Geophysical Research Abstracts
Vol. 15, EGU2013-3509, 2013
EGU General Assembly 2013

Saturnian Local Time Effects in Titan's Interaction- A multi-fluid MHD study

Yingjuan Ma (1), Chris Russell (1), Andrew Nagy (2), Gabor Toth (2), Michele Dougherty (3), and Tom Cravens (4)

(1) Institute of Geophysics and Planetary Physics, UCLA, Los Angeles, CA, 90095, United States, (2) Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, Ann Arbor, MI, 48109, United States, (3) Space and Atmospheric Physics Group, Imperial College London, The Blackett Laboratory, London, SW7 2AZ, United Kingdom, (4) Department of Physics and Astronomy, University of Kansas, 1251 Wescoe Hall Dr., Lawrence, KS, 66045, United States

We use a multi-fluid MHD model to study the effects of Saturnian Local Time(SLT). The multi-fluid model improves the previously used 7-species single-fluid MHD model by solving the density, velocity and pressure equations for each of the seven ion fluids. This model allows the motion of the different ion fluids to be decoupled. The model is first applied to an idealized case and the results are compared in detail with that of the 7-species single-fluid MHD model to illustrate the importance of the multi-fluid effects. Simulation results show that the multi-fluid model is able to reproduce asymmetric results along the convection electric field direction. The velocities patterns are different for different mass ion fluids. The heavier the ion is, the more significant is the flow along the convection electric field direction. Also the multi-fluid MHD model predicts that more heavy ions are escaping from the satellite as compared with the single-fluid model. We also apply the model to test the effects of SLT and find that the escaping fluxes of heavy ions vary significantly with SLT.