TOOLS TO MANAGE AND ACCESS THE NOMAD DATA. L. Trompet[1], A.C. Vandaele[1], I. R. Thomas[1] and the NOMAD team, [1] Royal Belgian Institute for Space Aeronomy (IASB), 3 av. Circulaire, 1180 Brussels, Belgium (loic.trompet@aeronomie.be).

Introduction: The NOMAD (Nadir and Occultation for MArs Discovery) [1] is one of the four instruments on-board the ExoMars Trace Gas Orbiter. It consists of three high-resolution spectrometers sensitive in a wide spectral range from IR to UV. It is also able to operate with different viewing geometries: solar occultation, limb and nadir. Thereby, the NOMAD instrument will extend the current database of species composing the Martian atmosphere.

The nominal mission of the ExoMars spacecraft will start in March 2018. Nevertheless some observations have already been performed to ensure that NOMAD works correctly. These early data are also used to start the data pipeline of the treatment processes that will generate different level of calibrated spectra. Complex algorithms will be used with the fully-calibrated spectra to derive temperature, pressure and density profiles of the atmospheric constituents of Mars. This last step requires significant computational means. Furthermore, the whole dataset generated from this pipeline will require important storage capabilities.

The three spectrometers of NOMAD will generate a huge amount of data to treat and share. The NOMAD team can rely on the knowledge acquired from the SOIR [2] instrument that was on-board the Venus Express spacecraft.

Treatment: The treatment of the data of NOMAD can be separated into two main steps: the calibration of the spectra and the profiles derivation. The first step requires little computing resources but the second one needs significant computing resources.

The ASIMUT radiative transfer code will be used for the profiles derivation. It allows to retrieve profiles following the different viewing geometries and the spectral range of NOMAD including consideration of absorption and scattering processes. The ASIMUT program is based on the Optimal Estimation Method developed by Rodgers (1990, 2000) [3,4]. An online version of this program is available at https://asimut.aeronomie.be/ and the ASIMUT documentation is available at http://planetary.aeronomie.be/en/asimut_documentation/html/index.html. ASIMUT can be used for spectra simulation and for profiles retrievals from a series of spectra obtained by different Instrument types under different viewing geometries. This is the reason why ASIMUT is a tool of particular interest for Virtual Observatories. Therefore some efforts are currently being made to make ASIMUT available through the Virtual Observatory VESPA [5].

The ASIMUT program is regularly improved. It will in particular be optimized to be applied on NOMAD observations. Algorithm to manage the different runs of ASIMUT will be used as it was used for processing data obtained by SOIR. Furthermore, when possible, some parts of the code will be parallelized and run on the Space Pole HPC from Brussels, Belgium.

Sharing: An overview database has been created containing information such as the date, relevant geometry, spectral range for each measurement. This database can be accessible through the NOMAD database interface at http://mars.aeronomie.be/en/exomars/obs-overview/.

The calibrated spectra will be available for downloading in the ESA PSA (as it is already the case for SOIR spectra) using the PSA psa.esa.int interface. The profiles, for their part, will be accessible through the VESPA research infrastructure as this is already the case for SOIR profiles.

Summary: The NOMAD instrument on-board the ExoMars Trace Gas Orbiter will generate a large amount of data of the Martian atmosphere. The Planetry Aeronomy Division at IASB is willing to make their tools (such as ASIMUT and the overview) and these data (using the PSA and VESPA) available to the whole planetary science community.

References:

[1] Vandaele A.C. et al. (2015) *Planet. Space Sci., 119,* 233-249. [2] Vandaele A.C. et al. (2016) *Adv. Space Res., 57,* 443-458. [3] Rodgers C.D. (1990) *J. Geophys. Res., 95(D5),* 5587-5595. [4] Rodgers C.D. (2000) *World Scientific, ed. N.J. Hackensack,* University of Oxford. [5] Erard S. et al. (2017) *Planet. Space Sci., In Press.*