

Bias correction issues in limited area models: a strategy for ALADIN

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- R. SZOTÁK, L. KULLMANN, S. KERTÉSZ and E. GÉRARD

- Use of satellite radiances in the ALADIN community
- Use of Harris and Kelly's method in LAM
- Impact of bias correction files in the LAM analysis and short-range forecasts
- Conclusions

Investigation of satellite radiances in the ALADIN model:

- Météo France
- Moroccan Meteorological Service
- Hungarian Meteorological Service

Investigation of satellite radiances in the ALADIN model:

- Météo France
 - Presented by E. GÉRARD

- Moroccan Meteorological Service (Zahra SAHLAOUI)
 - Export of the observations and bias correction file from Toulouse

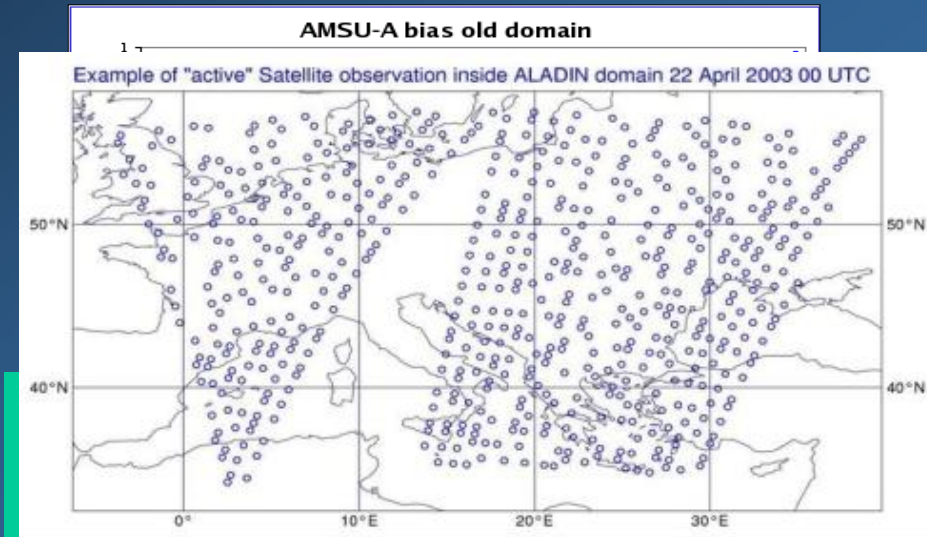
- Hungarian Meteorological Service
 - Use of locally received and pre-processed radiances and those re-transmitted through Eumetcast

 - Local reception through HRPT antenna and pre-processing using the AAPP package

The problem of the use of Harris and Kelly's method in LAM

computed scan angle bias

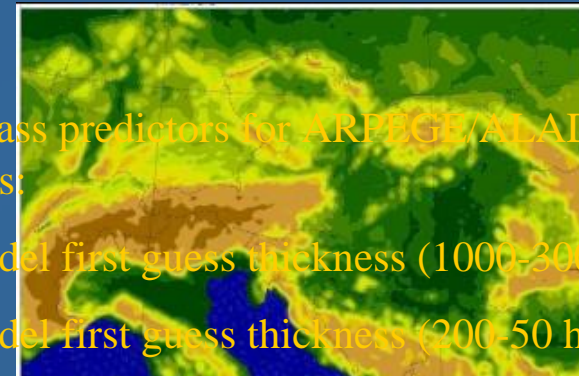
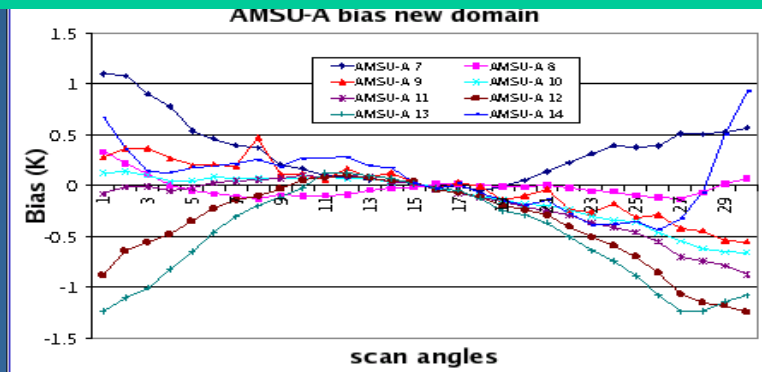
LAM domain



Air-mass predictors for ARPEGE/ALADIN models:

- model first guess thickness (1000-300 hPa)
- model first guess thickness (200-50 hPa)

as correction file in LAM?
computed for the global model?



The ALADIN/HU model and its assimilation system

Model:

- Hydrostatic (AL15/CY24T1)
- Horizontal resolution: 12 km
- 37 vertical levels

3D-Var:

- Background error covariance matrix “B”: computed using “standard NMC” method
- RTTOV as forward model
- 6 hour assimilation cycling: 00, 06, 12 and 18 UTC
- coupling every 6 hours: ARPEGE long cut-off analysis
- Satellite data (AMSU-A) from NOAA-15&16 [ch. 5-12]

OI:

- Surface fields analysis

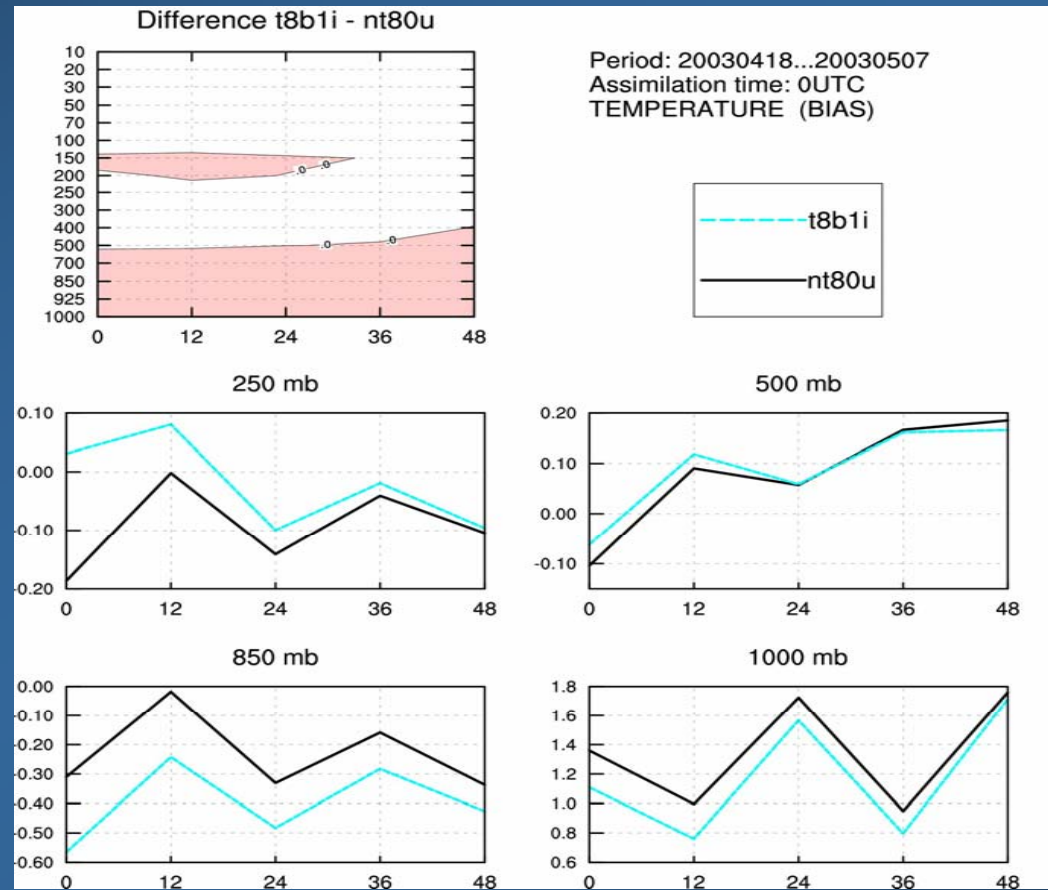
Forecast: - 48h from 00 UTC

Description of the experiments (performed for a two-week period)

- NT80U: ALADIN/HU bias correction file (control run in this study)
- T8B1I: ARPEGE bias correction file
- T8B2I: ARPEGE scan angle bias and NO air-mass bias
- T8B3I: ARPEGE scan angle bias and ALADIN air-mass bias
- NOT8U: The same as NT80U for the second period
- O8B1I: The same as T8B1I for the second period
- O8B3I: The same as T8B3I for the second period

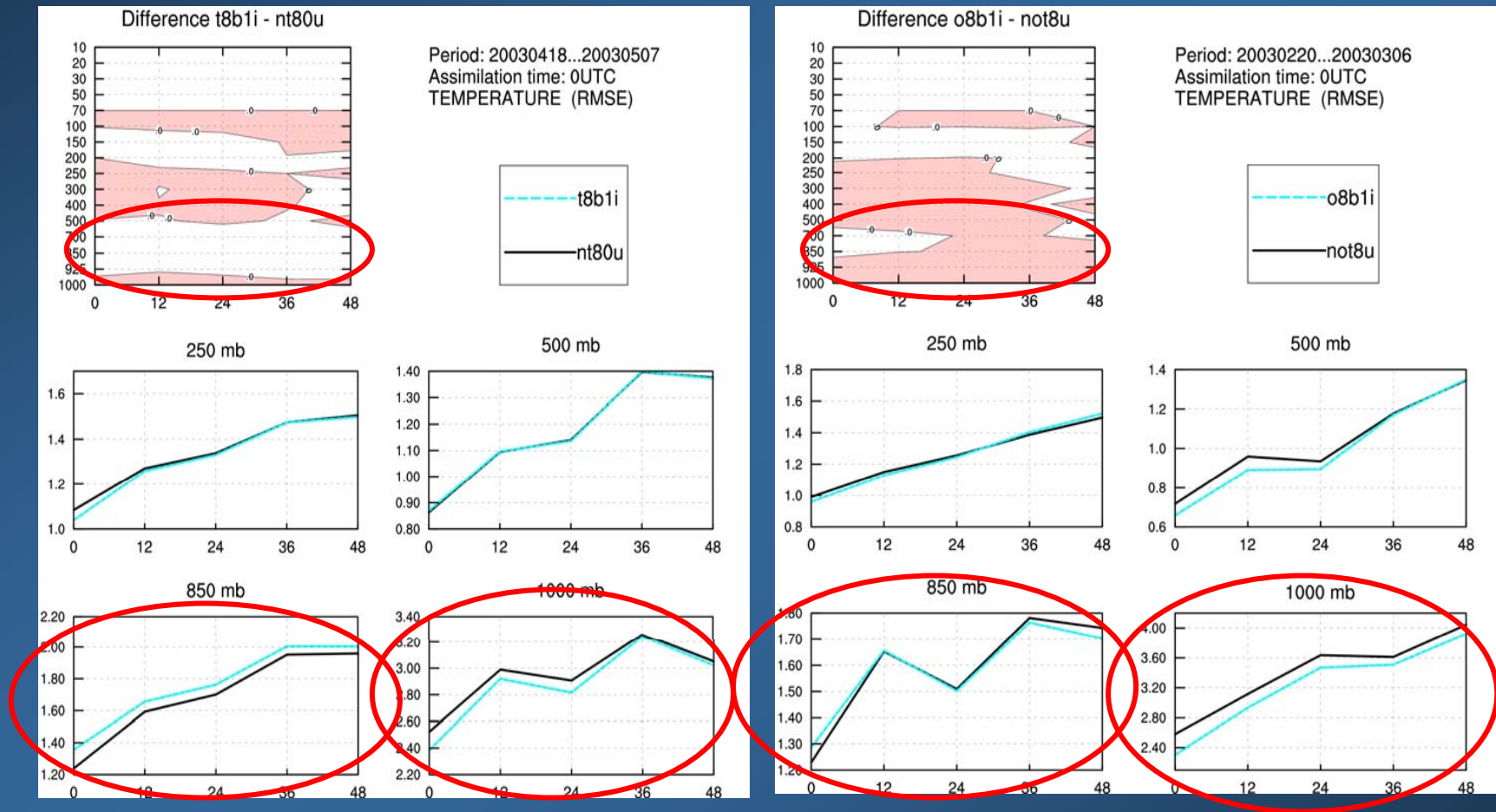
Results

BIAS (ARPEGE bc vs ALADIN bc)

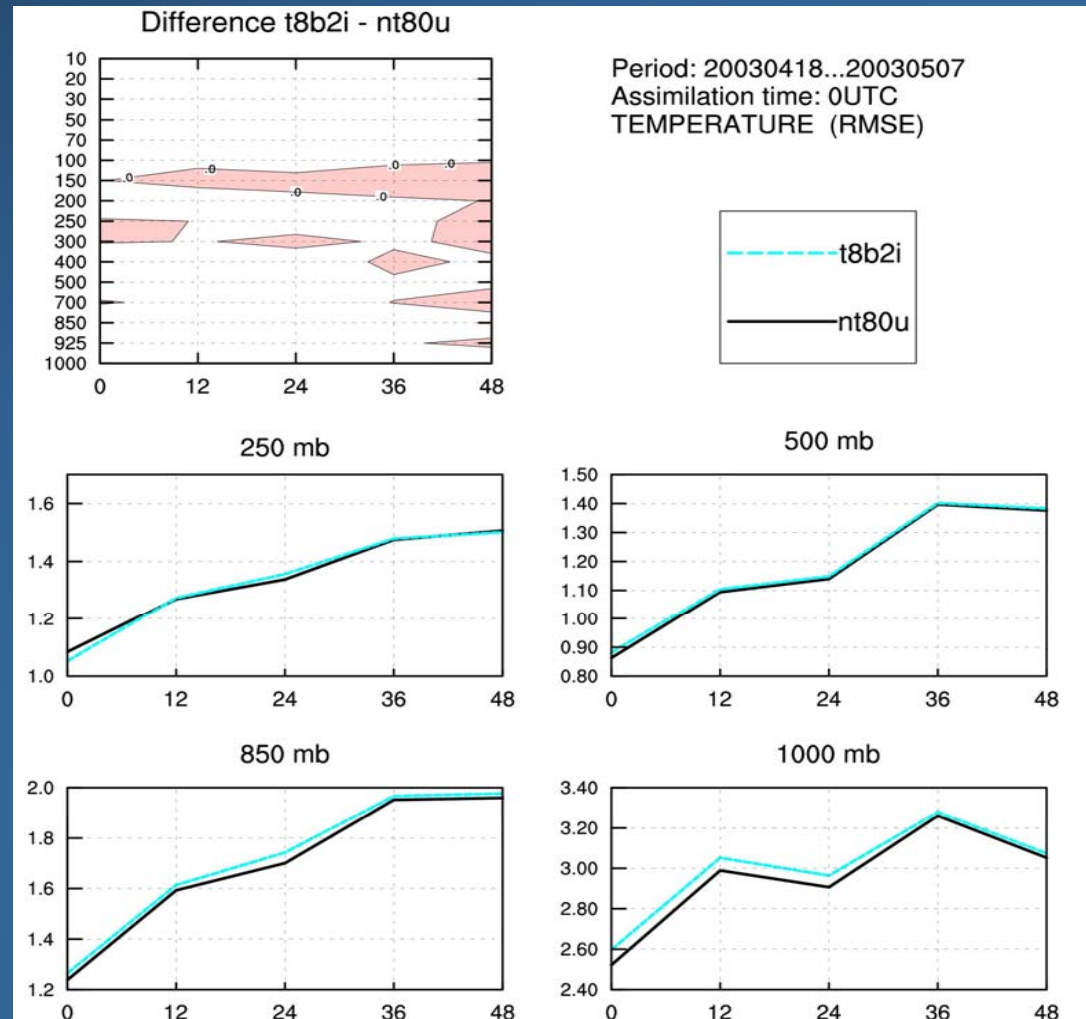


Impact of the bias correction file in LAM analysis and short-range forecasts

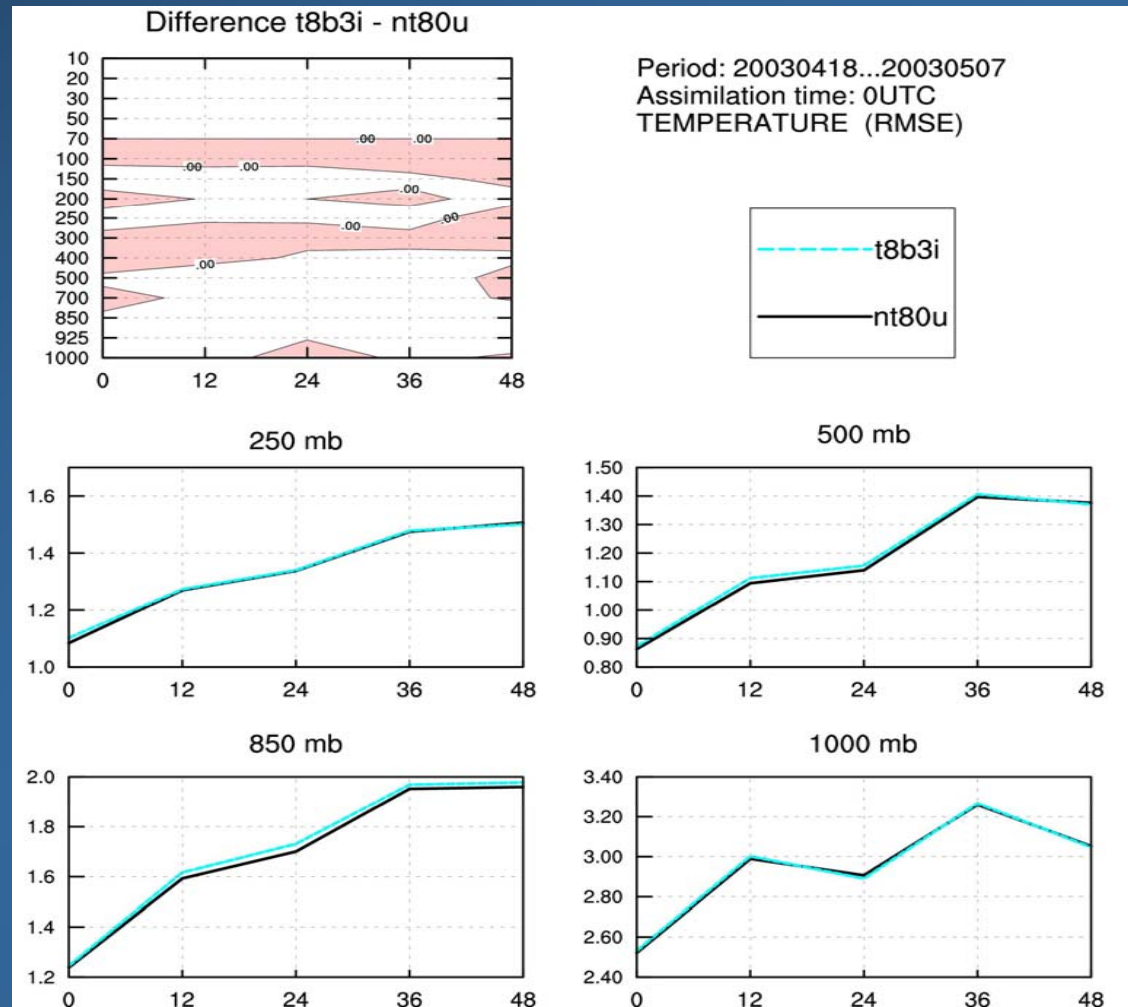
RMSE (ARPEGE bc vs ALADIN bc)



RMSE (ARPEGE scan angle NO air-mass bias)

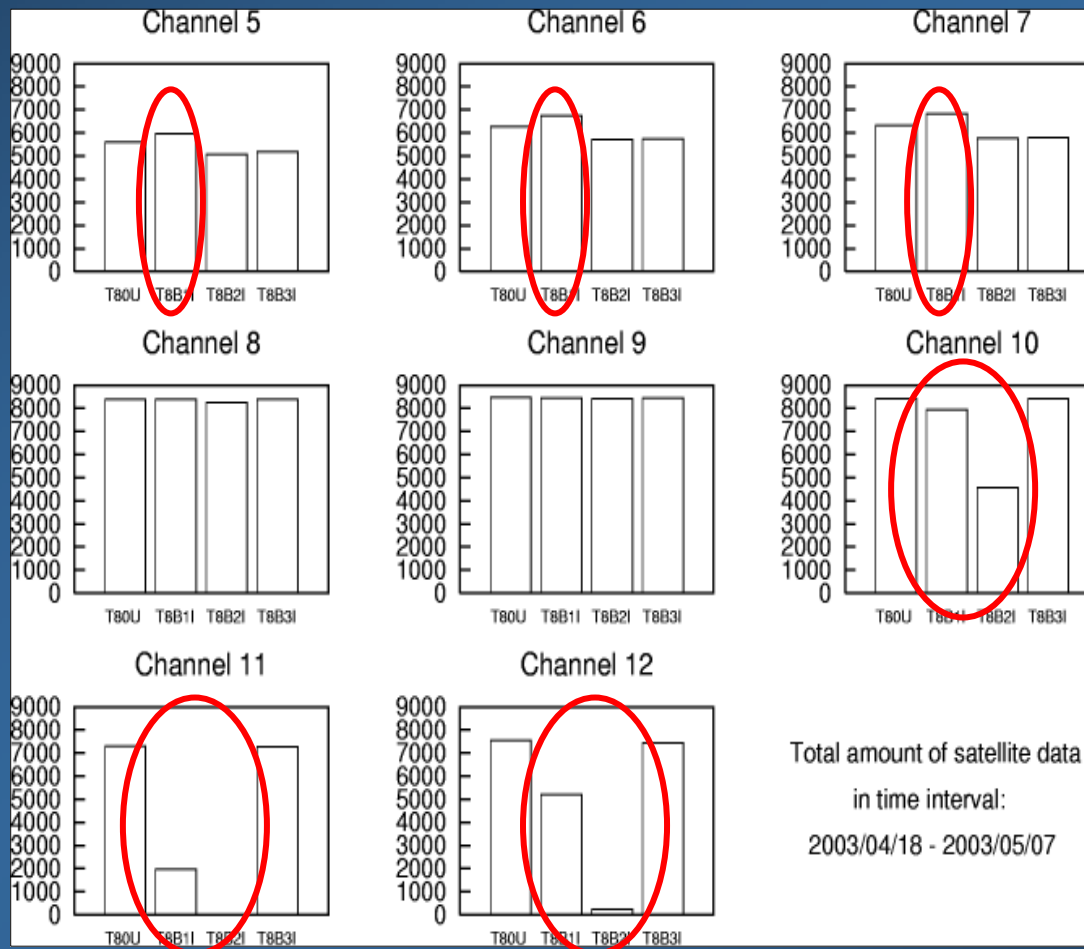


RMSE (ARPEGE scan angle ALADIN air-mass bias)

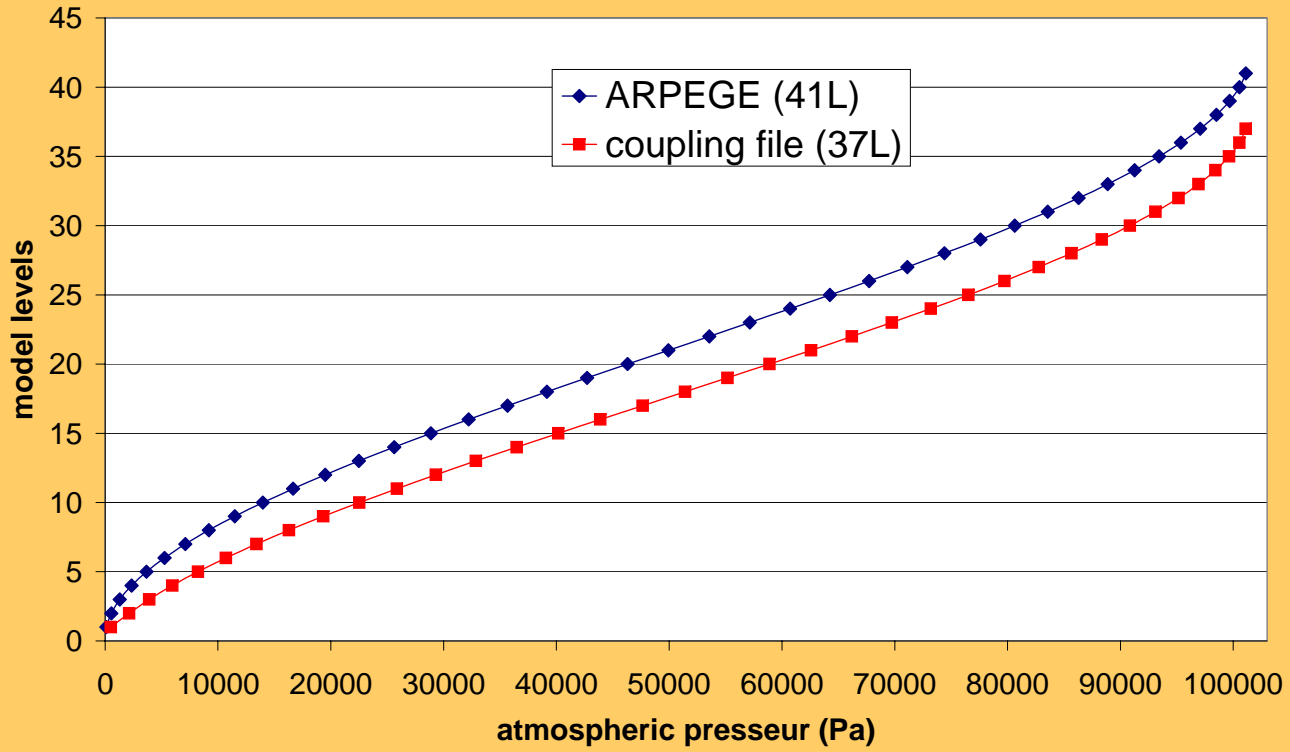


Impact of the bias correction file in LAM analysis and short-range forecasts - discussion

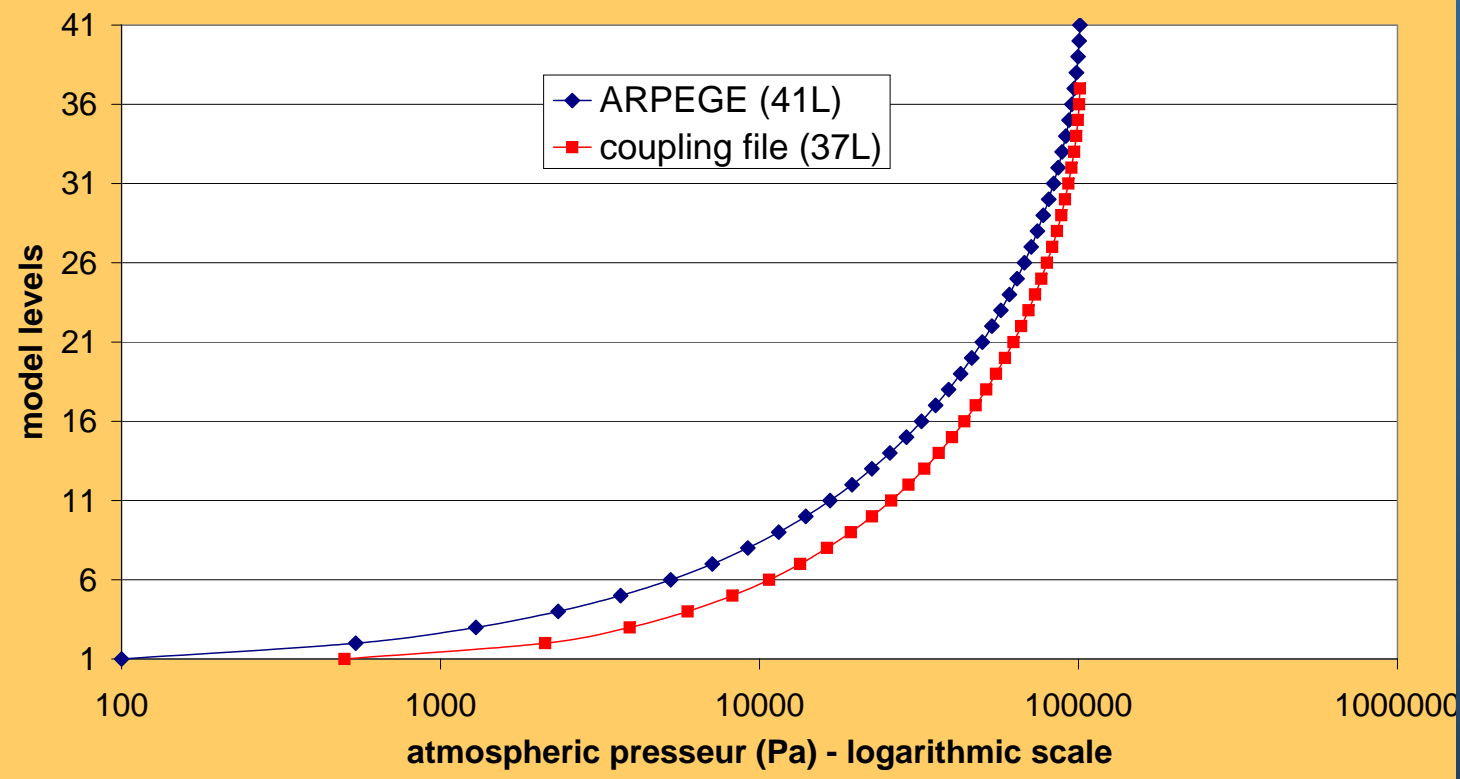
Total number of active sat. observations: 18.04.2003 - 07.05.2003



ARPEGE vs coupling



ARPEGE vs coupling



Atmospheric Pressure (hPa)	ARPEGE model levels	Coupling and ALADIN/HU model levels
1-200	12	9
200-400	6	6
400-800	12	11
800-1000	11	11

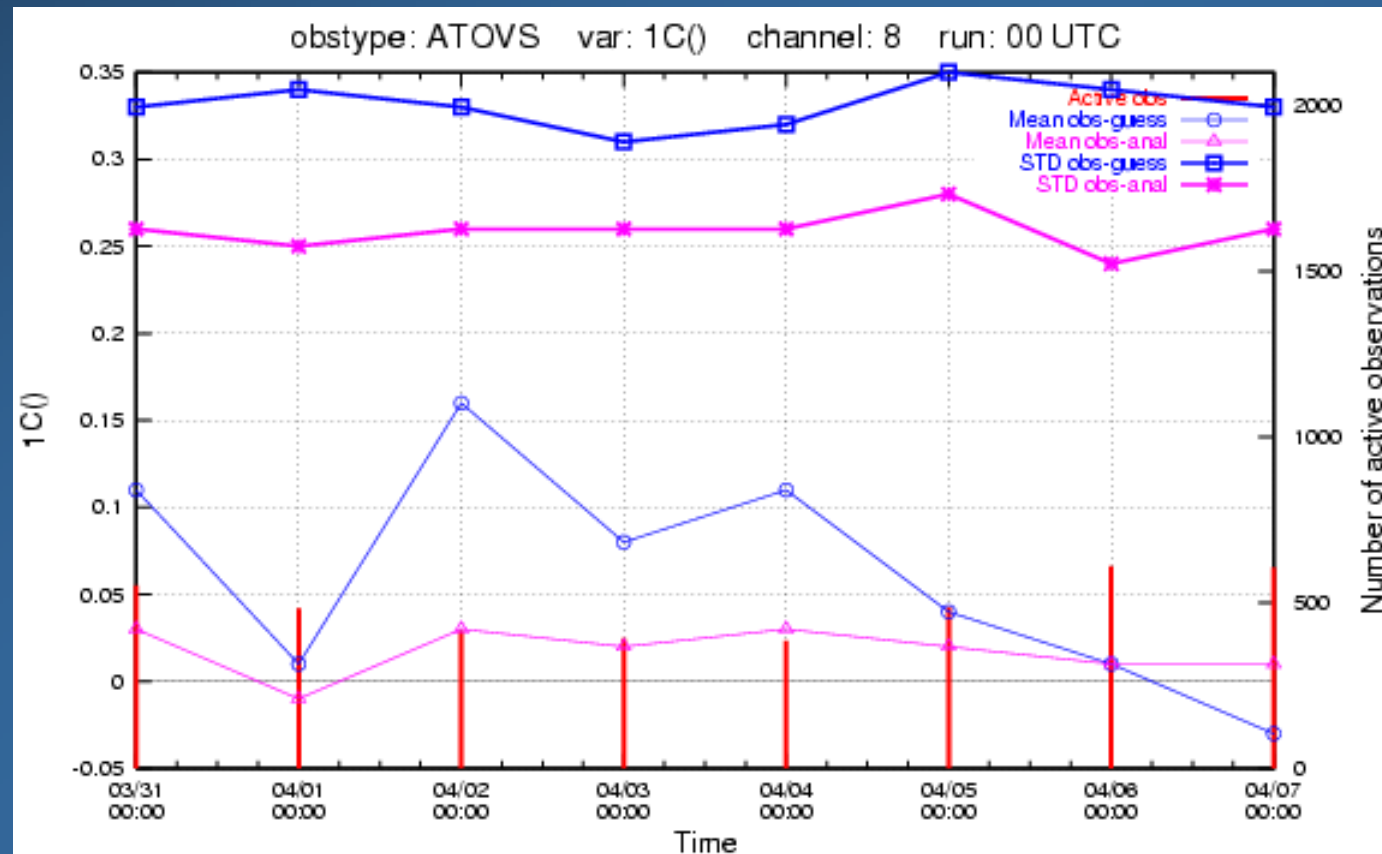
Conclusions (1)

- Our experiments show the importance of the bias correction coefficients in the pre-processing of the AMSU-A data in the ALADIN/HU LAM
- In lower troposphere, the use of the global bias correction file showed different impacts
 - LAM bias correction coefficients provide a “stable” impact on analysis as well as on the short-range forecasts
- ARPEGE and ALADIN models use basically the same parameterisation of physical processes. Nevertheless, we have to compute the bias correction file for ALADIN to have better processing of the AMSU-A data in the analysis system

Conclusions (2)

- The air-mass bias correction must be included in the processing of AMSU-A data in the LAM
- Channels 10-12 in LAM are very sensitive to the bias coefficients computed for the global model
- Applying the ARPEGE bias correction coefficients we used more observation for channels 5-7 and got positive impact near the surface
 - Not to do local surface analysis
 - Use of the ARPEGE analysed surface fields instead of the LAM ones

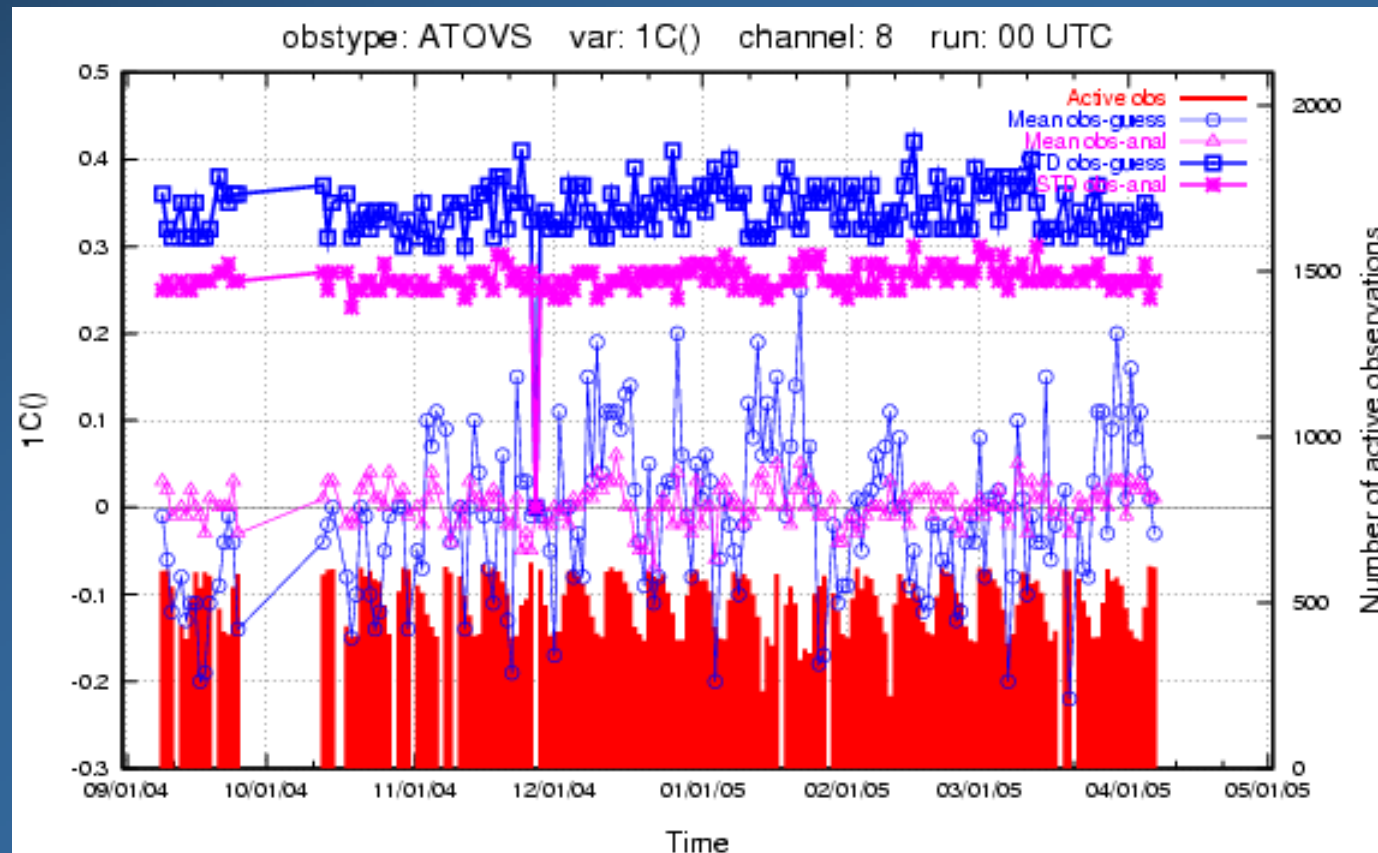
How often do we need to update the bias correction file?
Observation monitoring system – *monitoring of AMSU-A ch. 8*
one week



How often do we need to update the bias correction file?

Observation monitoring system – *monitoring of AMSU-A ch. 8*

longer period



- The validity of the bias correction coefficients varies from 2-4 months
- The bias correction coefficients are computed within a period of about one month

Thank you for your kind attention!