Atmospheric Carbon Dioxide and Methane measurements at Sodankylä, Finland

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Carbon dioxide and methane column measurement at the Finnish Meteorological Institute's Sodankylä facility in northern Finland started in early 2009. The measurements have been taken by a Fourier Transform Spectrometer (FTS) in the near-infrared spectral region. From the spectra column-averaged abundances of CO\textsubscript{2}, CH\textsubscript{4} and other gases are derived. The instrument participates in the Total Carbon Column Observing Network (TCCON). Here we present long-term ground based FTS measurements of carbon dioxide and methane and comparisons with satellite borne observations. We find that CO\textsubscript{2} column amounts have increased by 2.2 ± 0.1 ppm/year since the start of the measurements in 2009 and CH\textsubscript{4} column amounts have increased by 7 ± 0.4 ppb/year. The measurements are in good agreement with multi-year measurements by the Greenhouse Gases Observing Satellite (GOSAT): the relative difference in XCH\textsubscript{4} has been -0.07 ± 0.02 % and the relative difference in XCO\textsubscript{2} has been 0.04 ± 0.02 %. Finally we use balloon borne AirCore observations at the Sodankylä site to provide comparisons between FTS and in situ observations during all seasons.