

File Revision Date:

May 25, 2021

Data Set Description:

PI: James W. Hannigan

Instrument: Bruker 125HR Fourier Transform Interferometer

Site(s): Mauna Loa Observatory, Hawaii, USA 19.54N, 204.43E, 3396masl

Measurement Quantities:

Column Density [molec/cm²] : 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:

"Results from the 1995 Stratospheric Ozone Profile Intercomparison at Mauna Loa." R. D. McPeters, D. J. Hofmann, M. Clark, L. Flynn, L. Froidevaux, M. Gross, B. Johnson, G. Koenig, X. Liu, S. McDermid, T. McGee, F. Murcray, M. J. Newchurch, S. Oltmans, A. Parrish, R. Schnell, U. Singh, J. J. Tsou, T. Walsh, and J. M. Zawodny. *J. Geophys. Res - Atmos.*, 104(D23):30,505-30,515, December 1999.

"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*, 26:1814-1828, March 2009. doi: 10.1175/2009JTECHA1230.1.

Instrument Description:

This meta-data file describes the FTIR data taken at Mauna Loa Hawaii The instrument has been intercompared as per the NDSC requirements. The instrument, intercomparison, data, analysis and errors are described in the references given above. The instrument runs autonomously via computer control. Observations are programmed to be take daily weather permitting. The instrument measures solar absorption spectra from 750cm⁻¹ to 5000cm⁻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. Spectra are downloaded to NCAR via internet daily for analysis. The HDF data in the archive are per measurement profile retrievals. As of April 2015 all HDF 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>).

Algorithm Description:

As of April 2015 all data in the NDACC archive has been reprocessed with the latest versions of SFIT4 to the current NDACC/IRWG standard retrieval guidelines (www.acd.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 JGR paper. Current best estimates are given in the HDF files and are calculated for each retrieved profile.

Instrument History:

See References above. An early Bomem instrument was installed in 1991. This was replaced with a Bruker 120HR in August 1995. The instrument fell into disrepair in the early '00's. The site was managed by Univ. of Denver from 1991 to 2008. Retrievals of total columns from these data are in the archive in AMES format. In 2008 management of the site was taken over by NCAR. The automatic operation sub-systems was updated. In 2010 the instrument was removed to the manufacturer for approx. 1 year for upgrades. Operations resumed in August 2011 with a 125HR series instrument. Optical filters and detectors were the same. The instrument operates under linux. The solar tracker is unchanged from 1991. The instrument was put under vacuum in 2013 after loss of KBr beamsplitters due to excess water vapor.