



## The Martian environment observed by NOMAD on ExoMars Trace Gas Orbiter

**Ann Carine Vandaele**<sup>1</sup>, Frank Daerden<sup>1</sup>, Ian R. Thomas<sup>1</sup>, Shohei Aoki<sup>2</sup>, Cédric Depiesse<sup>1</sup>, Justin Erwin<sup>1</sup>, Lori Neary<sup>1</sup>, Arianna Piccialli<sup>1</sup>, Bojan Ristic<sup>1</sup>, Séverine Robert<sup>1,3</sup>, Loïc Trompet<sup>1</sup>, Sébastien Viscardy<sup>1</sup>, Yannick Willame<sup>1</sup>, Jean-Claude Gérard<sup>4</sup>, Geronimo Villanueva<sup>5</sup>, Jon Mason<sup>6</sup>, Manish Patel<sup>6</sup>, Giancarlo Bellucci<sup>7</sup>, Miguel Lopez-Valverde<sup>8</sup>, and Jose-Juan Lopez-Moreno<sup>8</sup>

<sup>1</sup>Royal Belgian Inst. for Space Aeronomy, Planetary Aeronomy, Bruxelles, Belgium (a-c.vandaele@aeronomie.be)

<sup>2</sup>ISAS, JAXA, Japan

<sup>3</sup>Institute of Condensed Matter and Nanosciences, UCLouvain, Belgium

<sup>4</sup>Uliège, Belgium

<sup>5</sup>NASA Goddard Space Flight Center, USA

<sup>6</sup>School of Physical Sciences, The Open University, Milton Keynes, UK

<sup>7</sup>Istituto di Astrofisica e Planetologia Spaziali (IAPS/INAF), Rome, Italy

<sup>8</sup>Instituto de Astrofisica de Andalucia (IAA/CSIC), Granada, Spain

The NOMAD (“Nadir and Occultation for MArS Discovery”) spectrometer suite on board the ExoMars Trace Gas Orbiter has been designed to investigate the composition of Mars’ atmosphere, with a particular focus on trace gases, clouds and dust. The instrument probes the ultraviolet and infrared regions covering large parts of the 0.2-4.3  $\mu\text{m}$  spectral range [1,2], with 3 spectral channels: a solar occultation channel (SO – Solar Occultation; 2.3–4.3  $\mu\text{m}$ ), a second infrared channel capable of nadir, solar occultation, and limb sounding (LNO – Limb Nadir and solar Occultation; 2.3–3.8  $\mu\text{m}$ ), and an ultraviolet/visible channel (UVIS – Ultraviolet and Visible Spectrometer, 200–650 nm). Since its arrival at Mars in April 2018, NOMAD performed solar occultation, nadir and limb observations dedicated to the determination of the composition and structure of the atmosphere.

NOMAD has been accumulating data about the Martian atmosphere and its surface since its insertion. We will present some results covering the atmosphere composition including clouds and dust, climatologies of water, carbon monoxide and ozone. We also report on the different discoveries highlighted by the instrument by pointing to a series of contributions to this conference that will present in detail several specific studies, like recent progress in the instrument calibration, the latest CO<sub>2</sub> and temperature vertical profiles, studies of aerosol nature and distribution, water vapor profiles and variability, carbon monoxide vertical distribution, dayglow observations; detection of HCl, its vertical profiles and in general advances in the analysis of the spectra recorded by the three channels of NOMAD.

### References

[1] Vandaele, A.C., et al., 2015. *Planet. Space Sci.* 119, 233-249.

[2] Vandaele et al., 2018. *Space Sci. Rev.*, 214:80, [doi.org/10.1007/s11214-11018-10517-11212](https://doi.org/10.1007/s11214-11018-10517-11212).

