



Solar Wind Plasma/Particle Entry into the magnetosphere during quiet times and its Related Auroral activities

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During quiet times when the interplanetary magnetic field (IMF) is northward, using Cluster multi-spacecraft observation between August to October each year from 2002 to 2004, Shi, et al. [2013] reported an unexpected discovery observation of regions of solar wind entry into the Earth's high-latitude magnetospheric lobes where the solar wind plasmas may penetrate into magnetosphere through the mechanism of high-latitude magnetic reconnection. From statistical analysis, they found that the IMF B_x component may influence the solar wind entry into the magnetosphere by changing the occurring conditions of high-latitude magnetic reconnection. Based on their studies, in this paper we use another period Cluster data which is between January to April each year from 2001 to 2006 to do a further study. As a result, the influence of the IMF B_x component is consistent with the results from [Shi, et al. 2013]. We find that the IMF B_y component influenced affects the events along with the IMF B_x component, which is consistent with the Parker Spiral of the IMF.

We also present some transpolar arc observations occurring in correlation with the solar wind entry events. The properties of entry plasma, electron and ion properties associated with aurorae and correlations with IMF conditions are examined using multiple spacecraft data (Cluster, TIMED, DMSP, IMAGE, POLAR). The time evolution and asymmetries between two hemispheres for these transpolar arcs are studied as well.

Using multi satellite, we have studied the geospace effect of the solar electron release. In several events, the electron flux enhanced in different regions of the magnetosphere after some solar electrons arrived at the vicinity of the earth. The entry mechanism of these high energy electrons is discussed.