Geophysical Research Abstracts,
Vol. 11, EGU2009-10447, 2009
EGU General Assembly 2009

On the possible formation of Alfvén wings at Mercury during encounters with Coronal Mass Ejections

M. Sarantos and J. A. Slavin
Heliophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD, USA (menelaos.sarantos-1@nasa.gov)

The solar wind conditions near Mercury's perihelion, especially during Interplanetary Coronal Mass Ejection (ICME) events, will often be characterized by very low Alfvén Mach number (≤ 3). We suggest that the low Mach numbers and large north-south magnetic fields during ICMEs will lead to the formation of "Alfvén wings" that will affect the configuration of the Hermean magnetosphere. It is shown that an electrical conductance threshold of about 5 S, comparable to the Alfvén conductance in the solar wind, is required for generation of Alfvén wings at Mercury. The source of field-aligned current may arise either from ion pickup conductance or, more likely, from the conductivity of the regolith, crust and upper mantle. Assuming crustal conductances of ~ 5 S it is demonstrated that currents in the Alfvén wings and closing across the planetary surface will produce significant perturbations (≥ 10 nT) of the magnetospheric magnetic field. In that case the Mercury-solar wind interaction will be modified during ICMEs as the solar wind flow about Mercury is decelerated by the formation of Alfvén wings, which would reduce the energy transfered into the magnetosphere. In conclusion, Mercury under southward IMF and low Mach number conditions may resemble the interaction of Ganymede with Jupiter's magnetosphere. The MESSENGER spacecraft, which will orbit Mercury during solar maximum conditions, may thus provide invaluable information regarding the interaction of planetary magnetospheres with CMEs.