



## **A statistical study of the solar wind at Mercury and the resulting Hermean magnetosphere and exosphere**

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The exosphere of Mercury is coupled to its magnetosphere through the dependence of an important source process, sputtering, on the magnetospheric configuration. The degree of penetration of solar wind electrons and ions onto the surface of Mercury is highly variable. It has been shown that the latitude and extent of the cusp regions of Mercury's magnetosphere depend on both the solar wind dynamic pressure and the magnitude and extent of the interplanetary magnetic field (IMF), but the IMF is the most critical parameter. The IMF has been measured at the orbit of Mercury by both the Helios I and II spacecraft. In order to determine the most likely configuration for Mercury's magnetosphere, and also to determine the possible configurations and how often they are likely to occur, we have done a statistical study of the Helios data at the times when the spacecraft were within the bounds of Mercury's orbit. We show statistics for the IMF, its various components, and the relationships between them, the solar wind dynamic pressure and density. We have calculated the most likely magnetospheric configurations, and the possible excursions. Then we compute the most likely exospheric density and distribution and the possible variation from that mean. We show how often these possible but unlikely configurations should occur.