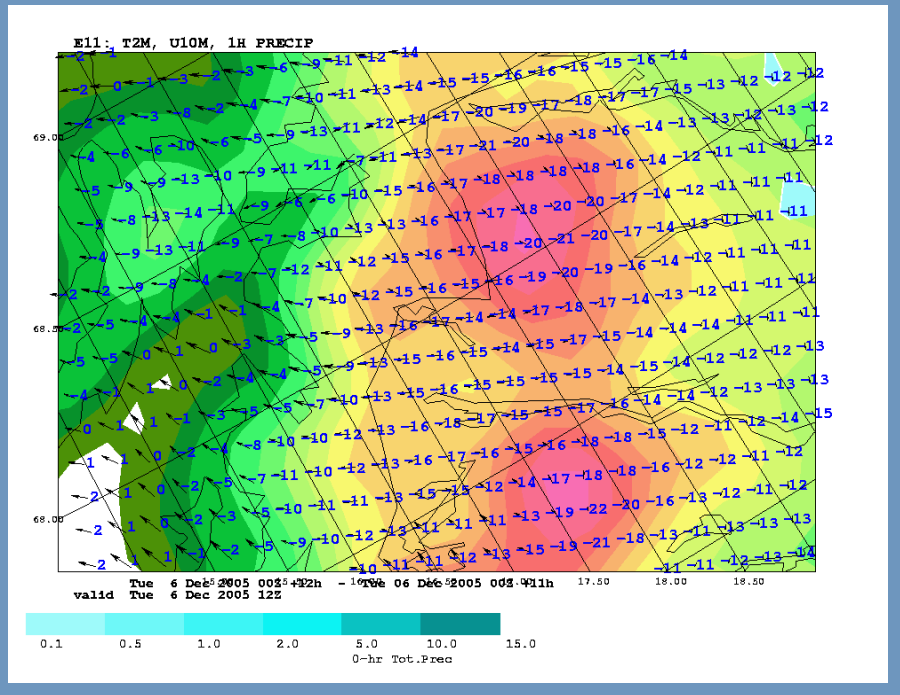
SMHI

About 2.5km ALADIN-NH

Forecasters have been happy with valley winds but not at mountain tops

Coupling with dispersion model (MATCH) was problematic due to unrealistic precipitation





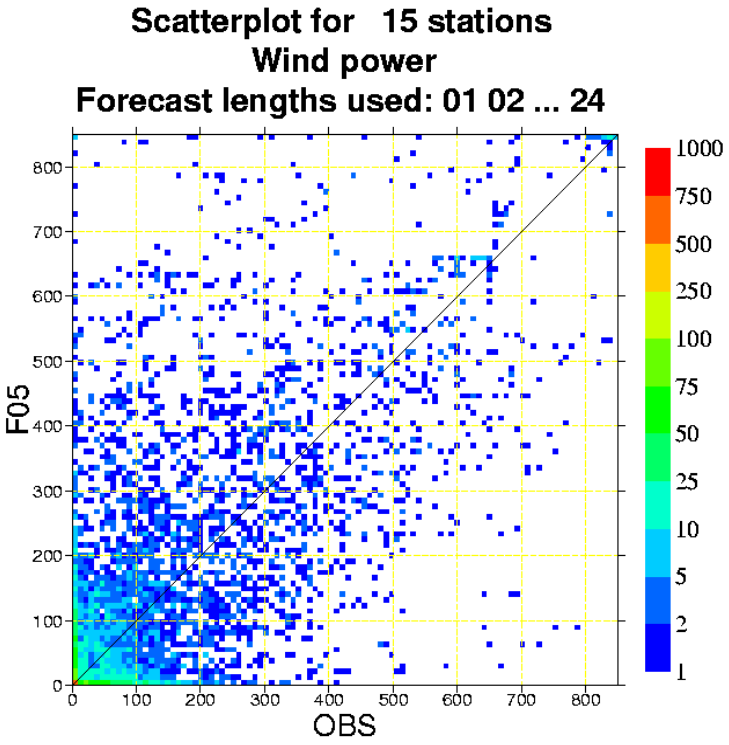
SMHI

Is there any useful information

F05: HIRLAM 5km

Stat

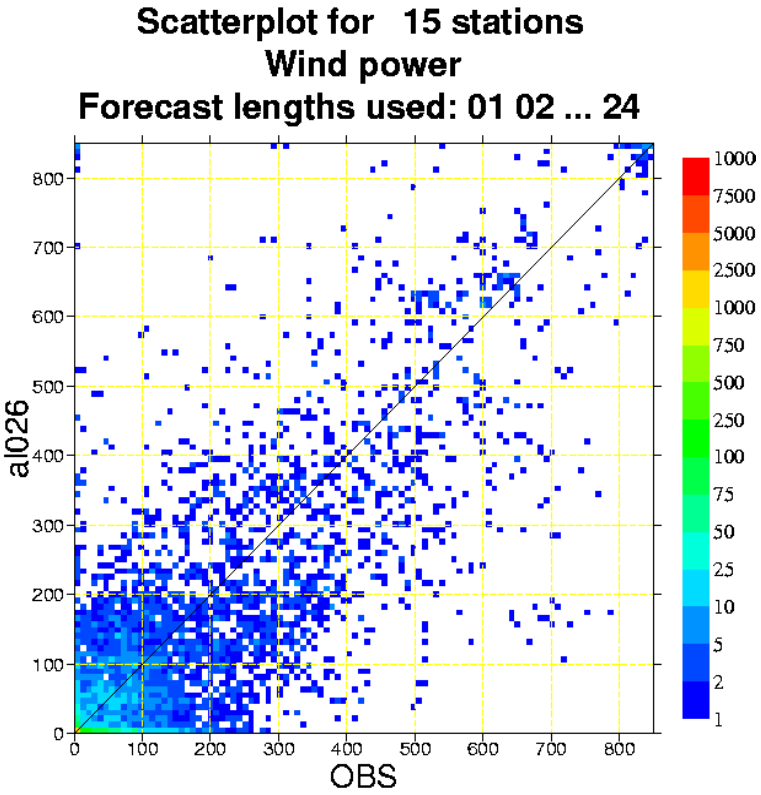
Forecast



Number of obs =

y mean = 157.0 y stdev
x mean = 132.2 x stdev
BIAS (y-x) = 24.75
RMS = 145.48
corr. coef. = 0.687

5km

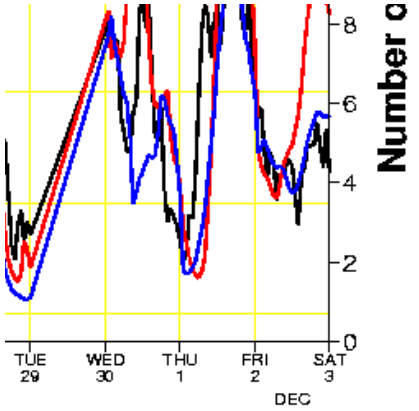


MAGICS 6.9.1 pclx054.smhi.se - uandrae Thu Mar 30 10:48:06 2006

Number of obs = 6120

y mean = 119.4 y stdev = 169.2
x mean = 132.2 x stdev = 170.0
BIAS (y-x) = -12.80
RMS = 107.80
corr. coef. = 0.801

2.5km



MAGICS 6.9.1 pclx054.smhi.se - uandrae Thu Mar 30 10:48:06 2006

SMHI

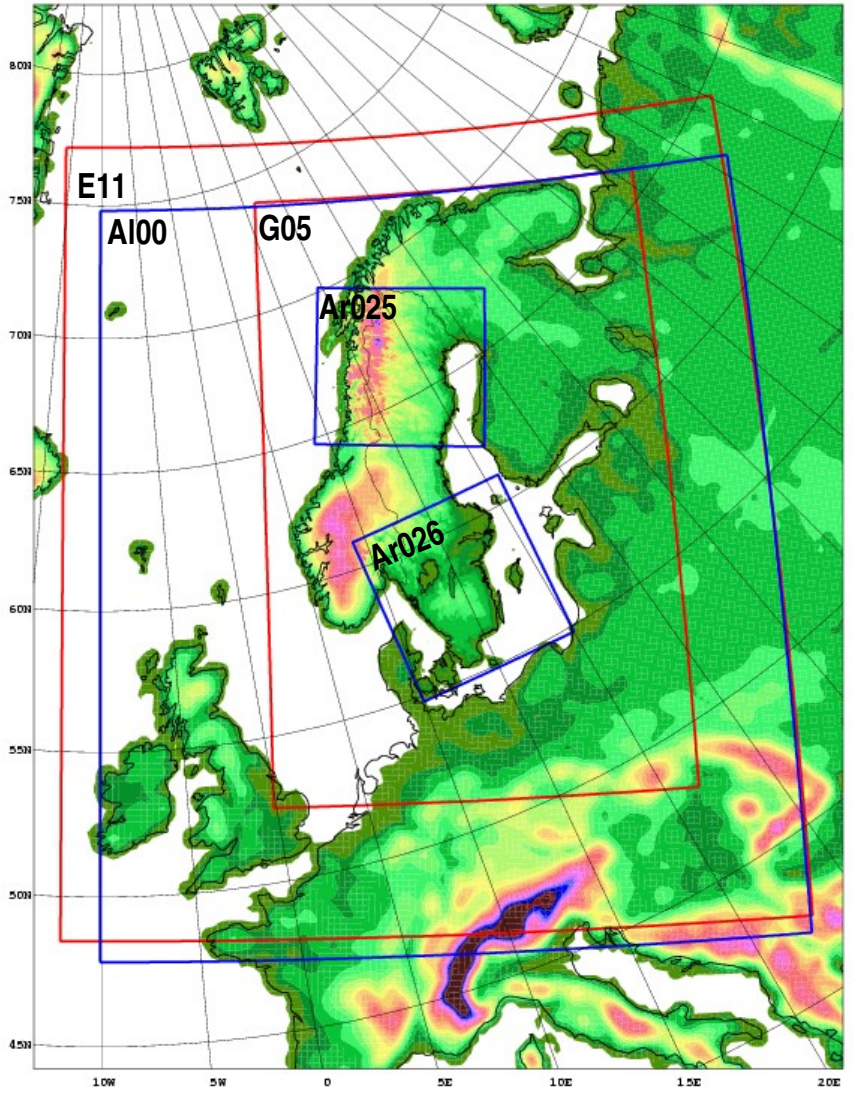
HIRLAM

Operational assimilation cycles

C22 22 km 40 levels

E11 11km 60 levels

G05 5.5km 60 levels



ALADIN / AROME

Daily runs without assimilation
"Cold start" every time

al00 11km, 60 levels forced by C22.

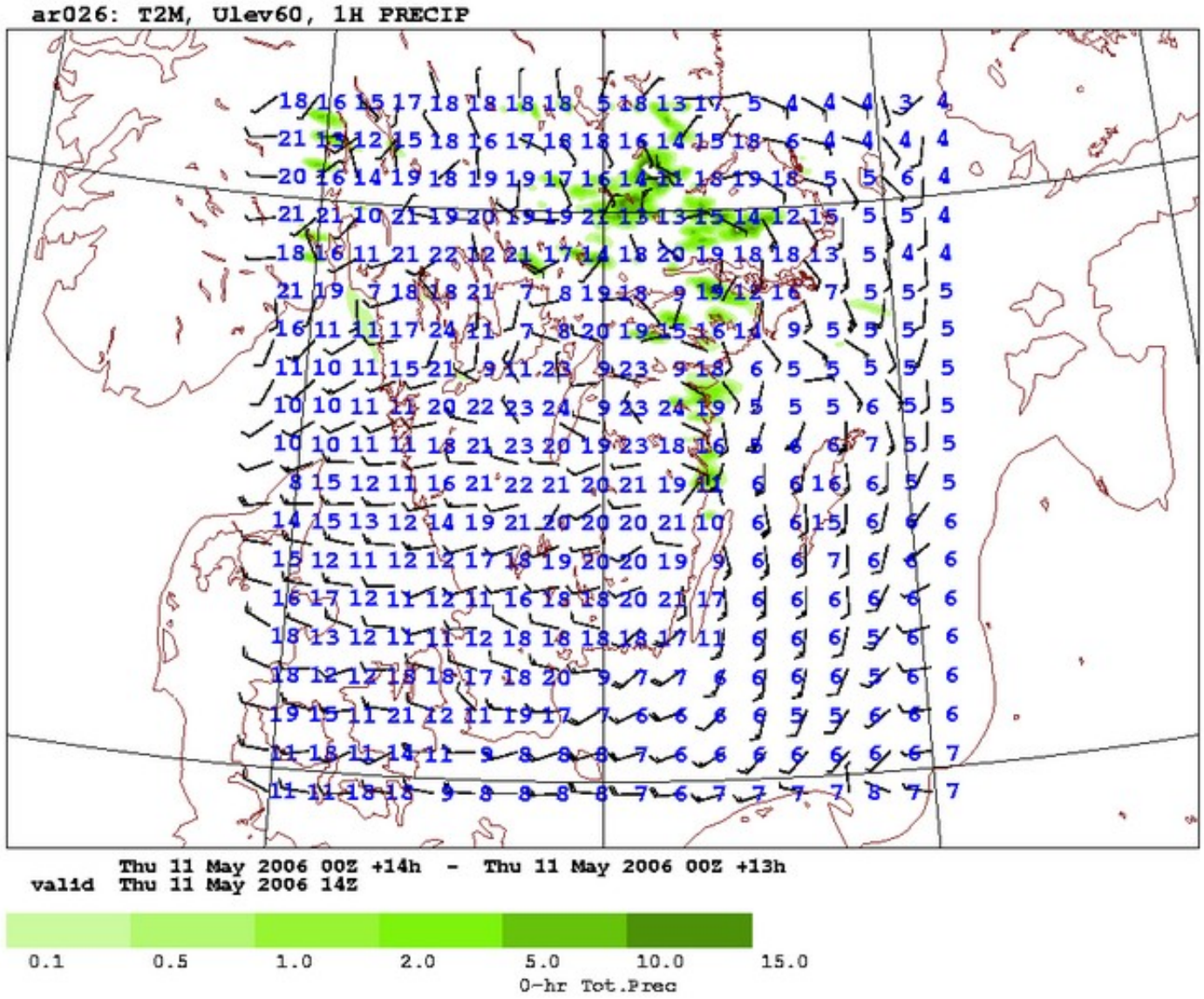
One with MF and one with CE physics

ar025, ar026 2.5km **NH** 60 levels

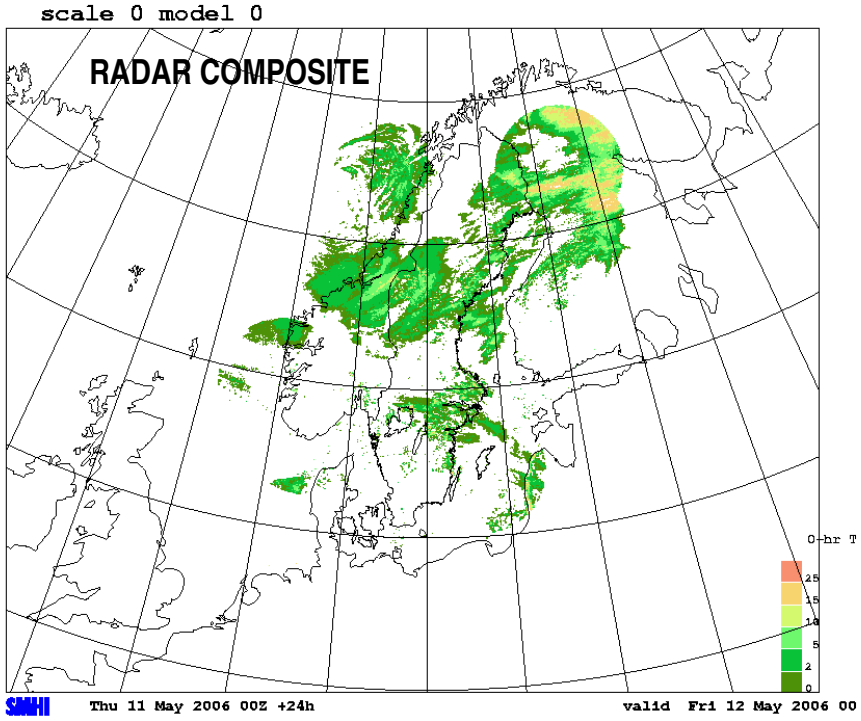
Forced by al00

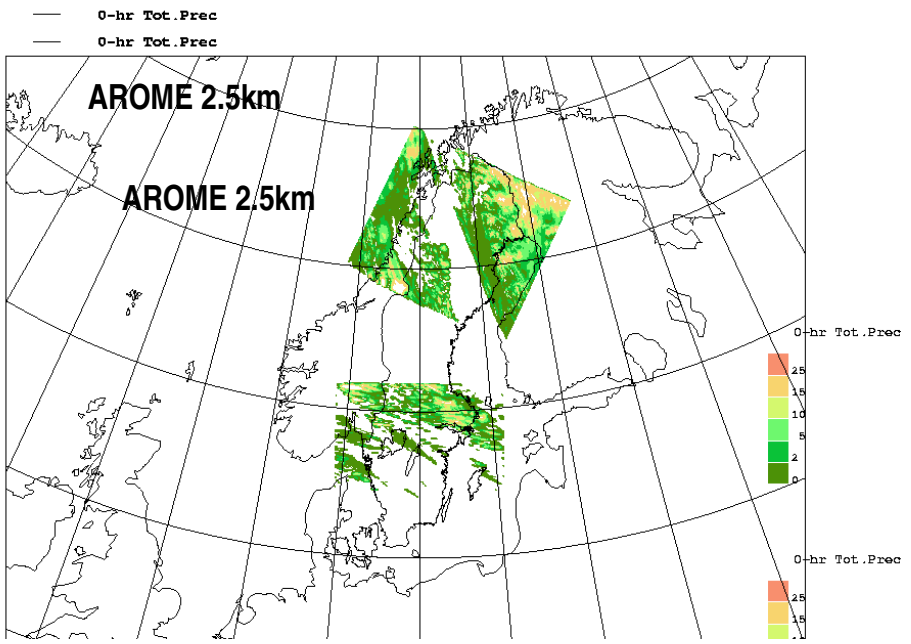
Running on Dunder : **50 node,64-bit Dual Intel Xeon EM64T CPU @ 3.40GHz, InfiniBand**

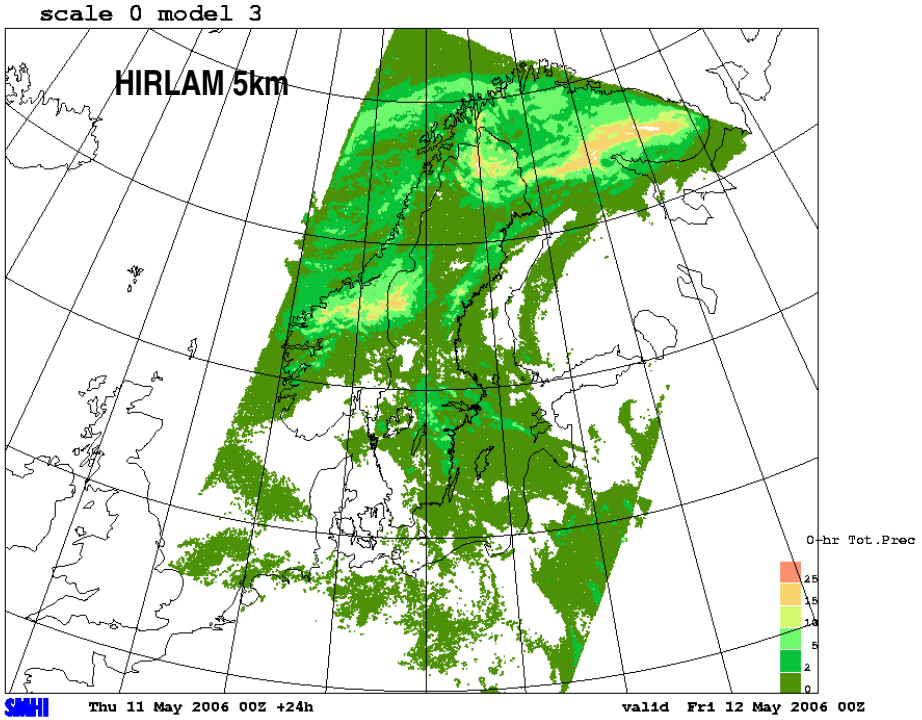
First examples with AROME



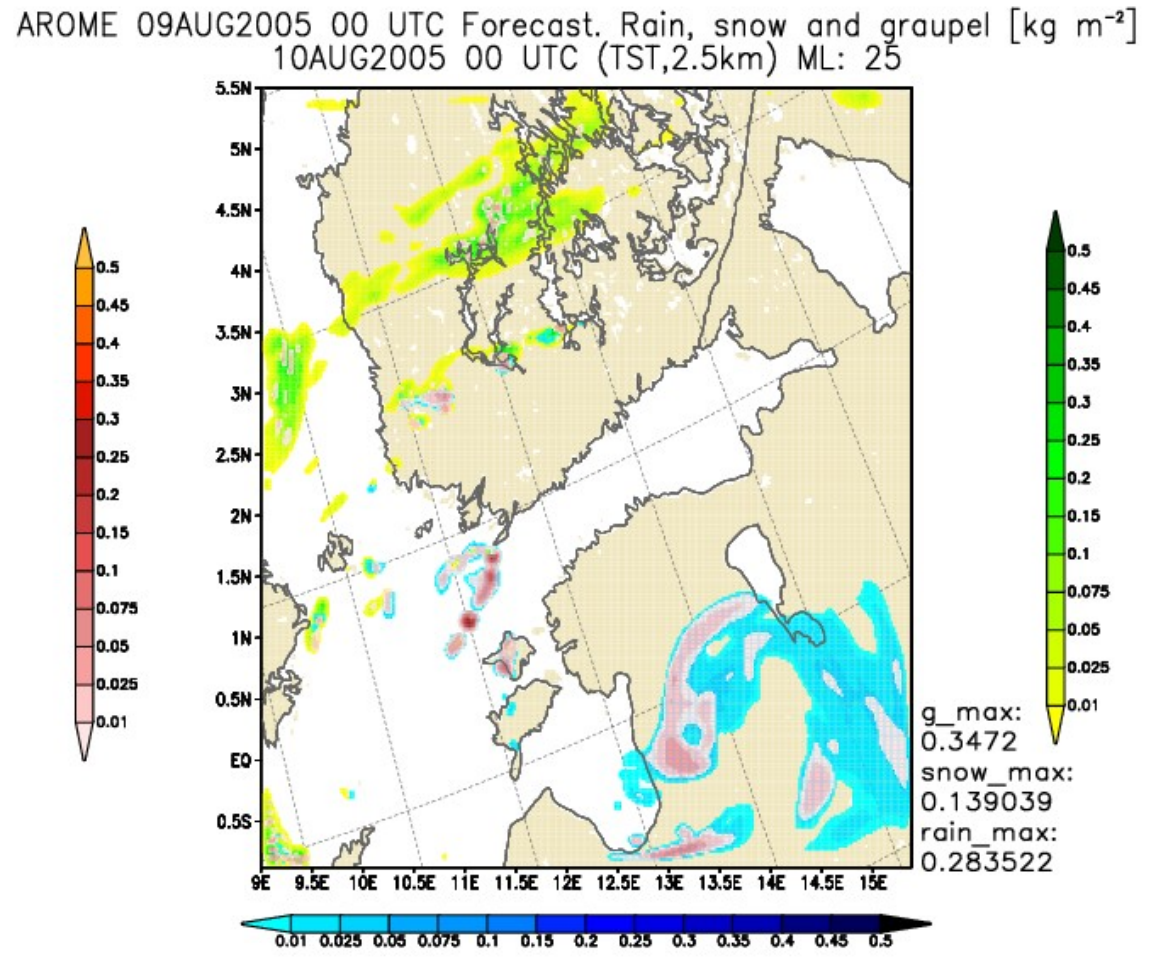
24h Accumulated precipitation on 20060511+24







FMI example (Sami Niemela)



Yellow and green is rain (liquid), blue is snow and red is graupels.

All on the model level 25.

SMHI

Future

- Daily runs with ALADIN/AROME will continue.

  Make sure we are using it correctly

  Speed of AROME is a worry.

- HIRLAM - > AROME (fullpos/other).

  Does other ALADIN countries have similar needs?

- HIRLAM physics is interesting (Ororad)
- Extend evaluation: Sodankylä, Helsinki testbed, radar,

Thanks to ALADIN people!

Ryad El Khatib, Yann Seity and others

Follow the work on WWW:

Google ”webgraf+aladin”