



Modelling the Environment of Mercury

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The proximity of Mercury to the Sun makes this planet a particularly interesting subject for extreme environmental conditions. In particular, Mercury's exosphere, its interaction with the solar wind and its origin from the surface of the planet, can provide important clues about planetary evolution. In fact, the Hermean exosphere is continuously eroded and refilled by these interactions, so that it would be more proper to consider the Hermean environment as a single, unified system: surface-exosphere-magnetosphere. Nonetheless, Mercury is yet a poorly known planet, since the only space-based information comes from three fly-bys performed in 1974 by the Mariner 10 spacecraft. Ground-based observations also provided some interesting results, but they are limited to few exospheric species and they are particularly difficult to obtain due to the planet's proximity to the Sun. The two missions scheduled to explore the iron planet: the NASA MESSENGER mission (launched in March 2004) and the ESA-JAXA BepiColombo (to be launched in 2013), will provide new insights in this system. Waiting for the missions, it is of crucial importance to perform accurate and comprehensive simulations in order to maximize the science return of the future space-based observations. For this objective the Hermean Environment Working Group has been formed within the BepiColombo science community. We present the general results of the 3D simulations of the neutral and ion environment of Mercury obtained by considering different possible scenarios at Mercury. A circulation model with the input of a magnetic field model and a surface composition model has been used. By means of an analytical exospheric model (e.g.: Mura et al., PSS in press, 2006) some possible key features of the exospheric profile are identified for deriving some physical conditions of the planet.