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Production of Global Satellite Mapping of Precipitation and Evolution for the Global Precipitation Measurement Mission

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Japanese Global Rainfall Map algorithm has been developed based on heritages of the Global Satellite Mapping for Precipitation (GSMaP) project, which was sponsored by the Japan Science and Technology Agency (JST) under the Core Research for Evolutional Science and Technology (CREST) framework between 2002 and 2007. The GSMaP project utilized accomplishments of observations by the Precipitation Radar (PR) onboard the Tropical Rainfall Measuring Mission (TRMM), and produce high-resolution and high-frequent global rainfall map based on multi-satellite passive microwave radiometer observations with information from the Geostationary InfraRed (IR) instruments. Output product of GSMaP algorithm is 0.1-degree grid for horizontal resolution and 1-hour for temporal resolution. The GSMaP near-real-time version product (GSMaP_NRT) has been in operation at JAXA since October 2008 in near-real-time basis, and browse images and binary data available at JAXA GSMaP web site (http://sharaku.eorc.jaxa.jp/GSMaP/). Altough the itinial GSMaP algorithm used passive microwave imagers only, SSMIS instruments onboard DMSP F16 and F17 has been introduced to GSMaP_NRT since 14 June 2010, in response to decrease of number of available passive microwave imagers. In addition, microwave sounders, AMSU-A/MHS instruments onboard NOAA-19 and MetOp-A has been introduced to the system since 1 August 2011.

With the objective of neccessity of continuous and log-term rainfall data set, GSMaP Reanalysis version (GSMaP_MVK V5.222) was produced and released recently. Reanalysis version is available for the period from March 2000 to November 2010, and will be updated in future. GSMaP_MVK product differs sligtly from the GSMaP_NRT product in terms of input data and algorithms. GSMaP_MVK uses all available microwave imager, microwave imager/sounder, and sounder data as inputs, since its processing is not in near-real-time basis. In addition, a full version of the algorithm (morphing and Kalman filtering by forward and backward processes) are used. GSMaP_MVK is available to registered users via JAXA GSMaP web site, as well as GSMaP_NRT. Users of GSMaP product extends broad user community, such as flood alert and weather services, and data utilization demonstrations are underway in several Asian and African countries.

The development of GSMaP algorithm was originally started for the Global Precipitation Measurement (GPM) mission, which is successor and extend mission of the TRMM. The GPM Core Observatory, which is a U.S-Japan joint mission, is scheduled to be launched in early 2014, and new version of GSMaP product is one of GPM products produced in JAXA. New version will include several updates of microwave imager and sounder algorithms and databases, and introduction of rain-gauge correction. As JAXA GPM product, we will provide 0.1-degree grid and hourly product for standard and near-realtime processing. Outputs will include hourly rainfall, gauge-calibrated hourly rainfall, and several quality information (satellite information flag, time information flag, and gauge quality information) over global areas from 60S to 60N. In addition, monthly rainfall product in 0.1-degree grid will be provided as JAXA GPM product.

Keywords: satellite observation, precipitation, high-resolution, high-frequent, GSMaP, GPM