

Measurement of precipitable water vapor using small and lightweight microwave radiometer

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Microwave radiometer passively measures the radiation from water vapor. We placed a small and lightweight proto-radiometer at Shionomisaki Wind Effect Laboratory, Disaster Prevention Research Institute, Kyoto University (latitude: 33.4466, longitude: 135.7563). We are trying to develop the real-time device which can measure the precipitable water vapor (PWV) without any compensation information. Because the proto-radiometer is small and weight is light, it should be easy to mount it on the moving vehicles like ships. In this study, we show the measurement results from 27th, Sep., 2018 to 14th, Jan., 2019 which includes the atmosphere and ocean and oceanic observations duration with “Chikyu” , “Shinsei-Maru” , “Seisui-maru” , and Shionomisaki Wind Effect Laboratory.

As the reference data, we use the radiosonde data which launched from Shionomisaki Weather Station, Japan Metrological Agency. The measured data is provided by the Integrated Global Radiosonde Archive. Note that, we also use the radiosonde data launched from Shionomisaki Wind Effect Laboratory. The measurement durations of radiosonde from the laboratory are 11-20th, Oct and 5-15th, Nov, 2018. Additionally, we also use GNSS system (RTNet, Hitachi Zosen, Osaka, Japan) as the reference data. The PWV is estimated by the Zenith Tropospheric Delay, pressure and temperature at measurement location. The PWV estimated using proto-radiometer shows the good agreement with the reference data except for rainfall duration. The results indicate that the small and lightweight proto-radiometer can measure the PWV correctly.

Keywords: microwave radiometer, precipitable water vapor