

Magnetospheric Circulation, Particle Precipitation and Exosphere Generation at Mercury

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The solar wind entry inside the Hermean magnetosphere is here described in order to trace the plasma flow pattern towards the surface of Mercury. Such a flow and the extension of the precipitation regions are strongly affected by the solar wind and IMF conditions, since the weak internal magnetic field is not able to effectively shield these particles, like it happens in the case of the Earth. This paper will focus also on the effectiveness of the solar wind precipitation on the planet's surface in causing neutral gas emission that contributes to the Hermean exosphere generation. In fact, both ion and chemical sputtering may contribute to the emission of neutral gas which is inserted into parabolic trajectories due to the planet gravitational field, and partially it may fall back again onto the planet's surface. On the other hand, this emitted gas may have enough energy to escape from Mercury and to be lost in space. The two neutral particle instruments ELENA and STROFIO, both part of the SERENA package on board BepiColombo MPO, will monitor the exospheric gas with the goal of understanding the dynamics and composition of these trapped and escaping particles. Some speculations on the influence of these processes in the frame of Mercury evolution will be also briefly presented.