Geophysical Research Abstracts
Vol. 15, EGU2013-1722-2, 2013
EGU General Assembly 2013

What Controls the Configuration of the Titan Ionospheric Magnetic Field

Hanying Wei (1), Yingjuan Ma (1), Christopher Russell (1), and Michele Dougherty (2)

(1) Dept of Earth and Space Science, Univ of California Los Angeles, Earth and Space Science, UCLA, Los Angeles, United States (hwei@igpp.ucla.edu), (2) Imperial College, The Blackett Lab., Dept. of Physics, London, SW72BZ, UK

Titan does not have a significant intrinsic magnetic field, but it has a dense atmosphere which interacts with the sub-corotating plasma in the Saturnian magnetosphere. During the interaction, the upstream plasma flow slows down and diverts around Titan, and the magnetic field slowly diffuses into Titan's ionosphere and induces currents in the ionosphere. The resulting field pattern is that, upstream field lines drape around Titan, and downstream field lines stretch into a tail. We investigate whether such a draping-field pattern is present statistically in all eight years of Cassini Titan flyby data, to answer the question, How well can a steady-state model predict the observations? We find that the high-altitude field (above 1200 km altitudes) agrees with the draping-field picture and can be well-ordered by the current upstream conditions; however, the low-altitude (below 1200 km altitudes) field does not. Due to the time-variability of upstream conditions, coupling between the neutral and ionized components of the atmosphere, and the long magnetic-diffusion time scale at low altitudes, the magnetic field at these altitudes has a complex pattern and may not be due to the "current" upstream condition but a "previous" upstream condition. We use MHD models to simulate the Titan interaction with varying upstream conditions and Titan scales of fields at high and low altitudes. This paper presents the results from these observations and simulations.