

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

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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 source is CFCs is a key molecule to investigate the chlorines chemistry. Therefore, it is expected that more accurate prediction of ozone recovery should be based on the observational data obtained by long term monitoring of ClO. For this reason, we started to measure vertical profiles of the stratospheric ClO from its millimeter-wave spectra. Because the intensity of ClO spectrum is much weaker than that of ozone, a high sensitivity receiver system and small opacity in the millimeter-wavelength is strongly required for such a measurements. Atacama highland in a desert area in the northern Chile is one of the most suitable places for ground-based millimeter-wave observations.

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 and an acousto optical spectrometer covering 1 GHz bandwidth. Using this instrument, we observed ClO spectra in 204 GHz band with typically 4 hours integration from August to December 2008.

In this paper, we will present features of the instrument and preliminary results of the temporal variations of the stratospheric ClO measured in Atacama, Chile.