High-frequency flux transfer events detected near Mercury

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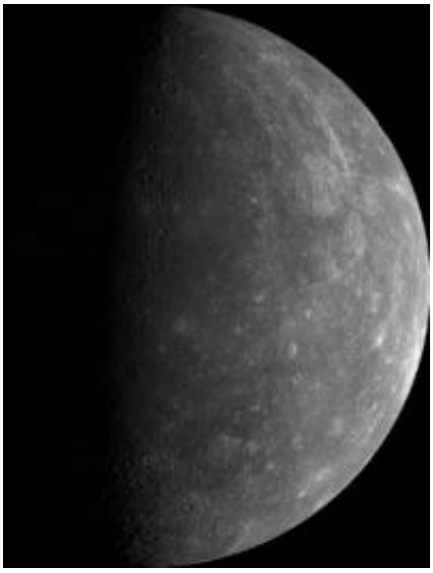

Mercury. Credit: NASA

The physical process that creates connections between the magnetic fields emanating from the Sun and a planet - a process known as magnetic reconnection - creates a portal through which solar plasma can penetrate the planetary magnetic field. The opening of these portals, known as flux transfer events (FTEs), takes place roughly every 8 minutes at Earth and spawns a rope of streaming plasma.

As early as 1985, scientists analyzing the Mariner 10 observations, collected during their 1974 and 1975 flybys, have known that FTEs also

occur at Mercury.

However, using the measurements returned from the MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) spacecraft now orbiting Mercury, Slavin et al. find that Mercurial flux transfer events are proportionally much larger, stronger, and more frequent than those at Earth.

Over a 25-minute period on 11 April 2011, MESSENGER detected 163 FTEs near the Mercurial magnetopause. The individual events took 2 to 3 seconds to move past the spacecraft, and the events were separated by 8 to 10 seconds.

Using a model of FTE motion, the authors find that the FTEs were likely initiated near the planet's southern magnetic pole before traveling to MESSENGER's location at the nightside magnetopause.

Modeling the changes in magnetic field observed as the FTEs passed over MESSENGER, the authors determined that the FTEs had elliptical cross sections with a mean semimajor axis of about a sixth of the radius of Mercury.

The authors suggest that if MESSENGER had not orbited out of the path of the events emanating from the southern magnetic pole, then FTEs likely would have continued to be detected until the interplanetary magnetic field conditions became unfavorable for reconnection.

More information: MESSENGER observations of a flux-transfer-event shower at Mercury, *Journal of Geophysical Research - Space Physics*, doi:10.1029/2012JA017926 , 2012