

Ground based FTS at NCAR Foothills Lab

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We operate a solar viewing high resolution Fourier Transform Interferometer at FL-0 on the NCAR Foothills campus. Observations are made on a weekly or more frequent basis. Leading up to and during the FRAPPE / Discover-AQ campaign daily observations are being performed. Observations are direct sun and a preference is toward longer atmospheric optical paths hence the majority of data points will be early morning through midday. High-resolution solar spectra (0.0035cm^{-1}) from $700 - 6000\text{ cm}^{-1}$ are recorded. From these data mixing ratios are retrieved for the following species: CO, CH₄, C₂H₂, C₂H₄, C₂H₆, H₂CO, O₃, CO₂, OCS, HCN, HNO₃, NO₂ and NH₃. Physical quantities available and archived will be total or partial columns or mass weighted tropospheric mixing ratios.



Left: Solar tracker dynamically aligned to the center of the solar disc is mounted on the roof of FL-0 and delivers a stable 4" dia. direct solar beam to the instrument below.

Below: The Bruker IFS120HR FTS instrument has a maximum optical path (MPD) of 600 cm but operated at 250 cm for atmospheric gas retrieval.

Mid to near -IR spectra are recorded in 9 filter regions by either an LN₂ cooled InSb or HgCdTs or room temperature InGaAs detector. A full filter set takes 45min and several sets are taken per day weather permitting during FRAPPE.



Our group maintains similar instruments as members of the IRWG of the NDACC (www.ndacc.org, www.acd.ucar.edu/irwg/) at Mauna Loa Observatory, HI and

Thule, GR. Although the FLO instrument is not formally part of the network it is operated and retrievals are performed to the same standards.

Retrieval process uses daily NCEP pressure and temperature fields provided by the NDACC. Apriori water profiles are derived from daily mean ERA-40 data fields interpolated to the site. Apriori chemical profiles for retrieved and background species are derived from WACCM model climatological datasets interpolated to the FLO site. Short delays in apriori data allow retrievals to be performed and archived in near real time with a lag of a few days.

Data will be provided beginning in 2010 through FRAPPE time period to provide a time series context for the current campaign data. An overview of observations and retrievals can be found in Hannigan et. al 2009.

Hannigan, J.W., M.T. Coffey, and A. Goldman, 2009, *Semiautonomous FTS Observation System for Remote Sensing of Stratospheric and Tropospheric Gases.*: J. Atmos. Oceanic Technol., 26, 1814–1828. DOI: 10.1175/2009JTECHA1230.1