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Effect of the 2018 Martian global dust storm on the CO_2 density in the lower nightside thermosphere observed from MAVEN/IUVS Lyman-alpha absorption

Jean-Yves Chaufray (1), Michael Chaffin (2), Justin Deighan (2), Sonal Jain (2), Nick Schneider (2), Majd Mayyasi (3), and Bruce Jakosky (2)

(1) LATMOS/IPSL, CNRS, Sorbonne Université, UVSQ, Paris, France (chaufray@latmos.ipsl.fr), (2) LASP, University of Colorado, Boulder, CO, USA, (3) Center for Space Physics, Boston University, Boston, MA, USA

The planetary upper atmosphere is the region where most of the solar photons in the far and extreme UV are absorbed and provide heating and ionization of the neutral atmosphere. The use of this absorption during stellar or solar occultation is a standard method to identify species or derive information on the density and temperature of the upper atmosphere. The UV emissions of the interplanetary hydrogen, and of the extended planetary hydrogen coronae can also be absorbed by the planetary upper atmosphere and therefore be used to study the density of the planetary upper atmosphere. This method was used for example by the Mars Express mission to study the seasonal variations of the CO_2 density in the Martian upper atmosphere.
In June 2018, an intense global dust storm surrounded Mars for a few months, heating the lower atmosphere and leading to an expansion of the Martian atmosphere of few kilometers in the thermosphere. The Imaging Ultraviolet Spectrograph (IUVS) on the Mars Atmosphere and Volatile EvolutioN (MAVEN) mission measured the Lyman-α emission line from the interplanetary hydrogen and from the extended hydrogen corona of Mars at the limb before and throughout this Planet Encircling Dust Event (PEDE). In the nightside IUVS observations, the CO_2 absorption of the Lyman-α photons is seen in the lower thermosphere near 110 km. An increase in the altitude of the absorption was observed on 8 June 2018. This altitude shift is attributed to an increase of the CO_2 density due heating of the lower atmosphere during the large dust storm at the surface of Mars.
In this presentation we will present these observations and the CO_2 density variations, at a given altitude. Results from this analysis are compared to other observations of the Martian upper atmosphere obtained at the dayside.