

Methane observations using FTS and AirCore

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A Fourier Transform Spectrometer (FTS) has been installed in Sodankylä (67.4° N, 26.6 ° E) to record direct solar spectra in the near-infrared spectral region in the spectral range between 0.7 and 2.5 μm . From the spectra column-averaged abundance of CH₄, N₂O and other gases are retrieved. The FTS instrument in Sodankylä is based on Bruker 125 HR and participates in the TCCON Network. The measurements have been performed since 2009. Based on the measurements from 2009 until 2014 we find statistically significant increase in methane by 6 +/- 1 ppb per year. Secondly, we performed comparisons with space borne measurements by the GOSAT (the Greenhouse Gases Observing Satellite) mission. We found a good agreement between the GOSAT and ground based observations. In case of CH₄ the relative difference has been -0.08 +/- 0.03 % over the time period 2009-2014. At the site of the FTS we have also started the AirCore measurements using a long sampling tube to collect air samples from stratosphere down to the surface. These samples have been analyzed by a Picarro gas analyzer. The measurements have helped us to evaluate the accuracy of the FTS retrieval of CH₄. In addition the methane profiles by AirCore have been used to study the effect of stratospheric profiles on the FTS retrievals during a polar vortex overpass in spring.