Ring current electron behaviour during a magnetic disturbance

Satoshi Kasahara[1]; Shinsuke Imada[2]; Yukinaga Miyashita[3]; Hiroshi Hasegawa[3]; Yoshizumi Miyoshi[4]; Yusuke Ebihara[5]; Masaki Fujimoto[6]; Elizabeth A. Lucek[7]; Christopher J. Owen[8]

[1] Earth and Planetary Sci., The Univ. of Tokyo; [2] none; [3] ISAS/JAXA; [4] STEL, Nagoya Univ.; [5] Nagoua Univ., IAR; [6] ISAS, JAXA; [7] Imperial Coll.; [8] MSSL, Univ. Coll. London

It is well known that charged particle fluxes in the Earth's inner magnetosphere significantly change during geomagnetic disturbances. Many intensive studies have been made to clarify acceleration and loss mechanisms for ring current ions and radiation belt relativistic electrons in particular. However, there are only a limited number of researches on the dynamics of ring current electrons with energies of a few keV up to several hundreds of keV; temporal variations of the spatial distribution of ring current electrons are poorly understood, particularly for the near-equatorial region of L=4-7. In the present study we have analysed medium-energy electron (30-400keV) data obtained by Cluster/RAPID; the Cluster satellites have a polar orbit and pass the equatorial region with a perigee of L˜4. We have investigated temporal changes of the spatial distribution of ring current electrons, by making use of successive passages through the same L regions with time delays of a few to tens of minutes. Hear we focused our examination on the period from 22 UT on 19 July to 08 UT on 20 July 2002, during which flux changes were clearly observed by the Cluster satellites. In this event, LANL satellites observed successive flux enhancements. The maximum Kp value was 4+, and the minimum value of SYM-H ˜-50 nT was seen at ˜0130 UT. We discuss a flux enhancement of ring current electrons at L=5 that occurred at about 04 UT on 20 July prior to that in outer L regions. We also present a whistler hiss enhancement and associated electron pitch angle scattering on a time scale of ten minutes. In addition, we show the electron energy density in an energy range of 30-400 keV, in which rapid enhancement by a factor of ˜2 in less than two hours can bee seen.