AOGS 2006
©2006 Asia Oceania Geosciences Society, Singapore

High-Spatial Monitoring of the Mass Density Along Field Lines (L ∼ 6) by Ground-Based Magnetometers at Geomagnetically Conjugate Points

SATOKO TAKASAKI[1], NATSUO SATO[1], AKIRA KADOKURA[1], YUSUKE EBIHARA[1], HISAO YAMAGISHI[1]

[1] *National Institute of Polar Research, Japan*

Continuous monitoring with high-spatial resolution of the magnetospheric plasma density is important to understand physical mechanisms of time-dependent phenomena, such as the effects of magnetic storms on perturbations of the magnetospheric plasma density. The mass density along the geomagnetic field line can be inferred from the observed field-line eigenfrequency (i.e., the frequency of FLR), if appropriate models of the magnetic field and the field-aligned magnetospheric mass density distribution are assumed. Ground magnetometers can continuously observe FLRs for daylight hours; hence, FLRs observed on the ground are useful for monitoring the magnetospheric mass density in the dayside magnetosphere. To investigate the magnetospheric mass density distribution at high-latitudes, we analyzed the data from four Antarctic stations together with the geomagnetically conjugate station, Tjornes in Iceland (mlat.66.53, mlong. 72.30). The four magnetometers including the one at Syowa station in Antarctica (mlat.-66.25, mlong.71.62) formed a square of 100 ∼ 150 km. In the coherence and phase analyses of geomagnetic pulsations, broadband noises with the period of 15 - 1000 sec were presented over the Antarctic stations, and the signature of FLRs were lost among the noises. On the other hand, interhemispheric coherence analysis could filter out the broadband noises, and thus we could identify the resonance structure and determine the eigenfrequencies of the field lines between each station pairs. We infer that, in each hemisphere, broad ionospheric electrojets flowed in the ionosphere, and their temporal and spatial variations caused the broadband noises. Coherence and phase analyses such as this study will be useful to monitor the eigenfrequencies of the magnetospheric field lines and infer the equatorial mass density with a high resolutions (dL ∼ 0.01 - 0.23) in the auroral zones. Furthermore, we estimated the equatorial mass densities along field lines from the identified eigenfrequencies. We will show the estimated densities and discuss the magnetospheric plasma distribution.