Title: README for gas-phase NH_3 data

Author(s):

Ilana B. Pollack (https://orcid.org/0000-0001-7151-9756)

TRANS^{2}AM project Co-PI, NH_3 instrument team lead, corresponding author for the NH_3 dataset

Research Scientist III, Colorado State University, Department of Atmospheric Science, ilana.pollack@colostate.edu, 970-491-8605

Julieta Juncosa Calahorrano (https://orcid.org/0000-0001-8293-7566)

TRANS^{2}AM project, NH_3 team member, contributing author to the NH_3 dataset

Graduate Research Assistant, Colorado State University, Department of Atmospheric Science, jjuncosa@rams.colostate.edu

Emily V. Fischer (https://orcid.org/0000-0001-8298-3669)

TRANS^{2}AM project Lead-PI, corresponding author for the project

Associate Professor, Colorado State University, Department of Atmospheric Science, evf@atmos.colostate.edu, 970-491-8785

1.0 Data Set Description

Final data for gas-phase ammonia (NH_3) measurements collected aboard the University of Wyoming King Air aircraft during phase 1 and phase 2 of the TRANS^{2}AM field campaign. NH_3 data status is final data - revision R0. Data are collected at 10 Hz and averaged to 1-Hz for reporting.

The base of operations for the UWKA aircraft during the TRANS^{2}AM field campaign was Laramie Airport in Laramie, WY (KLAR). Phase 1 of the field intensive took place in July and August 2021. Phase 2 of the field intensive took place in August and September 2022.

Use of data require prior okay from data authors (please see list above).

2.0 Instrument Description

Gas-phase NH_3 measurements were collected *in-situ* using a commercial Aerodyne QC-TILDAS outfitted with a custom-built heated aircraft inlet that allows for injection of calibration gases at the inlet tip and an inertial inlet that provides separation of particles from the air sampling stream. The NH_3 instrument was operated in tandem with another QC-TILDAS for measuring nitric acid (HNO_3). The NH_3 and HNO_3 QC-TILDAS spectrometers shared a common aircraft inlet, inertial inlet, flow path, and pumping system. The NH_3 instrument was placed upstream of the HNO_3 instrument in the flow path. The instrument is calibrated with a known mixing ratio of NH_3 generated from a temperature-controlled permeation device. Calibrations are performed on the ground between

flights. The instrument is routinely zeroed on the ground and in flight by overblowing the inlet with a supply of ultrapure air. For more details, please see these references listed below.

3.0 Data Collection and Processing

NH_3 data are collected at 10 Hz and averaged to 1-Hz for reporting. NH_3 data are reported in units of ppbv (parts per billion by volume)

4.0 Data Format

1-Hz NH_3 data files are reported in ICARTT format. NH_3 data are reported on the UWKA time base. Missing data due to in-flight zeros and laser position calibrations are flagged as -9999.

5.0 Data Remarks

Use of data require prior okay from data authors (please see list above).

6.0 References

Pollack, I. B., Lindaas, J., Roscioli, J. R., Agnese, M., Permar, W., Hu, L., and Fischer, E. V. (2019) Evaluation of ambient ammonia measurements from a research aircraft using a closed-path QC-TILDAS operated with active continuous passivation, Atmos. Meas. Tech., 12, 3717–3742, https://doi.org/10.5194/amt-12-3717-2019.

Pollack, I. B., McCabe, M. E., Caulton, D. R., Fischer, E. V. (2022) Enhancements in Ammonia and Methane from Agricultural Sources in the Northeastern Colorado Front Range Using Observations from a Small Research Aircraft, Environmental Science & Technology, https://pubs.acs.org/doi/10.1021/acs.est.1c07382.