Enhancement of 10MeV protons associated with a change of magnetic field configuration at geosynchronous orbit

*Takahiro Obara[1]

1. Planetary Plasma and Atmospheric Research Center,Tohoku University

It was found that 10MeV proton flux enhanced at geosynchronous orbit during the thinning of the magnetic field configuration. Since no significant enhancement of 10MeV proton flux was observed outside of the magnetosphere, the 10MeV protons seem to be of magnetospheric origin. Drastic decrease of 2MeV electron flux was observed at the geosynchronous orbit when the thinning of the magnetic field commenced. The 2MeV electron flux recovered when the dipolarization of the magnetic field occurred, while 10MeV proton flux remained almost constant. Three hours before the increase of 10MeV protons, shock structure of the solar wind hit the Earth’ s magnetosphere. At that time, increase of 6.5MeV protons was observed at geosynchronous orbit. Low energy (1~10MeV) protons are thought to be produced by the interaction of the solar wind shock and the magnetopause (Shimazu and Tanaka, 2005). In this event, only 6.5 MeV protons could reach geosynchronous orbit just after the production. Due to the thinning of the magnetic field configuration, 10MeV protons could then reach geosynchronous orbit. Low energy (1~10MeV) protons will be probes of the magnetosphere configuration weather the magnetosphere is truly quiet when the first protons (6.5MeV protons) arrive at geosynchronous orbit altitude and time delay of second protons (10MeV protons) was accompanied by the magnetic field changes in the magnetosphere. This type of event will be interesting from the view of the magnetosphere configuration change during the solar wind shock arrival. We are collecting more events to confirm above mentioned scenario.

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