

Title: ReadMe for CAVE 2019 TEOM Dataset

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1.0 Data Set Description

Final data for a Tapered Element Oscillating Microbalance (TEOM) run from 7/25/2019 to 9/4/2019 during the CarCavAQS field campaign in Carlsbad Caverns National Park, NM. Data are 6 min integrated concentrations of total PM_{2.5}. The data are reported at ambient conditions (i.e., not corrected for temperature and pressure).

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 Tapered Element Oscillating Microbalance (TEOM, model 1405-DF) from Thermo Scientific was used to measure the PM_{2.5} mass concentration [Clements *et al.*, 2013]. The TEOM 1405-DF uses diffusion drying rather than heating to better retain semi-volatile species. This is achieved using the Filter Dynamics Measurement System (FDMS) the TEOM 1405-DF comes equipped with. 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 TEOM was operated as suggested by the manufacturer. The instrument temperatures were set to the default. The flow control set to active. The data was downloaded each day and reported as obtained directly from the instrument. The TEOM was calibrated in the field with a standard calibration filter from the manufacturer.

4.0 Data Format

The TEOM data file is reported as a CSV file and named CAVE2019_TEOM_final.csv. TEOM data are reported on a 6-minute time basis. The file contains the start time, end time, and the total PM_{2.5} concentration. PM_{2.5} is provided as ambient concentrations (i.e., not correct for temperature and pressure). The start and end times are provided in MDT. Units are µg/m³. The limit of detection (LOD) is 0.1 µg/m³. 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. 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.

Due to conducting our measurements in the Biology Office and Building 58, the TEOM inlet could not be directly installed over the instrument. The inlet was instead mounted to the same stand used by all near real-time instruments and conductive tubing run through the window into the top the TEOM. Therefore, PM₁₀ data are not reported.

6.0 Description of Variables

Variable Name	Units	Description	Time Resolution	Limit of Detection
Start_time (MDT)	MM/DD/YYYY HH:MM	mountain daylight time zone date time (24-hour)		
End_time (MDT)	MM/DD/YYYY HH:MM	mountain daylight time zone date time (24-hour)		
PM2.5_ugm3	µg m ⁻³	PM _{2.5} concentration	6-minute	0.1 µg m ⁻³

7.0 References

Clements, N., J. B. Milford, S. L. Miller, W. Navidi, J. L. Peel, and M. P. Hannigan (2013), Errors in coarse particulate matter mass concentrations and spatiotemporal characteristics when using subtraction estimation methods, *Journal of the Air & Waste Management Association*, 63(12), 1386-1398, doi:10.1080/10962247.2013.816643.