Geophysical Research Abstracts, Vol. 7, 08731, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08731

Multi-instrument Case Study of Interchanging Flux Tubes Within the Saturnian Inner Magnetosphere

N. André (1), P. Louarn(1), T. W. Hill(2), M. K. Dougherty(3), C. T. Russell(4), J. S. Leisner(4), M. Blanc(1), F. J. Crary(5), W. S. Kurth(6), M. F. Thomsen(7), K. K. Khurana (4), A. M. Rymer (8), A. J. Coates(8), I. Dandouras (1), N. Krupp (9), D. A. Gurnett(6), S. M. Krimigis(10) and D. T. Young (5)

(1) CESR/CNRS, 9 AV. Colonel Roche, TOULOUSE, F-31028 France(nicolas.andre@cesr.fr)

(2) Rice University, MS 108, Houston, TX 77005 United States

(3) The Blackett Laboratory, Imperial College, London, SW7 2BZ United Kingdom

(4) Institute of Geophysics and Planetary Physics, UCLA, Los Angeles, CA 90095 United States

(5) Southwest Research Institute, P. O. Drawer 28510, San Antonio, TX 78228-0510 United States

(6) University of Iowa, Dept. of physics and Astronomy, Iowa city, 52242 United States

(7) Los Alamos National Laboratory, MS D466, Los Alamos, NM 87545 United States

(8) Mullard Space Science Laboratory, Holmbury St. Mary, Dorking, Sur RH5 6NT United Kingdom

(9) Max Planck Institute, Max Planck Str., Lindau, 37191 Germany

(10) APL, John Hopkins University, Laurel, 20723 United States

The Cassini magnetometers reveal a very dynamic plasmasphere within the inner Saturnian magnetosphere during the first three orbits of the orbital tour. This corotation-dominated region is made up of various neutral and plasma populations, and Voyager observations suggest that radial transport redistributes the plasma created locally out to the remote magnetospheric regions, by a mechanism yet to be identified.

We report anomalous magnetic signatures inside 8 Saturn radii observed on Octo-

ber 28^{th} between 1830 and 2000 UT that may participate in this radial transport and that seem to be consistent with signatures of interchanging flux tubes. These unusual events are characterized in the magnetometer (MAG) data by sharp boundaries and abrupt enhancements of the magnetic pressure. We interpret these magnetic field observations as being signatures of depleted flux tubes missing some plasma energy density and mass content compared to their surroundings, and consequently floating inwards to return to the inner magnetosphere the magnetic flux carried outwards by mass-loaded flux tubes.

We will perform a detailed case study of these events using the unique capabilities of the Magnetosphere and Plasma Science instrument suite including the Cassini Plasma Spectrometer (CAPS), the Radio and Plasma Wave Science instrument (RPWS) and the Magnetospheric Imaging Instrument (MIMI) in order to confirm our interpretation. We will also discuss their similarities with previously identified signatures of interchanging flux tubes near the Io torus by the Galileo spacecraft, in the context of plasma transport in giant planet magnetospheres.