Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

PEM024-P05 Room: Convention Hall Time: May 25 17:15-18:45

Tracing geomagnetic conjugate points during a substorm development reproduced by a global MHD simulation

Satoko Saita[1*], Akira Kadokura[2], Natsuo Sato[2], Shigeru Fujita[3], Takashi Tanaka[4], Yusuke Ebihara[5], Ken T. Murata[6], Daisuke Matsuoka[7], Genta Ueno[8], Asanobu Kitamoto[9]

[1]TRIC, [2]National Institute of Polar Research, [3]Meteorological College, [4]Kyushu University, [5]Institute for Adv. Res., Nagoya Univ., [6]NiCT, [7]JAMSTEC/ESC, [8]ISM, [9]NII

It is generally considered that the auroral particle guided along the geomagnetic field lines falls to Earth's atmosphere. Thus we can expect that nightside auroras appear simultaneously at both the conjugate points. However, simultaneous auroral observations at the conjugate points have not always show that auroral features may not always be conjugate.
Previous observations [e.g., Sato et al., 1998; Ostgaard et al., 2005] have shown that the interplanetary magnetic field (IMF) penetrates the magnetotail and that IMF orientation affects the location of the nightside aurora. Ostgaard et al. [2005] have demonstrated that IMF orientation acts as the main controlling factor of the relative displacement of the aurora in the conjugate hemispheres on the statistical basis. Comparing their results with the displacement predicted by empirical magnetospheric models (T96, & T02), these models have provided a strong observational support, but underestimated this effect by an order of magnitude. The distortion of the magnetospheric magnetic field line geometry by the penetrated IMF By is inversely proportional to the strength of the ambient geomagnetic field. The geomagnetic field lines extended from active auroral arc are most likely mapped into the transient regions of low magnetic field. These transient and spatially localized substorm-related depressions of B are not adequately reproduced by these empirical models.
In this study, we studied relative displacements of geomagnetic conjugate points during a course of substorm reproduced by southward IMF in a global MHD simulation model. A case study for the penetrated IMF By shows that drastic displacements of geomagnetic conjugate points occur during the development of the substorm onset.

Keywords: aurora, substorm, 3-D visualization, MHD simulation, geomagnetic conjugate point, magnetosphere