

## Japanese Ground Validation Plan for GPM Products

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Global Precipitation Measurement (GPM) started as an international mission and follow-on mission of the Tropical Rainfall Measuring Mission (TRMM) project to obtain more accurate and frequent observations of precipitation. Japan Aerospace Exploration Agency (JAXA) is in charge of developing GPM/Dual-frequency Precipitation Radar (DPR) algorithms as the sensor provider and producing and delivering hourly global precipitation map to make useful for various research and application areas. In order to secure the quality of precipitation estimates, ground validation (GV) of satellite data and retrieval algorithms is essential.

End-to-end comparisons between instantaneous precipitation data observed by satellite and ground-based instruments are not enough to develop and improve the algorithms. In order to estimate the error of various physical parameters in the precipitation retrieval algorithms (e.g. attenuation factor, drop size distribution, terminal velocity, density of the snow particles, etc.), we plan to make intensive observations before the satellite launch. JAXA is now developing two ground-based Ka-band radars for ground validation to estimate the attenuation characteristics by precipitation, especially solid and melting precipitations. From the comprehensive observations and/or utilization of cloud resolving models, a simulation of satellite measurements can be performed using forward calculations. Precipitation profiling algorithms for DPR can be applied to the simulated measured quantities, such as measured radar reflectivities at two wavelengths. The advantage of this method is that the simultaneous observation of precipitation from both ground and space is not required.

The validation methodology for statistical rain data and hourly global precipitation mapping from constellation is different from the instantaneous estimates. Comparisons with other ground-based and spaceborne data, such as long-term routine observation data and GCOM-W1/AMS2 and EarthCARE/CPR data will be performed for the product validation. For the upscaling of the GV site observation not only in space but also in time, the super site and/or dense gauge networks should be embedded in the operational radar/raingauge networks. Various GV data on various climatological types are crucial for algorithm improvement after launch of GPM-core satellite, especially in Asian countries.

Keywords: GPM; DPR; precipitation; ground validation.