

Long-term monitoring of water vapor by using a next generation microwave radiometer “KUMODES”

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Weather forecasts in the early stage are important to minimize damages caused by natural disasters. In particular, the forecast of sudden natural disasters (e.g. tornadoes, heavy snowfalls, heavy rainfalls) is an important subject. The sudden natural disasters follow the rapid change of atmospheric thermodynamic field. Precise monitoring of the atmosphere in high rate is essential to understand its variation.

"KUMODES" is a next-generation microwave radiometer. It simultaneously measures the atmospheric radiation at 20 - 30 GHz range and 50 - 60 GHz range. The radiation spectrum at 20 - 30 GHz range by using a cryogenic receiver allows us to measure the quantity of water vapor as well as the thickness of clouds. The cryogenic system provides us the low noise data. The spectrum at 50 - 60 GHz range allows us to measure the vertical profile of the physical temperature for Oxygen molecule. Novel calibration technique using a blackbody material maintained at 50 K is useful for long-term observations. Configuration for the atmospheric observation or calibration is switched by using an optical path selector. A direction of wiregrid selects each signal. We can remotely control the configuration by using the mechanical drive for the selector. This technique guarantees the quality of the data in long-term without any special work during the observation.

Towards the research about the atmospheric thermodynamic field, we have observed atmosphere by using KUMODES in Tsukuba city. In this presentation, we will report the status of our long-term observation including comparisons with other monitors. We will also introduce a hand-carry version of KUMODES which is under development.

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