Geophysical Research Abstracts
Vol. 15, EGU2013-9007-1, 2013
EGU General Assembly 2013

Structure Of The Plasma Depletion Layer: Statistical Results From Multispacecraft

Aysegul Ceren Moral (1), Zerefsan Kaymaz (1), Filiz Turk Katicioglu (1), and David Sibeck (2)

(1) Istanbul Techcnial University, Faculty of Aeronautics and Astronautics, Maslak, Istanbul, TR, (2) NASA/GSFC Space Weather Laboratory, Greebelt, MD, US

Plasma depletion layer (PDL) is a region on the sunward side of the magnetopause boundary where the magnetic field strength increases while plasma density decreases. Often it is detected at the subsolar magnetopause. As it modifies the solar wind flow and magnetic field input at the magnetopause boundary, its presence is important in space weather modeling studies. It is known to occur during the northward IMF orientations. Searching through 4 years of data from several spacecraft including Interball, Cluster, Themis B and C covering both high and low latitudes of the dayside magnetosphere, we detected 25 clear PDL crossings. We looked for the decreased density and increased magnetic field signatures just in front of the magnetopause. It is often very difficulty to distinguish PDL from LLBL. We used energetic particle observations in addition to the plasma and magnetic field data. We determined 30 PDL cases. We investigated PDL characteristics, i.e. thickness, spatial occurrence etc, depending on latitude, shear angle, plasma beta, as well as the solar wind and IMF orientation. Out of 30 cases, we have seen only two cases occurred during the southward IMF. More PDL crossings were detected during the low shear angles and at low latitudes. Determining the thickness of the PDL is a challenging process owing to both magnetopause and spacecraft motion while within the PDL. Preliminary results show the thickness of the PDL events seems to increase towards the higher latitudes, which is also reported in the literature. In some of the cases, out-of-phase variations in density and magnetic field were found indicating wave activity within PDL. These cases also exhibit presence of high energetic particles within the PDL. In this study, based on the 30 PL cases, we will present our statistical results on the flow and field structure of PDL, its characteristics and their dependence on IMF. We will particularly focus on the wave structure and energetic particle presence in PDL and their significance on the interaction with the magnetopause.