EPSC Abstracts
Vol. 5, EPSC2010-509, 2010
European Planetary Science Congress 2010

Solar cycle effects on the dynamics of Jupiter's and Saturn's magnetospheres

C.M. Jackman (1), C.S. Arridge (2)
(1) Imperial College London, UK, (2) Mullard Space Science Laboratory, UK (c.jackman@imperial.ac.uk / Fax: +44-207-5947772)

Abstract

The giant planetary magnetospheres surrounding Jupiter and Saturn respond in quite different ways, compared to Earth, to changes in upstream solar wind conditions. Spacecraft have visited Jupiter and Saturn during both solar cycle minima and maxima. In this paper we explore the large-scale structure of the IMF upstream of Saturn and Jupiter as a function of solar cycle, deduced from solar wind observations by spacecraft and from models. We show the distributions of solar wind dynamic pressure and IMF azimuthal and meridional angles, as well as heliospheric flux content over the changing solar cycle conditions, detailing how they compare to Parker predictions and to our general understanding of expected heliospheric structure at 5 and 9 AU.
We explore how Jupiter's and Saturn's magnetospheric dynamics respond to varying solar wind driving over a solar cycle under varying Mach number regimes, and consider how changing dayside coupling can have a direct effect on the nightside magnetospheric response. We also address how solar UV flux variability over a solar cycle influences the plasma and neutral torii in the inner magnetospheres of Jupiter and Saturn, and estimate the solar cycle effects on internally-driven magnetospheric dynamics. We conclude by commenting on the effects of the solar cycle in the release of heavy ion plasma into the heliosphere, ultimately derived from the moons of Jupiter and Saturn.