File Revision Date:
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Data Set Description:

PI: Justus Notholt and Otto Schrems
Instrument: Bruker IFS 120 M
Site(s): Research vessel Polarstern, Atlantic (79 N - 70 S, 20 m a.s.l.)
Measurement Quantities:
Solar observations of atmospheric trace gases. Total columns of more than 20 trace gases, concentration profiles in up to 3-4 layers for a few trace gases on request.

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Reference Articles:

J. Notholt, I. Beninga, O. Schrems, Shipborne FTIR measurements of atmospheric trace gases on a South (33 °S) to North (53 °N) Atlantic traverse, Applied Spectr., 49, 1525-1527, 1995.

N. S. Pougatchev, N.B. Jones, B.J. Connor, C.P. Rinsland, E. Becker, M.T. Coffey, V.S. Connors, Ph. Demoulin, A.V. Dzhola, H. Fast, E.I. Grechko, J.W. Hannigan, M. Koike, Y. Kondo, E. Mahieu, W.G. Mankin, R.L. Mittermeier, J. Notholt, H.G. Reichle Jr., B. Sen, G.C. Toon, L.N. Yurganov, R. Zander, Y. Zhao, Carbon Monoxide Ground-based Infrared Solar Spectroscopic Measurements During 1994 MAPS Flights, J. Geophys. Res., 103, 19317-19325, 1998.

J. Notholt, G.C. Toon, C.P. Rinsland, N. Pougatchev, N.B. Jones, B.J. Conner, R. Weller, M. Gautrois, O. Schrems, Latitudinal variations of trace gas concentrations in the free troposphere measured by solar absorption spectroscopy during a ship cruise, J. Geophys. Res., 105, 1337-1349, 2000.

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Instrument Description:
Commercial interferometer, IFS120 M from Bruker GmbH, Karlsruhe Germany.
max. possible optical path difference: 257 cm
total spectral region used: 300 nm to 15 um.
Internal parallel beam diameter: 6 cm
Active solar tracker to focus the sun light on the
entrance aperture.
LN-cooled MCt- and InSb-detectors for the IR, Si- and
GaP-diodes and photomultipliers for UV/Vis.
KBr-, CaF2- and quarzglass-beamsplitters.

Algorithm Description:
The retrieval of the column abundances is performed by the GFIT algorithm, which used temperature profiles from sondes launched daily during the cruise, and an initial set of vmr profiles derived from MkIV balloon measurements (G. Toon, JPL), which were then stretched/compressed above 10 km altitude to account for day-to-day variations in the amount of subsidence.

The concentration profiles are derived using SFIT2/SFIT4, based on the optimal estimation method.

Expected Precision/Accuracy of Instrument:
The errors tabulated in the main part of the data file, determined from the quality of the spectral fits, represent the 1-sigma measurement precisions. These errors are appropriate for comparing columns measured on different days. For most gases, the main systematic errors arise from uncertainties in the assumed vmr profiles shapes, and from uncertainties in the spectroscopic parameters (of both the target gas and interfering gases).

Instrument History:
-Measurements with this instrument in Ny-Aalesund/Spitsbergen from 1992 to 1995
-First cruise campaign onboard Polarstern in May/June 1994
-2nd campaign in Oct./Nov. 1996
-3rd campaign in Dec. 1999/Jan. 2000
-4th campaign in Jul. 2000
-5th campaign in Oct./Nov. 2002
-6th campaign in Jan./Feb. 2003
-7th campaign in Oct./Nov. 2003
-8th campaign in Oct./Nov. 2005
update to new electronic.
-9th campaign in Oct./Dez. 2009 in the Pacific.

Measurements are performed by placing the instrument inside a thermostated container on the upper deck of the ship, approx. 20 m above sea level.