Introduction

- Satellite-derived surface variables such as Sea Surface Temperature, Snow Cover, Sea Ice, and Soil Moisture are very important for better understanding of interaction between the sea- and land-surface and the atmosphere (Reynolds et al., 2007).
- But there has been no snow observation information incorporated into the NWP model (Samantha et al., 2010). Recently, Satellite-derived SST and SSI are frequently used in NWP model to improve surface conditions.
- We present results of the quality improvement of COMS SST and SSI which is used in KMA NWP model. Also, we will present the impact of these products on KMA NWP model simulation.

Improvement of COMS SST and SSI

Sea Surface Temperature(SST)

To improve quality of COMS SST in the East Asia region, KMA/NMSC retrieved new regression coefficient for Multi-Channel Sea Surface Temperature (MC SST) using quality controlled buoy data and robust cloud screening.

<table>
<thead>
<tr>
<th>Method</th>
<th>MC SST</th>
<th>MC SST - AVHRR + a2(IR1 - IR2) + a3<a href="SeaIR-1">IR1 - IR2</a> + a4 [New Regression Coefficients]</th>
<th>PD &amp; EMX vs. BUOY</th>
<th>31/31, 3.2.1 - 2012. 3, 31.</th>
</tr>
</thead>
</table>

Cloud Screening

- Cloud mask (CLD)
- Land/Sea mask
- New namelists

Comparison of SST

- A) OSTIA – Before
- B) OSTIA – After

Improved Merging technique of multi-sensor SST

- Multi-sensor and Satellite
- The weight of each satellite SST using bias and observation errors (ADJ)

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Bias</th>
<th>Percent</th>
<th>Improved</th>
<th>Original</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMS</td>
<td>0.1</td>
<td>5</td>
<td>0.172</td>
<td>0.173</td>
</tr>
<tr>
<td>NOAA-18 AVHRR</td>
<td>1.8</td>
<td>1</td>
<td>0.180</td>
<td>0.181</td>
</tr>
<tr>
<td>NOAA-19 AVHRR</td>
<td>3.1</td>
<td>1</td>
<td>0.358</td>
<td>0.357</td>
</tr>
<tr>
<td>GCM3 MIROB</td>
<td>1.0</td>
<td>1</td>
<td>0.370</td>
<td>0.370</td>
</tr>
</tbody>
</table>

The optimal interpolation is applied to merge various SSTs after the bias correction of each SST was done.

Snow Cover and Sea Ice

Interactive Multisensor Snow and Ice Mapping System (IMS)’s snow cover has been used to modify background snow amount of the operational KMA NWP model. However, snow cover was frequently overestimated with IMS data in the East Asia. So, we improved COMS snow detection algorithm and try to adjust the model background snow amount by using COMS SSI.

Modification

- Upper level cloud contamination with CTH
- Modify Albedo in the forest area using NDVI
- Modify thresholds for Sea Ice
- Periods: 2013. 10. ~ 2014. 2.
- 2014. 10. ~ 2015. 2.

Application of COMS Snow Cover

Impacts of COMS snow cover in Global NWP model

- Verification: Observation, Analysis
- Right figure shows original IMS snow cover and adjusted IMS snow cover using COMS snow for two different days.
- The effects of adjustment in snow build-up period appears more larger than winter season. Unfortunately, IMS grbi data files do not exist in this period, the experiment is started from 12 November.
- The effects on the snow analysis appear slightly positive impacts in the snow build-up periods.
- Asia region affected by COMS snow data is improved for all verification results.
- Mean improvement rate(%) of RMSE according to the regions. Left panel is for observation verification and right panel is for analysis.

Summary and Further Work

- We not only improved the accuracy of COMS SST through robust quality control process of in-situ SST and cloud screening, but also developed a blending technique of multi-sensor SST from COMS and LE0 SST over the East Asia region.
- The accuracy of new COMS SST and multi-sensor SST was -0.32 °C, -0.025 °C for bias °C and 1.25 °C, 0.807 °C for RMSE respectively.
- We improved COMS snow detection algorithm and try to adjust the model background snow amount by using COMS SSI.
- The effects on the snow analysis appear slightly positive impacts in the snow build-up period. Asia region affected by COMS snow data is improved for all verification results.
- We will try to improve accuracy of satellite-derived surface parameters such as Sea Surface Temperature, Snow Cover, and Soil Moisture to use as input on NWP.