



Current Status of Japan's Activity for GPM/DPR algorithm development

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The Global Precipitation Measurement (GPM) mission is composed of a Tropical Rainfall Measuring Mission (TRMM)-like non-sun-synchronous orbit satellite (GPM core satellite) and constellation of satellites carrying microwave radiometer instruments. The GPM core satellite carries the Dual-frequency Precipitation Radar (DPR), which is being developed by the Japan Aerospace Exploration Agency (JAXA) and the National Institute of Information and Communications Technology (NICT), and microwave radiometer provided by the National Aeronautics and Space Administration (NASA). Development of the DPR instrument is in good progress for scheduled launch in 2013, and DPR Critical Design Review has completed in July - September 2009.

DPR Level 1 algorithm, which provides DPR L1B product including received power, will be developed by the JAXA. The DPR L1B product format (Version1) was determined in 2010. DPR L1B data format is basically similar to the TRMM/PR L1B data format. JAXA already generate some preliminary DPR L1B sample products. The DPR L1B Version1 algorithm development will be completed on March 2011 and the Version2 algorithm development will start on April 2011.

DPR Level 2 algorithm will be developed by the DPR Algorithm Team led by Japan, which is under the NASA-JAXA Joint Algorithm Team. The first version of GPM/DPR Level-2 Algorithm Theoretical Basis Document was completed on November 2010. The algorithm will be constructed in modular structure that enables the algorithm developers to develop the modules independently. The retrieval process is carried out in the Solver module, but the preparation of radar equations is shared by the other modules, i.e. Preparation module, Vertical Profile module, Classification module, SRT module, DSD module, and Texture module. The Level-2 algorithms will provide KuPR only products, KaPR only products, and Dual-frequency Precipitation products, with estimated precipitation rate, radar reflectivity, and precipitation information such as drop size distribution and bright band height. It is important to develop algorithm applicable to both TRMM/PR and KuPR in order to produce long-term continuous data set. Synthetic radar data of the DPR is necessary as a test bed of the DPR Level-2 algorithm. We're developing empirical synthetic data and numerical simulation-based synthetic data. JAXA conducted an experiment with TRMM/PR for 7 orbits on mid-March 2007. The normal PR observes 250km width with 49 beams. In contrast, the experimental PR observes 125km width with the KuPR-matched beams (25 beams) and interlaced beams (24 beams) like the KaPR sampling. This dataset will be useful for the DPR algorithm development. The synthetic data will be also developed by a satellite radar simulation algorithm using atmospheric data by a cloud-resolving model.