AQRP Monthly Technical Report

PROJECT TITLE	**Using Satellite Observations to Quantify Surface $PM_{2.5}$ Impacts from Biomass Burning Smoke**	**PROJECT #**	20-005
PROJECT PARTICIPANTS	Matthew Alvarado, Archana Dayalu	**DATE SUBMITTED**	03/08/2021
REPORTING PERIOD	**From:** 02/01/2021 **To:** 02/28/2021	**REPORT #**	7

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.

Detailed Accomplishments by Task for reporting period

In this reporting period, we continued refining the sections of the User's Guide/Documentation pertaining to Tasks 1 and 2.1. In addition, we began an outline for a journal article synthesizing the results of this project, including incorporating anticipated results from Tasks 2.1 and 3. As part of our goal to submit a journal article on the results of this project, we are considering refining our Smoke Confidence Index (SCI) such that it is more reflective of our findings.

Preliminary Analysis

As detailed in past reports, our findings suggest that the GOES smoke product has higher correlation with smoke-relevant indicators than the NOAA HMS or TROPOMI UVAI products taken alone. When combined with the NOAA HMS product, the smoke prediction ability increases further. Based on our preliminary analysis of the simple SCI, the TROPOMI UVAI product does not appear to provide added value to assessments of smoke presence. As part of a publication-ready analysis, we are therefore considering revising the current SCI. Our revisions to the SCI may include some combination of the following, which better incorporates our analysis to date: (1) elimination, appropriate weighting, or selection criteria refinement of the UVAI; (2) weighting of the GOES and NOAA HMS products; (3) incorporation of the auxiliary smoke variables (brown carbon, ammonia, carbon monoxide, and aerosol optical depth).

Data Collected

None

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

None

Goals and Anticipated Issues for the Succeeding Reporting Period

Over the next months, we will begin the HYSPLIT plume analysis on the Task 2.2 subset data. We will also begin Task 3, where we examine the ability of our smoke product (including AOD and the value of the SCI) to predict surface PM2.5, regressed against surface PM2.5 observations.

Detailed Analysis of the Progress of the Task Order to Date

We have selected 93 dates between January and July 2020 with suspected smoke intrusions in the Texas area. For these dates:

- We have merged all the Task 1 and 2 components thus far and placed them on a common grid.
- We have performed aggregate, seasonal, and daily analysis of the 93-day smoke data set, incorporating multiple auxiliary products (NH_3, CO, OMI BrC, AOD, PH) where relevant.
- We have developed a Smoke Confidence Index within a standalone data set that enables a user to perform multiple calculations including FMS, PH, etc.
- We have calculated PH from AOD bins based on Cheeseman et al. (2020) MAIAC PH/AOD relation.
- We have performed FMS analyses, aggregated over all times as well as broken down by day and measurement hour.
- We have developed a python-based GUI to visualize daily results from a user-selected date.
- We have subset relevant data for HYSPLIT Plume Analysis (Task 2.2)

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

Working title: Identification and evaluation of biomass burning events: a data assimilation approach over Texas
Journal: Journal of the Air and Waste Management Association
A draft of this manuscript will be provided to AQRP prior to submission.

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 (ie: publications that cite the project) 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**

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**

Identifying Smoke-Impacted Regions using the Optical Properties of Brown Carbon Aerosol, oral presentation at the CMAS Fall Meeting

Identifying Smoke-Impacted Regions using the Optical Properties of Brown Carbon Aerosol, poster at AGU Fall Meeting

Have any personnel changes occurred that were not listed in the original proposal? If so, please include a detailed description of the personnel change(s) below.

☒ **Yes** ☐ **No**

Qiang Sun resigned from AER at the beginning of February.

Are any delays expected in the progress of the research? If so, please include a detailed description of the potential delay below.

☐ **Yes** ☒ **No**

Describe any possible concerns/issues (technical or non-technical) that AQRP should be made aware of.

None

Are you anticipating using all the available funds allocated to this project by the end date? If not, why and approximately what is the amount to be returned?

☒ **Yes** ☐ **No**

Submitted to AQRP by
Matthew James Alvarado