

**Title:** ReadMe for CAVE 2019 Aethalometer data

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**1.0. Data Set Description**

Final data for the Aethalometer measurements collected in Carlsbad Caverns National Park. Aethalometer data status is final data. Data are 2-minute integrated concentrations of light absorbing carbonaceous aerosol at 7 different wavelengths. The data are reported at ambient conditions (i.e., not corrected for temperature and pressure). Absorption was measured at the following wavelengths:

-350 nm  
-470 nm  
-520 nm  
-590 nm  
-660 nm  
-800 nm  
-950 nm

Measurements were made at the Biology Office and Building 58 (32.18° N, 104.44° W) located within Carlsbad Caverns National Park. The field study took place from Jul. 25-Sept. 5, 2019.

Those interested in using these data are encouraged to contact the authors listed above for more information. In case of planned publication, we request that data users contact Jeff Collett (collett@colostate.edu) to discuss appropriate recognition of those that collected the data and the agencies that sponsored data collection.

**2.0. Instrument Description**

A Magee-Scientific 7-channel Aethalometer (model AE31) measured PM<sub>2.5</sub> light absorbing carbon at seven different wavelengths: 350, 470, 520, 590, 660, 880, and 950 nm [Hansen *et al.*, 1984]. Particles were collected on a quartz sample tape. An increase in light attenuation from the sampled location corresponds to an increase in collected light absorbing carbon. The Aethalometer sampled ambient air at 3LPM with a 2.5 um size-cut cyclone. The inlet was

approximately 6 meters above ground level and co-located with the inlets for all other near real-time instruments involved in the study.

### 3.0. Data Collection and Processing

The aethalometer was operated using the standard procedure provided elsewhere [Petzold *et al.*, 2013]. The data was filter spot corrected to account for filter loading and filtered with an Optimized Noise-Reduction Algorithm (ONA) to reduce data noise.

### 4.0. Data Format

Data can be found in the csv named CAVE2019\_Aethalometer.csv. The file contains the start time, end time, and concentration of light absorbing carbon (LAC) at 7 wavelengths. LAC concentrations are provided as ambient concentrations (i.e., is not corrected for temperature and pressure). The start and end times are provided in Mountain Daylight Time. Units are  $\mu\text{g m}^{-3}$ .

The limit of detection (LOD) for LAC at all wavelengths is  $0.01 \mu\text{g m}^{-3}$ .

A -8888 indicates data below the detection limit. A -9999 indicates missing data.

### 5.0. Data Remarks

Those interested in using these data are encouraged to contact the authors listed above for more information.

### 6.0 Description of Variables

Variable Name	Units	Description	Time Resolution	Limit of Detection
Start_time (MDT)	MM/DD/YYYY HH:MM:SS	mountain time zone date		
End_time (MDT)	MM/DD/YYYY HH:MM:SS	mountain time zone date		
Ch1_350nm	$\mu\text{g m}^{-3}$	Concentrations of light absorbing carbon species across 7 different wavelengths (350, 470, 520, 590, 660, 800, and 950 nm)	2-minute	$0.01 \mu\text{g m}^{-3}$
...				
Ch7_950nm				

### 7.0. References

- Hansen, A. D. A., H. Rosen, and T. Novakov (1984), The aethalometer — An instrument for the real-time measurement of optical absorption by aerosol particles, *Science of The Total Environment*, 36, 191-196, doi:[https://doi.org/10.1016/0048-9697\(84\)90265-1](https://doi.org/10.1016/0048-9697(84)90265-1).
- Petzold, A., et al. (2013), Recommendations for the interpretation of "black carbon" measurements, *Atmospheric Chemistry and Physics*, 13, doi:10.5194/acpd-13-9485-2013.