Monitoring & assimilation of IASI data in Météo-France NWP system

Vincent GUIDARD
Nadia FOURRIÉ & Thomas PANGAUD

Météo-France/CNRM – CNRS/GAME
Overview

- 1. Data Processing
- 2. Pre-operational Monitoring
- 3. First Assimilation Experiment
- Conclusions
1. Data Processing (1/2)

- Level 1C radiances are received via EumetCast in Toulouse (whole BUFR including 8461 channels)

- Only a subset of 314 channels is retained in the Operational Observational DataBase
  - 300 channels according to Collard (2007)
  - 14 additional channels

- A pre-thinning is performed:
  - 1 FOV AMSU-A / 2
  - 1 scanline / 2

- Only one detector / 4 is used (detector #1)
1. Data Processing (2/2)

- Radiances are bias corrected: Variational Bias Correction (VarBC) from ECMWF predictors are: powers of scan angle, thicknesses, …

- Cloud detection is based on a channel ranking method from ECMWF

- First-guess check
2. Pre-operational monitoring

- The whole subset of 314 IASI channels is monitored.
- All radiance data are bias corrected using VarBC (AMSU-A, AMSU-B/MHS, HIRS, SSMI, AIRS).
- Assimilation of ASCAT data, GPS Radio-Occultation data.
- Higher resolution than the current operational system.

- Expected to switch to operations at the beginning of 2008.
3. First assimilation experiment

- Assimilation of 41 channels peaking between 200 hPa and 600 hPa in CO$_2$ temperature LW band
- Only over Sea
- Prescribed sigma$_o$: 1 K
- Geographical thinning: average distance between 2 obs. is 250 km
3.1 Channel #0219 – 699.50 cm$^{-1}$

Weight function

![Graph showing weight function with hPa on the y-axis and Weight function on the x-axis.]

![Histogram showing number of observations with obs BC minus guess [K] on the x-axis and number of observations on the y-axis. The graph compares all (18054) and clear (11140) conditions.]
3.1 Channel #0219 – 699.50 cm$^{-1}$

Observation values all data

[Map showing distribution of observation values with various color codes indicating different ranges of values.]
3.1 Channel #0219 – 699.50 cm⁻¹

Bias corrected obs. minus first-guess clear data
3.1 Channel #0219 – 699.50 cm$^{-1}$

Bias corrected obs. minus analysis used data
3.2 Channel #0389 – 742.00 cm$^{-1}$

Weighting function

number of observations

hPa

obs BC minus guess [K]

METEO FRANCE
Tojours un temps d’avance
3.2 Channel #0389 – 742.00 cm⁻¹

Observation values all data
3.2 Channel #0389 – 742.00 cm⁻¹

Bias corrected obs. minus first-guess clear data
3.2 Channel #0389 – 742.00 cm$^{-1}$

Bias corrected obs. minus analysis used data
3.3 First Objective Evaluation

Fit of first-guesses to radiosonde winds
August 2007: 08 @ 06 UTC → 16 @ 00 UTC

Very slight impact
3.3 First Objective Evaluation

Consistency with ECMWF analyses for geopotential height
August 2007: average from 10 @ 00 UTC to 16 @ 00 UTC

RMS (ref. ana. w/r ECMWF ana.) – RMS (exp. ana. w/r ECMWF ana.)
850 hPa

BETTER
WORSE
Conclusions

- Pre-operational monitoring of 314 IASI channels → Operational monitoring at the beginning of 2008

- First experiments to assimilate 41 channels are going on → Encouraging first results

- Extension to channels peaking between 100 hPa and the low troposphere

- Towards an operational assimilation of IASI radiances (second quarter 2008 ?)

- Work on improving assimilation of AIRS & IASI over Antarctica → Concordiasi (see Florence Rabier’s poster !)