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Early MAVEN Results on the Mars Upper Atmosphere and Atmospheric Loss to Space

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The Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft went into orbit around Mars on 21 September 2014. After a commissioning phase that included science observations of Mars and of Comet Siding Spring during its close approach, its primary science phase began on 16 November 2014 and will run for a full Earth year, until November 2015.

The science objectives of the MAVEN mission are to characterize the upper atmosphere and ionospheric structure and composition, the interactions of the sun and the solar wind with the planet, and the processes driving loss of gas from the atmosphere to space. Our goal is to understand the chain of processes leading to escape today, learn how to extrapolate back in time, and determine the integrated escape of atmosphere over Martian history.

MAVEN has nine instrument sensors collected into eight separate instruments. The sensors can be thought of as being grouped into instruments measuring different aspects pertaining to the goals of MAVEN.
The first group of instruments measures the properties of the solar wind and of the sun that drive the processes in the upper atmosphere. The second group measures the structure and composition of the upper atmosphere and of the ions in the ionosphere, and also measures isotope ratios that can tell us about the integrated escape to space. In this group, NGIMS measures properties in situ at the location of the spacecraft, and IUVS measures them remotely, providing a powerful combination of local and global measurements. The third group measures the properties of the ionosphere that both drive escape and determine the composition and properties of the escaping ions.

The spacecraft and all science instruments are functioning nominally, and science data is being collected utilizing our planned observing scenarios. The first deep-dip campaign is scheduled for the second week of February 2015.

By the time of the EGU meeting, we expect to have a preliminary understanding of the instrument behavior, operations, and calibrations. We also expect to have sufficient data collected to allow us to reach preliminary conclusions about the state of the upper atmosphere, interactions with the solar wind, escape of atmospheric gas to space at the present epoch, and integrated escape to space over time. These early results will be presented.