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Remote Sensing Measurements of Carbon Dioxide and Methane over Northern Finland

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Remote sensing measurements of carbon dioxide and methane at the Sodankylä facility in northern Finland cover a 12-year time period. The measurements have been taken by a Fourier Transform Spectrometer (FTS), operating in the near-infrared spectral region. The Sodankylä site is participating in the Total Carbon Column Observing Network (TCCON). Here we present long-term measurements of column-averaged, dry-air mole fractions of carbon dioxide and methane and comparisons with satellite borne measurements. The relevant satellite missions include the TROPospheric Monitoring Instrument (TROPOMI) on board of the Copernicus Sentinel-5 Precursor satellite, the Orbiting Carbon Observatory-2 (OCO-2) and the Greenhouse Gases Observing Satellite (GOSAT). We have performed AirCore observations in the vicinity of the TCCON instrument at Sodankylä during all seasons. AirCore measurements are directly related to the World Meteorological Organization in situ trace gas measurement scales. The AirCore data are used in this study to provide comparisons with remote sensing retrievals.