

WP 2.2 Improved NWP

- Improved surface flux model
- Assimilation of TWV retrievals
- Direct assimilation of AMSU-B

Rest items:

- T_s and ε in HIRLAM 3D-Var



WP 2.2 cont. Cloud mask

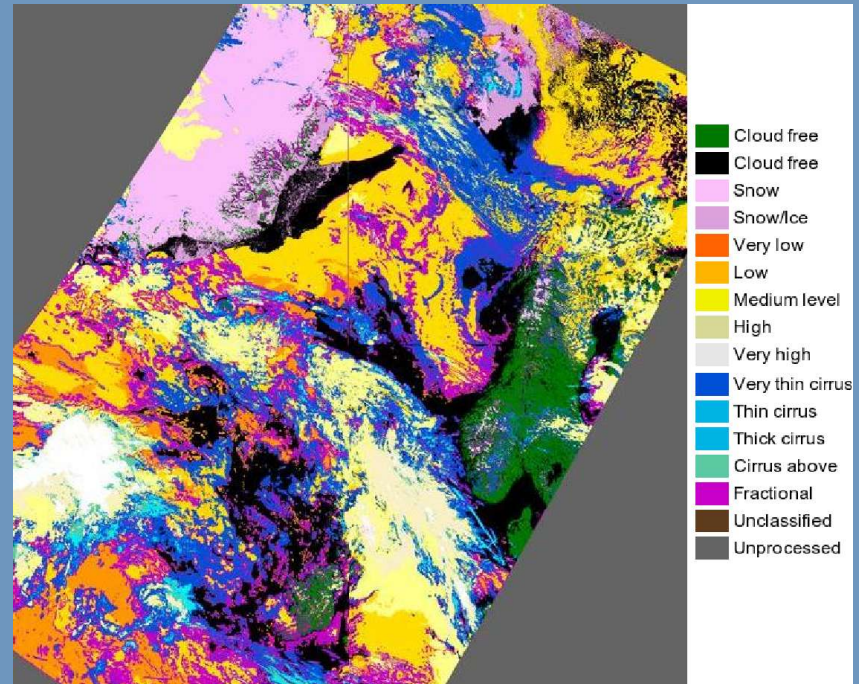
Study (y - Hx) statistics for each cloud type and each AMSU-B channel and compare with SI-index (T89 - T150) mask over sea.

Channel 3: Two classes in mask
mask - 15%

Channel 4: Four classes in mask
mask - 5%

Channel 5: Six classes in mask
mask - 25%

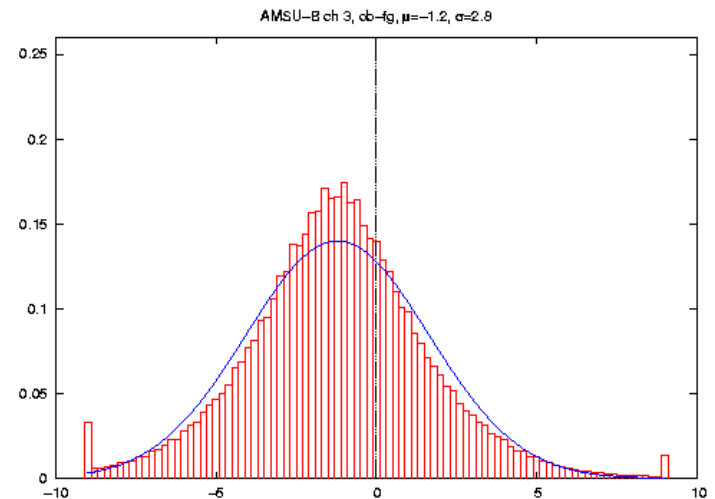
Assume that the same cloud types could be used in the mask over ice.



WP 2.2 cont

Why bias correction?

- Inaccuracies in RT-model
- Change in instrument characteristics
- NWP model bias
- Minimization based on $N(0,S)$ statistics
- BC gives positive impact on forecasts



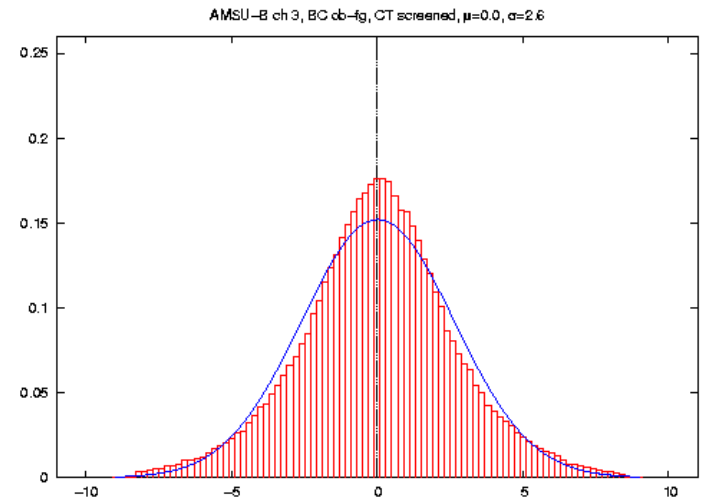
WP 2.2 cont. Bias correction, how?

Use cloud cleared data to compute bias correction coefficients W s.t.:

$$E\{ y - Hx - Wp \} = 0$$

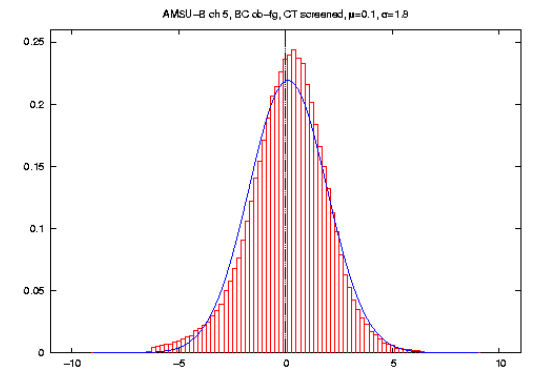
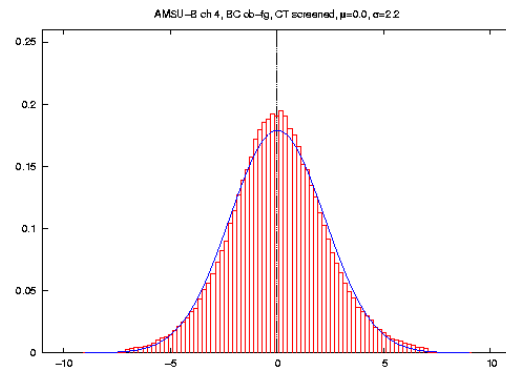
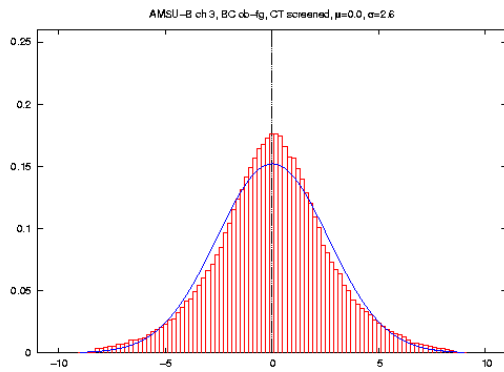
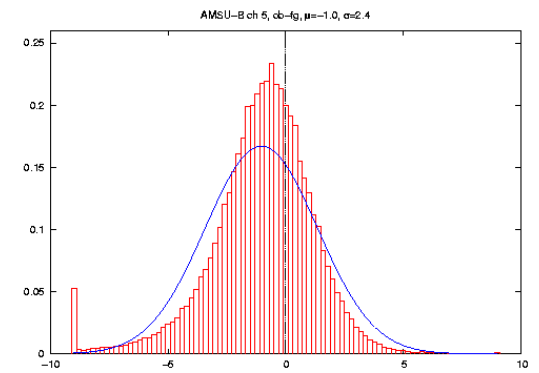
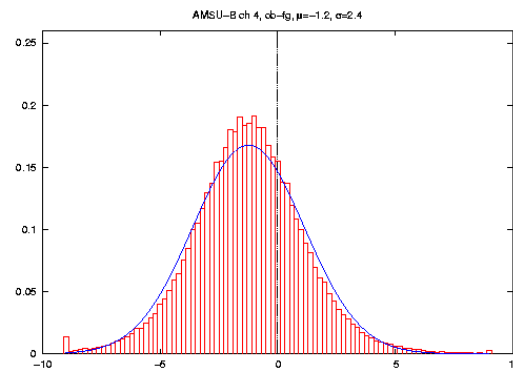
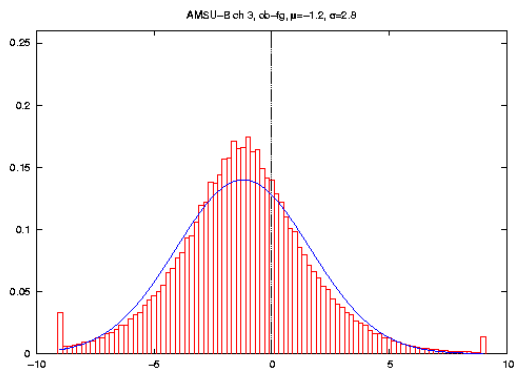
Predictors p :

- Mean temp 1000-300 hPa
- Mean temp 200-50 hPa
- Surface temp
- Obs zenith angle
- Square of obs zenith angle
- Constant offset

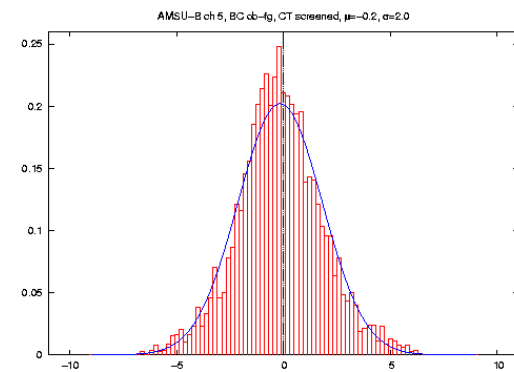
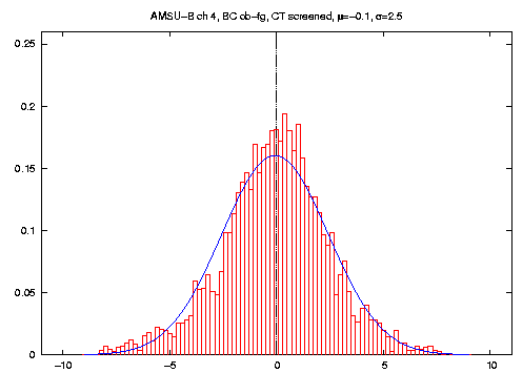
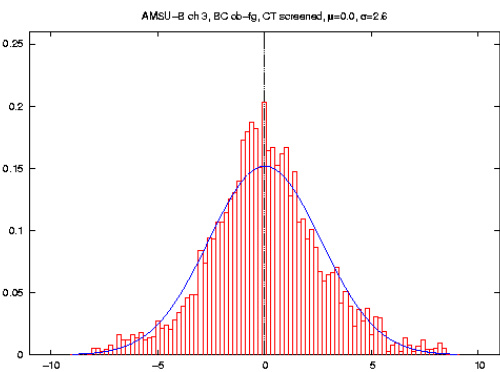
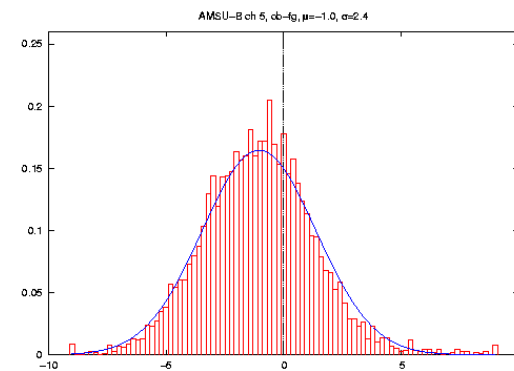
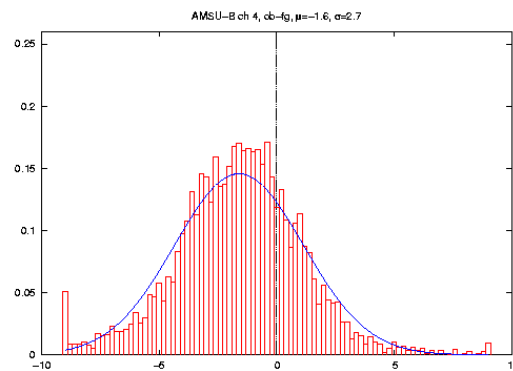
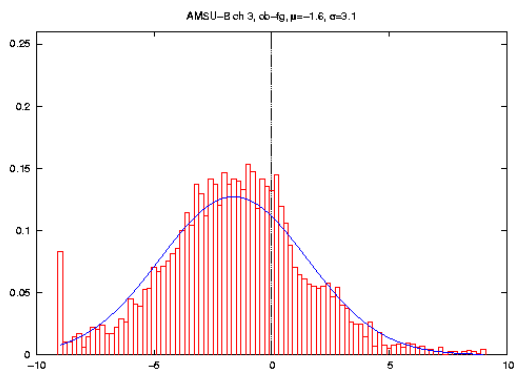


WP 2.2 cont. CM and BC, sea

NOAA-16, March and June 2004



WP 2.2 cont. CM and BC, ice



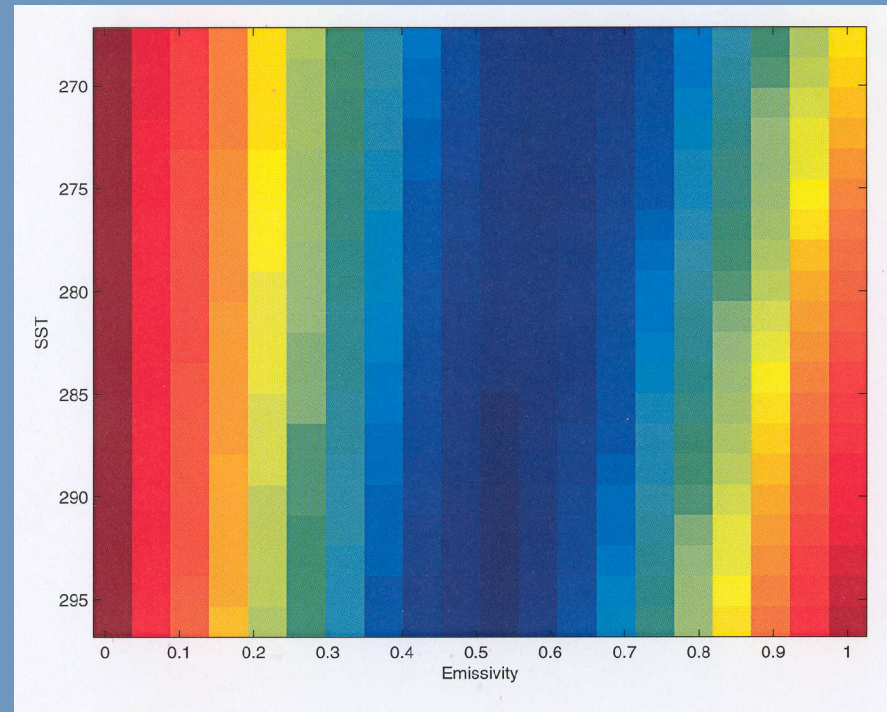
WP 2.2 cont. T-skin & emissivity

**Sensitivity experiment with AMSU-A
ch 1-4 over sea using RTTOV-7:**

- **Not so pronounced minimum**
- **More sensitive to emissivity than T_s**

Ideas:

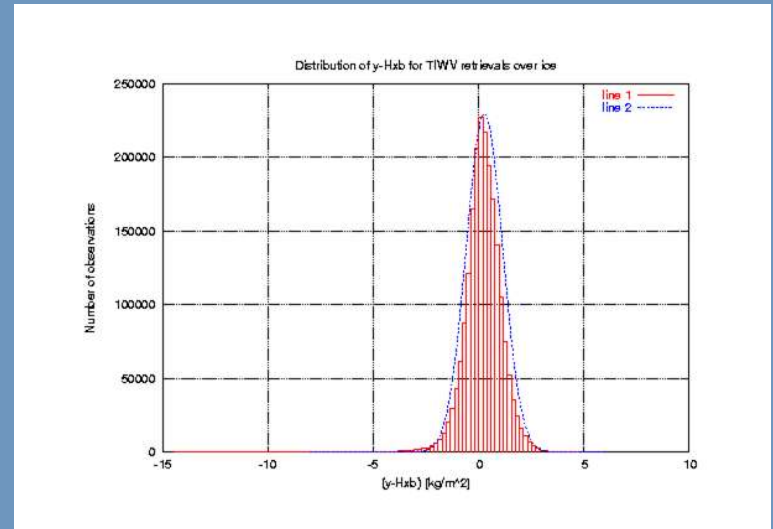
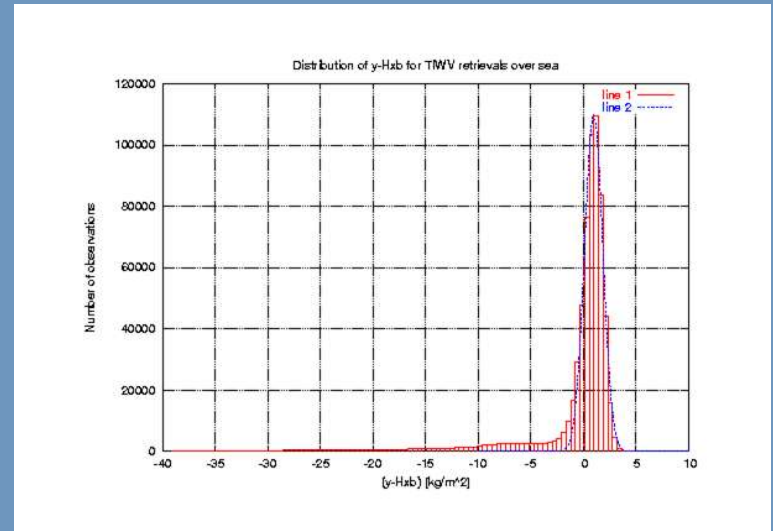
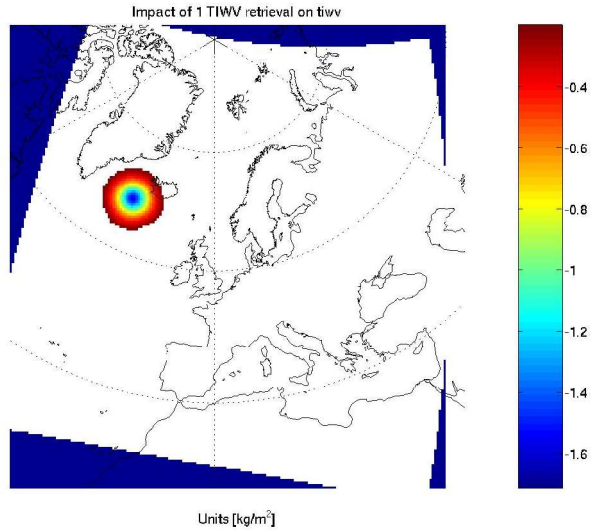
**Check AMSU-B response.
Different weights to T_s and ε .**



WP 2.3 Real Time Assimilation of TWV

■ Real time assimilation of TWV retrievals

QC: Lat > 75. Gross error check.



WP 2.4

Validation of NWP assimilation

- **Assimilation of TWV retrievals**
- **Assimilation of AMSU-B radiances**
- **Improved surface flux formulation**

WP 2.4 cont

Validation of TWV assimilation

BC statistics from Dec 2005.

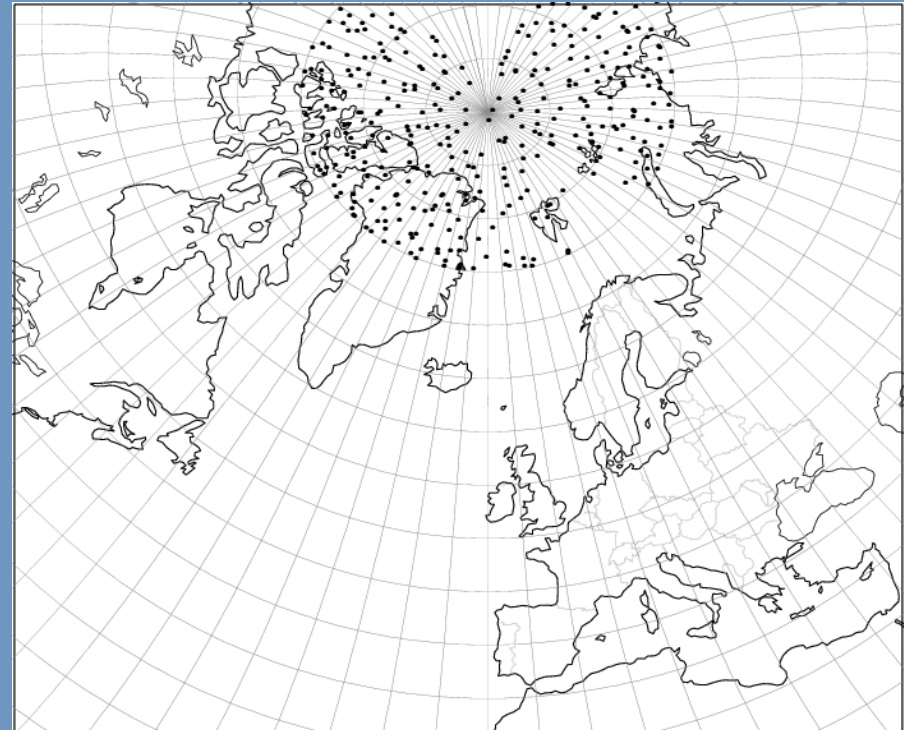
Validation experiment for Jan 2005.

Only use data with lat > 75°.

First results:

**Examples from forecast from 0 UTC,
Jan 1**

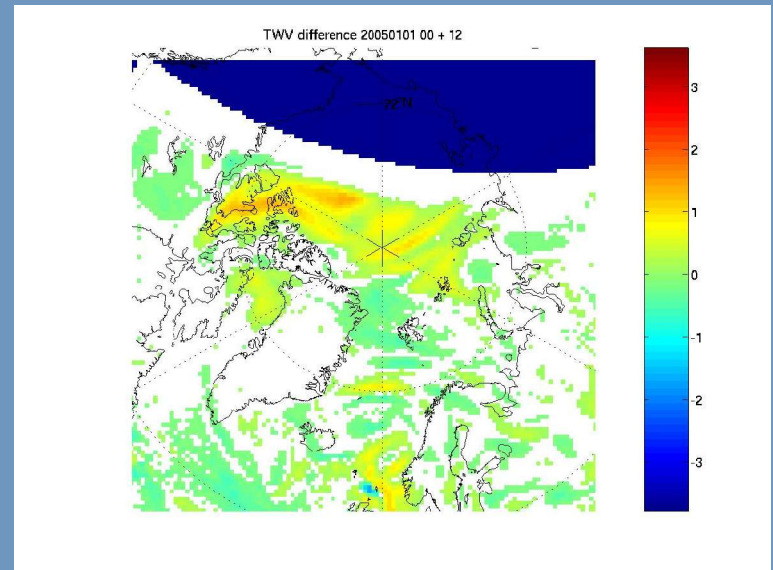
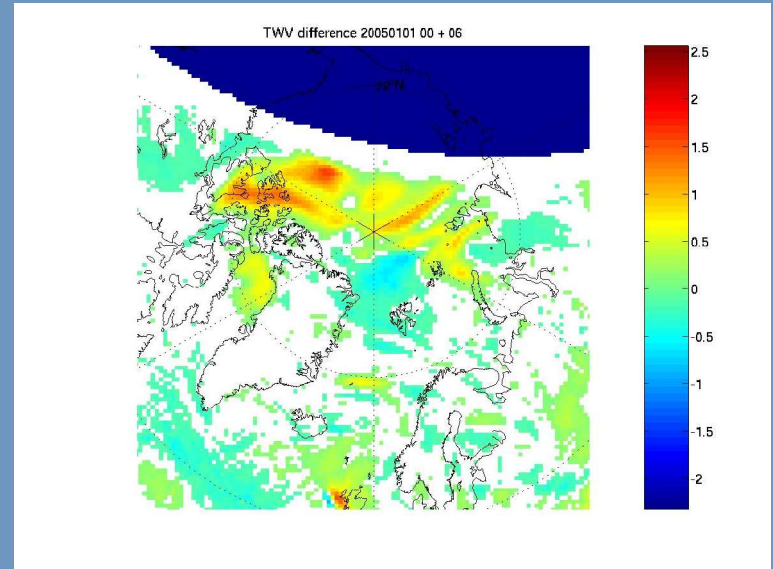
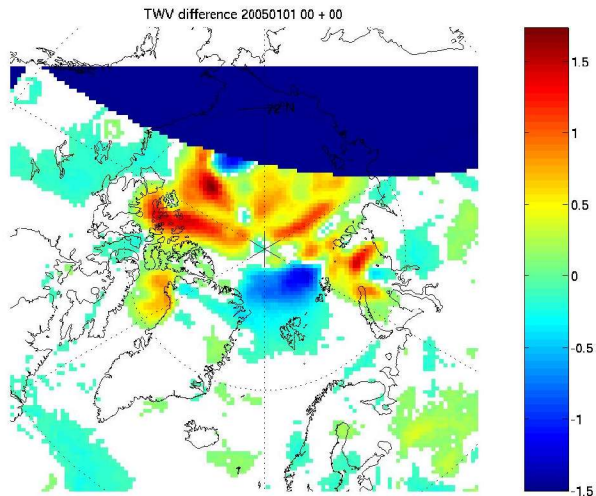
**TWV observations in the analysis at 0
UTC
January 1, 2005**



WP 2.4 cont Validation of TWV assimilation

Decreased impact on humidity with time.

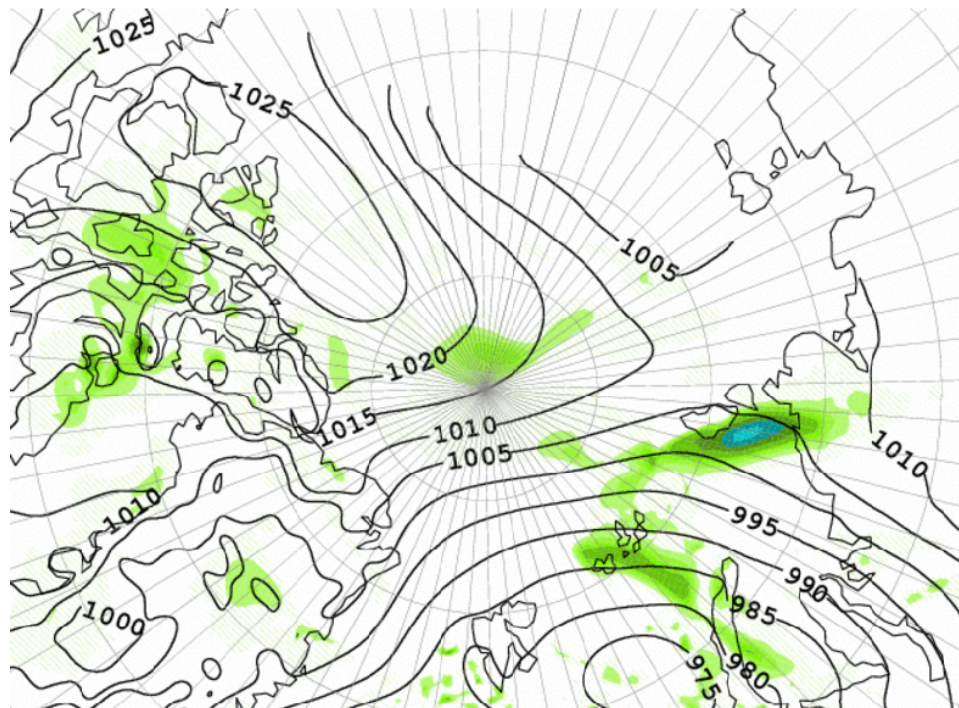
Not unique for TWV.



WP 2.4 cont Validation of TWV assimilation

Impact on 12 hr forecast of
precipitation:

Increased stratiform precip with
TWV.

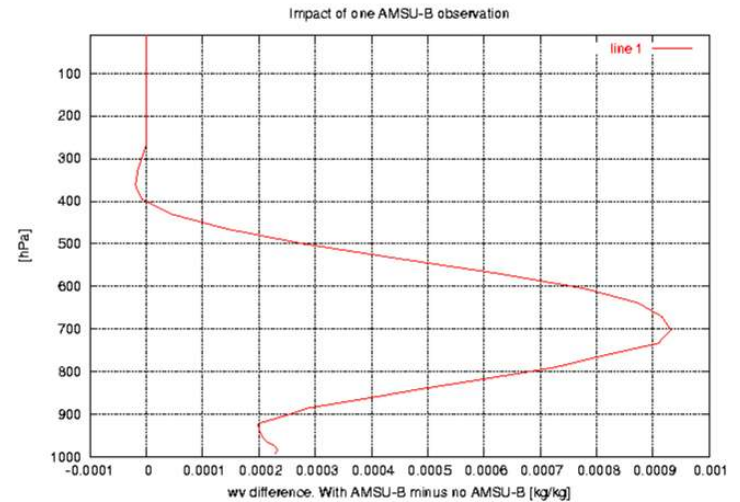
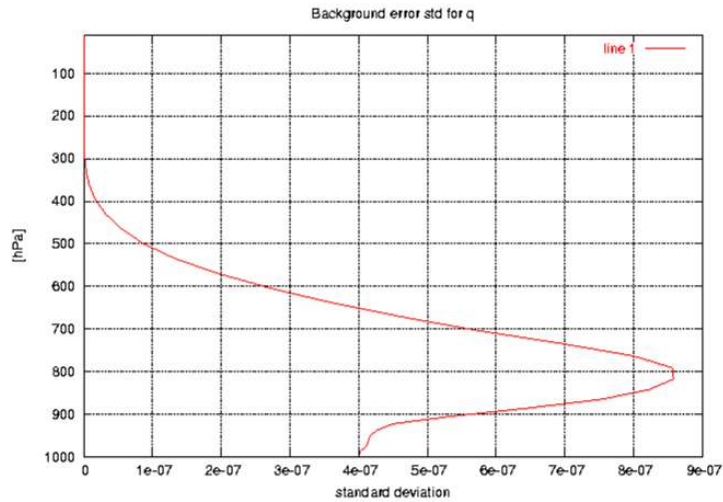


0-hr Str.Prec

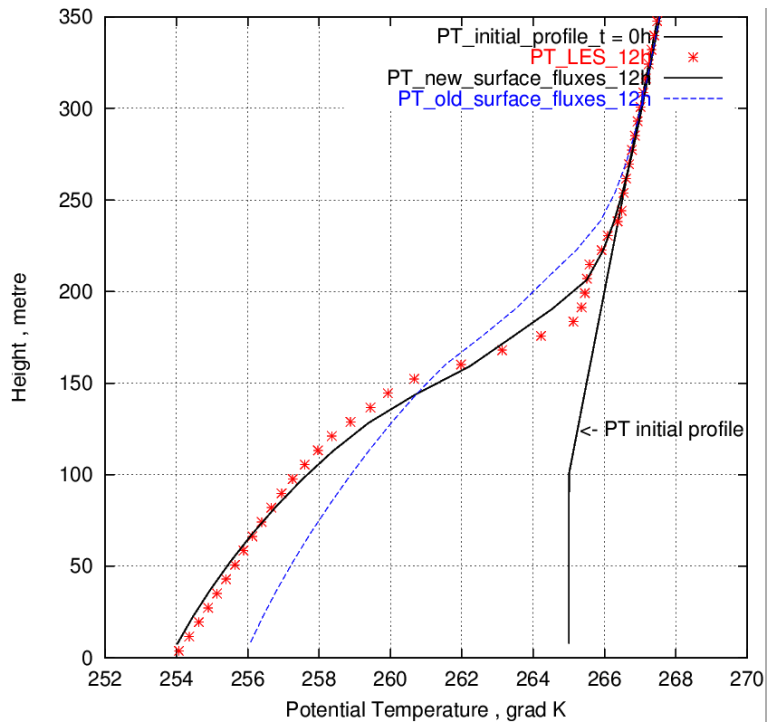


WP 2.4 cont. Validation of AMSU-B

Technical validation with HIRLAM 3D-Var

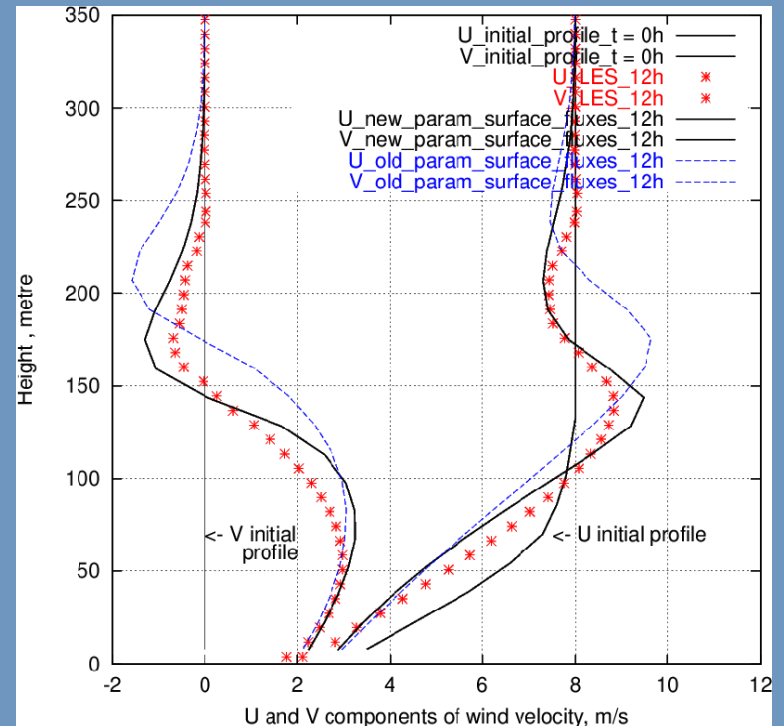


WP 2.4 cont. Improved flux



NWP model now includes internal waves from gradients in potential temperature.

Validation using data from the Beaufort Sea Arctic Stratus Experiment:

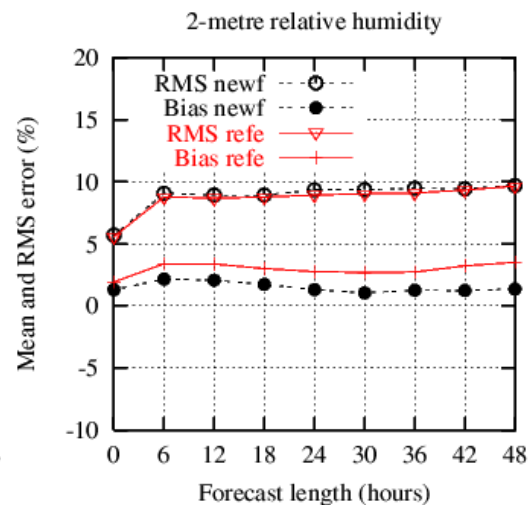
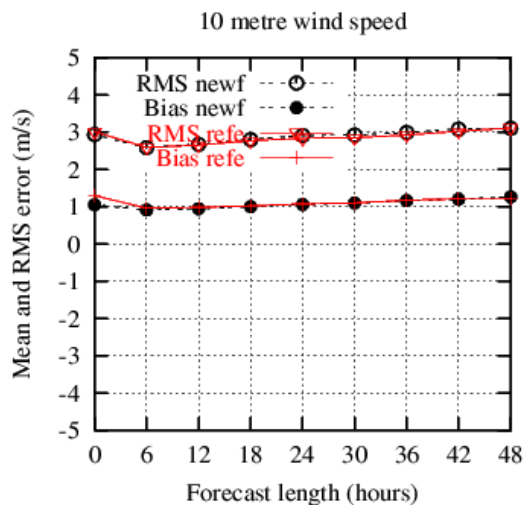
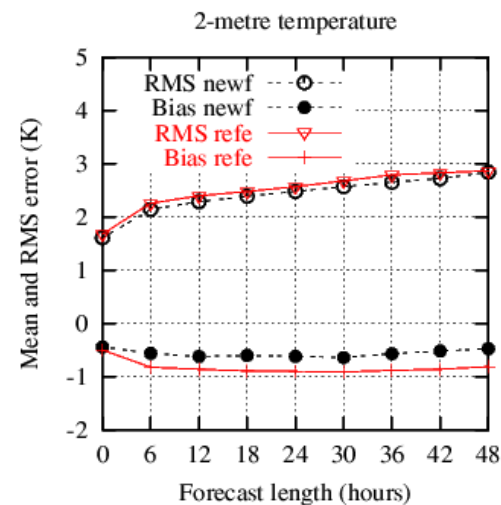
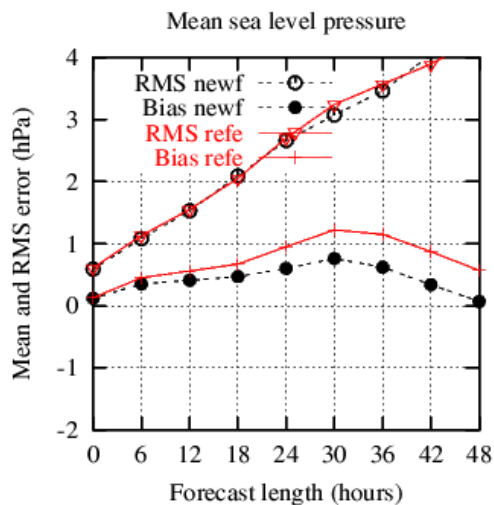


WP 2.4 cont. Improved flux

Results from runs with
HIRLAM 3D-Var during
January 2005.

Positive impact on:

- Mean sea level pressure
- 2-m temperature
- 2-m relative humidity



Remaining items

- Impact of OSI-SAF ice and new flux
- T_s and ε in HIRLAM 3D-Var
- Impact of AMSU-B radiances

