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Production of Global Satellite Mapping of Precipitation for GPM (GPM-GSMaP) and Future Improvements

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The Glopbal Rainfall Map product is a final output in the GPM mission led by Japan and US. There, hoewever, is no standard Global Rainfall Map product between Japan and US, but developed as national products in Japan and US, respectively, to respond their national needs. Japanese Global Rainfall Map product uses the latest version of Global Satellite Mapping of Precipitation (GSMaP) algorithm, and called as GPM-GSMaP. The GSMaP algorithm produce high-resolution and high-frequent global rainfall map based on multi-satellite passive microwave radiometer observations with information from the Geostationary InfraRed (IR) instruments, and databases using accomplishments of observations by the Precipitation Radar (PR) and Lightning Imaging Sensor (LIS) onboard the Tropical Rainfall Measuring Mission (TRMM). GSMaP product has been open to public as near-real-time version "JAXA Global Rainfall Watch" (or GSMaP_NRT) and reanalysis version (GSMaP_MVK) from the JAXA web site since 2007 (http://www.eorc.jaxa.jp/GSMaP/). Output products including browse images and binary/text data are 0.1-degree grid for horizontal resolution and 1-hour for temporal resolution, and provided about four hours after observation. Number of registered GSMaP users is 1,214 as of the end of January 2015. The algorithm version of GSMaP at the point of launch of the GPM Core Observatory is version 5, and improvements of GSMaP algorithm toward Japanese standard product in the GPM mission have been implemented by the GPM Map Algorithm Team.

The GSMaP for GPM (GPM-GSMaP) product (algorithm version 6 and product version V03) has been released to public from JAXA data distribution system called "G-Portal" (https://www.gportal.jaxa.jp) since September 2, 2014. At the same time, the GSMaP products that are available at the JAXA Global Rainfall Watch web site are switched to the GPM-GSMaP products but its data format is the same as in the past GSMaP product for convenience to users. Version up of Level 1 product is scheduled for the Advanced Microwave Scanning Radiometer 2 (AMSR2), we plan to make minor version up of GPM-GSMaP in March or April 2015.

Currently, GPM-GSMaP data is only available since February 2014 from the G-Portal system, but we plan to release past period data after March 2000 as the GSMaP Climate (GSMaP_CLM) product applying same algorithm as operational one. GSMaP_CLM product needs long-term continuous meteorological information to produce look-up table, we choose Japanese 55-year Reanalysis (JRA-55) instead of Japan Meteorological Agency's Global Analysis used in operational GPM-GSMaP processing. The GSMaP_CLM product is now being processed, and will be relased to public when data is ready.

There are several requirements from users for GSMaP improvements, but the most popular ones are shortening of data latency and higher horizontal resolution. Reagrding shortening of data latency, we are currently developing rapid version of GSMaP (GSMaP_NOW) product for observation area of the geostationary satellite "Himawari" (MTSAT). The GSMaP_NOW product uses passive microwave radiometer data that is available only within one hour after obserbation. Furthermore, addition of extrapolation by using cloud moving vector of one hour forward (toward future) enables us to produce "nowcasting" rainfall map over Asian regions. The development and validation of the GSMaP_NOW system is currently underway toward start of operation in the next Japanese fiscal year.

Keywords: satellite observation, precipitation, high-resolution, high-frequent, GSMaP, GPM