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## Recent Progresses of the Global Precipitation Measurement (GPM) Mission in Japan

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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, 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).

JAXA and NASA started to release the GPM/DPR Experimental product (Version 06X) in June 2020. This Version 06X is the first product to respond to the KaPR scan pattern changes implemented on May 21, 2018. This change in scan pattern allows for a more accurate precipitation estimation method based on two types of precipitation information, Ku-band Precipitation radar (KuPR) and KaPR, to be applied to the entire observation swath. A new version 07 of the GPM/DPR products will appear in 2021.

JAXA also develops the Global Satellite Mapping of Precipitation (GSMaP), to distribute hourly and 0.1-degree horizontal resolution rainfall map through the "JAXA Global Rainfall Watch" website (<https://sharaku.eorc.jaxa.jp/GSMaP/index.htm>). The GSMaP near-real-time version (GSMaP\_NRT) product provides global rainfall map in 4-hour after observation, and an improved version of GSMaP near-real-time gauge-adjusted (GSMaP\_Gauge\_NRT) product has been published since Dec. 2018. Now the JAXA is developing the GPM-GSMaP V05 (algorithm version 8) which will be released in 2021.

In the GPM-GSMaP V05, the passive microwave (PMW) algorithm will be improved in terms of retrievals extended to the pole-to-pole, updates of databases for the PMW retrievals, and heavy Orographic Rainfall Retrievals. Normalization module for PMW retrievals (Yamamoto and Kubota 2020) will be implemented. A histogram matching method by Hirose et al. (2020) will be implemented in the PMW-IR Combined algorithm. In the Gauge-adjustment algorithm based upon Mega et al. (2019), artificial patterns appeared in V04 will be mitigated in V05.

