

PLASMA MORPHOLOGY AT MARS. ASPERA-3 OBSERVATIONS

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The ASPERA-3 experiment on the MEX spacecraft provided us with a wealth of data on the plasma environment of Mars. The environment is controlled by the direct interaction between the solar wind and planetary atmosphere/ionosphere which results in the formation of a magnetospheric cavity. In this paper we analyze morphological features of the main magnetospheric regions. The ionospheric plasma is well traced by the characteristic ‘spectral lines’ of the photoelectrons. Plasma of solar wind and planetary origin is diagnosed by ion mass spectrometry. It is observed that the momentum of the solar wind is effectively transferred into the magnetosphere driving the motion of planetary ‘photo-ions’ and ionospheric plasma. Photo-ions gain significant energy and occupy two main reservoirs, the boundary layer/mantle adjacent to the magnetospheric boundary and the plasma sheet. Photo-electrons are also recorded far above nominal ionosphere altitudes. Maps of these regions are built on the base of a statistical study. Their morphology and dynamics are controlled by several factors. Among them are solar wind dynamic pressure, interplanetary electric field (determined as proxy products from the MGS measurements) and local crustal magnetizations.