

Initial results and validation of the TROPICS precipitation product.

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The estimation of precipitation from satellite sensors is crucial for the measurement of precipitation globally. While visible/infrared techniques provide frequent sampling with reasonable resolution, the relationship between the cloud top properties and surface precipitation are often poor. Passive microwave observations are sensitive to the presence of the precipitation particles themselves and therefore the observations are more directly related to the precipitation at the surface. Exploiting all the observations from passive microwave imaging and sounding instruments is necessary to ensure reasonable temporal sampling. The compact nature of passive microwave sounders has allowed these sensors to be developed for cubesats, such as the Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats (TROPICS) mission. The TROPICS mission comprises of a total of 7 cubesats, comprising of an initial pathfinder that was launched in June 2021, and to be followed by 6 more cubesats to be launched mid-2022. The pathfinder is presently in a polar orbit while the following 6 satellites will be placed in a low-inclination orbit, that will provide frequent observations across the Tropics. Each cubesat carries a passive microwave sounder gathering observations from 91.665 GHz to 204.8 GHz in a cross-track scanning mode with spatial resolutions similar to that of the current Microwave Humidity Sounder sensors. The Precipitation Retrieval and Profiling Scheme (PRPS), initially developed for the larger sounding instruments, has been adapted for use with the TROPICS observations. The PRPS uses an a priori database against which observed radiances are compared and the associated precipitation intensities retrieved. Initial results from the pathfinder will be presented, together with validation against surface reference data sets. These initial results are promising and show that the retrievals are comparable with other passive microwave sounding instruments.