# AQRP Monthly Technical Report

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| **PROJECT TITLE** | Detecting events and seasonal trends in biomass burning plumes using black and brown carbon: (BC)2 El Paso | **PROJECT #** | 19-031 |
| **PROJECT PARTICIPANTS** | Rebecca J. Sheesley (Baylor)<br>Sascha Usenko (Baylor)<br>James Flynn (UH) | **DATE SUBMITTED** | May 8, 2019 |
| **REPORTING PERIOD** | **From:** April 1, 2019<br>**To:** April 30, 2019 | **REPORT #** | 6 |

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15th of the month following the reporting period shown above.

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**Detailed Accomplishments by Task**

Daily Checks – $(BC)^2$ El Paso

- Established daily checklist for remote monitoring of instrumentation and data acquisition.
  - TAPs, CO, NOx, nephelometer
- Check for biomass burning plumes
  - Continued daily checking of TCEQ monitoring sites (UTEP and Chamizal sites) for local meteorological data (RH, temperature, wind parameters, and atmospheric pressure) and particulate matter, trace gases, and chemical speciation data.
  - Continued monitoring of MODIS satellite data for potential biomass burning events. If detected, a NOAA HYSPLIT forward trajectory is used to predict a potential influence of biomass burning on the site.
- Continued to develop a MATLAB program to compile daily data and perform preliminary data analysis. Aethalometer data analysis has been added in the latest version of the Matlab program
- Daily graphing of time series plots of absorption and scattering coefficients: Absorption Angstrom Exponent (AAE), Scattering Angstrom Exponent (SAE), and Single Scattering Albedo (SSA).
- Updated the daily checklist to include the daily median AAE, SAE and SSA.

Monthly site check of $(BC)^2$ El Paso site

- Travel to El Paso for a monthly site check of the Baylor trailer located on University of Texas El Paso (UTEP) campus adjacent to TCEQ. Sujan Shrestha flew to El Paso and was on site for 3 days (April 23-25)
  - Collected two 24-hour $PM_{2.5}$ filter samples and one field blank.
    - These will be used for a calculation of site-specific mass absorption efficiency of elemental carbon.
  - Competed thorough check of sampling system to ensure there were no leaks and flow was maintained. Cleaned the aethalometer and $PM_{2.5}$ inlets to rid the system of large particle accumulation.
  - Gas cylinders were monitored by comparing their current remaining pressure with the previous pressure measurement taken at the start of sampling in March.

- The computer was restarted to reboot DAQFactory.
- To ensure comparability, the flows were calibrated in both TAP instruments. The calibration constants have remained stable since the beginning of sampling.
- Sujan Shrestha met with the UTEP group and completed face-to-face training on the instrumentation, data acquisition, software, trouble shooting and regular checks. This training included:
  - Training on TAP, nephelometer, and aethalometer standard operation and maintenance
  - Training on DAQFactory and TAP software
  - The aethalometer requires manual data transfers. Training on aethalometer data transfers.
- Securing of the trailer to the ground via tie downs was started by UTEP facilities.

**Preliminary Analysis**

- Monitoring of the instrumentation and data from the $BC^2$ El Paso site since setup in March.

**Data Collected**

Data collection continued on through the month of April. Raw data from the TAP, nephelometer, aethalometer, and trace gases are stored on the h-net server. The research team has access to all data via the computer (TeamViewer) or h-net server. Representative absorption and scattering data from April 11 to 16 is presented in Figure 1. AAE, SAE, and SSA derived from the absorption and scattering data is presented in Figure 2. The preliminary results indicate an AAE value near 1 for the urban background in El Paso, which is indicative of motor vehicle exhaust with little influence from biomass burning plumes.

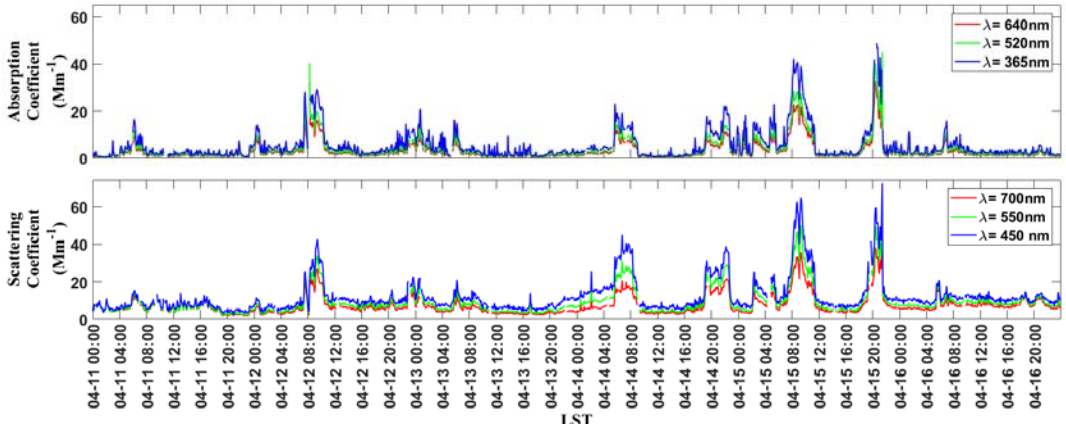


**Figure 1.** Example of particle-based optical measurements using the *Tricolor* Absorption Photometer (TAP, top) and nephelometer (i.e. scattering, bottom) from the $BC^2$ El Paso site. Absorption and scattering profile (5 min averages) of blue, red, and green wavelengths from April 11 to 16.

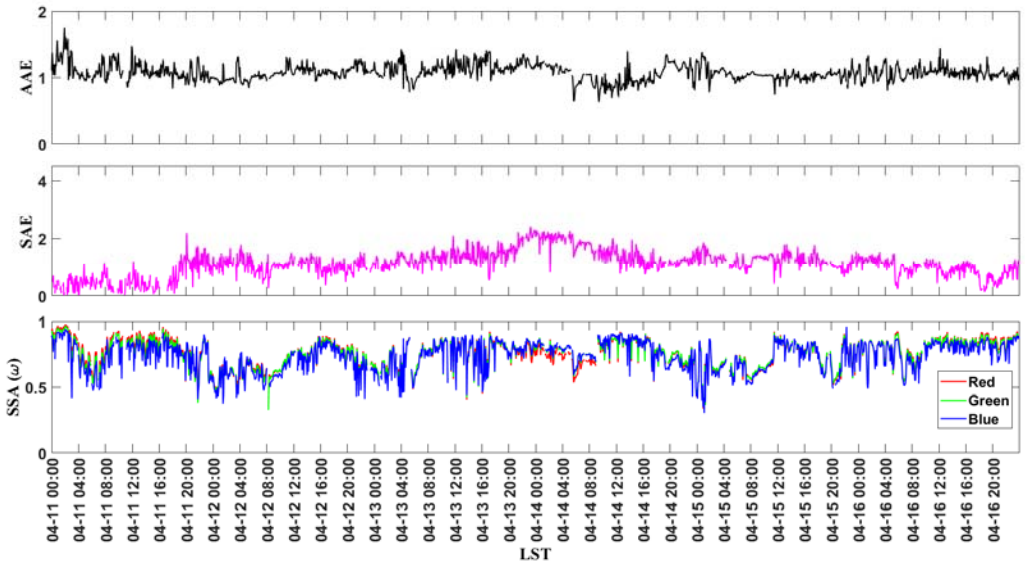


**Figure 2.** Example of AAE, SAE, and SSA calculated from optical TAP and nephelometer measurements from the BC$^2$ El Paso site. AAE, SAE, and SSA profile for blue, red, and green wavelengths with 5 min averages from April 11 to 16.

**Identify Problems or Issues Encountered and Proposed Solutions or Adjustments**

- The MFC connected to the TAP-A was thought to be operating slowly while initiating the sampling every hour and thus the flow was slow to rise. As it turned out, the TAP-A itself was the issue and Brechtel has been contacted regarding a solution. While this issue does not effect sampling and data acquisition, we are currently addressing it to improve instrument operation. If a physical alteration to the TAO is needed this will be rectified in the May visit made by Meghan Guagenti, however if this is an issue with the software it can be handled remotely.
- The DAQFactory data acquisition had an issue with NOx, CO and nephelometer data parsing on April 22 and 23, which was solved on site by restarting the computer.

**Goals and Anticipated Issues for the Succeeding Reporting Period**

No issues are anticipated at this time, and during the next site check on May 28$^{th}$-30$^{th}$, Meghan Guagenti plans to:

- Check the inlet of the TAP to see if there is any restriction causing the flow in the TAPs to respond slower.
- Collect two more 24-hour PM2.5 filter samples.
- Confirm completion of the tie-down of the trailer.

**Detailed Analysis of the Progress of the Task Order to Date**
**Do you have any publications related to this project currently under development? If so, please provide a working title, and the journals you plan to submit to.**

**___Yes _x_No**

**Do you have any publications related to this project currently under review by a journal? If so, what is the working title and the journal name? Have you sent a copy of the article to your AQRP Project Manager and your TCEQ Liaison?**

**___Yes _x__No**

**Do you have any bibliographic publications related to this project that have been published? If so, please list the reference information. List all items for the lifetime of the project.**

**___Yes _x__No**

**Do you have any presentations related to this project currently under development? If so, please provide working title, and the conference you plan to present it (this does not include presentations for the AQRP Workshop).**
**_x__Yes _ __No**

Working title: Detecting Biomass Burning Using Intensive Aerosol Optical Properties In El Paso, Texas - (BC)2 El Paso Field Campaign

Abstract submitted for AAAR national conference to be held in Portland, OR in Oct 2019.

**Do you have any presentations related to this project that have been published? If so, please list reference information. List all items for the lifetime of the project.**

**___Yes _x__No**

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Submitted to AQRP by

Principal Investigator