File Revision Date:
2023-06-14

Data Set Description:
PI:
Johan Mellqvist
Chalmers University of Technology
Gothenburg, Sweden

until March 2008, also:
Bo Galle
Chalmers University of Technology
Gothenburg, Sweden

Instrument:
Fourier Transform Infrared Spectrometer (FTIR)

Site:
Harestua solar observatory
Piperveien 490, 2716 Harestua
Norway
60.20 N, 10.80 E, 596 masl

Measurement Quantities:
FTIR vmr vertical profile data at Harestua, Norway
Column Density [molec/cm^2] C2H6, CFC12, CH4, ClONO2,
CO, CO2, COF2, HCFC-22, HCl, HF, HNO3, N2O, NO2, O3

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

:

Reference Articles:

Blumenstock, T. et al., Characterization and potential for reducing optical resonances in Fourier transform infrared spectrometers of the Network for the Detection of Atmospheric Composition Change (NDACC), Atmospheric Measurement Techniques, 14, 1239–1252, https://doi.org/10.5194/amt-14-1239-2021 (2021).

Sha, M. et al., Validation of methane and carbon monoxide from Sentinel-5 Precursor using TCCON and NDACC-IRWG stations, Atmospheric Measurement Techniques, 14, 6249–6304, https://doi.org/10.5194/amt-14-6249-2021 (2021).

Vigouroux, C. et al., Trends of ozone total columns and vertical distribution from FTIR observations at eight NDACC stations around the globe, Atmospheric Chemistry and Physics, 15, 2915-2933, https://doi.org/10.5194/acp-15-2915-2015 (2015).

Angelbratt, J. et al., Carbon monoxide (CO) and ethane (C(2)H(6)) trends from groundbased solar FTIR measurements at six European stations, comparison and sensitivity analysis with the EMEP model, Atmospheric Chemistry and Physics, 11 (17) 9253-9269, https://doi.org/10.5194/acp-11-9253-2011 (2011).

de Laat, A.T.J. et al., Validation of five years (2003-2007) of SCIAMACHY CO total column measurements using ground-based spectrometer observations, Atmospheric Measurement Techniques, 3(5), 1457-1471 (2010).

Dupuy, E. et al., Validation of ozone measurements from the Atmospheric Chemistry Experiment (ACE), Atmospheric Chemistry and Physics, 9, 287-343 (2009).

Vigouroux, C. et al., Evaluation of tropospheric and stratospheric ozone trends over Western Europe from ground-based FTIR network observations, Atmospheric Chemistry and Physics, 8, 6865-6886 (2008).

Gardiner, T. et al., Trend analysis of greenhouse gases over Europe measured by a network of ground-based remote FTIR instruments, Atmospheric Chemistry and Physics, 8, 6719-6727 (2008).

Dils, B. et al., Comparisons between SCIAMACHY and ground-based FTIR data for total columns of CO, CH4, CO2 and N2O, Atmospheric Chemistry and Physics, 6, 1953-1976 (2006).

Yurganov, L.N. et al., Increased Northern Hemispheric CO burden in the troposphere in 2002 and 2003 detected from the ground and from a satellite, Atmospheric Chemistry and Physics, 5, 563–573 ((2005).

Yurganov, L.N. et al., A Quantitative Assessment of the 1998 Carbon Monoxide Emission Anomaly in the Northern Hemisphere Based on Total Column and Surface Concentration Measurements, Journal of Geophysical Research, 109, (D15), D15305, https://doi.org/110.1029/2004JD004559 (2004).

Mellqvist, J. et al., Ground-based FTIR observations of chlorine activation and ozone depletion inside the Arctic vortex during the winter of 1999/2000, Journal of Geophysical Research, 107 (D20), 8263 (2002).

Galle, B. et al., Ground based FTIR measurements of stratospheric species from Harestua, Norway during SESAME and comparison with models, Journal of Atmospheric Chemistry, 32 (1), 147-164 (1999).

Paton Walsh, C. et al., An uncertainty budget for ground-based Fourier transform infrared column measurements of HCl, HF, N2O, and HNO3 deduced from results of side-by-side instrument intercomparisons, Journal of Geophysical Research, 102, 8867-8873 (1997).

Chipperfield, M.P. et al., On the use of HF as a reference for the comparison of stratospheric observations and models, Journal of Geophysical Research, 102, 12,901-12,919 (1997).

Instrument Description:

A Bruker instrument IFS 120 was installed in May 1994 at Harestua which is a solar observatory situated about 50km north of Oslo. Since the first measurements in Sept. 1994, the solar coeliostat of the solar observatory was used. A home made solar tracker has been in operation from 2006, and the instrument was upgraded in the summer of 2008. From August 2008 we use the IFS 125M (Brault aquisition)

Instrument IDs:
CTH001 - IFS 120
CTH002 - IFS 125M

Algorithm Description:

Our data has been evaluated with sfit2 and saved in Ames format up to 2019. Geoms-HDF files have been produced using sfit4 for O3, CH4 and HCl, and we expect that all species will be saved in Geoms-HDF at NDACC the next following years.

Expected Precision/Accuracy of Instrument:

Line shape measurements with HBr cell are performed monthly. We use linefit v9 for ILS.

License Type

Attribution-NonCommercial-ShareAlike

Instrument History:

July 2008 Upgrade of instrument to IFS 125M
Sep. 2008 New KBr beamsplitter
Oct. 2009 Compressor connected to instrument
Apr. 2010 New aperturewheel installed in instrument
May 2013 Tracker controller problem again. 4 weeks downtime
Sep. 2013 Laser encoder failure. Sent to Bruker. 7 weeks downtime
Oct. 2013 Sun tracker failure. 8 weeks downtime
Nov. 2015 Laser-freq. stability problem. 9 weeks downtime.
Dec. 2015 A new laser was installed
March 2021. New laser was installed.

Aug. 2016 Installation of new control PC running Windows 10
Dec. 2016 Laser encoder problems. Encoder/motor sent to Bruker.
July 2017 Tracking problems due to defect photo diode.
Sep. 2019 No measurements during the next four months due to a broken laser
Jan. 2020 The new laser has straylights. No measurements until May.

Days of observations with the IFS 125M instrument:

2008	46
2009	54
2010	56
2011	55
2012	49
2013	29
2014	53
2015	43
2016	49
2017	47
2018	57
2019	39
2020	35
2021	38