Initial performance of the rain retrieval algorithm for the Dual-frequency Precipitation Radar on the GPM core satellite

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The GPM core satellite is scheduled to be launched on February 28, 2014. This paper will report results of the early performance test of the Dual-Frequency Precipitation Radar (DPR) on the GPM core satellite in orbit. The DPR, which was developed by Japan Aerospace Exploration Agency (JAXA) and National Institute of Information and Communications Technology (NICT), consists of two radars: Ku-band precipitation radar (KuPR, 13.6 GHz) and Ka-band radar (KaPR, 35.5 GHz). KuPR is very similar to TRMM/PR, but its sensitivity is better than PR. The higher sensitivity is realized by the increase of the transmitting power and the increase of the independent samples. A technique of variable pulse repetition frequency (PRF) is used to optimize the sampling window for precipitation echoes and the number of independent samples. KaPR has a high sensitivity mode in order to detect light rain and some snow, which are predominant in high latitudes. The beams of KuPR and KaPR can be matched by adjusting the phase offset to each element of the phased array antenna in the across-track direction and the transmitting time offset between the two radars in the along-track direction. Beam matching is essential for the use of the dual-frequency algorithm to retrieve accurate rainfall rates. The hardware performance of DPR will be checked immediately after the launch. In addition to the basic characteristics of the radar such as the transmitting power, sensitivity, and resolutions, other characteristics peculiar to the DPR such as beam matching will be tested. The performance of the DPR algorithm will be evaluated by comparing the level 2 products with the corresponding TRMM/PR data in statistical ways. Such statistics include not only the radar reflectivity and rain rate histograms, but also precipitation detectability and rain classification.