

## A ground-based millimeter-wave measurement of mesospheric NO<sub>2</sub> over Atacama, Chile

# Tomoo Nagahama[1]; Akira Mizuno[1]; Hiroyuki Maezawa[2]; Toshihisa Kuwahara[1]; Ryouhei Terada[3]; Yasusuke Kojima[3]

[1] STEL, Nagoya U.; [2] STEL; [3] STEL, Nagoya Univ.

Mesospheric chemical composition largely varies caused by environmental changes of the earth inside and outside. Recent studies reported enhancement of NO<sub>x</sub> and HO<sub>x</sub> and ozone depletion in the polar mesospheric region at a large solar proton event. These suggest that injections of other high energy particles such as a magnetospheric electron also have influence on the chemical composition in the mesosphere. In order to investigate the relationship between the mesospheric chemical composition and space weather, continuous monitoring of the mesospheric minor constituents provides valuable information on it, and we can estimate influences of environmental changes on the mesospheric chemical composition.

For this purpose, we started to monitor mesospheric NO<sub>2</sub> distribution, which is expected to be enhanced at a penetration event of high energy particles, by using a ground-based millimeter-wave radiometer. Because simulation results showed that the intensity of the mesospheric NO<sub>2</sub> emission is estimated as below 50 mK in steady state, we newly developed the radiometer equipped with an SIS mixer receiver and a digital spectrometer, which provides extremely high sensitivity and sufficient frequency resolution. Using this instrument, we tried to measure a NO<sub>2</sub> spectrum at 247.355 GHz at Atacama in Chile (23S, 68W, 4800 m a.s.l.) located under the South Atlantic Anomaly region. We tried to measure the NO<sub>2</sub> emission in nighttime since December of 2008, and have detected its spectrum whose peak intensity is ~50 mK. The obtained spectrum shows a narrow line width, indicating that this NO<sub>2</sub> emission comes from the mesosphere.

In this presentation, we show the instrument features and details of the measurement results over Atacama.