Geophysical Research Abstracts
Vol. 17, EGU2015-10125-1, 2015
EGU General Assembly 2015

Science objectives and Expected performances of NOMAD, an ExoMars TGO instrument

Séverine Robert (1), Ann Carine Vandaele (1), Ian Thomas (1), Frank Daerden (1), Cédric Depiesse (1), Rachel Drummond (1), Lori Neary (1), Yannick Willame (1), José Juan Lopez-Moreno (2), Julio Rodriguez-Gomez (2), Manish R. Patel (3), Giancarlo Bellucci (4), and the NOMAD Team

(1) Belgian Institute for Space Aeronomy, Brussels, Belgium (severine.robert@aeronomie.be), (2) Institute of Astrophysics of Andalusia, Granada, Spain, (3) Open University, Milton Keynes, UK, (4) Institute for Space Astrophysics and Planetology, Roma, Italy

NOMAD, the "Nadir and Occultation for MArs Discovery" spectrometer suite will be part of the payload of the 2016 ExoMars Trace Gas Orbiter Mission. This instrument suite will measure the atmosphere of Mars in the infrared, visible and ultraviolet regions covering 0.2 – 0.65 and 2.2 – 4.3 μm. It is composed of three channels: a solar occultation only channel (SO) operating in the infrared wavelength domain, a second infrared channel capable of doing nadir, but also solar occultation and limb observations (LNO), and an ultraviolet/visible channel (UVIS) that can work in all observation modes. Thanks to its very high spectral resolution and multiple observational modes, NOMAD will be able to detect a wide range of atmospheric trace gases, many of which are important markers of geophysical and/or biogenic activity.

While the instrument is being assembled and tested, scientific preparations have begun. ASIMUT-ALVL, a line-by-line radiative transfer code developed at IASB-BIRA, is used to simulate spectra in the infrared range (0.7 — 4.5 μm) as would be measured by the instrument and under various atmospheric conditions obtained from the IASB-BIRA GCM, GEM-Mars. Random noise has then been added to the simulated spectra to match the real instrument characteristics of each channel: SNRs have been derived using a model that simulates the real instrument (e.g. transmission properties of optical components, expected in-flight instrument temperatures, detector responsivities, etc.). After NOMAD has been calibrated and tested, these values will be amended to match the ground-calibration results.

ASIMUT-ALVL has then been used to perform retrievals on the noisy spectra. In order to establish detection limits of trace gas and key isotopologues such as CH_4, C_2H_2, C_2H_4, C_2H_6, H_2CO, H_2S, H_2O, HDO, CO, HCl, HCN, N_2O, NO_2, O_3, OCS, SO_2, or NH_3 we had to define the best spectral ranges (both in the UV and IR) to be studied for each molecule and each observation mode. These results will be presented.