Geophysical Research Abstracts, Vol. 9, 01693, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01693

Rotational dynamics of the Jovian magnetosphere

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Jupiter's strong magnetic field, combined with its rotation and the mass addition due to the moon Io result in a magnetosphere that is strongly dominated by the planet's rotation and the energy that the rotation ultimately deposits into the magnetosphere. Recent simulations using our 3D global magnetohydrodynamic (MHD) model of the Jovian magnetosphere have shown that under some conditions a density and pressure pulse may be launched at the equator near dawn and that this pulse steepens into a discontinuity as it propagates upward along the flux tube toward the ionosphere. In the frame of the convecting flux tube, the tube sees the magnetopause rushing radial inward at dawn and this compression launches the "pulse." The propagation time of the pulse in part determines the time for information about the inward moving magnetopause to propagate to the inner magnetosphere. We will discuss implication and examples of this phenomenon.