

Read-me file for WINTER 2015 NH<sub>3</sub> Data.

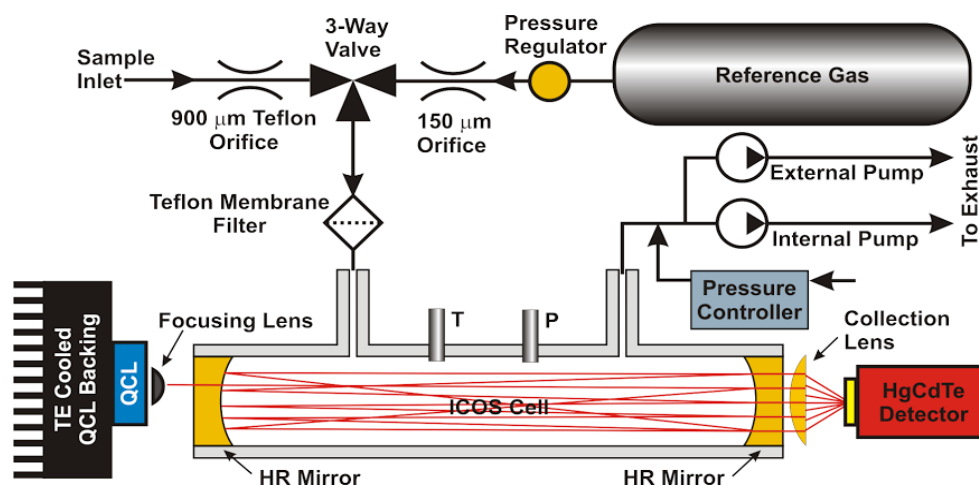
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## Data Set Overview

This data set covers the WINTER 2015 research flights 01 to 13 (Feb 03, 2015 to March 13, 2015). Flights occurred from the NASA Research Aviation facility, Langley, Va. The area surveyed covers the Eastern United states, inland, costal, and offshore regions. Data for the NH<sub>3</sub> measurements was collected on an Off-Axis Integrated Cavity Output Spectrometer provided by Los Gatos Research.

## Instrument description



Off-Axis Integrated Cavity Output Spectrometer. The reference gas used was 5 ppm OCS instead of 20% CO<sub>2</sub> as cited in the literature<sup>1</sup>.

## Data Collection and Processing

For each set of data an OCS reference measurement was taken every half hour during the flight for the first 5 to 6 hours of the flight. Data from the reference set indicates that there was an instrument drift of less than 2.0% peak to peak over the whole time interval for the flight. This indicates that the instrument is operating normally; however please note that it is not valid to claim that OCS has the same measurement stability as NH<sub>3</sub>. OCS has a stronger spectral signal than NH<sub>3</sub> and therefore greater measurement stability is expected.

Data manipulation occurred in this order;

1. Resolution of time degeneracy and residence time (~1.2 seconds)
2. Conversion of time to UTC from Eastern standard time
3. Production of supplementary data sets (5 pt and 10 pt data averaged sets for each original).

The raw data was produced in time degenerative steps at a rate of 1.001 to 1.004 Hz (a variance of 0.001 to 0.004 seconds per time step). In order to match the standard rate of 1 Hz additional point were inserted in regions where a whole number jump would occur. The data point inserted was an average of the neighboring NH<sub>3</sub> measurements (with a neighborhood of 1 data point centered at the point of insertion). Residence time, averaging 1.2 seconds, in the machine has been accounted for to the nearest second. This still leaves a ~0.2 second lag time from sample insertion in to the manifold to measurement by the device. Machine noise became more significant as the measurements of low amounts of atmospheric NH<sub>3</sub> occurred. In order to clarify the data, 5 pt and 10 pt data averaging was used throughout the whole time interval per data set.

Data Format

ICCART format

References

1. Leen, J. Brian, et al. "Fast In Situ Airborne Measurement of Ammonia Using a Mid-Infrared Off-Axis ICOS Spectrometer" *Environmental science & technology* 47.18 (2013): 10446-10453.)