An EISCAT radar observation of the dayside F-region ion heating in response to an IMF disturbance 1

Sawako Maeda[1]; Yasunobu Ogawa[2]; Satonori Nozawa[3]; Takuo Tsuda[4]; Asgeir Brekke[5]; Shigeto Watanabe[6]; Hiroshi Miyaoka[7]

[1] Kyoto Women's Univ.; [2] NIPR; [3] STEL, Nagoya Univ; [4] Particle and Astrophysical Sci.,Nagoya Univ; [5] The Auroral Observatory; [6] Earth and Planetary Sci., Hokkaido Univ; [7] National Inst. Polar Res.

The ion velocity and temperature show characteristic horizontal structures in the region of the day-side polar cap boundary depending on the IMF condition and geomagnetic activity. The EISCAT radars, however, are not located at the geomagnetic latitudes of about 70 degree. Hence it is not easy to measure the ionospheric parameters around the boundary.

The F-region ion temperature at about 70 degree geomagnetic latitude was measured by using the EISCAT-UHF radar and the ESR in August 19-20, 2006. The beams of the two radars had large aspect angles pointed toward the north and the south from Tromsoe and Longyearbyn, respectively in order to measure the ion temperature in a same scattering volume. On August 19, the line-of sight ion temperature at about 320 km height was elevated by about 1000 K in response to an IMF disturbance. The temperature increase at about 390 km seemed to be more than 2000 K. We reported preliminary results at the Fall SGEPSS meeting in 2006. By using the two line-of sight ion temperatures measured by the UHF radar and the ESR, the two components of the ion temperature parallel and perpendicular to the local geomagnetic filed and the resultant mean ion temperature are derived. The ion frictional heating is also calculated using the measured ion velocity and the modeled neutral velocity estimated from the HWM. The time variations of the mean ion temperature will be discussed in terms of the ion frictional heating. The ionospheric parameters such as temperature and velocity are obtained from the power spectra of scattered radio waves with a certain integration time. In order to examine how to extent the derived parameters are reliable, we have analyzed the data with various integration times from 1 to 20 minutes. The results will be also discussed.