



The NOMAD Spectrometer Suite on ExoMars Trace Gas Orbiter

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NOMAD (Nadir and Occultation for MArs Discovery) is a suite of three high-resolution spectrometers on-board the ExoMars Trace Gas Orbiter. The instrument will be able to detect and map a wide variety of Martian gases in unprecedented detail.

NOMAD's three spectrometers cover the UV-visible (UVIS channel - 200-650nm) and infrared ranges (SO and LNO channels - 2.2-4.3 μ m), operating in solar occultation, limb and nadir-viewing modes, generating a huge dataset of Martian atmospheric observations during the mission across a wide spectral range.

NOMAD has the resolving power to identify many trace gases that exhibit absorption features within the spectral range of the three channels. The order-of-magnitude increase in spectral resolution over previous instruments will enable spatial and temporal mapping of several isotopologues of methane and water, providing important measurements of the Martian D/H and methane isotope ratios globally. Sensitivity studies have shown that, using expected SNR values, NOMAD should have the ability to measure methane concentrations <25 parts per trillion (ppt) in solar occultation mode, and 11 parts per billion in nadir mode. Occultation detections as low as 10 ppt could be made if spectra are averaged sufficiently.

Using SO and LNO in combination with UVIS, aerosol properties such as optical depth, composition and size distribution can also be derived. NOMAD will also continue to monitor the major seasonal cycles on Mars, extending existing datasets made by successive space missions in the past decade.