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Data Set Description:
PI:
Johan Mellqvist
Chalmers University of Technology
Gothenburg, Sweden
Instrument:
Bruker 125HR Fourier transform infrared (FTIR) spectrometer
Site(s):
Onsala Space Observatory
SE-439 92 Onsala
Sweden
Measurement Quantities:
Column density (molec/cm^2) and volume mixing ratio (vmr) vertical profile of multiple species

Contact Information:
Name:
Johan Mellqvist
Address:
Chalmers University of Technology
Department of Space, Earth and Environment
SE-41296 Gothenburg
Sweden
Phone:
+49-31-772 4855
Email:
johan.mellqvist@chalmers.se

DOI:
None

Data License:

Date of NDACC/NDSC affiliation
2025-11

Instrument Description:
A commercial *Bruker 125HR* Fourier transform infrared spectrometer (FTS) was installed in a container at the Onsala Space Observatory during the summer of 2023 and has been in operation since September 2023. The Onsala Space Observatory is located about 50 km south of Gothenburg, Sweden. The instrument is equipped with four detectors: two used for NDACC observations (mid-infrared) and two

used for TCCON observations (near-infrared). The beamsplitter needs to be changed to switch from TCCON (CaF_2 beamsplitter) to NDACC (KBr beamsplitter) observations. Longer wavelengths are cut off by the CaF_2 beamsplitter, which prevents the use of the MCT detector (750cm^{-1} to 1300cm^{-1}; affected species are, e.g., O_3, freons, $ClONO_2$). The shorter wavelengths in the mid-infrared (InSb detector, 1850cm^{-1} to 4300cm^{-1}), are not cut off by either of the two beamsplitters. Beamsplitters are switched depending on the current weather and observation statistics, typically about every two weeks.

Algorithm Description:

Spectra are evaluated with the SFIT4 retrieval software which is implementing the optimal estimation method of Rodgers. Micro-windows are defined to isolate well characterized absorption lines of the target species. Spectroscopic parameters are taken from HITRAN databases. We use pseudoline lists produced by G.C. Toon (NASA, JPL) for species with unresolved parameters (e.g., freons, $ClONO_2$, C_2H_6). A priori profiles of target species are taken from long-term average of a WACCM run. Water vapor profiles are taken from the ECMWF ERA5 reanalysis. Pressure and temperature profiles are given by the NCEP reanalysis.

Expected Precision/Accuracy of Instrument:

Precision and accuracy are species dependent and are usually described in corresponding papers.
Line shape measurements with N_2O cell are performed twice a year. We use linefit v14 for instrumental line shape (ILS) characterization. ILS of the Bruker IFS125HR is known to be nearly perfect and stable in time.

Instrument History:

- Summer 2023: Installation