

**Title:** README for gas-phase HNO<sub>3</sub> data

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## 1.0 Data Set Description

Final data for gas-phase nitric acid (HNO<sub>3</sub>) measurements collected aboard the University of Wyoming King Air aircraft during phase 1 of the TRANS<sup>2</sup>AM field campaign. HNO<sub>3</sub> data status is final data - revision R0. Data are collected and reported at 1 Hz during phase 2 of TRANS<sup>2</sup>Am in 2022.

The base of operations for the UWKA aircraft during the TRANS<sup>2</sup>AM field campaign was Laramie Airport in Laramie, WY (KLAR). 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 HNO<sub>3</sub> 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 HNO<sub>3</sub> instrument was operated in tandem with another QC-TILDAS for measuring ammonia (NH<sub>3</sub>). The NH<sub>3</sub> and HNO<sub>3</sub> QC-TILDAS spectrometers shared a common aircraft inlet, inertial inlet, flow path, and pumping system. The NH<sub>3</sub> instrument was placed upstream of the HNO<sub>3</sub> instrument in the flow path. The instrument is calibrated with a known mixing ratio of HNO<sub>3</sub> 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. Active passivation of the flow path was not applied to the QC-TILDAS instruments for these flights. For more details, please see these references listed below.

### **3.0 Data Collection and Processing**

HNO<sub>3</sub> data are collected at 1 Hz and reported at 1 Hz during phase 2. HNO<sub>3</sub> data are reported in units of ppbv (parts per billion by volume).

### **4.0 Data Format**

1-Hz HNO<sub>3</sub> data files are reported in ICARTT format. HNO<sub>3</sub> 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).

Please see individual ICARTT file headers for more info. During phase 2, the uncertainty is estimated as 25% and the limit of detection is 1 ppbv.

### **6.0 References**

J. R. Roscioli, M. S. Zahniser, D. D. Nelson, S. C. Herndon, and C. E. Kolb (2016) New Approaches to Measuring Sticky Molecules: Improvement of Instrumental Response Times Using Active Passivation, *The Journal of Physical Chemistry A*, 120 (9), 1347-1357, <https://pubs.acs.org/doi/10.1021/acs.jpca.5b04395>.