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Solar Wind Regimes At Mercury's Orbit

Piero Diego (1) and Mirko Piersanti (1,2)
(1) INAF, IAPS, Italy (piero.diego@inaf.it), (2) INFN – University of Rome Tor-Vergata, Rome, Italy.

Mercury's environment is characterized by a high variability and strength of the solar forcing. Its magnetosphere is completely reconfigured at any changes in the Interplanetary Magnetic Field (IMF) directions and the Solar Wind (SW) dynamic pressure. This paper presents an analysis of the Helios data, collected between 0.29 and 0.47 AU during the minimum phase of solar cycle n. 20 and the ascending phase of solar cycle n. 21. Our results confirm discrepancies from the common knowledge of decrease laws of the both SW and IMF parameters, and furnish new insight for the comprehension of these different behaviors. In addition, comparing 0.29 AU to 1 AU data, we show that the SW structures have similar features and durations at both Earth's and Mercury's orbit. Lastly, we definitely have demonstrated how the IMF directly drives the dynamical physical processes in the Mercury magnetosphere, controlling the geometry and the magnetic field they generate. Therefore, a careful identification of different structures in the SW is needed to better characterize the Hermean magnetospheric conditions during the forthcoming BepiColombo mission.