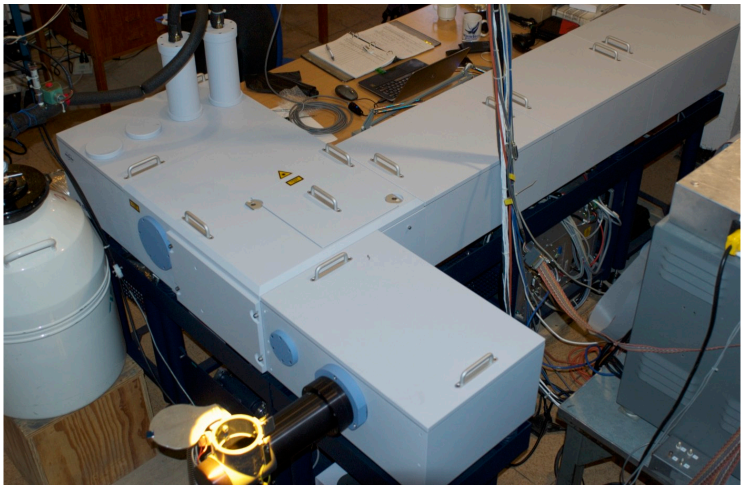
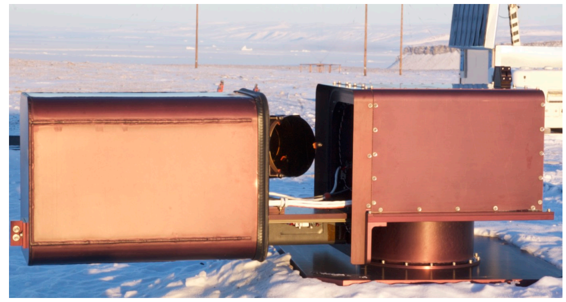
Fourier Transform Infrared Interferometer (FTIR)



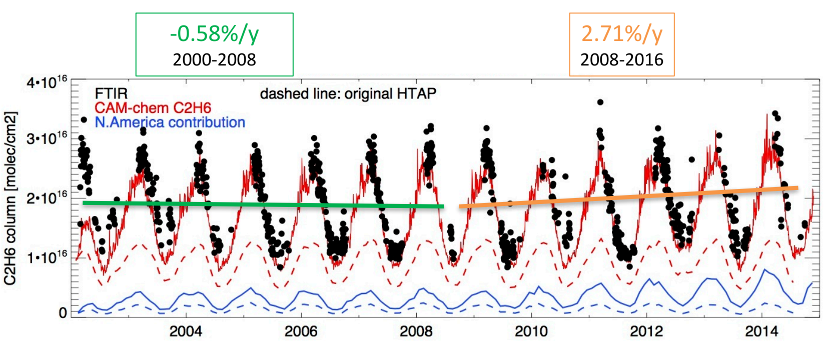


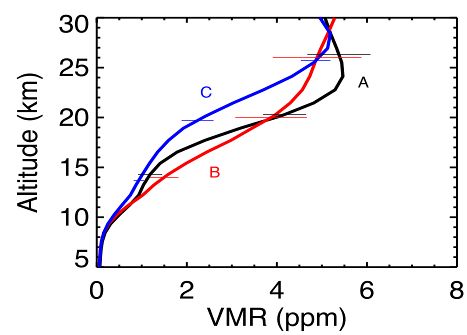
Above: Rooftop solar tracker, controlled by ephemeris calculations with image/aperture correction.
Left: 250cm OPD FTIR interferometer. At bottom is solar beam entrance, at

The FTIR measures several dozen chemical components in the atmosphere. These trace gases are important for understanding the accumulation of greenhouse gases, ozone depletion chemistry, transport of pollutants and biogenic emissions. These are signs of and can have far reaching effects on climate and air quality and how they are changing.

A tracker on the roof brings a direct solar beam into the instrument. The FTIR takes a high spectral resolution, broad band, infrared spectrum from 2 – 14µm. These spectra contain the absorption signatures of trace species including O_3, HNO_3, HCl, HF, $ClONO_2$, NO_2, CH_4, CO_2, N_2O, CO, C_2H_6, C_2H_2, HCN, H_2O, OCS, many of their isotopes, plus others.

Data are taken multiple times per day during sunlit periods of the year. A retrieval process calculates from the spectra the total amount and course vertical distribution of these trace gases in the atmosphere.





Left: Time series of C_2H_6 total column measurements (black) showing a reverse in trend in 2008. Models of emissions and global transport (red) show the increase at a rate of 2.7%/y to be derived from increased emissions in North America (blue) attributed to oil and natural gas extraction activities.
Right: In March 2011 the Arctic stratosphere experienced the largest ozone loss recorded. Due to activated chlorine 40% of ozone was removed. Ozone vertical profiles: compare the blue curve (March 2011) to the red (March mean 2000-10). Black curve is the March mean outside the polar vortex.

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