Geophysical Research Abstracts
Vol. 12, EGU2010-14150, 2010
EGU General Assembly 2010

Saturn's Current Sheet Structure as a Function of Solar Wind Dynamic Pressure and Season (Axial Tilt)

Kenneth Hansen (1), Bertalan Zieger (1,2), Xianzhe Jia (1), and Tamas Gombosi (1)

(1) University of Michigan, CSEM, Ann Arbor, MI, United States (kenhan@umich.edu), (2) Institut für Weltraumforschungm Graz, Austria

We present a model of Saturn's current sheet which have been developed using the results of our global, 3D MHD simulations of the magnetosphere. Our global MHD model self consistently treats the entire magnetosphere and includes magnetospheric plasma sources from a major disk-like source from Enceladus and the rings and a secondary toroidal plasma source from Titan. The model produces solutions which are not constrained to be symmetric therefore the results are quite useful in trying to extend previous models that have been generated using Cassini data. Because we can carefully control the inputs to our MHD model, we do not have to worry about separating variations due to local time, varying upstream conditions, spacecraft motion or changes in the mass loading rate that often make interpreting the data complicated. To generate our model of the current sheet, we begin by performing a series of steady states runs of the global model. To date we have more than 15 runs using different upstream dynamic pressures, axial tilts (corresponding to different Saturn seasons), upstream magnetic field orientation and internal mass loading rates. From each of these simulations we extract the current sheet surface (Br = 0) every hour during a minimum of 100 hours. We find that the current sheet shows the "bowl-like" behavior expect at most local times. However, at dusk, the current sheet is often quite warped. Initial fits to axisymmetric current sheet models [Arridge (JGR, 2008)] result in a fit to the hinging distance as a function of solar wind dynamic pressure that has a minimum of ∼15 Rs at very high dynamic pressure and can be as large as ∼35 Rs for very low dynamic pressures. The value we find for average solar wind dynamic pressures (0.012 nPa) of ∼22-23 Rs is comparable to, but lower than the Arridge result of 29 Rs. We have experimented with various non-axisymmetric models and will present results from these as well.