

No detection of methane on Mars from early ExoMars Trace Gas Orbiter observations

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ABSTRACT

Nowadays, methane on Mars has drawn our attention since it has been interpreted as a sign of geochemical or biotic activities. Various measurements of methane show transient property of methane, and there are seasonal variations in background methane concentrations. However, Martian atmosphere, which predicts a uniform distribution of methane, is difficult to reconcile with chemistry and physics understandings of it. Thus, highly sensitive measurements of atmospheric methane are the primary science goal. The authors report the measurements of the atmosphere on Mars for the purpose of detecting methane, using the ACS and NOMAD instruments onboard the ESA-Roscosmos ExoMars Trace Gas Orbiter in 2018. They obtained an upper limit for methane of about 0.05 parts per billion by volume (p.p.b.v.), which is 10 to 100 times lower than the detections previously reported. They think the background methane concentrations found in the Gale crater would need an unknown process which can suddenly remove or sequester methane from the lower atmosphere before it distributes universally.

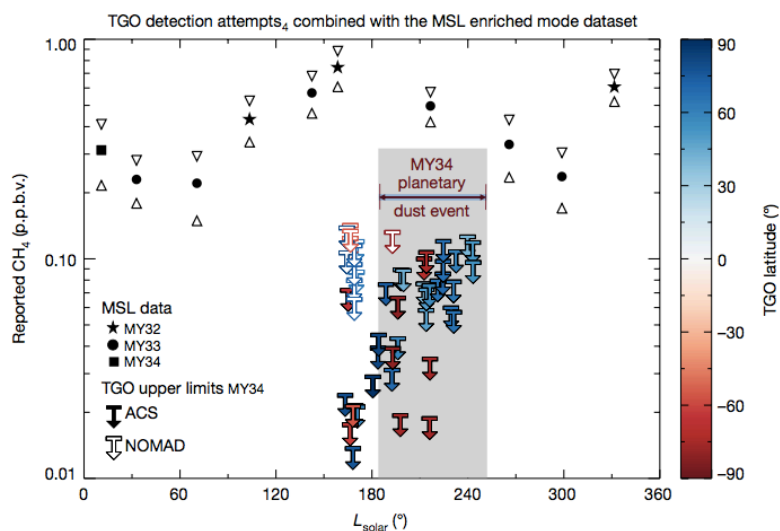


Fig. | TGO detection attempts combined with the MSL enriched-mode dataset.

REFERENCE

1. Korablev, O., et al. (2019). "No detection of methane on Mars from early ExoMars Trace Gas Orbiter observations." *Nature* **568**(7753): 517-520.
2. Lefevre, F. and F. Forget (2009). "Observed variations of methane on Mars unexplained by known atmospheric chemistry and physics." *Nature* **460**(7256): 720-723.