

Results from the Global Precipitation Measurement (GPM) prime mission period in Japan

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The Global Precipitation Measurement (GPM) mission is an international cooperate satellite project to achieve highly accurate and highly frequent global precipitation observations. The GPM mission consists of the GPM Core Observatory jointly developed by the U.S. and Japan and Constellation Satellites that carry microwave radiometers and provided by the GPM partner agencies. The GPM Core Observatory, launched on February 2014, carries the Dual-frequency Precipitation Radar (DPR) by the Japan Aerospace Exploration Agency (JAXA) and the National Institute of Information and Communications Technology (NICT). The GPM Core Observatory achieved its prime mission period planned for 3 years in 2017 and continues after prime mission period operation after that.

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. The DPR, the GMI, and the DPR-GMI combined algorithms was updated in May 2017 and the latent heating product was released in July 2017 as Version 05. New calibration factors were applied for both Ku and Ka-band radars. As its results, values of Z factor increased, but estimated value of rain intensity does not necessarily increase. Also calibration factors of TRMM/PR was re-examined to have consistency between DPR/Ku. The updated PR Level 1 data were released in October 2017. Using dual frequency information of DPR, the latest Level 2 algorithm outputs information such as precipitation phase at surface, heavy ice precipitation and so on. Also DPR observation clearly showed that vertical structure of precipitation systems are different between low and mid latitude area. After prime mission period, JAXA and NASA are planning to change the scan pattern of the Ka-band radar to realize matched beam observation for full swath.

JAXA also develops the Global Satellite Mapping of Precipitation (GSMaP), as a 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. 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 is, however, a requirement for shortening of data latency time from GSMaP users. To reduce data latency, JAXA has developed the GSMaP real-time version (GSMaP_NOW) product for observation area of the geostationary satellite Himawari-8 operated by the Japan Meteorological Agency (JMA). GSMaP_NOW product was released to the public in November 2, 2015 through the “JAXA Real-time Rainfall Watch” web site (http://sharaku.eorc.jaxa.jp/GSMaP_NOW/). All GPM standard products and the GPM-GSMaP product have been released to the public since January 2017 as Version 04. The GPM products can be downloaded via the internet through the JAXA G-Portal (<https://www.gportal.jaxa.jp>).

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