Geophysical Research Abstracts,
Vol. 11, EGU2009-3847, 2009
EGU General Assembly 2009

MESSENGER Observations of Magnetic Reconnection in Mercury's Magnetosphere

J. A. Slavin (1), M. H. Acuna (2), B. J. Anderson (3), D. N. Baker (4), S. A. Boardsen (1), H. Korth (3), S. M. Krimigis (3,5), R. L. McNutt, Jr. (3), S. C. Solomon (6), and T. H. Zurbuchen (7)

(1) NASA GSFC Heliophysics Science Division, Greenbelt, MD 20771, United States (james.a.slavin@nasa.gov, 001-301-286-1648), (2) Solar System Exploration Division, NASA Goddard Space Fight Center, Greenbelt, MD 20771, United States, (3) The Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723, USA, (4) Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder, CO 80309, United States, (5) Academy of Athens, Greece, (6) Department of Terrestrial Magnetism, Carnegie Institution of Washington, Washington, DC 20015, USA, (7) Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, Ann Arbor, MI 48109, USA

During MESSENGER's second flyby of Mercury on October 6, 2008, very intense reconnection was observed between the planet's magnetic field and a steady southward interplanetary magnetic field (IMF). The dawn magnetopause was threaded by a strong magnetic field normal to its surface, 14 nT, that implies a rate of reconnection 10 times the typical rate at Earth and a cross-magnetospheric electric potential drop of 30 kV. The highest magnetic field observed during this second flyby, 160 nT, was found at the core of a large dayside flux transfer event (FTE). This FTE is estimated to contain magnetic flux equal to 5% that of Mercury's magnetic tail or approximately one order of magnitude higher fraction of the tail flux than is typically found for FTEs at Earth. Plasmoid and traveling compression region (TCR) signatures were observed throughout MESSENGER's traversal of Mercury's magnetotail with a repetition rate comparable to the Dungey cycle time of 2 min. The TCR signatures changed from south-north, indicating tailward motion, to north-south, indicating sunward motion, at a distance 2.6 RM (where RM is Mercury's radius) behind the terminator indicating that the near-Mercury magnetotail neutral line was crossed at that point. Overall, these new MESSENGER observations suggest that magnetic reconnection at the dayside magnetopause is very intense relative to what is found at Earth and other planets, while reconnection in Mercury's tail is similar to that in other planetary magnetospheres, but with a very short Dungey cycle time.