Geophysical Research Abstracts, Vol. 9, 06202, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06202

Plasma pressure in Saturn's magnetosphere dominated by energetic ($>$ 10 keV) ions

N. Sergis (1), S.M. Krimigis (1,2), D.G. Mitchell (2), D.C. Hamilton (3), N. Krupp (4), and M. Dougherty (5)

(1) Office of Space Science and Technology, Academy of Athens, Athens, Greece, (2) Applied Physics Laboratory, Johns Hopkins University, Laurel, MD, USA, (3) University of Maryland, Department of Physics, College Park, MD, USA, (4) Max-Planck-Institut für Sonnensystemforschung, Lindau, Germany, (5) Space and Atmospheric Physics Group, Imperial College, London, UK

The Magnetospheric Imaging Instrument (MIMI) on the Cassini spacecraft performed comprehensive measurements of the energetic ion population within the magnetosphere of the planet since July 1, 2004. Observations of energetic ion directional intensities, energy spectra and ion composition were provided by the Charge-Energy-Mass-Spectrometer (CHEMS) over the range $\sim$3 to 220 keV per charge and by the Low Energy Magnetospheric Measurements System (LEMMS) that measures ions in the range 0.024 $< E <$18 MeV. We use energetic particle pressure distribution over the Saturnian magnetosphere and compare it to the magnetic pressure provided by the MAG sensor. A set of 11 equatorial plane passes (revolutions 15 to 25) and 15 non equatorial plane passes (revolutions 16 to 40), is utilized, providing an almost uniform local time coverage within a 5$<$L$<$20 region. Our study reveals: (1) the existence of a planetary ring current between L$\approx$8 and L$\approx$15; (2) the vertical extent of the Saturnian plasma sheet to be a thick layer of $\pm$ 5 to 6 R_S; (3) the ring current beta to be $\sim$ 1, with some dependence on local time; (4) the particle pressure to be dominated by the energetic (E$>$10 keV) particle population, rather than the denser cold plasma and (5) the pressure to be mostly due to O^+ ions whenever beta is $>$ 1. The results will be presented and discussed in the context of current models.