**Japan Geoscience Union Meeting 2011**
(May 22-27 2011 at Makuhari, Chiba, Japan)


AAS020-10 Room:102 Time:May 22 14:30-14:45

# A study of the relationship between polar stratospheric and upper tropospheric clouds

Masashi Kohma[1*], Kaoru Sato[1]

[1]The University of Tokyo, Tokyo, Japan

Occurrence frequency of PSCs (Polar Stratospheric Clouds) is strongly affected by atmospheric waves (Kohma and Sato, 2011). The effects of planetary waves on PSCs around an altitude of 20 km are large, while synoptic-scale waves significantly affect PSCs around 12 km. On the other hand, there are several cases that PSCs at these different altitudes propagate eastward with almost the same velocity, which does not accord with the background zonal wind. This fact suggests that the atmospheric waves control the formation of PSCs in a wide altitude region simultaneously. However, the mechanism remains unclear.

So as to elucidate this mechanism, cloud observations by CALIPSO lidar and reanalysis (ERA-Interim) data are analyzed for the time period of the austral winter of 2008 and boreal winter of 2007/2008.

The effects of atmospheric waves are examined in terms of Ertel's potential vorticity (PV). It is shown that PSCs at 20 km are frequently observed over anticyclonic PV anomaly on the 300 K surface (˜ tropopause height). This fact suggests that atmospheric waves near the tropopause may affect PSCs at 20 km remotely.

Recent studies (Wang et al., 2008, Adhikari et al., 2010) using CALIPSO observations indicated possible connection between PSCs and upper tropospheric clouds (˜ 8 km). However, because of the existence of a weak minimum in the temperature profile around 25 km, the tropopause height tends to be wrongly estimated based on temperature or static stability. It is possible that the "upper tropospheric" clouds are clouds in the lowermost stratosphere. In this talk, the results of detailed analysis from this viewpoint using the tropopause heights defined based on Ertel's potential vorticity will be shown.

Keywords: polar stratospheric clouds, atmoshpheric waves