Geophysical Research Abstracts, Vol. 9, 04793, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04793

Internal and external control of shock-induced flux closure in the Earth magnetosphere: a statistical study.

B. Hubert(1), M. Meurant(1,2), C. Blockx(1), J.-C. Gérard(1), S.E. Milan(3), A. Grocott(3), S.W.H. Cowley(3)

(1) University of Liège, Belgium (2) University of Calgary , Canada (3) University of Leicester, UK (contact: B.Hubert@ulg.ac.be)

The Imager for Magnetopause to Aurora Global Exploration (IMAGE) spacecraft was launched in 2000 with several imaging instruments onboard. The Far UltraViolet (FUV) experiment imaged the N2 LBH (Wideband Imaging Camera - WIC-), OI 135.6 nm (Spectrographic Imager -SI13-) and Doppler-shifted Lyman alpha auroral emission (SI12). The Doppler-shifted Lyman-alpha emission allows to monitor the auroral oval both on the day and night sides. Remote sensing of the polar aurora is completed by ground based data of the Super Dual Auroral Radar Network (SuperDARN) that monitors the ionospheric convection flow pattern in the polar region. In the present study, SI12 images are used to estimate the open/closed (o/c) field line boundary location, and monitor its movement. The SuperDARN data are used to compute the electric field of the polar cap at the location of the o/c boundary. The total electric field is then computed along the boundary accounting for its movement applying Faraday's law, so that the dayside and nightside reconnection voltages can be retrieved. This procedure is applied to a set of interplanetary shocks, and the shock-induced flux closure is studied from a statistical basis in correlation with the solar wind (SW) properties. The solar wind data are from the ACE satellite and used to retrieve the classical SW properties (v, n, dynamic P, B etc) as well as the geometry of the magnetosphere (magnetopause radius, shock standoff distance) using the model of Petrinec and Russel. The arrival of IP shocks, including weak ones, is identified by the Dayside Subauroral Proton Flash that they produce, observed in the SI12 images. Goes-8 magnetometer data are used to relate the flux closure and the magnetic field dipolarization. It is found that IP shocks play a triggering role for the shock-induced flux closure. Its magnitude is mainly controlled by the properties of the magneto-

sphere: the amount of open flux accumulated by the system prior to the shock arrival, and its geometry, i.e. the radius of the magnetopause. This suggests that the efficiency of the interaction between the solar wind and the magnetosphere depends on the size of the cross section of the magnetosphere exposed to the solar wind.