

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

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The Global Precipitation Measurement (GPM) mission is an international cooperative project to achieve highly accurate and highly frequent global precipitation observations by satellites. 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-W1) 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 the latest version of the Global Satellite Mapping of Precipitation (GSMaP), as national product to generate hourly and 0.1-degree horizontal resolution rainfall map. Major improvements in the GPM-GSMaP algorithm is; 1) Improvements in microwave imager algorithm based on AMSR2 precipitation standard algorithm, including new land algorithm, new coast detection scheme; 2) Development of orographic rainfall correction method for warm rainfall in coastal area (Taniguchi et al., 2012); 3) Update of database, including rainfall detection over land and land surface emission database; 4) Development of microwave sounder algorithm over land (Kida et al., 2012); and 5) Development of gauge-calibrated GSMaP algorithm (Ushio et al., 2013). In addition to those improvements in the algorithms number of passive microwave imagers and/or sounders used in the GPM-GSMaP was increased compared to the previous version. Moreover, ground validation activity using a dual Ka-band radar system developed by JAXA has been conducted along the slope of Mt. Zao in Yamagata Prefecture, Japan since Oct. 2013. The dual Ka-band radar system consists of two nearly identical Ka-band FM-CW radars, and the precipitation systems between two radars were observed in opposite directions. Sometimes DPR overpassed the Zao experimental site, and vertical profiles of rain/snow were compared with ground Ka-radar profiles. The comparison also showed that the DPR Ka-radar profiles were consistent with ground observation. 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>).

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