April 23, 2015

Caveat for Use of GPM Global Rainfall Map (GPM-GSMaP)

The GPM Global Rainfall Map (GPM-GSMaP) Level 3 product version 03 (Algorithm version 6) was released to the public since September 2, 2014. Product version 03E, minor update with reprocessing, has been released since April 23, 2015.

Followings are remarks and known bugs in current version of GPM-GSMaP product to be fixed in future versions.

Update from previous version

1. Correction of inadequate parameter settings for the ancillary database of climatological sea ice extent, which is applied to the retrievals of the AMSU-A/MHS (microwave sounder). By this update, missing areas in high latitudes in the AMSU-A/MHS (microwave sounder) will be largely reduced.

Continuous bugs from Ver. 03B

1. Precipitation over cold surface (below 273.2 K) or sea ice is not retrieved in all passive microwave radiometers.
2. Sometimes, surface snow was misidentified as precipitation signal in all passive microwave radiometers, especially in spring season.
3. Brightness temperatures used in rainfall retrievals of GCOM-W/AMSR2 and GPM-Core/GMI are bias-corrected using parameters provided by JAXA. These parameters may be modified in future when calibration of each Level 1B data is updated.
4. Scan errors are occasionally found in rainfall retrievals of SSMIS (microwave imager/sounder) on board the DMSP-F16, DMSP-F17 and DMSP-F18 satellites. This problem will be corrected in the next version.
5. MHS data used in the GSMaP product version 03 (algorithm version 6) is changed form Level 1B to Level 1C. Abnormal values (strong signals) are occasionally found in rainfall retrievals of AMSU-A/MHS (microwave sounder) on board the MetOp-A, MetOp-B, NOAA-N18 and NOAA-N19 satellites. AMSU-A/MHS rainfall retrievals may have other issues since algorithm is not adjusted sufficiently to MHS Level 1C product yet. Also, the Scattering Index (SI) in the AMSU-A/MHS algorithm is changed at altitude higher than 40 degree. However, we have not yet fully evaluated the effect. We would like to know evaluation and validation results of the GSMaP AMSU-A/MHS rainfall retrievals. We appreciate if you give us some feedback.
6. The orographic/non-orographic rainfall classification scheme has been implemented in the GSMaP algorithm for passive microwave radiometers (Yamamoto and Shige, 2014). The scheme is switched off for regions (e.g. the Sierra Madre Mountains in the United States and Mexico) where strong lightning activity occurs in the rainfall type database because deep convective systems for the regions are detected from the scheme involved in the orographic rain condition. The scheme improves rainfall estimation over the entire Asian region, particularly over the Asian region dominating shallow orographic rainfall. However, overestimation and

false-positive of orographic rainfall remain. This is because the orographic rainfall conditions have moderate thresholds for global application. We examine to resolve their problems.

7. Precipitation estimation of gauge-calibrated hourly rainfall product (GSMaP_Gauge) depends on a large part on the Climate Prediction Center (CPC) Unified Gauge-Based Analysis of Global Daily Precipitation data sets provided by NOAA. If the CPC data sets have good estimation of precipitation in a region, the GSMaP_Gauge data sets also will show good scores in the region. However, in case the CPC data sets under or overestimate the rain fall rate seriously or miss the rainfall event, the GSMaP_Gauge product also estimates or misses the precipitation in a similar manner as the CPC data sets. Note that the CPC data sets and hence the GSMaP_Gauge data do not always show accurate estimation particularly over less dense gauge region.
8. Although the GSMaP_Gauge_NRT is a near real time version of the GSMaP_Gauge, the products does not use the gauge measurement directly. Since the global gauge measurement takes much time to collect and process the data from all over the world, the gauge data is not available in near real time. Hence, in the GSMaP_Gauge_NRT product, only the error parameters are used to adjust the GSMaP_NRT estimation, which is named as the GSMaP_Gague_NRT. In addition, the GSMaP_Gauge_NRT has just been released as beta version. We would like to know evaluation and validation results of this product for modification. We appreciate if you give us some feedback.