



Report on the current status of the satellite data assimilation in Korea Meteorological Administration

This paper reports the current status of the satellite data assimilation in the numerical weather prediction at Korea Meteorological Administration (KMA).

Current status of the satellite data assimilation in KMA

1. The assimilation of satellite data in UM/VAR system

KMA has been operating UK Met Office's Unified Model(UM) and data assimilation(4DVAR) system since May 2010. KMA NWP centre has updated its operational model to higher resolution model (N512L70. vn7.7) , which has similar configuration to that used in UK Met Office, in May 2011 following the UK Met Office implemented it in the operation. And COMS started to release its product in April 2011. As planned, KMA NWP centre prepared the module to use COMS atmospheric motion vector (AMV) and tested it successfully.

1.1 Improvement of the use of satellite data

There are many improvements in the update of May 2011. KMA implemented direct radiance data assimilation of IASI and AIRS over cloudy area. More GPS-RO observation data from GRAS/MetOp, C/NOFS and SAC-C started to be used in KMA DA system in addition to COSMIC GPSRO. Currently, COMS AMV, WindSat sea wind, ground GPS data and soil moisture of ASCAT are being studied for application in DA and surface analysis.

In addition to increasing the data for assimilation, KMA is also making effort to use observation data in a proper way. As a result, KMA has excluded ERS-2 sea wind data in DA process in March 2011 when we aware of its poor quality through the monitoring of observation. KMA is updating the observation quality monitoring system based on the detailed technologies which are applied to the pre-process for quality flag in DA.

1.2 AMV experiments

KMA developed AMV producing algorithm for COMS with hourly UM background which was introduced in UM cycle. KMA NWP centre made the module for hourly COMS AMV in DA system. And KMA confirmed that it works well through a sampled data for three weeks during IOT (in orbit test) period. COMS shows quite good stability in operation through INR (image navigation and registration).

The statistical analysis of COMS AMV was performed every month by NMSC (National Meteorological Satellite Center) since April 2011. Based on these analyses, KMA updated COMS AMV algorithm and NWP centre performed the impact test of COMS AMV for several times (2010.12.23~2011.1.7, 2011.4, 2011.6) with more optimized COMS AMV. It was found that COMS AMV gave the comparable impact for NWP performance with MTSAT AMV (Fig1, Fig2)

1.3 Plans

Regarding to COMS data, QI(Quality Index) and other error characteristics of AMV will be surveyed continuously and the usage of hourly AMV in 4D-Var system will be optimized further. And the clear sky radiance (CSR) data during several months in 2011 will be re-analyzed and its impact will be tested. KMA runs the regional data assimilation over the East Asia. KMA's AMV and CSR will be applied to the regional data assimilation, too.

Recently, UK Met Office updated the usage of surface channels of IASI in favor of adding emissivity retrieval. The impact seems to be slightly positive in Northern Hemisphere at present. KMA will perform the impact test of newly added surface channels of IASI and exploit the usage of emissivity which is retrieved from IASI.

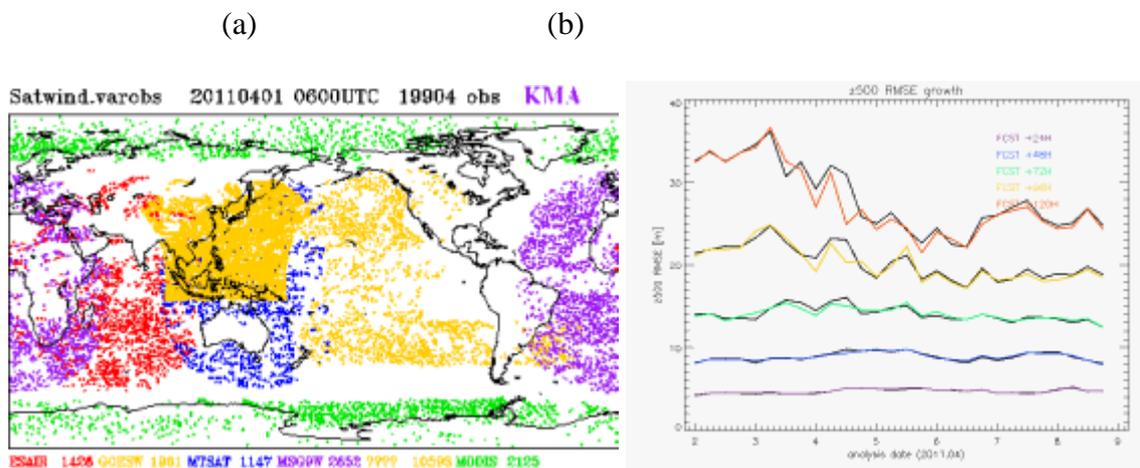


Figure 1. (a) The combined usage of COMS (yellow in Western Pacific) and MTSAT (blue) AMVs over East Asia. (b) The preliminary result of impact study for 1 hourly and 6 hourly COMS AMV combined with MTSAT AMV for two weeks of April 2011. Each colored line represents RMSE of 500 GPH from the experiment using hourly COMS AMV and MTSAT AMV according to

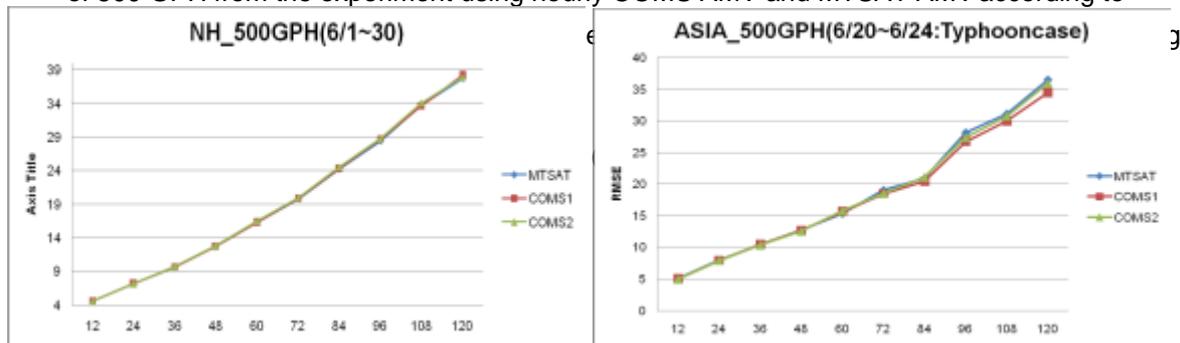


Figure 2. (a) Impact of COMS AMV over Northern Hemisphere is almost similar to that of MTSAT AMV in June 2011. (b) COMS AMV gives the positive impacts during the period when typhoon MEARI passes through East Asia region. COMS1 (red line) indicates the experiment which uses 2 hourly COMS AMV over the East Asian

region and MTSAT AMV over the other regions and COMS2 (green line) is the experiment which uses 1 hourly COMS AMV over East Asian region and MTSAT AMV over the other regions, while MTSAT (blue line) indicates the experiment which uses MTSAT only over whole region where MTSAT covers.