



Martian atmospheric aerosol composition and distribution over 3 full MYs from Nomad/TGO solar occultation measurements

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Suspended aerosols may have a direct impact in atmospheric processes, such as photochemical reactions and atmospheric radiative balance and dynamics. On Mars, the most common aerosols are composed of mineral dust particles and/or water ice. This last one is known to affect both the radiative balance [2] and the water cycle [1], whereas suspended mineral dust is the prevalent aerosol component on the planet.

The instrument Nadir and Occultation for Mars Discovery (NOMAD) is a suite of three spectrometers on board the Trace Gas Orbiter (TGO) which has been observing the Martian atmosphere routinely since April 2018, i.e., for almost 3 full Martian Years. [5] Data from its solar occultation channel (SO), combining several sets of diffraction orders, or wavelengths, are used in this work to retrieve the aerosol properties and distribution during that period with a very fine resolution in the vertical from the ground up to the thermosphere. Our aerosol retrieval strategy follows a three-step process [4]. Firstly, we perform a "cleaning" of the NOMAD observations, in the form of transmittance spectra at the tangent altitudes, using an in-house pre-processing algorithm developed at IAA/CSIC. This is intended to eliminate residual imperfections in the calibrated transmittances, like spectral shifts and bendings. Secondly, the cleaned spectra are used to retrieve the aerosol extinction vertical profiles following a global fit approach. Finally, we apply a fitting algorithm to compare the retrieved extinctions (spectral ratios of the retrieved extinctions) with the extinction ratios simulated with a Lorenz-Mie code [3]. The aerosol properties inferred are size (effective radius and effective variance), nature (mineral dust and water ice proportions), number density and mass of the particles, as well as their vertical distribution and variability over time.

In this talk we will review the obtained results analyzing more than three full Martian Years. This is a significant extension of a previous first analysis by our team [4] focused in the 1st year of

NOMAD data. We have also improved a couple of aspects from the previous work, like vertical sampling and wavelength coverage. We will describe the dataset and the major results obtained on the distribution and properties of the aerosols, splitting between dust and water ice.

References:

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