

File Revision Date:

September 2, 2022

Data Set Description:

PI: Tomoo Nagahama
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Co-PI: Isamu Morino
National Institute for Environmental Studies, Japan (NIES)

Instrument: Infrared Fourier Transform Spectrometer (FTIR)

Site(s): Rikubetsu Observatory, Hokkaido, Japan,
43.46N, 143.77E, 370m

Measurement Quantities: Column Density [molec/cm²] : O₃, HCl, HF, HNO₃, ClONO₂, CH₄, C₂H₆, CO, N₂O, HCN, OCS
Volume mixing ratios [vmr] : O₃, HCl, HF, HNO₃, ClONO₂, CH₄, C₂H₆, CO, N₂O, HCN, OCS

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Reference Articles:

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H. Nakajima, X. Liu, I. Murata, Y. Kondo, F.J. Murcray, M. Koike, Y. Zhao, and H. Nakane, Retrieval of vertical profiles of ozone from high resolution infrared solar spectra at Rikubetsu, Japan, *J. Geophys. Res.*, 102, 29981-29990, 1997.

Y. Zhao, Y. Kondo, F.J. Murcray, X. Liu, M. Koike, K. Kita, H. Nakajima, I. Murata, and K. Suzuki, Carbon monoxide column abundances and tropospheric concentrations retrieved from high resolution ground-based infrared solar spectra at 43.5°N over Japan, *J. Geophys. Res.*, 102, 23403-23411, 1997.

I. Murata, Y. Kondo, H. Nakajima, M. Koike, Y. Zhao, W. A. Matthews, and K. Suzuki, Accuracy of total ozone columns observed with infrared solar spectroscopy, *Geophys. Res. Lett.*, 24, 77-80, 1997.

Jones, N. B., M. Koike, W. A. Matthews, and B. M. McNamara, Southern Hemisphere Seasonal Cycle in total column Nitric Acid, *Geophys. Res. Lett.*, 21, 593-596, 1994.

Instrument Description:

A commercial Bruker IFS 120/5HR has been operated in Rikubetsu since January 2014. The instrument is equipped with MCT and InSb detectors for NDACC measurements as well as InGaAs and Si detectors for TCCON ones. The nominal range covered is 750-1250, 1400-2100, 2000-2650, 2300-3100, 2700-3800, and 3900-4300 cm⁻¹, based on a standard set of NDACC/IRWG filters.

Algorithm Description:

Since May 2017, all data in the NDACC archive has been reprocessed with the SFIT4 version 0.9.4.4 according to the NDACC/IRWG standard retrieval guidelines (www.acd.ucar.edu/irwg). In addition, the uncertainty estimates which are from retrievals with SFIT4, 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:

Current best estimates are given in the HDF files and are calculated for each retrieved profile.

Instrument History:

A commercial Bruker IFS 120M was installed at Rikubetsu by the Solar-Terrestrial Environment Laboratory (STEL), Nagoya University in May 1995. The instrument fell in June 2010, and was replaced

with a Bruker 120/5HR by the National Institute for Environmental Studies, Japan (NIES) in January 2014, which is also hired as parts of the TCCON network. The solar tracker is also changed in 2014 from a University of Denver solar tracker to a Bruker one with a Camtracker. Retrievals of total columns of O₃, HCl, HF, ClONO₂ and HNO₃ using SFIT were archived with AMES format in 2001 and 2008. In 2012, vertical profiles of O₃, HCl, HF and HNO₃ retrieved with SFIT2 were in the archive in HDF format, and those of the standard 10 species using SFIT4 are archived since 2017. In 2008, PI was changed from Prof. Yutaka Kondo.

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