



HAL
open science

Hunting for Methane on Mars: one Martian year of survey with ACS on TGO

Franck Montmessin, Oleg Korablev, Anna A. Fedorova, Alexander V. Trokhimovskiy, Franck Lefèvre, Lucio Baggio, Denis A. Belyaev, Kevin Olsen, Juan Alday, Abdanour Irbah, et al.

► **To cite this version:**

Franck Montmessin, Oleg Korablev, Anna A. Fedorova, Alexander V. Trokhimovskiy, Franck Lefèvre, et al.. Hunting for Methane on Mars: one Martian year of survey with ACS on TGO. Europlanet Science Congress 2020. EPSC 2020, Sep 2020, Virtual Meeting, Unknown Region. pp.EPSC2020-637, 10.5194/epsc2020-637 . insu-02994808v2

HAL Id: insu-02994808

<https://insu.hal.science/insu-02994808v2>

Submitted on 6 Mar 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License

Europlanet Science Congress 2020

Virtual meeting

21 September – 9 October 2020

[Home](#) > EPSC2020-637

EPSC Abstracts

Vol. 14, EPSC2020-637, 2020, updated on 12 May 2022

<https://doi.org/10.5194/epsc2020-637>

Europlanet Science Congress 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Hunting for Methane on Mars: one Martian year of s on TGO

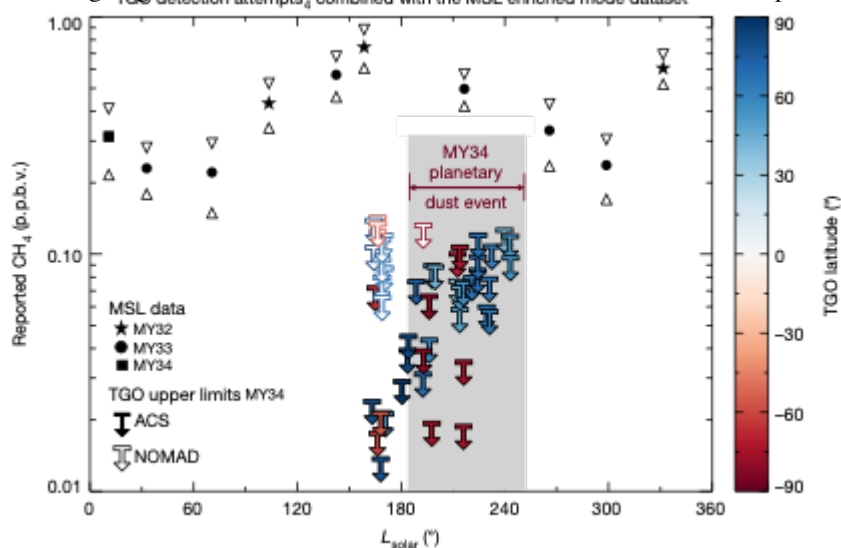
Franck Montmessin et al.

Abstract

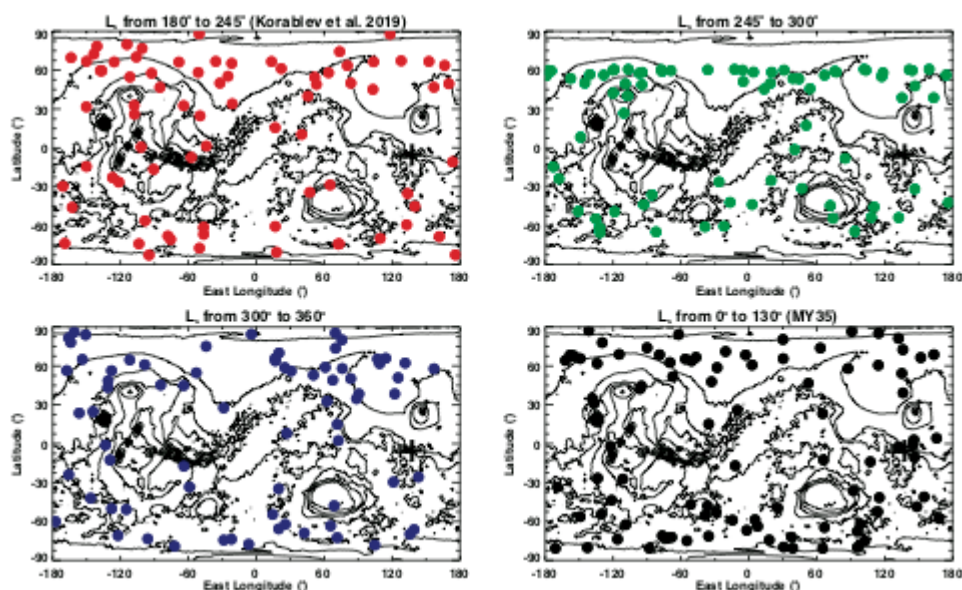
The Atmospheric Chemistry Suite (ACS) [1], one of the four science experiments on board ESA-Rosetta Orbiter (TGO) mission has started science operations in March 2018. ACS consists of 3 infrared unambiguous detection of trace gases of potential geophysical or biological interest. The dataset reports detection attempts conducted during the first complete Martian year (almost two Earth years) of occultation observing mode in orbit around Mars.

The Trace Gas Orbiter (TGO) of the ESA-Roscosmos ExoMars mission has ended its trip to Mars, reaching Mars after a year-long aerobraking phase, its scientific mission has begun on April 22nd, 2018 with the execution of the first solar occultation. The primary objective of TGO is to detect, map and locate trace gas sources, possibly revealing (biological) activity on Mars. The instrument of interest here is the infrared spectrometer Atmospheric Chemistry Suite (ACS) covers a wavelength range from 0.7 to 17 μm at very high spectral resolution ($\lambda / \Delta\lambda$ from 5,000 to 50,000) during solar occultation. Its performances complete the TGO trace gas detection arsenal together with NOMA and TGO.

A large part of the first months of the ACS observing mission has enabled the sensitive search of gas composition and vertical profile of the Martian atmosphere. The results from the first occultation up until early September 2018 incidentally covered the onset, the full development, and the demise of the Planetary Encircling Dust Storm (PEDS) instruments orbiting currently around Mars. Observing conditions proved more favourable than anticipated for the occultation cases to probe the Martian atmosphere close to the surface (<5 km) where the MSL Curiosity rover has detected a seasonally varying background level of CH₄ concentrations ranging between 240 and 650 pptv [2].



The first five months of ACS CH₄ detection attempts were reported in [3], revealing the absence of methane on the Martian globe (Figure 1). Part of the attempts at that time was impaired by the presence of abundant dust in the lower troposphere of Mars (<30 km) where methane, if detectable, presumably would have been destroyed. The ACS dataset analyzed here covers a period of more than 25 months, which is five times more than the dataset analyzed in [3]. This gives us a chance to perform a deeper exploration into the potential presence of methane on Mars and its implications for our understanding of active geophysical and physicochemical processes prevailing at Mars.



How to cite: Montmessin, F., Korablev, O., Fedorova, A. A., Trokhimovskiy, A. V., Lefevre, F., Baggio, L., J., Irbah, A., Lacombe, G., Patrakeev, A., Teinturier, L., Ignatiev, N., Luginin, M., Shakun, A., Guerlet, S., Wilson, C. F.: Hunting for Methane on Mars: one Martian year of survey with ACS on TGO, Europlanet S2 21 Sep–9 Oct 2020, EPSC2020-637, <https://doi.org/10.5194/epsc2020-637>, 2020.

Contact

[Contact](#)

[Data protection](#)

© 2019 Copernicus GmbH

Header image © Europlanet Society