

**Title:** ReadMe for CAVE 2019 PILS-TOC data

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### **1.0. Data Set Description**

Final data for the PILS-TOC (Particle-into-Liquid Sampler-Total Organic Carbon) measurements collected in Carlsbad Caverns National Park. PILS data status is final data. Data are 2 min integrated concentrations of WSOC (Water-Soluble Organic Carbon). The data are reported at ambient conditions (i.e., not corrected for temperature and pressure).

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**

The concentration of WSOC in near real-time was measured using a PILS-TOC system [Sullivan *et al.*, 2004, 2006]. The PILS collects ambient particles into purified water. After particles are grown inside the body of the PILS by mixing cool air with hot steam, the particles are collected by an impactor, and then washed off by a continuous flow of liquid passed over the impactor, providing a liquid sample with the aerosol particles dissolved in it for analysis [Orsini *et al.*, 2003]. The PILS sampled ambient air at 15 LPM with a 2.5 µm size-cut cyclone. The PILS 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. An activated carbon parallel plate denuder [Eatough *et al.*, 1993] was used to remove organic gases upstream of the PILS-TOC. To make a measurement of the background, a normally open actuated valve controlled by an external timer was periodically closed every 4 hours forcing the airflow through a Teflon filter before entering the PILS.

### **3.0. Data Collection and Processing**

For this measurement, to ensure insoluble particles were removed, the liquid sample from the PILS was first pushed through a 0.2 µm PTFE liquid filter using syringe pumps. The liquid was then sent to a Sievers Model M9 Portable TOC Analyzer (Suez Waters Analytical Instruments, Boulder, CO). This instrument oxidizes organic carbon to carbon dioxide using ammonium

persulfate and ultra-violet light. The carbon dioxide formed is measured by conductivity. The amount of organic carbon measured is proportional to the increase in conductivity observed. The instrument was run in on-line mode providing a 2 min integrated measurement of WSOC. The TOC Analyzer was calibrated in the factory and periodically verified by analysis of oxalic acid standards.

#### 4.0. Data Format

Data can be found in the excel file named CAVE PILS-TOC Data with LOD. The file contains the start time, end time, and concentration of WSOC. WSOC is provided as ambient concentrations (i.e., is not corrected for temperature and pressure). The start and end times are provided in local time (LT), which is Mountain Daylight Time. Units are  $\mu\text{g C}/\text{m}^3$ .

The limit of detection (LOD) for WSOC is  $0.01 \mu\text{g C}/\text{m}^3$ .

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. 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.

#### 6.0 Description of Variables

Variable Name	Units	Description	Time Resolution	Limit of Detection
WSOCStartDateTime (LT)	MM/DD/YYYY HH:MM	WSOC start time, mountain time zone date time (24-hour)		
WSOCEndDateTime (LT)	MM/DD/YYYY HH:MM	WSOC end time, mountain time zone date time (24-hour)		
WSOC ( $\mu\text{g C}/\text{m}^3$ )	$\mu\text{g C m}^{-3}$	Concentration of $\text{PM}_{2.5}$ water-soluble organic carbon	2-minute	$0.01 \mu\text{g C m}^{-3}$

#### 7.0. References

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