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Mars Ion Boundaries - Observations of the ASPERA-3 Experiment on board Mars Express

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The plasma boundaries caused by the interaction of the solar wind and the ionosphere of Mars have so far only been determined by magnetic field observations of the MAG-ER-experiment on board Mars Global Surveyor - apart from some earlier measurements by the Phobos mission. The Aspera-3 experiment on board Mars Express measures electrons, protons and heavy ions at thermal and at higher energies. We exploit this capability to investigate the build-up of ion boundaries related to the magnetic pile-up boundary and the penetration of different ion species into the Martian ionosphere. Specifically we discuss the impact of the He^{++}- penetration on the ionospheric erosion.