



## **Fourier Transform Spectrometer measurements of Atmospheric Carbon Dioxide and Methane**

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Ground based remote sensing measurements of column CO<sub>2</sub> and CH<sub>4</sub> using Fourier Transform Spectrometers (FTS) within the Total Carbon Column Observing Network (TCCON) are known for high precision and accuracy. These measurements are performed at various locations globally and they have been widely used in carbon cycle studies and validation of space born measurements. The relevant satellite missions include the Orbiting Carbon Observatory-2 (OCO-2) by the National Aeronautics and Space Administration (NASA); the SCanning Imaging Absorption SpectroMeter for Atmospheric CHartographY (SCIAMACHY) by the European Space Agency (ESA); the Greenhouse gases Observing SATellite (GOSAT) by the Japan Aerospace Exploration Agency (JAXA) and the upcoming Sentinel-5 Precursor mission, which is an ESA mission and scheduled for launch in 2016. Results of the column CO<sub>2</sub> and CH<sub>4</sub> measurements at Sodankylä in northern Finland (at 67.4° N, 26.6° E) are reported in this study. The measurements have been performed on regular basis since the beginning of the program in early 2009. We also present evaluation of the data quality of the ground based measurements and comparisons with the available satellite based retrievals. In case of comparisons between the GOSAT and ground based retrievals of CO<sub>2</sub> and CH<sub>4</sub> no significant biases were found. Sodankylä is one of the northernmost stations in the TCCON network. However, the data coverage has been relatively good thanks to the progress towards automation of the FTS measurement system. At Sodankylä the retrievals have been also compared with the balloon borne AirCore measurements at the site. AirCore sampling system is directly related to the World Meteorological Organization in situ trace gas measurement scales. The balloon platform allows sampling in both stratosphere and troposphere, which is a benefit, compared to the aircraft in situ measurements.