

MetaData File provided: September 1999.
Latest Revision: September 2025.

Data Set Description:

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Co-Is: U. Raffalski (IRF), Frank Hase (KIT-IMKASF)

IRF: Institutet foer Rymdfysik (Swedish Institute of
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IMKASF: Institute of Meteorology and Climate Research Atmospheric Trace Gases and
Remote Sensing
Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

Instrument: Fourier Transform Infrared Spectrometer (FTIR)

Site(s): IRF Kiruna
NDACC Arctic site
67.84 S, 20.41 E, 419m above sea level

Measurement Quantities: Vertical column abundances and Profiles of several trace gases above Kiruna
(in number molecules per cm²)

Contact Information:

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Online References:

<http://www.imkasf.kit.edu/english/714.php>

Instrument Description:

A Bruker IFS 120HR Fourier Transform Infra-red (FTIR) spectrometer has been operated at the Kiruna site on a continuous basis since Mar 1996. (A mobile Bruker 120-M had been operated at the nearby Esrange site by the IMK group on a campaign basis before March 1996.)

The FTS is operated in solar absorption geometry. The maximum optical path difference achievable is 360 cm corresponding to a spectral resolution of 0.002 cm⁻¹. Normally a resolution of 0.005 cm⁻¹ (opd = 180 cm) is chosen. The 120HR is equipped with two sets of InSb and MCT detectors allowing for solar and lunar absorption spectra. For solar observations the spectral range covered is 650 to 5000 cm⁻¹. The NDACC optical filter set is used.

The Instrumental Line Shape (ILS) is monitored routinely with HBr or N₂O gas cell measurements. Cell spectra are analyzed with the LINEFIT software (F. Hase, 1999).

Algorithm Description:

PROFFIT 9.6 (Hase et al., 2004) is used for the inversion of the spectra. PROFFIT is able to retrieve profiles and vertical column abundances of several species in several microwindows simultaneously. For the profile retrieval the Philipps-Tikhonov approach is used. For some species the inversion is performed on a logarithmic scale to avoid negative vmr values.

PROFFIT also includes a forward model. The synthetic spectra are calculated using daily pressure and temperature data of the National Center for Environmental Prediction (NCEP). Spectroscopic data are taken from HITRAN 2008 data base.

Expected Precision/Accuracy of Instrument:

The error estimate is given for each data point in the data files.

Data License type:

CC-BY-NC-SA license (not open for commercial use - credits required – share alike)

Location of L0/L1 data:

Same as PI address given above

Instrument History:

Mar. 1996	start-up of the instrument at IRF Kiruna
Mar. 1998	side-by-side intercomparison with the Bruker 120M from NPL
Feb. 1999	new solar tracker system installed
July 2001	new PC; OPUS-OS/2 replaced by OPUS-NT;
July 2002	camera system for cloud observation installed
July 2004	remote control implemented
July 2007	spectrometer upgraded to 125 HR; basically a new electronics was installed, optics wasn't changed

Sept. 2010	camera based camtracker implemented (Gisi et al., 2011)
Mar. 2014	new PC: Win XP => Win 7
Mar. 2017	low-resolution FTIR spectrometer Bruker EM-27/SUN added for GHG measurements
Dec. 2021	PC: Win 7 => Win 10
Dec. 2021	Bruker EM-27/SUN shipped back to Karlsruhe; second detector channel for CO added
Mar. 2022	Bruker EM-27/SUN measurements resumed

Days of observation:

1996	27
1997	100
1998	84
1999	84
2000	74
2001	74
2002	95
2003	91
2004	87
2005	79
2006	91
2007	95
2008	59
2009	47
2010	64
2011	79
2012	64
2013	66
2014	70
2015	68
2016	81
2017	73
2018	110
2019	103
2020	105
2021	95
2022	116
2023	117
2024	94

Total	2392
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Selected Articles:

Van Malderen, R., Zang, Z., Chang, K.-L., Björklund, R., Cooper, O. R., Liu, J., Maillard Barras, E., Vigouroux, C., Petropavlovskikh, I., Leblanc, T., Thouret, V., Wolff, P., Effertz, P., Gaudel, A., Tarasick, D. W., Smit, H. G. J., Thompson, A. M., Stauffer, R. M., Kollonige, D. E., Poyraz, D., Ancellet, G., De Backer, M.-R., Frey, M. M., Hannigan, J. W., Hernandez, J. L., Johnson, B. J., Jones, N., Kivi, R., Mahieu, E., Morino, I., McConville, G., Müller, K., Murata, I., Notholt, J., Piders, A., Prignon, M., Querel, R., Rizi, V., Smale, D., Steinbrecht, W., Strong, K., and Sussmann, R.: Ground-based tropospheric ozone measurements: regional tropospheric ozone column trends from the TOAR-II/HEGIFTOM homogenized datasets, *Atmos. Chem. Phys.*, 25, 9905–9935, <https://doi.org/10.5194/acp-25-9905-2025>, 2025.

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For full list of references please see:

<http://www.imkasf.kit.edu/english/709.php>