Geophysical Research Abstracts
Vol. 12, EGU2010-6109-1, 2010
EGU General Assembly 2010

MESSENGER Observations of Extreme Magnetic Tail Loading and Unloading during its Third Flyby of Mercury: Substorms?

James A. Slavin (1), Brian J. Anderson (2), Daniel N. Baker (3), Mehdi Benna (4,5), George Gloeckler (6,7), Stamatios M. Krimigis (2,8), Ralph L. McNutt, Jr. (2), David Schriver (9), Sean C. Solomon (10), and Thomas H. Zurbuchen (7)

(1) Heliophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA (james.a.slavin@nasa.gov, 001-301-286-1648), (2) Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723, USA, (3) Laboratory for Atmospheric and Space Physics, University of Colorado Boulder, CO 80303, USA, (4) Solar System Exploration Division, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA, (5) Goddard Earth Science andTechnology Center, University of Maryland, Baltimore County, Baltimore, MD 21228, USA, (6) Department of Astronomy, University of Maryland, College Park, MD 20742, USA, (7) Department of Atmospheric, Oceanic and Space Sciences, The University of Michigan, Ann Arbor, MI 48109, USA, (8) Academy of Athens, Athens 11527, Greece, (9) Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90024, (10) Department of Terrestrial Magnetism, Carnegie Institution of Washington, Washington, DC 20015, USA

During MESSENGER's third flyby of Mercury on September 29, 2009, a variable interplanetary magnetic field produced a series of several minute enhancements of the tail magnetic field by factors of $\sim$ 2 to 3.5. The magnetic field flaring during these intervals indicates that they result from loading of the tail with magnetic flux transferred from the dayside magnetosphere. The unloading intervals were associated with plasmoids and traveling compression regions which are well known signatures of tail reconnection. The peak tail magnetic flux during the smallest loading events equaled 30% of the magnetic flux emanating from Mercury, and may have reached 100% for the largest event. In this case the dayside magnetic shielding is reduced and solar wind flux impacting the surface may be greatly enhanced. Despite the intensity of these events and their similarity to terrestrial substorm magnetic flux dynamics, no energetic charged particles with energies greater than 36 keV were observed. This absence of energetic particles constitutes a deepening puzzle for the view that the Mercury magnetosphere system is undergoing dynamical processes analogous to those at Earth during substorm events.