

Impact of ATOVS AMSU-A radiance data in the DMI-HIRLAM 3D-Var analysis and forecasting system

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Since May 2001 an ongoing observing system experiment (OSE) using Advanced TIROS (Television Infra-Red Observation Satellite) Operational Vertical Sounder (ATOVS) brightness temperatures from the polar orbiting satellite NOAA16 (National Oceanic and Atmospheric Administration) in near real-time has been run at DMI (Danish Meteorological Institute). All AMSU-A (Advanced Microwave Sounding Unit-A) level 1c data (channels 1 to 10, only) available from locally received data from the DMI Smidsbjerg antenna as well as from the DMI Sdr. Strømfjord/Kangerlussuaq (Greenland) antenna have been used.

Initially an observation error covariance matrix was calculated using data from a two month period with passive inclusion of NOAA16 data received via the local DMI Smidsbjerg antenna. Subsequently, new observation error covariance matrices have been calculated using data from later one month periods including data from the DMI Sdr. Strømfjord antenna.

The setup used for the first impact studies from June through September 2001 as well as some results can be found in Amstrup, 2001. Further details concerning the forecast model can be found in Sass *et al.*, 2002. The basic model is the DMI-HIRLAM-G (DMI High Resolution Limited Area Model - G) for which the horizontal resolution is 0.45° , the number of vertical levels 31, the number of grid points is 190×202 , the time step is 240s, and the lateral boundary values are from ECMWF forecasts.

Based on observation (obs-) and field verification the impact is basically neutral in this period. There is a marginal positive impact on some parameters based on obs-verification.

Subsequently, some changes were made, including modifications in the observation covariance matrix used. Results for December 2001 and January 2002 can be found in Schyberg *et al.*, 2002. The results for December were neutral, but for January a positive impact was found. An illustration of this is shown in terms of observation verification results in Figure 1. In this figure WIA denotes the run with ATOVS AMSU-A data included and REF denotes the reference run.

The plans at DMI involve usage of ATOVS AMSU-A data in the operational assimilation system in the autumn of 2002 unless unforeseen problems are revealed during the continuous pre-operational runs.

References

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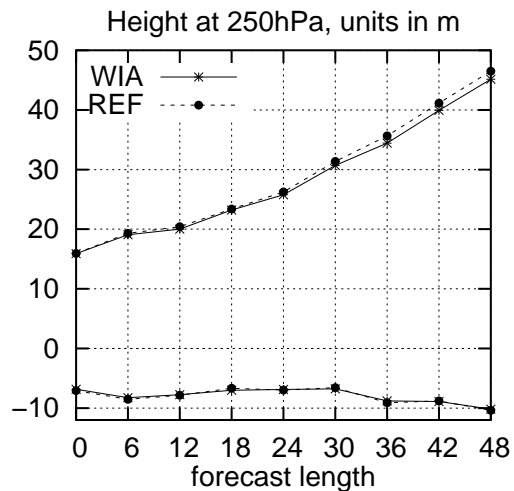
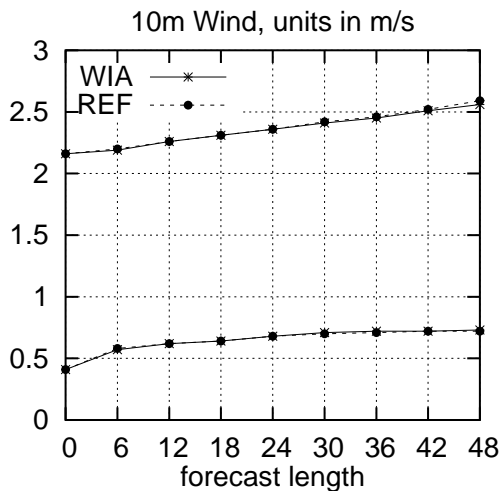
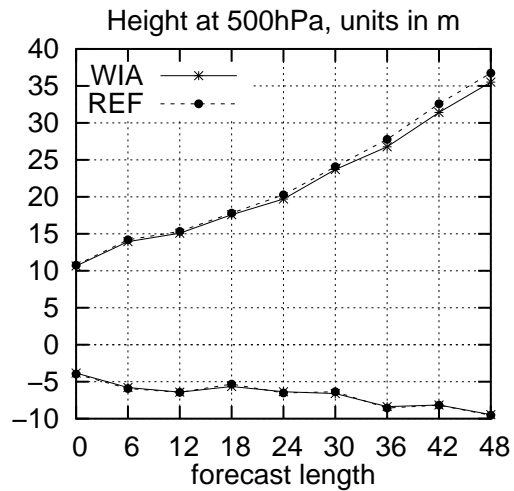
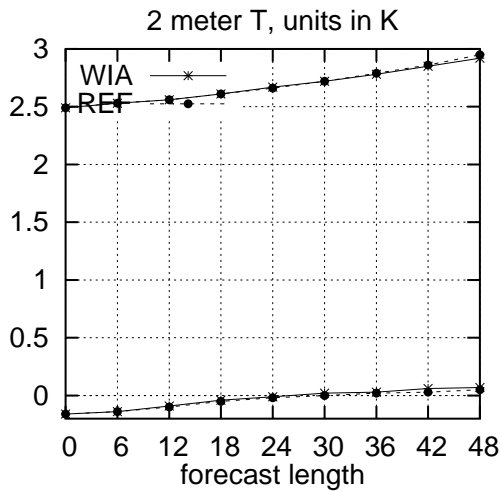
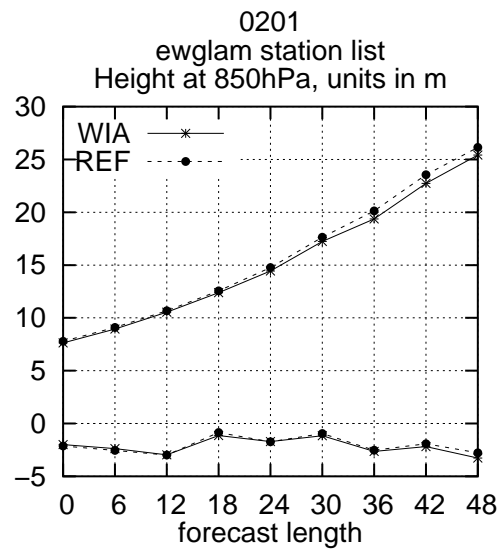
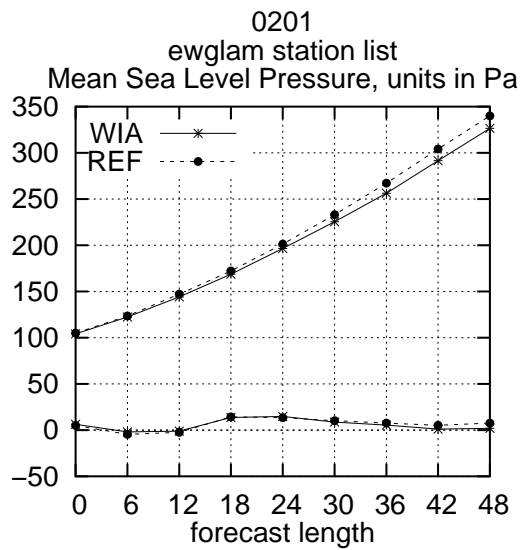


Figure 1: Observation verification results of surface parameters (left) and geopotential heights (right) for January 2002 for WIA and REF of surface and upper level parameters as specified in the plot. EWGLAM station list. The upper curves are root mean square errors and the lower curves are bias.