Abstract

Japan Aerospace Exploration Agency (JAXA) has developed and operated near-real-time data processing system with passive microwave radiometer (PMW) data (i.e., TRMM TMI, Aqua AMSR-E, and DMSP SSM/I) and geostationary satellite IR data and distributed rainfall products via the Internet (http://sharaku.eorc.jaxa.jp/GSMaP/). Core algorithms of the system are based on the combined PMW-IR algorithm developed under the Global Satellite Mapping of Precipitation (GSMaP) project. In order to improve sampling of observation of rainfall, the GSMaP algorithm for passive microwave sounders (GSMaP-MWS) over ocean has been developed by the window channels (23, 31, 89 and 150 GHz). The over-ocean GSMaP_MWS was described in Shige et al. (2009). Now we’re developing the over-land GSMaP_MWS. We develop the rain/no-rain classification (RNC) method for an over-land rainfall retrieval algorithm for the Advanced Microwave Sounding Unit (AMSU) based on the GSMaP algorithm for passive microwave imager. The current RNC method over land based on the window channels tends to underestimate warm rain areas due to high and variable emissivity over land surface. The sounder channels are less affected by surface emission. Therefore we proposed a new RNC method using the sounder channels such as 89, 150, 186 and 190 GHz in order to detect the warm rain which is missed by the current method.

Rain/no-rain Classification Method for GSMaP_MWS

Flowchart of GSMaP algorithm

(a) original method

(b) revised method

Proposed RNC method

The revised method can detect the precipitation whose top height is about 3.52 km.

PDF of detected rain pixel as function of rain height

Results of revised RNC Method

Case 1: South America (2nd Jan. 2007; TRMM orbit number 52041, NOAA-15 orbit number 44915)

Case 2: North Africa (14th Jan. 2007; TRMM orbit number 52217, NOAA-15 orbit number 45076)

Skill scores for PR-AMSU matched-up cases in 2007

POD FAR TS FB

Most of threat scores (for about 84% of PR-AMSU matched-up cases) are improved from those of the original method.

Conclusion and Future works

Development of the new RNC method over land in the GSMaP sounder algorithm

The scattering index (SI) which is Tb difference between 89 and 150 GHz is introduced to the new RNC method over land.

The proposed method will be adopted to the current GSMaP_MWS algorithm.