Reconnection Events and Sodium Morphology at Mercury

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New observations from the first three MESSENGER flybys indicate that Mercury's position in the inner solar system, coupled with its weak magnetic field lead to extreme loading of the magnetotail on short time scales. In preparation for the orbital insertion of the MESSENGER spacecraft in March of 2011 and planning for the BepiColombo mission, we use a multi-fluid model to determine the expected time scales and likely solar wind access to Mercury's surface that occur as a result of loading and unloading of the magnetotail.

The size and structure of flux ropes indicated by the MESSENGER observations are also modeled. We also discover how dayside magnetic shielding is reduced during these events and explore the extent to which solar wind proton density and flux on Mercury's surface is enhanced. In addition to comparisons to MESSENGER flyby data and ground-based observations, we determine how magnetospheric conditions affect asymmetric sodium outflow at high latitudes to better understand the sodium morphology in Mercury's exosphere.