

# First retrievals of ozone vertical profiles from NOMAD-UVIS

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## Abstract

The NOMAD (Nadir and Occultation for MArS Discovery) – operating on board the ExoMars 2016 Trace Gas Orbiter mission – started to acquire the first scientific measurements on 21 April 2018.

Here, we will present first retrievals of ozone vertical profiles obtained with NOMAD UVIS solar occultations.

## 1. The NOMAD UVIS channel

NOMAD is a spectrometer operating in 3 channels: 1) a solar occultation channel (SO) operating in the infrared (2.3-4.3  $\mu\text{m}$ ); 2) a second infrared channel LNO (2.3-3.8  $\mu\text{m}$ ) capable of doing nadir, as well as solar occultation and limb; and 3) an ultraviolet/visible channel UVIS (200-650 nm) that can work in the three observation modes [1,2].

The UVIS channel has a spectral resolution  $<1.5\text{nm}$ . In the solar occultation mode it will be mainly devoted to study the climatology of ozone and aerosols content [3].

## 2. Ozone retrievals

Ozone is a highly reactive species on Mars. In particular, it displays steep gradients across the terminator due to photolysis [4]. Odd hydrogen radicals play an important role in the destruction of ozone. This results in a strong anti-correlation between  $\text{O}_3$  and  $\text{H}_2\text{O}$  [4]. NOMAD will help us improve our knowledge of the climatology of ozone and of its complex photochemistry.

We will present first retrievals of ozone vertical profiles. NOMAD-UVIS spectra will be simulated using the line-by-line radiative transfer code ASIMUT-ALVL developed at IASB-BIRA [5], and the NEMESIS code [10] developed for use on NOMAD-UVIS data at the Open University. In a preliminary study based on SPICAM-UV solar occultations (See [6]), ASIMUT was modified in order to take into account the atmospheric composition and structure at the day-night terminator. We will follow the same method described in [7] to check that the spectra are correctly calibrated and accurately normalized to the solar spectrum. As input for ASIMUT, we will use gradients predicted by the 3D GEM-Mars v4 Global Circulation Model (GCM) [8,9] and the UK version of the LMD GCM. UVIS ozone profiles will also be compared to SPICAM-UV retrievals.

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