Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

PEM37-P06 Room:Poster Time:April 30 18:15-19:30

Energy dispersion and trajectory of particles injected from the magnetotail in magnetospheric quiet conditions

YAMAUCHI, Satoko[1*] ; NAGAI, Tsugunobu[2]

[1]Tokyo Institute of Technology, [2]Tokyo Insutitute of Technology

Particle injection is sudden enhancement in flux of energetic charged particles, commonly observed at geosynchronous orbit ($6.6R_E$), and associated with magnetospheric substorms. Since 2007, dispersive particle injections have been observed in the further dawnside of the magnetosphere ($>10R_E$) than geosynchronous orbit in quiet conditions with the spacecraft Geotail and THEMIS. Although only electron injections are observed in most cases, both electron and ion injections are observed in some cases. The injected population displays energy dispersion in which more energetic particles arrive at a given location earlier than less energetic particles. This dispersion occurs because of energy dependence of particle drift in the magnetospheric magnetic field. In order to investigate the time delay, we have calculated electron trajectories in the inner magnetosphere. We assume that the magnetospheric magnetic field is a simple dipole and the magnetospheric electric field is sum of a convection electric field and a corotation electric field, and obtain the particle trajectories in the equatorial plane using particle drift velocity. We find that the time delay is related to the intensity of the convection electric field. The simulations and observations show that electrons drift from the nightside through the dawnside to the dayside while ions drift from the nightside through the duskside to dayside. However, in the range given by the dipole field, it is not possible to explain the energy dispersion as observed. The shape of the magnetic field is different from the magnetic dipole in the magnetic tail region because the magnetosphere is stretched by the solar wind. In order to provide a more realistic magnetic field model in the magnetosphere, we use the Tsyganenko model that is an empirical magnetic field model of the magnetosphere. In this study, multi-satellite observations and test particle simulations are carried out to explore mechanisms in energization and transport of electrons in the quiet magnetosphere.

Keywords: magnetosphere, perticle injection, energy dispersive, Tsyganenko, quiet condition, trajectory