Geophysical Research Abstracts
Vol. 21, EGU2019-16389, 2019
EGU General Assembly 2019

The Magnetopause Location as Monitor for Solar Wind Upstream Conditions at Mercury

Johannes Z. D. Mieth, Katharina Ostaszewski, Daniel Heyner, and Karl-Heinz Glassmeier

Technische Universität Braunschweig, Institut für Geophysik und extraterrestrische Physik, Braunschweig, Germany (j.mieth@tu-braunschweig.de)

Knowledge about the location of the magnetopause at Mercury enables one to constrain the solar wind upstream conditions. With a single spacecraft such as the NASA-MESSENGER (MErcury Surface, Space ENvironment, GEochemistry, and Ranging) probe, these conditions are inaccessible once having entered the magnetosphere. Here, we perform a statistical analysis on the magnetopause location as determined by the MESSENGER mission from magnetic field data. We focus on the nightside magnetopause crossings, as these are especially susceptive to changes in the solar wind velocity. An average of the solar wind speed, especially the radial component, over a short period of time is determined from our analysis and compared to the well-known ENLIL heliospheric modelling results. In addition to the known inner- and outermost magnetopause crossing locations from the MESSENGER mission, we use a machine learning (ML) algorithm to find further crossings in between. As a basis for the ML algorithm, several thousands of mid-tail crossings measured by the ARTEMIS (Acceleration, Reconnection, Turbulence and Electrodynamics of the Moon's Interaction with the Sun) mission at Earth are used to obtain a principle magnetic signature of a crossing. This model is then transferred to the mercury system. This enhances the statistics on the short-term variability of the solar wind at Mercury.