Title: README for Tahoe measurements.

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1.0 Data Set Description

Final data for the mobile plume tracker drives using the Colorado State University (CSU) Tahoe during Phase 1 of the TRANS^{2}Am field campaign. Data includes GPS information (latitude, longitude, and altitude), meteorological parameters (wind speed and direction, temperature, and relative humidity), and concentrations of methane, ammonia, carbon dioxide, and water vapor. The data from June 16, 2021 to July 16, 2021 (TD01, TD02, TD03, TD04, TD05) were collected using a G2508 5-channel Picarro Analyzer with a A0931 mobile module kit and an EBI20 Temperature Sensor. The data in September 2021 (TD06, TD07) were collected using a G2203 2-channel Picarro Analyzer with a A0931 mobile module kit and an Ammonia Air Sentry Analyzer. Data were interpolated to 1Hz to match the GPS data.

The base of operations for the CSU Tahoe during the TRANS^{2}AM field campaign was Fort Collins, CO. Phase 1 of the field intensive took place in July and September 2021.

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

2.0 Instrument Description

A 5-channel Picarro Analyzer (G2508) was used to quantify gas concentrations of methane, ammonia, carbon dioxide, and water vapor. All species were detected using cavity ring-down spectroscopy (CRDS).

A Picarro Analyzer (G2203) was used to quantify gas concentrations of methane and water vapor. All species were detected using cavity ring-down spectroscopy (CRDS).

A Particle Measuring Systems Air Sentry Ammonia Analyzer was used to quantify gas concentrations of ammonia. Ammonia was detected using ion mobility.

Depending on the configuration deployed, a Picarro or Picarro and Air Sentry sampled from the same ¼" heated Teflon line to limit loss of gaseous ammonia. The inlet line was kept as short as possible and was attached to the Tahoe via a roof rack. The inlet line extended the length of the

roof rack from over the driver's seat to the back seat and then through a port added to the roof of the Tahoe and into the analyzers. A fiber filter was also placed at the inlet tip to remove particles.

The met data was collected from a mast attached to the front of the Tahoe. The GPS and Temperature Sensor were mounted to the roof rack.

All analyzers were operated from two large rechargeable lithium batteries installed in the Tahoe.

More information on the CSU mobile plume tracker can be found in *Hecobian et al.* [2019].

3.0 Data Collection and Processing

Methane, ammonia, carbon dioxide, water vapor, temperature, and relative humidity are interpolated to 1Hz to match the GPS time base. Methane and carbon dioxide are reported in ppmv, ammonia in ppbv, and water vapor in percent.

4.0 Data Format

1-Hz data files are reported in ICARTT format. Data are reported on the GPS time base. Missing data are flagged as -9999.

5.0 Data Remarks

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

6.0 References

Hecobian, A. et al., Air Toxics and Other Volatile Organic Compound Emissions from Unconventional Oil and Gas Development, *Environ. Sci. Technol. Lett., 6*, 720-726, doi:10.1021/acs.estlett.9b00591, 2019.