E138-P024 **Room: Poster Session Hall** **Time: May 17**

Electron temperature observation in the lower thermosphere in polar region by the EISCAT radar and the sounding rocket

Kazuhiro Iwamitsu[1]; Takumi Abe[2]; Satonori Nozawa[3]; Yasunobu Ogawa[4]; Ryoichi Fujii[3]

[1] Physics, Tokyo Univ. of Sci.
; [2] ISAS/JAXA; [3] STEL, Nagoya Univ; [4] STE Lab., Nagoya Univ.

The auroral emission is generated by the interaction between electron precipitating from the magnetosphere along the magnetic field lines and the neutrals in the lower thermosphere. However, the quantitative relation between the precipitating energy input and a variation of the local electron temperature as well as the detailed spatial distribution has not well been understood.

A purpose of our study is to investigate the spatial distribution and energy budget of the electron heating associated with the auroral energy input in the lower ionosphere from observations by Langmuir probe on a sounding rocket, the EISCAT radar, and all-sky cameras during the DELTA campaign.

The DELTA campaign aims at understanding the dynamics and energetics of the lower thermosphere in aurora region with collaborative observations by three complementally instruments; the ionospheric sounding rocket, the EISCAT radar, a ground based optional instruments such as a Fabry-Perot interferomater. The sounding rocket was launched from Andoya Rocket Range in Norway, at 0:33:00 UT on 13 December 2004. The EISCAT UHF radar in Tromso, Norway was operated to provide altitude profile of the electron density, the electron temperature, the ion temperature, and the ion velocity during the campaign.

According to the data from the Langmuir probe, the electron temperature increases mainly above 108 km, where the rocket passed at 0:34:40 UT, during its ascent. At one minute before this time (0:33:30 UT), the EISCAT radar observed that the electron temperature increases almost in the same altitude region. However, it should be noted that a transmitting beam of the EISCAT radar was directed toward southeast, and the observed region was very far (above 150 km) from the rocket position. The all-sky camera on the ground in Kilpisjarvi detected auroral arc, although the emission locally existed. It should be necessary to investigate why the similar temperature structure is observed in such distant places.

On the sounding rocket, the APD (auroral particle detector) identified an enhancement of the precipitating electron flux simultaneously with the electron temperature increase. In general, it is thought to be difficult to that the precipitating electrons locally heats thermal electron below 120 km altitude in the lower thermosphere. In contrast, no increases of the ion temperature were identified at the same altitude (~108 km) by the EISCAT radar. Therefore, it is suggested that Joule heating is unlikely responsible for the electron heating but the heating process related to the plasma instability may influence the electron temperature.

According to the data from sounding rocket during the rocket's descent, there is a slight increase in the electron temperature at altitude between 114 km and 118 km. Since it is not easy to explain such a temperature increase only in this altitude region, it may be possible that the temperature variation exists not in the vertical but in the horizontal direction, i.e., it is due to the horizontal movement of the rocket. A comparison of the rocket and the EISCAT radar observations during the rocket's descent suggests that the ion temperature is higher than the electron temperature. The fact that there exists no auroral emission in the direction of the EISCAT radar beam according to the all-sky camera may indicate that the electron precipitation is unlikely the cause of the electron temperature increase. An increase of the electric field observed by the EISCAT radar may suggest the possibility that Joule heating is responsible for the change in the temperature structure.