Temporal variation of the isotope ratio of methane observed with FTIR at Tsukuba

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We are trying to retrieve total columns (and vertical profiles) of methane isotopes ($^{12}CH_4$ and $^{12}CH_3D$) from the spectra observed with solar infrared spectroscopy using a Fourier transform spectrometer (FTIR) at Tsukuba. SFIT4 spectral fitting program was used for the retrieval.
$^{12}CH_4$ was retrieved from 3 microwindows (MWs) in 3 μm region using the parameters recommended by the Network for the Detection of Atmospheric Composition Change/InfraRed Working Group (NDACC/IRWG). The absorption lines of $^{12}CH_3D$ are also exist in 3 and 8 μm regions. We retrieved $^{12}CH_3D$ total columns from 4 MWs in 3 μm region for 2014 and 2023 and got the results with fairly small random error. δD of total column was calculated using $^{12}CH_4$ total column observed on the same day and the results in 2023 were lower than those in 2014. This tendency is consistent with the trend of the surface sampling results.

Keywords: FTIR, methane, isotope

