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# Variability of the Martian Hot Oxygen Corona Observed by MAVEN/IUVS and Implications for Atmospheric Evolution

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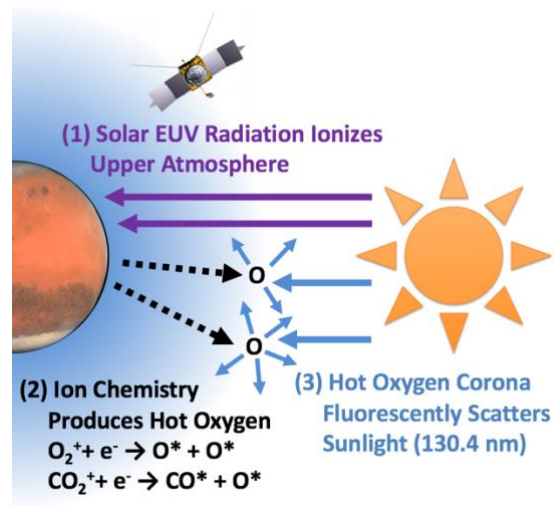
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**VARIABILITY OF THE MARTIAN HOT OXYGEN CORONA OBSERVED BY MAVEN/IUVS AND IMPLICATIONS FOR ATMOSPHERIC EVOLUTION.** J. Deighan<sup>1</sup>, S. K. Jain<sup>1</sup>, M. S. Chaffin<sup>1</sup>, J.-Y. Chaufray<sup>2</sup>, N. M. Schneider<sup>1</sup>, F.G. Eparvier<sup>1</sup>, E. Thiemann<sup>1</sup>, J.T. Clarke<sup>3</sup>, M. Mayyasi<sup>3</sup>, R.J. Lillis<sup>4</sup>, <sup>1</sup>LASP, University of Colorado (1234 Innovation Dr., Boulder, CO 80303, USA, justin.deighan@lasp.colorado.edu), <sup>2</sup>LATMOS/CNRS (Université Pierre et Marie Curie, boîte 102, 75005 Paris, France), <sup>3</sup>Center for Space Physics, Boston University, Boston, MA USA, <sup>4</sup>Space Sciences Laboratory, University of California Berkeley, Berkeley, CA, USA

**Introduction:** While Mars currently maintains a very thin, cold, and dry CO<sub>2</sub> atmosphere, the surface displays abundant chemical and morphological evidence of a thicker, warmer atmosphere capable of supporting liquid water in the distant past. To understand the removal of this atmosphere, loss mechanisms active at the current epoch must be well characterized.

One of the most important atmospheric loss mechanisms from modern Mars is the non-thermal escape of atomic oxygen to space. Energized by photochemical reactions in the upper atmosphere, a fraction of this so-called “hot” oxygen population can achieve escape velocity, while the remainder forms a gravitationally bound corona around the planet. Observing this tenuous hot oxygen corona is challenging [1–3].

**Observations:** The MAVEN (Mars Atmosphere and Volatile EvolutionN) mission is specifically designed to study the upper atmosphere of Mars and active mechanisms of loss to space. Its IUVS (Imaging UltraViolet Spectrograph) [4] is the most powerful UV instrument ever deployed to Mars, and over the past 2 Martian years (4 terrestrial years) has acquired regular observations of the hot oxygen corona scattering sunlight at 130.4 nm. We describe these observations and present an overview of the data collected to date, with an emphasis on variability due to solar activity as measured by the MAVEN EUVM instrument [5] and implications for atmospheric evolution [6,7].



**Figure 1. Processes and observables of the Martian hot oxygen corona**

**References:** [1] Chaufray et al. (2009) *JGR*, 114, E02006, [2] Feldman et al. (2011) *Icarus*, 214, 394–399, [3] Deighan et al. (2015) *GRL*, 42, 9009–9014, [4] McClintock et al. (2014) *Space Sci Rev*, 195, 75–124, [5] Eparvier et al. (2015), *Space Sci Rev*, 195, 293–301, [6] Cravens et al. (2017), *JGR*, 122, 1102–1116, [7] Lillis et al. (2017), *JGR*, 122, 3815–3836

