Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

PEM28-09 Room:302 Time:May 23 11:15-11:30

Solar zenith angle dependence of tweek reflection height during magnetically quiet time and magnetic storms

Hiroyo Ohya[1*], Kazuo Shiokawa[2], Yoshizumi Miyoshi[2]

[1]Graduate School of Engineering, Chiba Univeristy, [2]Solar-Terrestrial Environment Laboratory, Nagoya Univeristy

Reflection height of tweek atmospherics is an indicator of the height of the ionospheric D-layer. Variations in tweek reflection height through the day-night boundary at Antarctic station were reported by Saini and Gwal (2010). The tweek reflection height gradually varied from 64 km to 79 km at Indian Maitri station in Antarctica through three months (January-March) in both 2003 and 2005, showing variations of the tweek reflection height under the midnight sun at polar region. The descent (rise) of the reflection height corresponds to increase (decrease) in electron density in the ionospheric D- and lower E-regions. Singh et al. (2011) reported the variations of the tweek reflection height observed in India during a solar eclipse of 22 July, 2009, which occurred just after sunrise. The tweek reflection height decreased from about 94 km to 90 km during the sunrise. However, solar zenith angle dependence of the tweek reflection height has not been studied statistically. In this study, we statistically investigate the solar zenith angle dependence of the tweek reflection height, using long-term tweek data of 1976-2010 during magnetically quiet time, and for 7 major magnetic storms occurred in 1978 - 1999. We pick up major magnetic storms with the Dst minimum of less than -200 nT to know the difference between the storm time and quiet time. The tweek reflection height in the magnetically quiet time rises from about 88 km to 96 km with increasing the solar zenith angle from 80 degrees to 105 degrees. In the solar zenith angle range of 105 - 170 degrees, the tweek reflection height keeps at the height of 96 km. This shows that the tweek reflection height under the sunset/sunrise condition is lower than that in complete nighttime, indicating the increase in the electron density in the lower ionosphere due to the sunset/sunrise. The tweek reflection height during the magnetic storms also shows similar solar zenith angle dependence with that in magnetically quiet time. However, the tweek reflection height during magnetic storms is systematically entirely lower by about 2 km than that during magnetically quiet time. This shows the electron density increase during magnetic storms.