

Search of CH₄ on Mars by SOFIA/EXES

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Discovery of CH₄ in the Martian atmosphere has led to much discussion since it could be a signature of biological/geological activities on Mars. However, the presence of CH₄ and its temporal and spatial variations are still under discussion. We performed sensitive measurements of Martian CH₄ by using the Echelon-Cross-Echelle Spectrograph (EXES) onboard the Stratospheric Observatory for Infrared Astronomy (SOFIA) on 16 March 2016, which corresponds to summer ($L_s = 123.2^\circ$) in the northern hemisphere on Mars. The high altitude of SOFIA telescope (~ 13.7 km) enables us to significantly reduce the effects of terrestrial atmosphere, and the high spectral resolution of EXES ($R \sim 90,000$) enables us to detect the intrinsically narrow lines of Martian CH₄ at the $7.5 \mu\text{m}$ band. . Mars disk was spatially resolved into 3×3 areas, none of the observed region showed the unambiguous detections of CH₄. The upper limits on the CH₄ volume mixing ratio ranges from 1 to 6 ppb.

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