

ENA emissions from Mars: simulations and observations on Mars Express

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ENAs (Energetic Neutral Atoms) at Mars result from two processes (1) charge – exchange of the solar wind and planetary plasma on the exospheric gasses and (2) backscattering of precipitating ions through elastic collisions with atmospheric gasses. Imaging charge – exchange ENAs reveals global structure of the plasma flow at Mars and distribution of the planetary ions. Imaging backscattering ENAs provides precipitation maps which can be used to calculate the energy and matter input from the solar wind to the Martian atmosphere. We briefly review simulations of ENA production at Mars and focus on the current results from the ENA imagers of the ASPERA-3 (Analyzer of Space Plasmas and Energetic Atoms) experiment onboard Mars Express. ASPERA – 3 performs ENA imaging in the energy range 0.1– 10 keV and was designed to investigate both ENA populations. We focus on the following observations (1) mapping of the solar wind precipitation onto the Martian upper atmosphere, (3) imaging of proton plasma distribution in the subsolar region and reconstruction of the plasma flow in the magnetosheath, (4) exospheric sounding with ENAs, (5) temporal variations of the charge – exchange ENA fluxes.

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