Statistical analysis on the lower thermospheric winds observed with EISCAT Svalbard radar

Takuo Tsuda[1]; Satonori Nozawa[1]; # Shin-ichiro Oyama[1]; Yasunobu Ogawa[2]; Ryoichi Fujii[3]
[1] STEL, Nagoya Univ; [2] NIPR; [3] Nagoya Univ

Of vital importance is to qualify significance of the magnetospheric forcing (such as the Joule heating and the ion drag) into the polar lower thermospheric wind dynamics, in order to obtain better understanding of the Magnetosphere-Ionosphere-Thermosphere (MIT) coupling process. Several measurements by Incoherent Scatter (IS) radars and Fabry-Perot Interferometers (FPIs) demonstrated neutral winds with speeds exceeding 300 m/s in the polar lower thermosphere during geomagnetically active intervals. The wind speeds are significantly larger than a typical wind speed (less than 200 m/s). This suggests that the magnetospheric forcing generates such high-speed neutral winds. A case study determined contributions of the Joule heating and the ion drag on the generation of a high-speed neutral wind (˜500 m/s, at 118 km), and suggested that the Joule heating was a major important factor. However, general characteristics of the high-speed neutral winds are little known.

In order to investigate general characteristics (e.g., occurrence rate) of the high-speed neutral winds, we have accumulated and analyzed wind data sets (more than 800 hours) obtained during 129 days from 1998 to 2005 with the European Incoherent SCATter (EISCAT) Svalbard Radar (ESR) located in Longyearbyen (78.2 deg N, 16.0 deg E in geographic coordinates, 75.2 deg in invariant latitude). The wind speeds between 100 and 120 km tend to be larger at higher heights. Among the wind data at 117-120 km height, some wind data have speeds of more than 400 m/s, and its occurrence rate is ˜10%, while ˜60% of the data exhibits speeds of less than 200 m/s. The high-speed neutral winds (with speeds of more than 400 m/s) are seen more frequently at dayside in magnetic-local-time (MLT). The high-speed neutral winds are not necessarily found during the strong electric field, while the wind speeds tend to be larger when the electric field is stronger. Based on these results, we will discuss the generation of the high-speed neutral winds in the presentation.