AQRP Monthly Technical Report

PROJECT TITLE	*Evaluating the Ability of Statistical and Photochemical Models to Capture the Impacts of Biomass Burning Smoke on Urban Air Quality in Texas*	PROJECT #	22-003
PROJECT PARTICIPANTS	Matthew Alvarado, Jen Hegarty, Rick Pernak, Mike Iacono, John Henderson	DATE SUBMITTED	08-10-2023
REPORTING PERIOD	From: July 1, 2023 To: July 31, 2023	REPORT #	12

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

To further investigate the influence of fire emissions on urban MDA8 O_3 in Houston and El Paso, we calculated total fire counts and emissions of multiple species in geographic regions near Texas: the Yucatan (YUC), all of Mexico (MEX), California (CA), and states bordering Texas (LA, AR, OK, NM). We then replaced the FINN fire count predictors used in Section 4.1.2 above with these new predictors one by one to find the FINN variable in each region that gave the best fit with MDA8 background and maximum O_3. The best variables for each region and predictand are given in Table 7. We are currently combining these predictors to see if they give better predictions of the MDA8 O_3.

Table 1. Best FINN fire variable by geographic region.

Region	Houston		El Paso	
	Maximum MDA8 O_3	Background MDA8 O_3	Maximum MDA8 O_3	Background MDA8 O_3
MEX	Biomass burned (BMASS)	Non-methane hydrocarbon (NMHC) emissions	BMASS	Xylene emissions
YUC	Fire Area	Fire Count	Fire Area	Fire Area
OK	Fire Count	BMASS	Fire Count	Fire Count
NM	Fire Count	Fire Count	Fire Count	Fire Count
LA	Fire Count	Fire Count	Hydroxyacetone (HYAC) emissions	CH_3CN emissions
AR	Fire Count	NMHC emissions	Fire Count	Fire Count

CA	NO$_x$ emissions as NO	Glycoladehyde (GLYALD) emissions	NO$_x$ emissions as NO	Fire Area

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 NOx, VOC, and PM$_{2.5}$ emissions multiplied by the daily surface "footprints" to the GAM input datasets. We will also submit a final report to TCEQ and present at the AQRP workshop.

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. Evaluated CAMx predictions of smoke impact with statistical model. Completed draft final report.

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