

JAXA-NASA collaborations toward a better understanding of the global water and energy cycle: From TRMM and GPM to ACCP

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The Tropical Rainfall Measuring Mission (TRMM) was a joint US-Japan mission marking a milestone in the history of rainfall measurement from space. The TRMM satellite was launched in late 1997, carrying the Precipitation Radar, the first spaceborne radar to measure precipitation, provided by JAXA and other instruments including the TRMM Microwave Imager (TMI) by NASA. Unprecedented 17-year observations from the TRMM PR and TMI substantially updated our knowledge of tropical and mid-latitude rainfall and opened new pathways for the practical applications including numerical weather forecast and disaster prevention. The Global Measurement Mission (GPM) core observatory, with its operation started in 2014, has expanded the TRMM observational capability in many ways, for instance, the enhanced detectability of solid precipitation by the Dual-frequency Precipitation Radar (DPR) over a latitudinal coverage extended to 65°S/N. A multi-satellite precipitation data product or the Global Satellite Mapping of Precipitation (GSMaP), developed as a part of the JAXA GPM program, is exploited for broad applications, most notably in aid of the infrastructure development and protection in the Asia-Pacific countries.

Meanwhile, the blueprint of new satellite missions is being developed in a NASA-led initiative called the Aerosol, Cloud, Convection, and Precipitation (ACCP). The ACCP teams are looking into a range of possibilities in the satellite instrumentation optimal for advancing our understanding of the physical processes involved in the atmospheric water and energy cycle. The science goals of ACCP are highly multi-disciplinary, bridging the gap among past and current satellite programs such as TRMM, GPM, CloudSat, and CALIPSO. JAXA has been working with their science team to discuss a next-generation spaceborne precipitation radar with enhanced (e.g., Doppler) capabilities, whose unique potential is being renewed in light of the scientific and technological demands of ACCP. In this talk, we will present selected scientific achievements from recent satellite observations and discuss the new horizon of scientific knowledge expected to be opened by ACCP.

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