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ENA Production at Mars, the Moon, and Mercury

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The solar wind can interact directly with the surface of the moon and Mercury. It also interacts with the tenuous exosphere of Mercury and the upper parts of Mars' atmosphere. The solar wind interaction can be remotely studied by energetic neutral atom (ENA) imaging. Here we consider the energy regime 10 eV-10 keV, and review the different sources of ENAs at Mars, at the moon, and at Mercury.
At the moon, ENAs are produced by sputtering resulting from the precipitating solar wind. These sputtered neutrals can be imaged by an orbiting ENA detector, and the images can produce information on space weathering, magnetic anomalies, and surface composition.
At Mars, hydrogen ENAs are produced by charge exchange between solar wind protons and neutrals in Mars' exosphere. Imaging of these ENAs provide global information on the distributions of ions and neutrals.
At Mercury, ENAs are produced from the surface of the planet, and from charge exchange in the exosphere.
For ENAs produced from charge exchange, it is not straight forward to extract information on the distributions of ions and neutrals from an ENA image, since we only know the ENA flux integrated along lines of sight. Inverse modeling is needed to extract parameters from observed ENA images.

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