# Assimilation of AMSU-B Radiances In the HIRLAM 3DVAR Analysis
## ITSC-15 2006. Maratea, Italy.
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## HIRLAM: **HI**gh **R**esolution **L**imited **A**rea **M**odel

LAM model used for operational forecasting and research in:
Sweden, Finland, Norway, Denmark, Ireland, The Netherlands, Spain

## EXPERIMENT SETUP

Period: January 2005

### ANALYSIS
3DVAR
Background error structure functions based on analytical balance
FGAT (First Guess at Appropriate Time)
6h assimilation cycle

REF: Conventional observations + AMSU-A
EXP: REF+ AMSU-B from NOAA16

### FORECAST MODEL
33km horizontal resolution
40 vertical levels
Semi-Lagrangian semi-implicit dynamics
Kain-Fritsch (convection)
Rasch-Kristjánsson (stratiform)
CBR (turbulence)

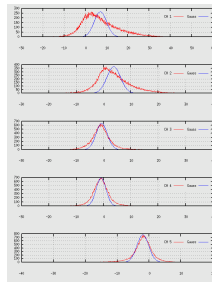ISBA (surface scheme)
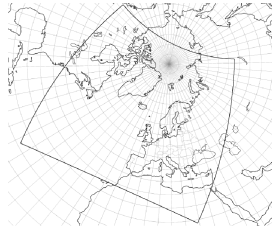
## BIAS CORRECTION

$p_0$: constant
c: coefficients, calculated from a reference data-set
P: predictors

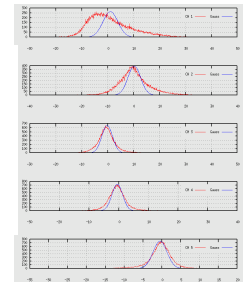$$corr = p_0 + \sum_{j=1}^{N} c_j P_j$$

Predictors:
- Mean temperature 1000-300hPa
- Mean temperature 200-50 hPa
- Square of scan-angle
- Scan-angle

Data from December 2004 were used to calculate the coefficients



x-axis: ($y-Hx_b$) [K]
y-axis: number of samples
Blue: overlayed gaussian curve
Red: data distribution

Uncorrected innovations                    Bias-corrected innovations

## QUALITY CONTROL

Scattering will influence the AMSU-B measurements if there is rain or ice particles.
Ch1 – Ch2 is used a (crude) index to spot, and remove, such observations:
**Ch1 –Ch 2 >-15K ➔ reject**
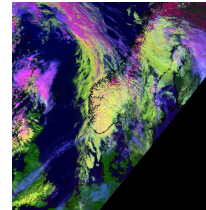


AVHRR RGB image            AMSU-B CH1-Ch2          AMSU-B Ch1-Ch2 >-15K
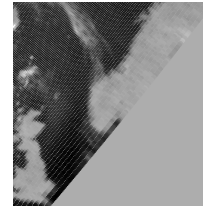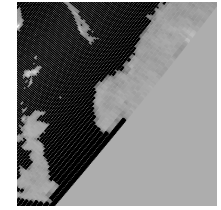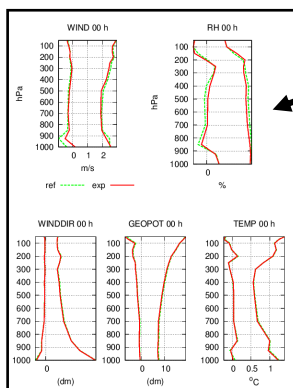Ch 134

NOAA17 3/5-2006 11:52UTC

## OBSERVATION ERRORS

|       | Approximated background error (BGOS) | Assigned observation error | Weight given in analysis $\sigma_b/\sigma_o$ (approx) |
|-------|-----------|-----------|-----------|
| CH 3  | 3.5 K     | 2.0K      | 1.75K     |
| CH 4  | 2.0 K     | 2.0K      | 1.0       |
| CH 5  | 1.5 K     | 2.0K      | 0.75      |

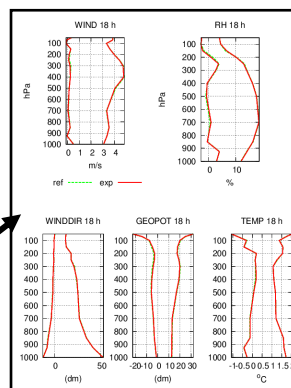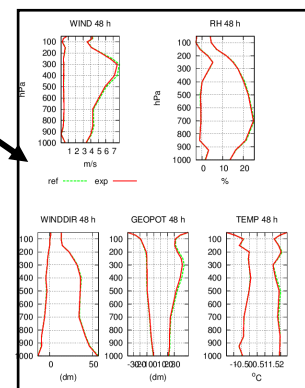## RESULTS COMPARED TO RADIOSONDES



A humidity increment influence the humidity and the wind

Some of the initial changes in the humidty is likely overrun by model dynamics

**+00H**



The initial humidity changes may however spread to other variables (clouds, radiation etc) which in turn can have an effect on the mass-field

**+18H**



**+48H**

**SMHI**