Status of ATOVS Radiance Data Utilization in the JMA Global Data Assimilation System

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JMA assimilates ATOVS (AMSU-A, AMSU-B and MHS) radiance data in the operational JMA 4D-Var global data assimilation system. The satellites used in the system are shown in Table 1.

Since 9 December 2009, AMSU-A and MHS data from NOAA-19, which was launched on 6 February 2009, have been included in the system. The total number of assimilated ATOVS data has seen a modest increase of 5%, because the orbit of NOAA-19 is overlaps with that of NOAA-18. The improvement rate (%) in the RMSE of forecasting with assimilated NOAA-19 data is shown in Figure 1, which indicates a slightly positive impact in the Southern Hemisphere on the latter part of the forecast time.

NOAA-19 data from RARS[1] (A-P RARS[2] and EARS[3]) have also become available in addition to data from NOAA/NESDIS (Figure 2). These RARS data fill the gap in the NOAA/NESDIS data.

JMA set up a website for quality monitoring of the satellite data (radiance and atmospheric motion vectors) assimilated in the system. It shows sequences of statistics such as data counts, means and standard deviations of observation minus background (O-B) and observation minus analysis (O-A). The site can be accessed at http://qc.kishou.go.jp/Sat_monit/seqgraph_radiance.html.

Table 1 ATOVS sensors used in the JMA global data assimilation system (as of Jan 2010)

Satellite	AMSU-A	AMSU-B or MHS
NOAA-15	Assimilated	Assimilated
NOAA-16	Assimilated	[4]Not assimilated (30 Apr 2009)
Aqua	Assimilated	
NOAA-17		Assimilated
NOAA-18	Assimilated	Assimilated
Metop-A	Assimilated	Assimilated
NOAA-19	Assimilated (since 9 Dec 2009)	Assimilated (since 9 Dec 2009)

[1] Regional ATOVS Retransmission Service
[2] Asia-Pacific RARS
[3] EUMETSAT Advanced Retransmission Service
[4] JMA stopped using NOAA-16/AMSU-B on 30 April 2009 due to an increase in sensor noise.

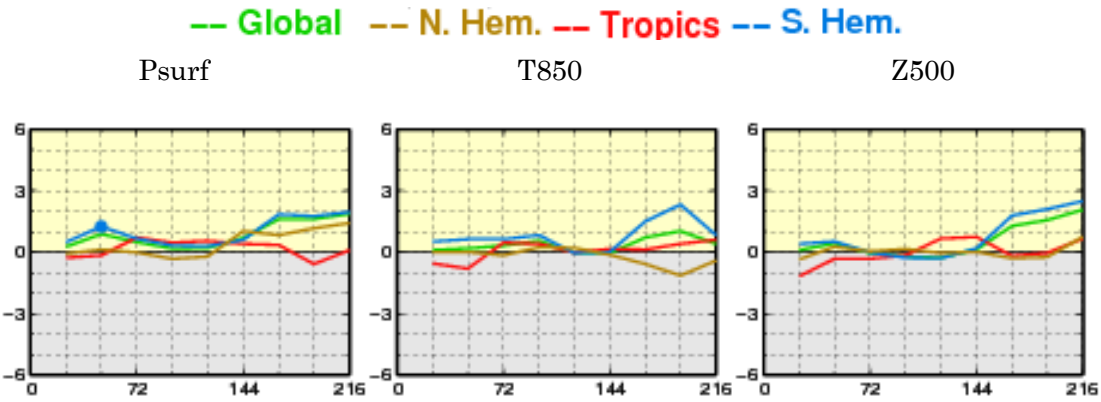

Figure 1: Rate of improvement (%) in the RMSE of forecasting with NOAA-19 data against that without for surface pressure (left), T850 (middle) and Z500 (right) in August 2009. The horizontal axis represents forecast hours. Lines in the upper (yellow) area indicate improved scores. Dots on the score lines represent statistical significance.

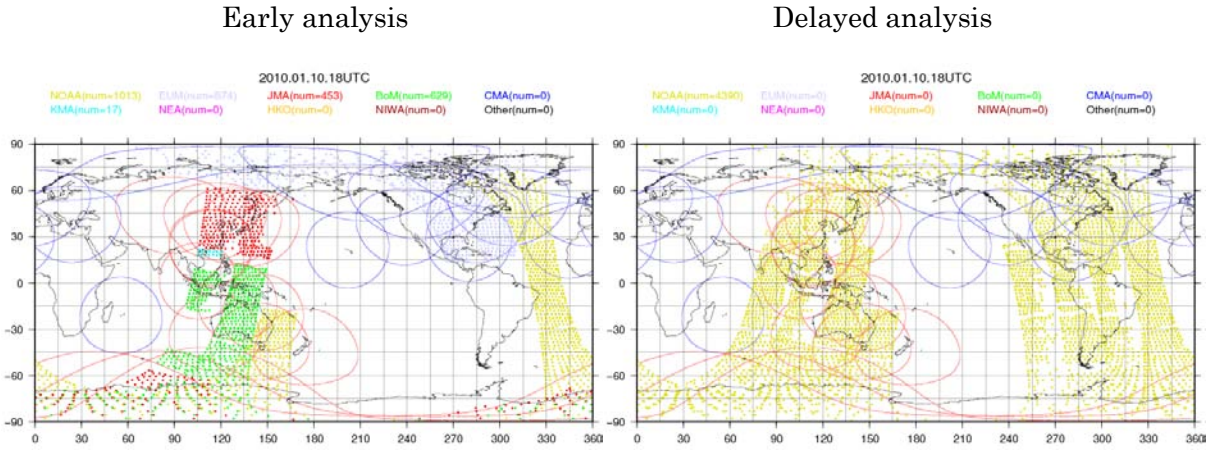

Figure 2: Snapshot of NOAA-19/AMSU-A data cover in the six-hour data assimilation window (at 18 UTC, 4 January 2009)

Left: early analysis with a 2.5-h data cutoff time from the analysis time. Right: delayed analysis (for generation of the first guess in the assimilation system) with a 6-h data cutoff time from the analysis time. The red circles are direct readout areas of A-P RARS stations, and the blue circles are those of EARS. The yellow plot points show data from NOAA/NESDIS, and points in other colors are from A-P RARS (red: JMA; sky blue: KMA; green: BoM) and EARS (light purple). The RARS data fill the gap in the NOAA/NESDIS data in the early analysis.