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Evaluation and Comparison of Long-term Total Precipitable Water Products by the GCOM-W/AMSR2

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Water vapor is a strong greenhouse gas with a feedback effect closely related to climate systems such as clouds and precipitation. The Intergovernmental Panel on Climate Change (IPCC) Working Group I (WG I) Sixth Assessment Report (AR6) concluded that global water vapor has very likely increased since 1979 and that the combined water vapor and lapse rate feedback makes the single largest contribution to global warming. Therefore, the long-term observation of water vapor is important to understanding global climate and water cycle changes.

The Advanced Microwave Scanning Radiometer 2 (AMSR2) is a Japanese passive microwave radiometer onboard the Global Change Observation Mission—Water (GCOM-W) satellite, or SHIZUKU. GCOM-W/AMSR2 can observe more than 99% of the Earth surface every two days and estimate amount of total precipitable water vapor (TPW) over the ocean.

This study compared the long-term AMSR2 TPW data of July 2012–December 2020 produced independently by the Japan Aerospace Exploration Agency (JAXA) and Remote Sensing Systems (RSS). We compared the accuracy of JAXA and RSS TPW products based on in-situ observations. In addition, we investigated the meteorological conditions that caused the large difference between JAXA and RSS TPW products, using reanalysis data and MODIS data.