Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

AAS21-P06 Room:Convention Hall Time:May 19 18:15-19:30

Optimization of wavenumber regions for the retrieval of the vertical profiles of CH_4 from infrared spectra

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CH_4 is the second important greenhouse gas but there is large variability of its increasing rate that may be due to variabilities of sources. Therefore, it is important to investigate the vertical profile of CH_4.

Solar infrared spectra have been observed with a Fourier transform spectrometer (FTS) at Tsukuba, Japan. FTS has advantages in its high-resolution and the wide wavenumber range. Vertical profiles of some species can be derived from the high-resolution spectra with the SFIT2 spectral fitting program developed by Rinsland et al. (1998). It needs to select appropriate wavenumber regions and the optimization of fitting parameters is also needed. Now we are investigating these wavenumber regions and parameters in the NDACC/IRWG group for the retrieval of the vertical profiles and column densities of CH_4. Sussmann et al. [2011] analyzed with some combinations of the following wavenumber regions: 1) 2613.7 - 2615.4 cm^{-1}, 2) 2650.6 - 2651.3 cm^{-1}, 3) 2835.5 - 2835.8 cm^{-1}, 4) 2903.6 - 2904.03 cm^{-1}, 5) 2921.0 - 2921.6 cm^{-1}, and reported the combination of 1), 3), and 5) is best. We also compared the results from some combinations of these wavenumber regions and found that the discrepancy become large in summertime. It may be due to HDO absorption lines existing in these wavenumber regions as an interfering species.

Keywords: FTIR, Trace Species, Methane