Version 1 – 31 January 2023

Read Me File for TRACER-CAT-UCDavis optical property and size distribution data obtained using the UC Davis two-wavelength dual Cavity Ring Down-Photoacoustic Spectrometer and a scanning electrical mobility sizer (SEMS). Data from an additional instrument, a humidified CAPS-SSA, are not yet available owing to challenges in the operation of that instrument given the high ambient humidity. The measurements were made from June 30, 2022 at 16:10 local time (CDT) until the end of the campaign (August 1, 07:00 local time, CDT), with some gaps in the data owing to instrumental issues or power outages. Data were collected by Chris Cappa, Rachael Dal Porto, and Zewen Zheng from UC Davis.

Questions: contact Chris Cappa (cdcappa@ucdavis.edu, 530-752-8180)

General Note:

Data have been checked to remove generally "bad" periods, but no further filtering has been done.

Time:

Time is reported in "Igor" time (seconds elapsed since 12:00 am, Jan. 1, 1904) and is local time (CDT). Data have been averaged to 5 minute (300 second) time intervals. "TimeStart_Local" gives the start point of the averaging period and "TimeStop_Local" gives the stop point of the averaging period. Higher time resolution data is available upon request. It is recommended that the absorption data are averaged to 30 minutes for use.

CRD:

The CRD operated during the entire campaign with 2 wavelengths: 405 (Blue) and 532 (Green). Data points were collected approximately every 2.2 seconds (this was not fixed and did fluctuate somewhat). Data are reported at the measurement T and P.

Two green channels are reported: Low RH (RH_Dry < ~50%) and high RH (RH_Wet ~85%).

One blue channel is reported at low RH (~35% RH).

The estimated precision-based uncertainty for these measurements determined from an Allan Variance analysis of filtered air prior to the campaign was: Green → 0.27 Mm^{-1} (1 sigma, 2.2 seconds) or 0.05 Mm^{-1} (1 sigma, 60 seconds); Blue → 0.32 Mm^{-1} (1 sigma, 2.2 seconds) or 0.07 Mm^{-1} (1 sigma, 60 seconds). The actual performance across the campaign may not have been as good

PAS:

The PAS operated at two wavelengths, 405 nm and 532 nm, and at low RH for the entire campaign. The channels were in series with the low RH blue and green CRD channels, respectively. Data were collected approximately every 2.2 seconds. Data are reported at the measurement T and P.

The estimated precision-based uncertainty for the PAS based on Allan Variance analysis is: Green → 1.3 Mm^{-1} (1 sigma, 2 seconds) and 0.31 Mm^{-1} (1 sigma, 60 seconds); Blue → 1.87 Mm^{-1} (1 sigma, 2 seconds)

and 0.46 Mm^{-1} (1 sigma, 60 seconds). The actual performance across the campaign may be not as good as this.

SEMS:

The SEMS measured the number distribution of dry particles as dNd/logDp according to their mobility diameter from 10.17 nm to 944.22 nm in 114 bins. The particle concentrations are reported in p/cm^3 at the measurement conditions (T and P). The reported diameters are the midpoint diameters.

Data Wave Names:

Filename: UCD_CRDPAS_R1.txt

TimeStart_Local = start time of averaging period (igor time)

TimeStop_Local = stop time of averaging period (igor time)

Babs532nm = dry 532 nm absorption

Babs405nm = dry 405 nm absorption

Bext532nm_Wet = 532 nm extinction for particles dried and then rehumidified to ~ 85% RH

Bext532_Dry = ambient 532 nm extinction at <50% RH

RH_Dry = RH for dry measurements

RH_Wet = RH for humidified measurements

Filename: UCD_SEMS_2D_R1.txt

TimeStart_Local = start time of averaging period (igor time)

TimeStop_Local = stop time of averaging period (igor time)

BinX_YY_ZZ = the dN/dlogDp (in p/cm^3) for each size bin. The X indicates the bin number while the YY_ZZ indicates the midpoint diameter, where the ZZ is after the decimal. For example, the first bin is Bin1_10_17, corresponding to a midpoint diameter of 10.17 nm.