

Current status of the Global Precipitation Measurement (GPM) mission in Japan

*Riko Oki¹, Takuji Kubota¹, Takeshi Masaki¹, Yuki Kaneko¹, Kinji Furukawa¹, Misako Kachi¹, Yukari Takayabu², Toshio Iguchi³, Kenji Nakamura⁴

1.Japan Aerospace Exploration Agency, 2.University of Tokyo, 3.NICT, 4.Dokkyo University

The Global Precipitation Measurement (GPM) mission is an international collaboration to achieve highly accurate and highly frequent global precipitation observations. The GPM mission consists of the GPM Core Observatory jointly developed by U.S. and Japan and Constellation Satellites that carry microwave radiometers and provided by the GPM partner agencies. The GPM Core Observatory was successfully launched at 3:37 a.m. on February 28, 2014 (JST). The Dual-frequency Precipitation Radar (DPR) was developed by the Japan Aerospace Exploration Agency (JAXA) and the National Institute of Information and Communications Technology (NICT), and installed on the GPM Core Observatory. The GPM Core Observatory chooses a non-sun-synchronous orbit to carry on diurnal cycle observations of rainfall from the Tropical Rainfall Measuring Mission (TRMM) satellite, while the Constellation Satellites, including JAXA's Global Change Observation Mission (GCOM) - Water (GCOM-W) or "SHIZUKU," are launched by each partner agency sometime around 2014 and contribute to expand observation coverage and increase observation frequency. JAXA develops the DPR Level 1 algorithm, and the NASA-JAXA Joint Algorithm Team develops the DPR Level 2 and DPR-GMI combined Level2 algorithms.

JAXA also develops the Global Rainfall Map (GPM-GSMaP) algorithm, which is a latest version of the Global Satellite Mapping of Precipitation (GSMaP), as national product to distribute hourly and 0.1-degree horizontal resolution rainfall map. The GSMaP near-real-time version (GSMaP_NRT) product is available 4-hour after observation through the "JAXA Global Rainfall Watch" web site (<http://sharaku.eorc.jaxa.jp/GSMaP>) since 2008. To assure near-real-time data availability, the GSMaP_NRT system simplified part of the algorithm and its processing procedure. Therefore, the GSMaP_NRT product gives higher priority to data latency than accuracy, and has been used by various users for various purposes, such as rainfall monitoring, flood alert and warning, drought monitoring, crop yield forecast, and agricultural insurance. There are, however, several requirements from users for GSMaP improvements not only for accuracy but also specification. Among those requests for data specification, the most popular ones are shortening of data latency time and higher horizontal resolution. To reduce data latency, JAXA has developed the GSMaP realtime version (GSMaP_NOW) product for observation area of the geostationary satellite Himawari-8 operated by the Japan Meteorological Agency (JMA). GSMaP_NOW product uses satellite data that is available within 0.5-hour, including GMI, AMSR2 direct receiving data, AMSU direct receiving data and Himawari-8, to produce GSMaP at 0.5-hr before. Then, we are applying 0.5-hour forward extrapolation for future direction by cloud motion vector to produce GSMaP at current hour (GSMaP_NOW) over Himawari-8 observed area. GSMaP_NOW product was released to public in November 2, 2015 through the "JAXA Realtime Rainfall Watch" web site (http://sharaku.eorc.jaxa.jp/GSMaP_NOW/).

Moreover, ground validation (GV) activity using a dual Ka-band radar system developed by JAXA has been conducted along the slope of Mt. Zao in Yamagata, Japan from Oct. 2013 to May 2015. During Dec. 2015-Jan. 2016, the single Ka-radar observation was operated on R/V Mirai of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) over the Indian Ocean aiming at Maritime precipitation.

After the early calibration and validation of the products and evaluation that all products achieved the release criteria, all GPM standard products and the GPM-GSMaP product has been released to the public since September 2014. The GPM products can be downloaded via the internet

through the JAXA G-Portal (<https://www.gportal.jaxa.jp>). All GPM standard products will be reprocessing using the updated algorithms (Version 4) on March-April 2016, and the GPM-GSMaP product will be on July 2016.

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