Ep-023 Room: C513 Time: June 6 16:15-16:30

EISCAT Tromsoe and Svalbard radar observations of ion and neutral temperatures

Sawako Maeda[1], Satonori Nozawa[2], Masahiko Sugino[3]

[1] Kyoto Women's Univ., [2] STEL, Nagoya Univ, [3] STEL

From simultaneous measurements of the ion temperature and velocity by the two EISCAT UHF radars at Tromsö and Longyearbyen, a distribution of the E-region neutral temperature over the polar cap and the auroral oval was derived. The neutral temperature at Longyearbyen was mostly higher than that at Tromsö within 04-12UT. In order to study the effects of particle and Joule heating in the dayside ionosphere, the F-region ion temperatures at the two locations were also compared. It was found that the F-region ion temperature at Longyearbyen was much higher than that at Tromsö. The physical mechanism which contributes to the hot polar cap and cool auroral oval will be discussed in terms of the magnetospheric convection and particle precipitation.

By using simultaneous measurements of the ion temperature and velocity by the two EISCAT UHF radars at Tromsoe (69.6N, 19.20E) and Longyearbyen (Svalbard, 78.2N, 16.0E), we analyzed the Common Program 2 (CP2) data between 99 and 113 km height to obtain a distribution of the neutral temperature over the polar cap and the auroral oval. The neutral temperature at Longyearbyen was mostly higher than that at Tromsoe within 04-12UT. The temperature difference between them was about 40 K at 107 km height, and up to 80 K at 113 km height. In order to study the effects of particle and Joule heating in the dayside ionosphere, the ion temperatures up to 300 km height at the two locations were also compared. It was found that the F-region ion temperature at Longyearbyen was much higher than that at Tromsoe. The difference between them was up to 400 K in the pre-noon sector.

The orientation of interplanetary magnetic field (IMF) was such as negative Bx, large positive By and small negative Bz. Although the IMF Bz component was negative, its magnitude was less than 3nT. In such a condition, it is inferred that merging between the IMF and the magnetospheric lobe field lines can affect the magnetospheric convection (Crooker, 1988). Using the AMIE procedure, Knipp et al. (2000) showed that the pattern of magnetospheric convection was a single vortex confined to the polar cap and the Joule heating was also focused above the same latitude when the orientation of the IMF was (Bx <0, By >0, Bz~0). At the same period, the precipitation of electrons in the range around 200 eV, of which the spacial characteristics were common to polar rain, were observed (Anderson et al., 2000). The hot polar cap and cool auroral oval observed by the EISCAT radars may be attributed to the specific IMF orientation and resultant magnetospheric convection pattern and particle precipitation.

References

Crooker, N.U., J. Geophys. Res., vol. 93, p. 7338, 1988.
Knipp, D.J. et al., Geophys. Res. Lett., vol. 27, p.4013, 2000.
Anderson, P.C. et al., Geophys. Res. Lett., vol. 27, p.4021, 2000.