



HAL
open science

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

J Deighan, S K Jain, M S Chaffin, Jean-Yves Chaufray, N M Schneider, F G Eparvier, E Thiemann, J T Clarke, M Mayyasi, R J Lillis

► **To cite this version:**

J Deighan, S K Jain, M S Chaffin, Jean-Yves Chaufray, N M Schneider, et al.. Variability of the Martian Hot Oxygen Corona Observed by MAVEN/IUVS and Implications for Atmospheric Evolution. Ninth International Conference on Mars, Jul 2019, Pasadena, United States. pp.LPI Contribution No. 2089, id.6383. insu-04414034

HAL Id: insu-04414034

<https://insu.hal.science/insu-04414034v1>

Submitted on 24 Jan 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

VARIABILITY OF THE MARTIAN HOT OXYGEN CORONA OBSERVED BY MAVEN/IUVS AND IMPLICATIONS FOR ATMOSPHERIC EVOLUTION. J. Deighan¹, S. K. Jain¹, M. S. Chaffin¹, J.-Y. Chaufray², N. M. Schneider¹, F.G. Eparvier¹, E. Thiemann¹, J.T. Clarke³, M. Mayyasi³, R.J. Lillis⁴, ¹LASP, University of Colorado (1234 Innovation Dr., Boulder, CO 80303, USA, justin.deighan@lasp.colorado.edu), ²LATMOS/CNRS (Université Pierre et Marie Curie, boîte 102, 75005 Paris, France), ³Center for Space Physics, Boston University, Boston, MA USA, ⁴Space Sciences Laboratory, University of California Berkeley, Berkeley, CA, USA

Introduction: While Mars currently maintains a very thin, cold, and dry CO₂ 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].

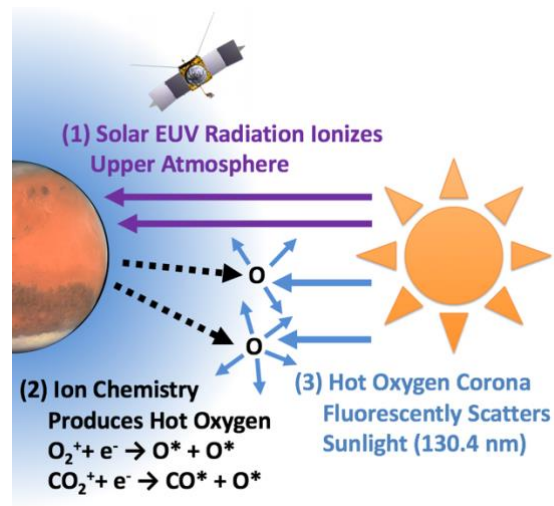


Figure 1. Processes and observables of the Martian hot oxygen corona

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

