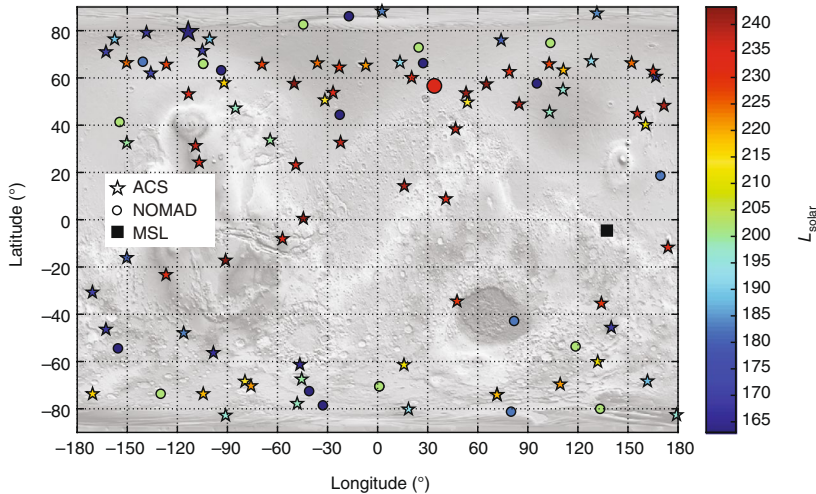


MARS

Methane hide-and-seek

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Credit: Springer Nature Ltd

Another episode in the confusing Martian methane saga has been written by the first observations of ESA's ExoMars Trace Gas Orbiter (TGO). Oleg Korablev and colleagues analysed spectroscopic data from the ACS (Atmospheric Chemistry Suite) and NOMAD (Nadir and Occultation for Mars Discovery) instruments to find no methane in any of the sampled locations (pictured, where the colour indicates the Martian day expressed in solar longitude, L_{solar}).

The main reason behind the intense scrutiny of methane on Mars is the fact that more than 99% of terrestrial methane is biogenic, produced by microorganisms. Up to now, the most convincing detection came from the Curiosity rover (MSL, Mars Science Laboratory), which saw a sudden spike of almost 7 parts per billion by volume (ppbv) between late 2013 and early 2014 at its location (Gale Crater, indicated by a square in the figure) over a baseline of ~0.4 ppbv. TGO's sensitivity is much lower than these values, ranging between 0.01 and 0.1 ppbv (depending on the dust loading of the atmosphere).

Korablev et al. explain why their result cannot be reconciled with the Curiosity data. Even supposing that Gale Crater is the only source of methane on Mars (unlikely), the intense convection that develops in the lower Martian atmosphere during daytime should be able to transport it around, leading to uniform mixing relatively quickly. The only possibility would be a mechanism that removes methane from the lower atmosphere of Gale Crater 1,000 times faster than predicted by standard chemistry, before it has time to spread. Such a mechanism, however, would defy our current knowledge of Martian photochemistry, which manages to reproduce the behaviour of all of the other atmospheric species quite well. No easy solution to the Martian methane mystery is thus in sight.

Luca Maltagliati

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