

BB-FLUX 2018 project summary

The Biomass Burning Fluxes (BB-FLUX) campaign used the Solar Occultation Flux (SOF) instrument from the University of Colorado on the University of Wyoming King Air to quantify absolute emission fluxes in wildfires. This project was concurrent with WE-CAN project, which utilized the C130 aircraft to probe wildfire emissions and secondary plume chemistry during the 2018 fire season in the Pacific Northwest.

The project was nominally based out of Boise, ID. During the project, refueling with second missions was done at a number of airports. During the project the aircraft was relocated several other airports: Redding, CA (24-26 August 2018); Redmond, OR (5-15 September 2018); and Provo, UT (15-17 September 2018). Intercomparisons with the NSF/NCAR C-130 were done on 2 August 2018 and 28 August 2018.

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 temperature
- Rosemount 102 temperature
- Friehe temperature
- Heitronics KT1585 IR temperature
- EdgeTech Vigilant model 137 chilled mirror hygrometer
- Rosemount 1501 HADS static pressure
- Weston static pressure
- Cabin pressure
- LI-COR LI-7000 closed-path CO₂/H₂O Gas Analyzer
- LI-COR LI-7500 open-path CO₂/H₂O Gas Analyzer
- Rosemount 0858 for indicated airspeed, angle of attack, and sideslip angle to derive winds
- Co-pilot indicated airspeed
- APN 232 Radar Altitude
- King KRA 405 Radar Altitude (to 2000 ft)
- DMT LWC-100 liquid water content
- DMT Cloud Droplet Probe (CDP)
- DMT Passive Cavity Aerosol Spectrometer Probe (PCASP-100X)
- Eppley upward and downward looking Pyranometer
- Eppley upward and downward looking Pyrgeometer
- Rosemount 871FA icing rate
- MRI turbulence
- Left engine torque

Further information on the King Air instrumentation can be found at <https://www.uwyo.edu/atsc/uwka/in-situ-instrumentation.html>

Non-UWYO instruments included in the dataset:

- Aero-Laser AL-5002 VUV Fluorescence provided by Teresa Compos with ACOM at NCAR
- Ozone chemiluminescence (CI) detector provided by Florian Obersteiner and Andreas Zahn with the Institute for Meteorology and Climate Research (IMK), Karlsruhe Institute of Technology (KIT)

Data not included in this dataset

- Wyoming Cloud Lidar (WCL)
- University of Colorado Solar Occultation Flux (SOF)
- University of Colorado Differential Optical Absorption Spectroscopy (DOAS)

Instrument Notes:

Data system: One data file on Aug 3 was corrupt. The processed flight was divided into two segments. We were able to stitch a 1 Hz file with a reduced set of variables during the missing gap using other data sources.

PCASP: The primary PCASP (serial number 39798-0200-26 also called PCASP-2) failed for the second flight on 12 August 2018. No PCASP was available on the flight on 15 August 2018. The secondary PCASP (serial number 1013-0502-29 also called PCASP-1) was install prior to the flights on 19 August 2018. Within the smoke plumes, the aerosol concentrations can be sufficiently high that particle coincidence may become significant resulting in a negative bias. The PCASP data were not corrected for coincidence. The PCASP is calibrated using PSL spheres. The particle sizes have not been adjusted for the difference in refractive index between PSL and smoke. The lowest channel on PCASP-1 were noisier than for PCASP-2. The first bin on PCASP-1, flown after August 19, were not used to calculate the concentration and higher moments. When the PCASP probe was replaced, some of the coefficients in the header were not changed for the different probe. These are corrected beginning with the processing tagged bbflux18_qc5. Further discussions of the PCASP probes are given in [pcasp_measurement_processing_v2.pdf](#) and [pcasp_measurement_processing_addendum.pdf](#).

Carbon Monoxide: Carbon Monoxide measurements were taken with an Aero-Laser AL-5002 VUV Fluorescence provided by Teresa Compos with ACOM at NCAR. The measurements were sampled through a aft-facing inlet on the upper fuselage of the King Air. The data were provided to the University of Wyoming as ICARTT files and merged with the UWYO 1 second data. No data are available for Aug 15 and Sep 17.

Ozone: Ozone measurements were taken with a chemiluminescence (CI) detector that is calibrated using simultaneously measured data from a UV photometer provided by Florian Obersteiner and Andreas Zahn with the Institute for Meteorology and Climate Research (IMK), Karlsruhe Institute of Technology (KIT). No data are available for either flight on Aug 19 or the first flight on Sep 16. A description of their processing is in [BBFlux_KITO3_postprocessing_descr_v190510.pdf](#).

Licor 7500: No data were collected from the Licor 7500 on Aug 28. The data rate after this date was set to 1 Hz rather than 20 Hz.