

The Global Water Cycle Observation by the Global Change Observation Mission 1st - Water "SHIZUKU" (GCOM-W1)

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Japan Aerospace Exploration Agency (JAXA) launched the Global Change Observation Mission 1st - Water (GCOM-W1) or "SHIZUKU" (meaning "droplet" in Japanese) on 18 May 2012 (JST) from JAXA's Tanegashima Space Center. GCOM-W1 is not a name of single satellite mission. It is a part of global and long-term observation program with two complementary medium-sized satellites (GCOM-W and GCOM-C series) and three generations (10-15 years) for stable data records.

The Advanced Microwave Scanning Radiometer 2 (AMSR2) onboard the SHIZUKU satellite is a successor instrument to the Advanced Microwave Scanning Radiometer for EOS (AMSR-E) onboard NASA's Aqua satellite, which was launched in 2002. In response to the successful observation and achievements of AMSR-E, AMSR2 is developing based on AMSR-E, and its basic performance and observation frequencies will be similar to that of AMSR-E based on the minimum requirement of data continuity of AMSR-E, with several enhancements. Higher level products of AMSR2 will be the same to current seven geophysical parameters derived by AMSR-E; they are precipitable water, cloud liquid water, precipitation, sea surface temperature, sea surface wind speed, sea ice concentration, snow depth, and soil moisture.

Furthermore, The GCOM-W1 satellite was installed in front of the Aqua satellite on the "A-Train" orbit to keep continuity of AMSR-E observations and provide synergy with the other A-Train instruments for new Earth science researches. Unfortunately, AMSR-E reached its limit to maintain the rotation speed necessary for regular observations (40 rotations per minute), and the radiometer automatically halted its observations and rotation. It, however, has restarted observation in low rotation mode with 2-rpm in December 2012 in order to perform cross-calibration with AMSR2.

The SHIZUKU satellite has joined the A-train orbit since 29 June 2012, and started normal observation since 3 July 2012. The first light of AMSR2 was released on 4 July, and since then, many observation results has obtained; such as melting of entire surface ice sheets over Greenland in July, rainfall by Typhoon HAIKUI (TC1211) in August, and new record minimum of the Arctic sea ice extent in September. Browse images of AMSR2 can be available in near-real-time at the web site of JAXA Satellite Monitoring for Environmental Studies (JASMES) for Water Cycle (http://suzaku.eorc.jaxa.jp/GCOM.W/JASMES_daily/index.html).

AMSR2 Level 1 brightness temperature products have released to public since 25 January 2013 via the GCOM-W1 Data Providing Service System (<https://gcom-w1.jaxa.jp/>), and level 2 geophysical parameter products will be released to public in May 2013. The Data providing Service System also distributes products of series of AMSR instrument, including AMSR-E and AMSR onboard the Advanced Earth Observing Satellite-II (ADEOS-II). Near-real-time products are already distributed to weather agencies, such as Japan Meteorological Agency (JMA), National Oceanic and Atmospheric Administration (NOAA), and European Centre for Medium-Range Weather Forecasts (ECMWF), and will be used in operational weather forecasts and other applications.

Keywords: satellite remote sensing, microwave radiometer, global water cycles, climate, AMSR, earth observation