Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

ACG06-09 Room:315 Time:April 29 09:30-09:45

Initial validation results of Dual-frequency Precipitation Radar on Global Precipitation Measurement Core Observatory

KUBOTA, Takuji[1*] ; IGUCHI, Toshio[2] ; SETO, Shinta[3] ; AWAKA, Jun[4] ; URITA, Shinji[5] ; YOSHIDA, Naofumi[5] ; OKI, Riko[1]

[1]Japan Aerospace Exploration Agency, [2]National Institute of Information and Communications Technology, [3]Nagasaki University, [4]Tokai University, [5]Remote Sensing Technology Center of Japan

The Global Precipitation Measurement (GPM) Mission consists of a Tropical Rainfall Measuring Mission (TRMM)-like non-sun-synchronous orbiting satellite (GPM Core Observatory) and a constellation of satellites carrying microwave radiometer instruments. The GPM Core Observatory, which will be launched in 28 February 2014, carries the Dual-frequency Precipitation Radar (DPR) developed by the Japan Aerospace Exploration Agency (JAXA) and the National Institute of Information and Communications Technology (NICT). The DPR consists of two radars; Ku-band (13.6 GHz) precipitation radar (KuPR) and Ka-band (35.55 GHz) radar (KaPR). The DPR is expected to advance precipitation science by expanding the coverage of observations to higher latitudes than those obtained by the TRMM Precipitation Radar (PR), by measuring snow and light rain via high-sensitivity observations from the KaPR, and by providing drop size distribution (DSD) information based on the differential scattering properties of the two frequencies. For operational productions of precipitation datasets, it is necessary to develop computationally efficient, fast-processing DPR Level-2 (L2) algorithms that can provide estimated precipitation rates, radar reflectivity factors, and precipitation information, such as the DSD and precipitation type. The L2 algorithms have been developed by the DPR Algorithm Development Team under the NASA-JAXA Joint Algorithm Team.

Before the launch of the GPM Core Observatory, synthetic DPR Level-1 (L1) data are needed as a test bed for the DPR L2 algorithms. In this work, we use data simulated from the TRMM/PR. The primary advantage is that measured Ku-band data from the TRMM/PR, obtained under a wide variety of meteorological conditions, forms the basis of the simulation. As such, the results can be compared directly to the standard TRMM/PR retrievals. Thus, ”at-launch” codes of DPR precipitation algorithms, which will be used in GPM ground systems at launch, were evaluated using synthetic data based upon the TRMM/PR data. Results from the codes (Version 4.20131010) of the KuPR-only, KaPR-only, and DPR algorithms were compared with ”true values” calculated based upon drop size distributions assumed in the synthetic data and standard results from the TRMM algorithms at an altitude of 2 km over the ocean. The results indicate that the total precipitation amounts during April 2011 from the KuPR and DPR algorithms are similar to the true values, while the estimates from the KaPR data are underestimated. By analysis results, the underestimation of the KaPR can be caused by a problem in the attenuation correction method. This was verified by the improved codes (Version 4.20131129), and so this problem has been resolved in the latest version.

After the launch, calibration and validation of the DPR products will be implemented toward the public release of all products to general users. Data release date is currently scheduled to be 6-month after the launch. In this work, we introduce initial validation results of the DPR-L2 product, mainly based upon comparisons of the TRMM/PR product.

Keywords: Global Precipitation Measurement, Dual-frequency Precipitation Radar, algorithm, validation