

CO2 and Temperature vertical profiles in the Martian atmosphere from solar occultation measurements at 2.7 micron by instruments NOMAD and ACS on board the Exomars Trace Gas Orbiter

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Miguel Angel Lopez-Valverde, Brittany Hill, Bernd Funke, Francisco González-Galindo, Adrian Brines, et al.. CO2 and Temperature vertical profiles in the Martian atmosphere from solar occultation measurements at 2.7 micron by instruments NOMAD and ACS on board the Exomars Trace Gas Orbiter. 15th Europlanet Science Congress 2021, Sep 2021, Vitual Meeting, Unknown Region. pp.EPSC2021-109, 10.5194/epsc2021-109. insu-04497355

HAL Id: insu-04497355 https://insu.hal.science/insu-04497355

Submitted on 9 Mar 2024

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EPSC Abstracts Vol. 15, EPSC2021-109, 2021 https://doi.org/10.5194/epsc2021-109 Europlanet Science Congress 2021 © Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



$\rm CO_2$ and Temperature vertical profiles in the Martian from solar occultation measurements at 2.7 micron NOMAD and ACS on board the Exomars Trace Gas (

Miguel Angel Lopez-Valverde et al.

Introduction

Vertical profiles of CO2 and temperature with good vertical resolution are key measurements to chara although difficult to obtain from remote observations [1]. For the first time these vertical profiles can b occultation technique by the instruments NOMAD and ACS on board the Exomars Trace Gas Orbiter [scheme designed to derive atmospheric profiles of CO2 and temperature from the bottom to the top (adapted to solar occulation and applied to exploit the operational sounding of these two instruments work is to characterize the Martian thermal structure from the troposphere up to the thermospher resolution and also to cross-validate both TGO instruments as best as possible, with a single retrieval (analysis approaches.

Retrieval approach

This work is focussed on the solar occultation channels NOMAD-SO and ACS-MIR, in routine operati these unique datasets, it is of paramount importance to examine the performance of the two instrum retrieval results as accurately as possible. For this purpose we apply a flexible and well tested Ear [5,6,7], to both of them, after adaptation to Mars atmospheric conditions [4] and the necessary a characteristics [8]. The retrievals use calibrated transmittance spectra to tackle three targets, CO2 loading, in a simultaneous global-fit inversion, with updated hydrostatic equilibrium in every iteratior like H2O, and after a pre-processing/data cleaning analysis which is also similar in both instruments. A for both instruments with the help of synthetic retrievals and a series of sensitivity tests performed with similar treatment of the key error terms (measurement noise and systematics).

Comparison of results

We will present data obtained in the 2.7 μ m region, dominated by a well known ro-vibrational band of ($1 \sin_3 a$ mixture of diffraction orders that are used routinely in the operational sounding is the operational sounding in the operational sounding is the operational sound is the operational sound is the operational sound is the o ^{CO}Meeting or anizer EPSC2021 S-MIR diffraction positions, which contains a sufficient number of CO2 lines in capability to sample the whole atmosphere, up to about 180 km, in a single vertical scan. For both lowest troposphere is limited by the amount of atmospheric dust, which is also retrieved simultaneousle will compare the vertical profiles obtained in a small sample of profiles from each instrument which is and atmospheric dust loadings, during the first year of TGO operations. The comparisons take into ac individual solar occulation scans are non-coincident in time and space. Comparions are also peformed by other groups in the NOMAD and ACS teams [9]. Two important applications of the obtained retrieval propriate inputs to the retrieval of other atmospheric species from the same instruments and the s assume a prior or first guesses from global circulation models (GCM), see companion contributions to to validate predictions from these GCMs, and therefore, to help to improve them, particularly at high where these datasets are particularly valuable [1].

Acknowledgements

The IAA/CSIC team acknowledges financial support from the State Agency for Research of the Span Excellence Severo Ochoa' award for the Instituto de Astrofísica de Andalucía (SEV-2017-0709) and fun B-100 (MCIU/AEI/FEDER, EU). ExoMars is a space mission of the European Space Agency (ESA experiment is led by the Royal Belgian Institute for Space Aeronomy (IASB-BIRA), assisted by Co-P Italy (INAF-IAPS), and the United Kingdom (Open University). US investigators were supported by the Administration. Thanks are extensive to all members of the NOMAD Science Team and the ACS Science

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How to cite: Lopez-Valverde, M. A., Hill, B., Funke, B., González-Galindo, F., Brines, A., Stolzenbach, A Trompet, L., Aoki, S., Thomas, I., Vandaele, A. C., Villanueva, G., Belyaev, D., Trokhimovskiy, A., Korable 2 sReducci, G., and Patel, M.: CO2 and Temperature vertical profiles in the Martian atmosphere/figure. CO Meeting Organizer EPSC2021 2.7 micron by instruments NOMAD and ACS on board the Exomats Trace Gas Orbiter, Europianet Scier 13–24 Sep 2021, EPSC2021-109, https://doi.org/10.5194/epsc2021-109, 2021.

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