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An Ultraviolet Perspective of the Dynamic Atmosphere of Mars: Highlights from six Years of Observations from the MAVEN Imaging UltraViolet Spectrograph

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Abstract

The Mars Atmosphere and Volatile EvolutioN (MAVEN) mission's Imaging Ultraviolet Spectrograph (IUVS) observes Mars in the far and mid ultraviolet (110-340 nm), investigating lower and upper atmospheric structure and indirectly probing neutral atmospheric escape. The instrument is among the most powerful spectrographs sent to another planet, with several key capabilities: separate Far-UV & Mid-UV channels for stray light control; a high-resolution echelle mode to resolve deuterium and hydrogen emissions; internal instrument pointing and scanning capabilities to allow complete mapping and nearly continuous operation; and optimization for airglow studies. After four Earth years in orbit (three Mars years), IUVS has assembled a large quantity of data and provided insights on present-day processes at Mars including dayglow, nightglow, aurora, meteor showers, clouds, and solar-planetary interactions. In this presentation, we will highlight key results obtained by IUVS, including: (1) mapping of thermospheric composition, structure, and variability, including effects of the global dust storm of 2018 and solar x-ray flare; (2) first spatial mapping of nitric oxide nightglow reveals regions of atmospheric downwelling necessitating substantial changes to global atmospheric circulation models; (3) Coupling between lower and upper atmosphere.