

AQRP Monthly Technical Report

PROJECT TITLE	Analysis of Ozone Production Data from the San Antonio Field Study	PROJECT #	19-040
PROJECT PARTICIPANTS	Ezra Wood, Shannon Capps, Daniel Anderson Drexel University	DATE SUBMITTED	3/8/2019
REPORTING PERIOD	From: 2/1/2019 To: 2/28/2019	REPORT #	5

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

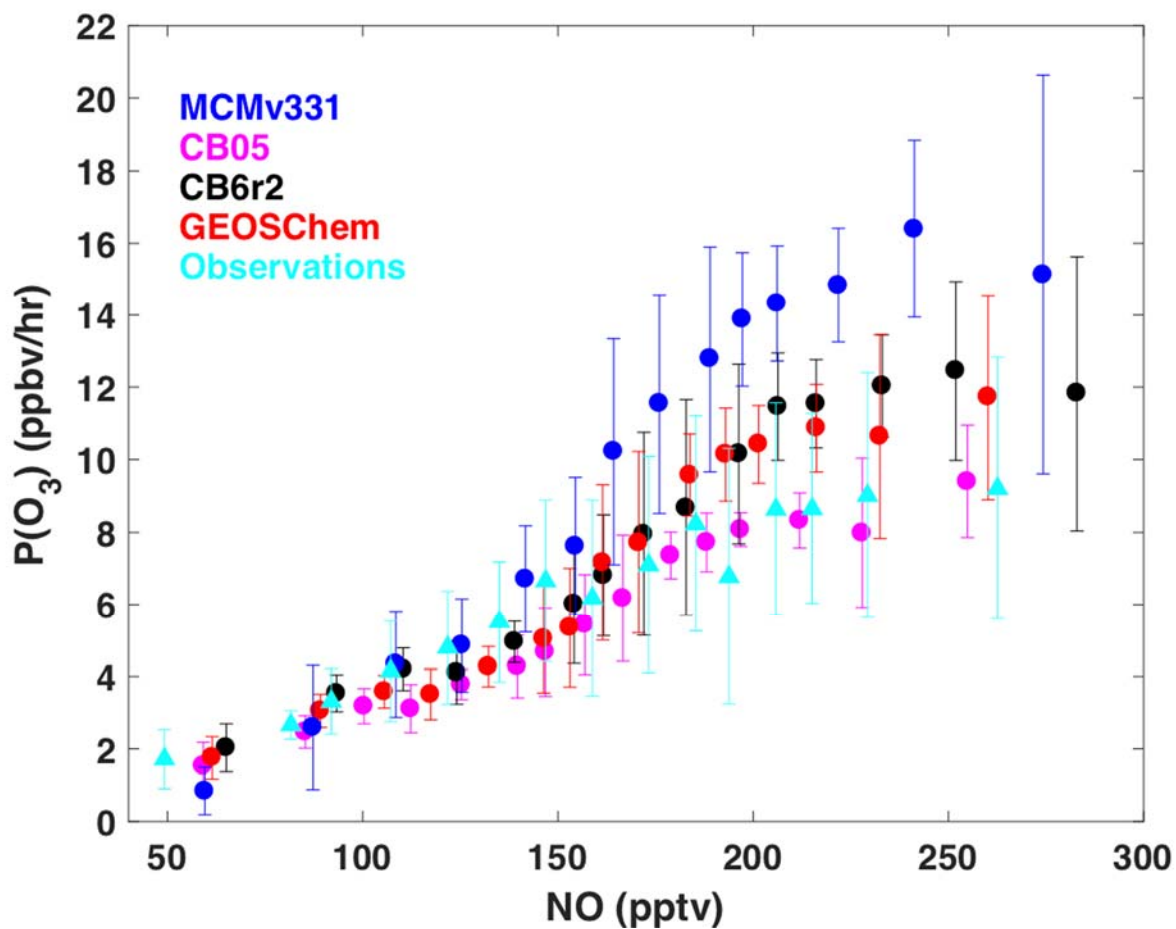
The goal of Task #1 is to quantify the dependence of the ozone production rate on the concentrations of NO_x, VOCs, and other measurements at the three SAFS sites where peroxy radical concentrations were measured. Most of this work has been collected into a paper which was submitted to the journal *Atmospheric Chemistry and Physics* in October of 2018. The final revised paper has been accepted and published and can be accessed at <https://www.atmos-chem-phys-discuss.net/acp-2018-1083/>. Remaining parts of Task #1 are to investigate the influence of biomass burning on ozone formation in the San Antonio area and to investigate to what extent the time averaging of the NO and peroxy radical measurements affects the calculated ozone production rates.

Task #2 consists of conducting 0-D photochemical modeling constrained by the Aerodyne/Drexel and Rice/Baylor/U. Houston measurements with several model chemical mechanisms for four SAFS measurement sites, spanning a large range of NO_x values. Example preliminary outputs from the model are described in the “preliminary analysis” section. Work will continue on this during the next several months.

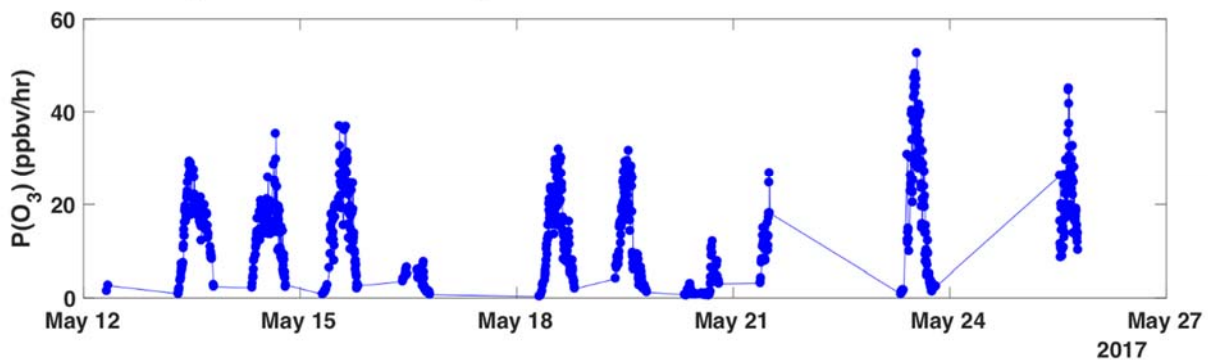
The goal of Task #3 is to apportion ozone concentrations to location-specific emission sources using 3-D air quality modeling with the instrumented Community Multiscale Air Quality model (CMAQ). Preliminary execution of the model has not occurred yet but is planned for the coming weeks.

Preliminary Analysis

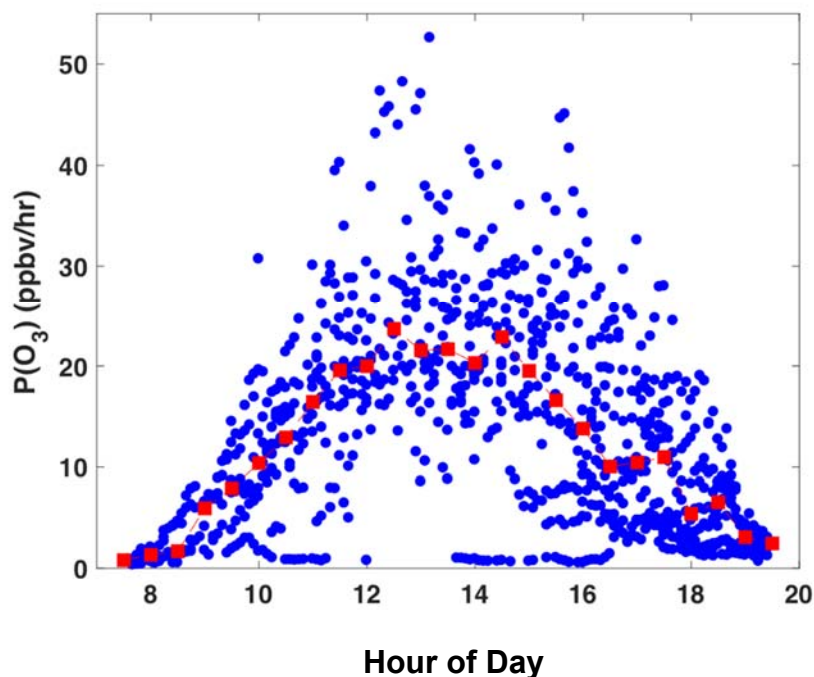
A comparison of the ozone production rates calculated using the measurements of nitric oxide and the peroxy radical aboard the Aerodyne mobile laboratory with outputs from the F0AM model using several chemical mechanisms are shown in the figure below. The data is mostly from UTSA but with some data from Floresville and Corpus Christi as well.



Overall, the results produced using the CB05 mechanism are closest to the observations, with the other three mechanisms (MCM v3.3.1, CB6r2 and GEOSChem) between 20 to 70% higher for [NO] values greater than 200 ppt. This gives us a preliminary feel for the accuracy of the models. We calculated the ozone formation rate at the Traveler's World site in the same way, using the GEOSChem mechanism. The results (below) show higher values than observed at the UTSA sites, which is expected based on the higher NO_x values.



The diurnal profile is shown below, in which all data are plotted on the same 24-hours, with the median shown in red.



Data Collected

No additional data have been collected.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

The federal government shutdown delayed our work on task 3 as described in an earlier report. We are slightly behind schedule on Task 3 but anticipate that we will be able to catch up given the progress on Tasks 1 and 2.

Goals and Anticipated Issues for the Succeeding Reporting Period

We will refine the 0-D modeling and begin first tests of CMAQ using the recently acquired 2017 emissions data.

Detailed Analysis of the Progress of the Task Order to Date

Task 1 is near-complete. Task 2 is making good progress and 3 has started.

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 **No**

The title is “Characterization of Ozone Production in San Antonio, Texas Using Observations of Total Peroxy Radicals”, submitted and accepted to *Atmospheric Chemistry and Physics*, accessible at <https://www.atmos-chem-phys-discuss.net/acp-2018-1083/>. This manuscript was sent to Gary McGaughey (Project Manager for project 17-032, during which most of the analysis was conducted) and Mark Estes (TCEQ) prior to submission.

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**

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**

Submitted to AQRP by

Ezra Wood,
Principal Investigator