

**R009-28**

**Zoom meeting D : 11/2 AM2 (10:45-12:30)**

**10:45~11:00**

## **Observation Capability of a Ground-based Terahertz Radiometer in Martian atmosphere**

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We present expected performance for a ground-based Terahertz (THz) radiometer, plan to be launched on the TEREX-1 (TERahertz EXplore-1) Mars exploration micro spacecraft.

The small THz passive radiometer has been developed for the TEREX series of future micro spacecrafts.

This spacecraft is an opportunity for organizations with limited resources and technology to conduct frequent missions to Mars well suited for resource exploration in contrast to all of the current and past Mars missions of large/giant class missions with fully government lead.

The observation frequencies of TEREX-1 radiometer are 474.64 to 475.64 and 486.64 to 487.64GHz with 100 kHz resolution, and the double-sideband noise temperature less than 3000 K.

A theoretical error analysis is performed with the instrument characteristics to assess for the first time up-looking observations of atmospheric Oxygen molecules (O<sub>2</sub>) and water vapor (H<sub>2</sub>O).

Measurement errors for O<sub>2</sub> and H<sub>2</sub>O are 7 to 22% and 14 to 25% with 8 to 17 km and 5 to 10 km vertical resolution in the vertical ranges 0 to 55 km and 0 to 25 km, respectively.

TEREX-1 is also capable to measure minor species, O<sub>3</sub> and H<sub>2</sub>O<sub>2</sub>, with a precision better than 30% within two independent layers.

We used the integration time of 1 hour for all simulations.

Our theoretical simulation showed the instrument characteristics of the TEREX-1 sensor is able to observe vertical profiles of O<sub>2</sub> and H<sub>2</sub>O abundances with the same level of the large class missions.