

## Recent progress of satellite precipitation products by TRMM and GPM

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The Tropical Rainfall Measuring Mission (TRMM) satellite is the first satellite mission focused on 'rainfall' observation. TRMM is a joint mission between Japan and the U.S., and continues excellent observation over about fourteen years since its launch on November 1997. The TRMM carries the world's first satellite-borne Precipitation Radar (PR) developed by Japan, in addition to conventional instruments, such as an infrared imager and microwave imager (TRMM Microwave Imager; TMI). JAXA and NASA have started to provide a new version (Version 7) of TRMM standard products since July 2011. In version 7, overall PR rain estimates have increased with compared to Version 6 product released in June 2004. PR Version 7 increased over land globally, especially over the equatorial region, while TMI Version 7 decreased significantly. Differences over the ocean were small even in Version 6, and became smaller in Version 7 over the ITCZ region. Thus, consistency of PR with TMI was improved. Moreover, unnatural angle dependence in PR over ocean disappeared and so the reliability of the PR rain estimates is considered to be increased. In addition, TRMM latent heat products were newly released as the standard products on February 2012.

The Global Precipitation Measurement (GPM) mission is composed of two categories of satellites; 1) a TRMM-like non-sun-synchronous orbit satellite (GPM Core Observatory); and 2) constellation of satellites carrying microwave radiometer instruments. The GPM Core Observatory carries the Dual-frequency Precipitation Radar (DPR), which is being developed by the JAXA and the NICT, and microwave radiometer provided by the NASA. GPM Core Observatory will be launched around February 2014. As a proto-type for Japanese GPM mission products, JAXA has developed and operated near-real-time data processing system with passive microwave radiometer (PMW) data (i.e., TRMM TMI, Aqua AMSR-E, and DMSP SSM/I) and GEO IR data and distributed rainfall products via the Internet (<http://sharaku.eorc.jaxa.jp/GSMaP/>). Core algorithms of the system are based on the combined PMW-IR algorithm developed under the Global Satellite Mapping of Precipitation (GSMaP) project. In order to improve sampling of observation of rainfall, the products from passive microwave imager/sounder (i.e., DMSP SSMIS) since 11 Jun. 2010 and passive microwave sounder data from NOAA-19 and MetOp-A since 1 Aug. 2011 is introduced into the near-real-time system. Currently, the near-real-time system is operated with 7 PMW data and GEO IR data. In addition, re-processing (re-collection and more elaborated algorithms) is going on. We completed the re-processing with the period during 2007-2010. The re-processing during 2000-2006 will be completed by March 2012.

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