



Fourier Transform Spectrometer measurements of column CO₂ and CH₄ at Sodankylä

Rigel Kivi (1), Pauli Heikkinen (1), Juha Hatakka (2), Tuomas Laurila (2), Hannakaisa Lindqvist (2), and Huilin Chen (3)

(1) Finnish Meteorological Institute, Sodankylä, Finland, (2) Finnish Meteorological Institute, Helsinki, Finland, (3) University of Groningen, Groningen, Netherlands

Fourier Transform Spectrometer (FTS) measurements of atmospheric carbon dioxide and methane were established at Sodankylä (67.4° N, 26.6° E) in early 2009. The instrument records high-resolution solar spectra in the near-infrared spectral region. Column-averaged abundances of methane, carbon dioxide and other gases are derived from the measured spectra. The FTS at Sodankylä participates in the Total Carbon Column Observing Network (TCCON). Here we present data from ten years of measurements at Sodankylä and comparisons with satellite borne observations. In order to guarantee the optimal performance of the ground based FTS, we have checked and adjusted the optical alignment of the instrument on regular basis. The instrument line shape measurements show that the derived modulation efficiency at maximum optical path difference has remained relatively stable, indicating that the alignment has been maintained. Relevant satellite missions during the recent ten-year time period include the TROPOspheric Monitoring Instrument (TROPOMI) on board of the Copernicus Sentinel-5 Precursor satellite, the Orbiting Carbon Observatory-2 (OCO-2); the Greenhouse Gases Observing Satellite (GOSAT); the SCanning Imaging Absorption spectroMeter for Atmospheric CHartographY (SCIAMACHY) and TanSat. Finally we compare the remote sensing observations with in situ measurements at Sodankylä. The in-situ measurements were performed at a tower near the FTS site and by using a balloon-borne AirCore instrument.