File revision Date:
May 25, 2021

Data Set Description:

PI: James W. Hannigan
Instrument: Bruker 125HR Fourier Transform Interferometer
Site(s): NCAR Foothills Lab -0 Boulder CO, : 39.99¬∞N, 105.26¬∞W, 1634masl
Measurement Quantities:
Column Density [molec/cm^2] N2O, O3, HCl, HF, HNO3, CO, CLONO2, CH4, H2O, HCN, C2H6
Volume mixing ratios [vmr] N2O, O3, HCl, HF, HNO3, CO, CH4, H2O, HCN, C2H6

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Reference Articles:

"Network for the Detection of Stratospheric Change Fourier transform infrared intercomparison at Table Mountain Facility, November 1996", A. Goldman et.al., J. Geophys. Res., Vol. 104, No. D23, pp30481-30503, 20 Dec 1999

"Semiautonomous FTS Observation System for Remote Sensing of Stratospheric and Tropospheric Gases." J. W. Hannigan, M. T. Coffey, and A. Goldman. Journal of Atmospheric and Oceanic Technology, 26:1814,Äì1828, March 2009. doi: 10.1175/2009JTECHA1230.1.

“Tropospheric water vapor profiles obtained with FTIR: comparison with balloon-borne frost point hygrometers and influence on trace gas retrievals,”, I. Ortega, R. R. Buchholz, E. G. Hall, D. F. Hurst, A. F. Jordan, and J. W. Hannigan, Atmospheric Measurement Techniques 12.2 (2019), pp873,Äì890. doi: 10.5194/amt-12-873-2019.

Instrument Description:

This meta-data file describes data taken at Boulder, CO, USA 1634masl. The instrument has not been blind intercompared as per the early NDSC requesite. The instrument is operated and held to the same standards as the Thule instrument which has been intercompared . That instrument, intercomparison, data, analysis and errors are described in the reference given above. This instrument operates manually. Observations are taken work days weather permitting. The instrument measures solar absorption spectra from 750cm-1 to 6000cm-1 in seven filter bands. A single spectra is the average of at least one forward and one backward scan which can be taken in under 3 minutes. All current data in the NDACC archive have been reprocessed with the latest versions of SFIT4 to the current NDACC/IRWG standard retrieval guidelines (https://www2.acom.ucar.edu/irwg).

Algorithm Description:

All data in the NDACC archive has been reprocessed with the latest versions of SFIT4 to the current NDACC/IRWG standard retrieval guidelines (https://www2.acom.ucar.edu/irwg). This includes HITRAN 2008 plus updates, NCEP temperatures and pressures as distributed by NDACC, a priori profiles from the IRWG_V6 of WACCM. This version of SFIT4 includes uncertainty estimates based on modeled sensitivities calculated in the retrieval model for many retrieved, forward model and instrumental parameters. These uncertainty estimates are included in the HDF archived data files along with the best estimate of the water vapor profile at the time of the measurement, the mixing ratio profile and the air mass profile.

Expected Precision/Accuracy of Instrument:
A complete discussion of the errors in the columns can be found in the error analysis section of the papers above. Current best estimates are given in the HDF files and are calculated for each retrieved profile.

Instrument History:
This Bruker IFS120 (600cm OPD) was installed at the NCAR Foothills Lab in Boulder in 2008. We began routine atmospheric measurements in 2010. The solar tracker is a 3,Äù aperture dynamical tracking Univ. of Denver unit. Measurements are taken manually workdays weather permitting. There are no data Dec 2017 - Sep 2018 as the instrument was upgraded to a Bruker 125HR. This improved reliability and greatly reduced the spectral noise floor. Data resumed and has been uninterrupted during the COVID-19 related slowdown period. The instrument is very high resolution at 600cmOPD or 0.0015cm-1. It is also used for lab cell measurements. Routine calibration cell measurements are taken with N2O and HBr cells per IRWG best practices. The instrument is not evacuated.