

## AQRP Monthly Technical Report

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|-----------------------------|--|-----------------------|-------------|
| <b>PROJECT TITLE</b>        | Detecting events and seasonal trends in biomass burning plumes using black and brown carbon: (BC) <sub>2</sub> El Paso | <b>PROJECT #</b>      | 19-031      |
| <b>PROJECT PARTICIPANTS</b> | Rebecca J. Sheesley (Baylor)<br>Sascha Usenko (Baylor)<br>James Flynn (UH)   | <b>DATE SUBMITTED</b> | Aug 8, 2019 |
| <b>REPORTING PERIOD</b>     | <b>From:</b> July 1, 2019<br><b>To:</b> July 30, 2019  | <b>REPORT #</b>       | 9           |

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 15<sup>th</sup> of the month following the reporting period shown above.

### Detailed Accomplishments by Task

- Data for the entire campaign was download and backed up on University of Houston Servers as well as Baylor University computers.
- Significant progress has been made towards the development of the final report, however analysis and interpretation of the biomass burning event in late June still needs to be completed.
  - Data for the entire campaign has undergone 10% data quality audit.
  - As a 10% QAQC of the raw data check, the two TAP instruments were collocated. In total, we had around 12 days of collocated data available for the entire campaign duration. The coefficient of determination ( $r^2$ ) was 0.99 for all three wavelengths. The calculated AAE from the individual TAPs during the collocation period were also correlated. The AAE values highly correlated with  $r^2$  of 0.93 and slope of 0.98. The aethalometer derived BC concentration was converted to absorption coefficient by dividing with the mass absorption efficiency (MAE) from the literatures. The aethalometer derived absorption coefficient was correlated with the TAP data. Furthermore, as a part of QAQC, our 5 minutes averaged  $\text{NO}_x$  and CO measurements were correlated with the respective 5-minutes averaged TCEQ CAMS 12 measurements. The orthogonal linear regression between our and the TCEQ measurements showed that the data were comparable with slopes close to 1 (1.03 for CO and 0.94 for  $\text{NO}_x$ ).
  - The raw data from two TAPs, nephelometer, CO and  $\text{NO}_x$  were averaged over 5 minutes. Any absorption coefficient values below zero and greater than  $100 \text{ Mm}^{-1}$  are removed for all three wavelengths to avoid the outliers. The set flow rate is 1.8 lpm in both the TAPs. So, whenever the flowrate is below 5% of 1.8 lpm (i.e. 1.71 lpm), the data values are not considered for further calculations. The scattering coefficient below zero and greater than  $100 \text{ Mm}^{-1}$  were also removed.

The AAE was calculated over the range of available wavelengths (640, 520 and 365 nm) and the SAE was calculated over the range of 700, 550 and 450nm. The nephelometer data was corrected for angular truncation. The correction showed that the uncorrected data was around 25% lower than the true value. The day-night filter samples were also collected from June 20 through 27. These will have organic and elemental carbon analysis completed.

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

In late June, there was a potential biomass-burning event. This event was identified with an increase in the Absorption Ångström Exponents, which was calculated from the raw TAP absorption data. This potential biomass burning event occurred approximately 7 days prior to the project data collection end date. As a result of this event, an issue arose where there was insufficient time to successfully, evaluate and incorporate these findings into the final report. To address the encountered issue a one-month no-cost extension was requested by the PIs. This request has been approved.

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

Our goals for this month are to successfully, evaluate and incorporate the June biomass-burning event into the final report. To achieve this goal the PIs will:

- evaluate the biomass-burning event AAE values and other aerosol and trace gas measurements made during the event.
- evaluate measurements made during biomass-burning event against measurements made throughout the campaign.
- evaluate enhancement ratios during the biomass-burning event.
- evaluate the biomass-burning event using NOAA HYSPLIT back trajectories. These trajectories will be overlaid with MODIS fire data onto regional Google Earth maps to assess regional fires (between June 20-27) and potential impacts on the (BC)<sup>2</sup> El Paso site.

### **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       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       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       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).**

Yes       No

**We are intending to present at both AAAR (American Association for Aerosol Research) and AGU (American Geophysical Union) in October and December, respectively. Both presentations are titled “Utilizing Intensive Aerosol Optical Properties for The Detection of Biomass Burning In El Paso, Texas - (BC)<sup>2</sup> El Paso Field Campaign”. Abstracts have been submitted to both conferences.**

**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       No

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Submitted to AQRP by

Rebecca Sheesley, Principal Investigator