

AAS003-P04

Room: Convention Hall

Time: May 27 17:15-18:45

A ground-based millimeter-wave measurement of stratospheric ClO over Atacama, Chile

Toshihisa Kuwahara^{1*}, Akira Mizuno¹, Tomoo Nagahama¹, Hiroyuki Maezawa¹,
Noriji Toriyama¹, Yasusuke Kojima¹

¹STEL, Nagoya U.

We present the results of measuring the stratospheric chlorine monoxide (ClO) with a millimeter-wave radiometer in Atacama (23S, 68W, Alt. 4800 m), Chile.

The chlorine chemistry plays an essential role in the ozone depletion in the stratosphere, and ClO whose main sources are CFCs is a key molecule to investigate the chlorines chemistry. Therefore, more detailed understanding of ClO behavior based on the observational data obtained by long term monitoring is necessary for more accurate prediction of ozone recovery. For this reason, we started routine measurements of the millimeter-wave spectra to derive the vertical profile of the stratospheric ClO.

In 2004, Solar-Terrestrial Environment Laboratory (STEL) of Nagoya University installed a ground-based millimeter-wave radiometer for detecting a thermal emission line of its rotational transition of ozone and other minor molecules in 200-210 GHz band at Atacama highland in Chile. The instrument is equipped with a superconducting (SIS) mixer whose noise temperature is ~200 K in double sideband at 204 GHz which allow us to obtain good S/N spectra enough to derive the vertical ClO profile between 30 and 70 km in altitude typically with 3 or 4 hours integration. We succeeded detection of the first ClO spectrum at Atacama in December 2007 (Nagahama et al. 2008, this meeting). After that, we developed a new observation system by using digital spectrometer which provides more stable operation and 16-times higher frequency resolution compared with the previous acousto-optical spectrometer. The digital spectrometer has a bandwidth and a frequency resolution of 1 GHz and 60 kHz, respectively.

In this paper, we will overview new features of the observation system, present the observational results of temporal variations of the stratospheric ClO measured in Atacama, Chile during about one month from December 2009 to January 2010, and compare them with the measurements of SMILES and the other satellites.

Keywords: stratosphere, ClO, ground-based millimeter-wave measurement