

## **TRANS<sup>2</sup>Am 2021 project summary**

The Transport and Transformation of Ammonia (TRANS<sup>2</sup>Am) campaign was focused on sampling emissions (primarily methane, ethane, and ammonia) associated with intensive animal farming operations in Colorado. In addition to instrumentation supported by the King Air facility, many of the air chemistry and aerosol measurements for this campaign were designed around multiple user-supplied instruments, including an Aerodyne Ethane Trace Gas Monitor, a Picarro G2401-m gas analyzer, Aerodyne nitric acid and ammonia analyzers, and a Particle-into-Liquid Sampler.

The project was based out of Laramie, WY, with 14 research flights taking place from 2 - 24 August 2022. The flights took place over north-central to northeastern Colorado, with two primary types of research flight profiles used. Most flights profiled emissions sampling directly around agricultural sites in this area. Several flights followed an alternate profile, performing vertically stacked north-south legs spaced from west to east to track emissions transport in upslope wind conditions.

The UWKA facility webpage for the project, including general flight summaries and detailed flight notes, can be found here: <http://flights.uwyo.edu/projects/trans2am21/>

### **Instrumentation:**

#### **Facility instrumentation:**

Data from the following University of Wyoming instruments are included in this dataset.

- Applanix AV 410 GPS/Inertial Measurement Unit

- Reverse-flow static air temperature

- Rosemount 102 static air temperature

- Heitronics KT1585 IR temperature

- EdgeTech Vigilant model 137 chilled mirror hygrometer

- Rosemount 1501 HADS static air pressure

- Weston static air pressure

- CPT-6140 static air pressure

- CPT-9000 static air pressure

- Rosemount 1332 cabin air pressure

- Rosemount 0858 for indicated airspeed, angle of attack, and sideslip angle to derive

winds

- Co-pilot indicated airspeed

- King KRA 405 Radar Altitude (to 2000 ft)

- DMT Passive Cavity Aerosol Spectrometer Probe (PCASP-100X)

- Rosemount 871FA icing rate

### **Instrument Notes:**

**Applanix:** The Applanix IMU/GPS measurements and associated parameters (aircraft location and attitude, three-dimensional winds) were post-processed following the project using updated values for the instrument's installed location within the cabin, and using reference measurements obtained during calibration maneuvers during the subsequent CHACHA-22 field deployment. Post-processing using Applanix's standard SmartBase procedure is currently unavailable for four flights (2021-07-09, 2021-07-20, 2021-08-09, and 2021-08-17); measurements from these flights were post-processed using the SingleBase procedure.

**PCASP:** The particle sizing for the PCASP employed for these flights (serial number 1013-0502-29) was calibrated using laboratory-generated test particles before and after the project deployment. In this case, the size calibration did not change between these testing periods. Additionally, an independent flow measurement system was used to calibrate the instrument's sample flow rate in the laboratory before and after the project. The updated calibration values are included in the final project data release. A more detailed summary of the calibrations and results is included as separate documentation for the PCASP. Finally, no PCASP measurements were available for the flight on 27 July 2021 (TF04).

**Cabin pressure:** The cabin air pressure sensor was nonfunctional on the 7 Aug 2021 flight (RF04). No interior air pressure measurements are available for this flight.