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The new TCCON-FTS site at Garmisch, Germany (47 °N, 11 °E, 744 m a.s.l.): Set up, first year of operation, and contribution to OCO and GOSAT validation

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Since 2007 at Garmisch, Germany (47.48 °N, 11.06 °E, 744m a.s.l.) a Bruker IFS125HR near-infrared Fourier-Transform-Spectrometer is operated as part of the Total Carbon Column Observing Network (TCCON; http://www.tccon.caltech.edu). Solar absorption spectra in the wave number range 4000 - 16 000 cm-1 are recorded continuously during clear sky conditions using dual acquisition from an InGaAs detector and a Si diode. From these spectra, accurate and precise column-averaged mixing ratios of CO2 and CH4 are retrieved using measured column ratios CO2/O2 and CH4/O2. These observations contribute to the validation of the Orbiting Carbon Observatory (OCO, NASA) and the Greenhouse Gases Observing Satellite (GOSAT, JAXA). They will also provide input data for the inverse modeling of sources and sinks of these Kyoto gases. Due to the high atmospheric background columns of CO2 and CH4 a single-column-measurement precision of better than 0.1% is required to be able to detect the relatively small effects from the sources and sinks of these species. This paper describes the observatory set up and the permanent observing program. We show an analysis of the first year of measurement data with a focus on quality control, and on annual as well as diurnal cycles of CO2/O2 and CH4/O2.