

# Study for measuring middle and upper atmospheric wind and temperature with sub-millimeter and TeraHertz limb sounders

Philippe BARON<sup>1</sup>, Hideo SAGAWA<sup>2</sup>, Donal MURTAGH<sup>3</sup>, Satoshi OCHIAI<sup>1</sup>,  
Naohiro MANAGO<sup>4</sup>, Hiroyuki OZEKI<sup>5</sup>, Yoshihisa IRIMAJIRI<sup>1</sup>, Yoshinori  
UZAWA<sup>1</sup>, Masato SHIOTANI<sup>6</sup>, Makoto SUZUKI<sup>7</sup>

<sup>1</sup>*National Institute of Information and Communications Technology, Japan*

<sup>2</sup>*Kyoto-Sangyo University, Kyoto, Japan*

<sup>3</sup>*Chalmers University of Technology, Göteborg, Sweden*

<sup>4</sup>*Chiba University, Japan*

<sup>5</sup>*Toho University, Japan*

<sup>6</sup>*Kyoto University, Kyoto, Japan*

<sup>7</sup>*Japan Aerospace Exploration Agency, Japan*

Spaceborne millimeter and sub-millimeter (SMM) limb sounders have been used for more than 3 decades to probe the middle and upper atmosphere (up to ~100 km). The molecular lines in the thermal emission spectrum are resolved with heterodyne spectrometers, and inverted to obtain the molecular concentration and temperature. It has been demonstrated with the Superconducting-Submillimeter-Wave-Limb-Emission-Sounder (SMILES) that good quality wind information can also be obtained between 30-90 km from the line Doppler shift. Molecules such as H<sub>2</sub>O, CO, O<sub>3</sub>, O<sub>2</sub> and atomic-O are directly measured in their fundamental states and the geophysical information is obtained for day and night conditions. Measurements at TeraHertz (THz) frequencies with new technologies allows to expand and improve the observations in the upper atmosphere up to ~300 km. In this presentation we will summarize the concepts for measuring middle and upper atmospheric wind and temperature with SMM/THz sounders and discuss the results of simulation studies for defining future missions.

Key words: remote sensing, terahertz, SMILES, wind, temperature.

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