

Proposal of AMSR2 Follow-on (AMSR3) Mission

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The Global Change Observation Mission-Water (GCOM-W) satellite was launched by the Japan Aerospace Exploration Agency (JAXA) on 17 May 2012, as a member of the A-Train satellite constellation. The GCOM-W satellite carries the Advanced Microwave Scanning Radiometer 2 (AMSR2), which is a 6-band multi-frequency (6.9/7.3, 10.6, 18.7, 23.8, 36.5, and 89.0 GHz), dual-polarization (V and H) microwave radiometer and is a successor of the AMSR on the Advanced Earth Observing Satellite-II (ADEOS-II) satellite and the AMSR for NASA's Earth Observing System (AMSR-E) onboard the Aqua satellite. The AMSR2 measures microwave brightness temperature over a 1600-km-wide swath with spatial resolutions of 5–50 km depending on the frequency. The conical scan mechanism of the AMSR2 covers more than 99% of the Earth's surface every 2 days. From the multi-frequency and dual-polarized measurements, several parameters of the ocean, atmosphere, land, and cryosphere were retrieved through theoretical and empirical algorithms. The JAXA's standard AMSR2 data product contains the sea surface wind speed, vertically-integrated water vapor, cloud liquid water, precipitation, sea surface temperature (SST), sea ice concentration, snow depths, and soil moisture. The AMSR2 provides global coverage of these parameters at high spatial and temporal resolution without influences of clouds. The AMSR series provide 7 of the essential climate variables (ECVs) designated by the Global Climate Observing System (GCOS).

The 5-years designed mission life of GCOM-W/AMSR2 was completed in May 2017. Although the satellite and sensor are healthy at present in the extended mission period, an early launch of a follow-on (FO) mission is strongly desired to prevent a large data gap between AMSR2 and AMSR2 FO missions and keep continuity of the data record. International communities of research and operational users have expressed their support for the FO mission. JAXA is now investigating feasibilities launching the AMSR2 FO (AMSR3) on the Greenhouse gases Observing SATellite-3 (GOSAT-3), according to the roadmap of space basic plan of the Japanese government. In the FO mission, enhanced spatial resolution using over sampling for low frequency channels (7 and 10 GHz) is considered, which results in SST with a resolution of 20 km. Also 166 and 183 GHz channels are planned to be added for solid precipitation observation. Calibration of the sensor will be improved compared to AMSR-E and AMSR2.

By using continuous data over the three missions of AMSR series (AMSR-E, AMSR2, and AMSR2 FO/AMSR3) since 2002, we may explore following scientific issues;

- Evaluation of the impact of global warming on climate system
- Elucidation of global water circulation system and impact of global warming
- Decadal and inter-decadal variation mechanism of atmospheric-ocean interactions

- Sea ice variations and their influences on deep ocean circulation
- Interaction between water cycle and carbon cycle, response of vegetation

Also data from AMSR2-FO (AMSR3) can be directly utilized in practical applications including;

- Weather forecast and disaster prevention/reduction
- Climate change monitoring and prediction accuracy improvement
- Monitoring coastal and offshore ocean conditions and cross border pollution
- Maritime safety and economical ship routing
- Operational support for Arctic ship routes
- Monitoring of fishing environment and fisheries resources management
- Monitor flood and drought and water resource management

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