

AQRP Monthly Technical Report

PROJECT TITLE	<i>Evaluating the Ability of Statistical and Photochemical Models to Capture the Impacts of Biomass Burning Smoke on Urban Air Quality in Texas</i>	PROJECT #	22-003
PROJECT PARTICIPANTS	Matthew Alvarado, Jen Hegarty, Rick Pernak, Mike Iacono, John Henderson	DATE SUBMITTED	06-12-2023
REPORTING PERIOD	From: May 1, 2023 To: May 31, 2023	REPORT #	10

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

We submitted a memo (Deliverable 2) on our initial statistical analysis using generalized additive models (GAMs) to see how fires impacted background and maximum concentrations of O₃ and PM_{2.5} in Houston and El Paso. Our results suggest that on days when the HMS indicated smoke over Houston and El Paso, the daily average PM_{2.5} was elevated by 1.4-2.6 µg/m³ on average (background and maximum) while the background MDA8 O₃ was elevated by 6-8 ppbv on average. These impacts may be related to long-distance transport of smoke from the Yucatan (Houston and El Paso) and California (El Paso only). In Houston, the impact on the maximum MDA8 O₃ was much higher than the background (6 ppbv on average), suggesting urban area chemistry amplified the impact of the smoke on ozone. However, in El Paso we instead see a decrease of 1.5 ppbv in the average impact of smoke, suggesting the response of the chemistry in these urban areas to smoke transport is very different.

During this reporting period we used TCEQ CAMx data to calculate background and maximum MDA8 O₃ values for El Paso and Houston for the 2019 ozone season. This data will be used in additional GAM training to determine if the relationships seen between smoke and fire predictors and O₃ in the monitoring data are the same as those seen in the CAMx data. These results will be reported in Deliverable 3 planned for end of June. We also continued developing STILT footprints for use in the GAMS.

Data Collected

None to date.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

None.

Goals and Anticipated Issues for the Succeeding Reporting Period

During the next reporting period we will complete work to include FINN NO_x, VOC, and PM_{2.5} emissions multiplied by the daily surface “footprints” to the GAM input datasets. We will also submit a preliminary CAMx analysis report to TCEQ.

Detailed Analysis of the Progress of the Task Order to Date

Completed initial drafts of Work Plan and QAPP. Held project kickoff. Started work on STILT analyses and gathering data for GAMM studies. Wrote and tested code to determine whether smoke occurred at a monitor location on a given day from the HMS smoke polygons. Performed initial GAM analysis and wrote report. Calculated MDA8 O₃ values from TCEQ CAMx output.

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 (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

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

Due to limits on Dr. Hegarty's availability for the next few months, we are having Dr. Mike Iacono step in to complete the initial GAMM analysis. Dr. Hegarty trained Dr. Iacono on the necessary scripts and steps in this reporting period. Mr. Henderson has also been assisting Dr. Hegarty with the development of STILT footprints.

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 J. Alvarado