Geophysical Research Abstracts
Vol. 15, EGU2013-1999, 2013
EGU General Assembly 2013

Links between the plasmapause and the radiation belts boundaries as observed by the instruments CIS, RAPID and WHISPER onboard Cluster

Fabien Darrouzet (1), Viviane Pierrard (1,2), Sylvie Benck (2), Guillaume Lointier (3), Juan Cabrera (2), Kris Borremans (1), and Natalia Ganushkina (4)

(1) Belgian Institute for Space Aeronomy (IASB-BIRA), Brussels, Belgium (fabien.darrouzet@oma.be, +32-2-374.84.23), (2) Center for Space Radiations (CSR), Louvain-la-Neuve, Belgium, (3) Laboratoire de Physique et Chimie de l'Environnement et de l'Espace (LPC2E), Orléans, France, (4) Finnish Meteorological Institute (FMI), Helsinki, Finland

In the present work, we study the relations between the position of the plasmapause and the position of the radiation belts boundaries. The Cluster mission gives the exceptional opportunity to analyze with the same spacecraft those different regions of the inner magnetosphere. We compare the positions of the radiation belts edges deduced from CIS observations (electrons with energy > 2 MeV) taken onboard Cluster with the positions of the plasmapause derived from WHISPER data (electron plasma frequency) measured onboard Cluster. In addition, we compare those results with the edges positions determined from RAPID observations (electrons with energy between 244.1 and 406.5 keV) taken onboard Cluster. The period of 1 April 2007 to 31 March 2009 has been chosen for the analysis because at that time Cluster was located at lower radial distances than during the earlier part of the mission. The perigee was then as close as 2 R_E, deep inside the plasmasphere and the radiation belts. This time period corresponds to a long solar minimum activity. Differences are observed between the two datasets of radiation belt boundaries positions obtained from the two different instruments: The radiation belt positions are related to the energy bands. The results show that the plasmapause is more variable than the radiation belt boundaries, especially during small geomagnetic activity enhancements. A correspondence is observed between the plasmapause position determined by WHISPER and the outer edge of the outer radiation belt of energetic electrons (> 2 MeV) observed by CIS. This result is unexpected since previous studies based on other spacecraft observations indicated more a correlation between the inner edge of the outer belt and the plasmapause. However, during higher geomagnetic activity time periods, the plasmapause is located closer to the inner boundary of the outer radiation belt. Also, the thickness of the slot region is found to follow the global evolution of the geomagnetic activity.