

AQRP Monthly Technical Report

PROJECT TITLE	A synthesis study of the role of mesoscale and synoptic-scale wind on the concentrations of ozone and its precursors in Houston	PROJECT #	18-010
PROJECT PARTICIPANTS	Qi Ying, John Nielsen-Gammon	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

Task 1: Synthesis of mesoscale wind structures in the synoptic-scale context

Dr. Nielsen-Gammon was not able to work on this due to some last-minute request from Dept. of Agriculture. We expect to do much work on this in the second half of March.

Task 3: Analysis of the interaction of mesoscale winds and ozone formation during key episodes

Based on Dr. Nielsen-Gammon's suggestion, Dr. Ying continued to work on the 2000 episode. The unified source-oriented approach for the age and source-region apportionment of ozone, NO_x and VOCs using a source-oriented version of the SAPRC-07 mechanism.

Preliminary Analysis

High contributions of highly aged ozone (>8 hours old) occurred at both Aldine and Galveston on the nights of September 1-2, 4-5, 5-6 and 6-7. On 5-6 and 6-7, the aged ozone was originated from Louisiana but on the other two nights it was due to emissions originated in Texas (Figure 1). Banta et al. (2005) focused on August 30 and presented evidence for the bulk of the ozone being multi-hour aged pollution. Figure 2 shows the simulated O₃ concentrations with different atmospheric ages on 1500-1600 CST, August 2000. The results clearly show that aged ozone (or ozone from aged precursors) accounts for majority of the non-background ozone in the southeast portion of the modeling area, along the coastline of Gulf of Mexico.

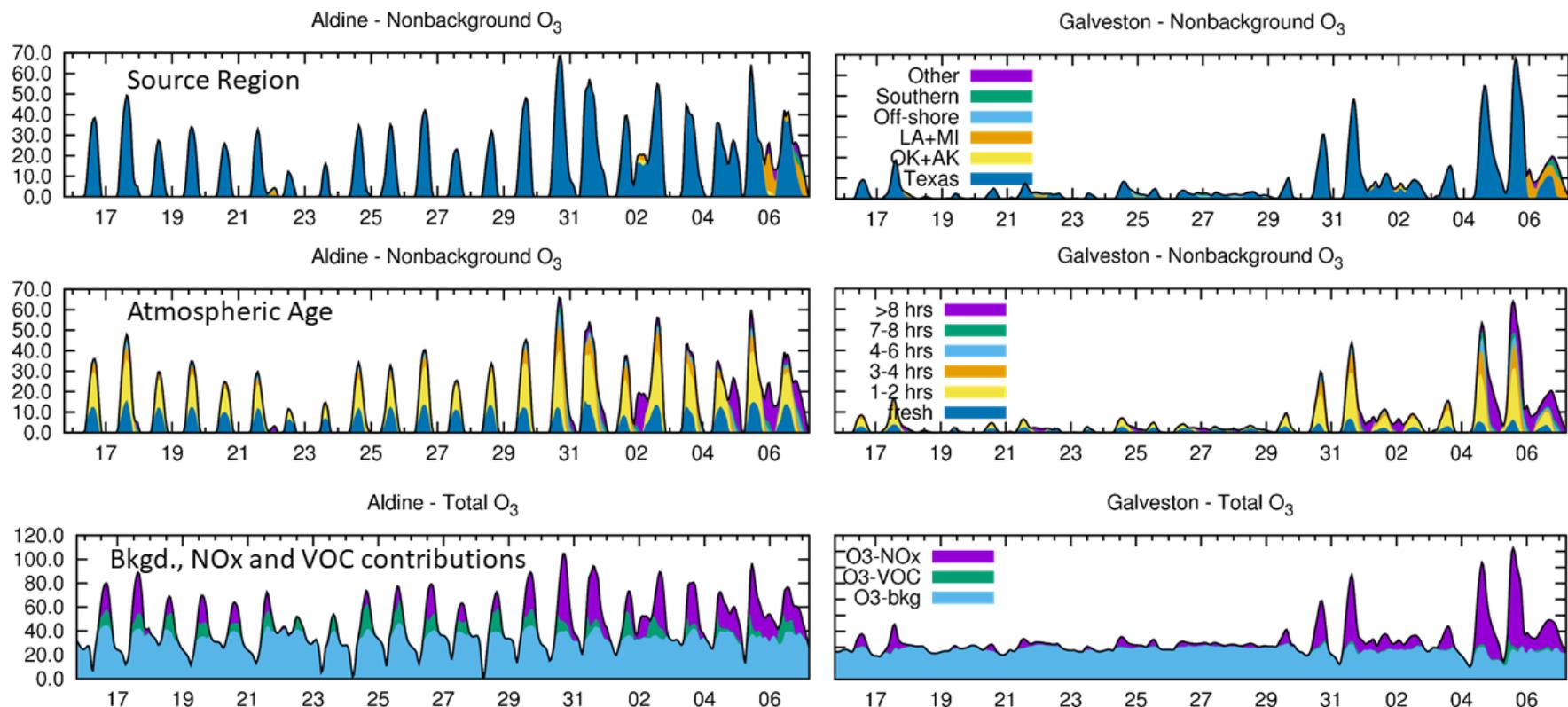


Figure 1 Source region (first row), atmospheric age (second row) and background vs. non-background analysis of ozone time series at the Aldine and Galveston sites between August 15 and September 7, 2000. Units are ppb.

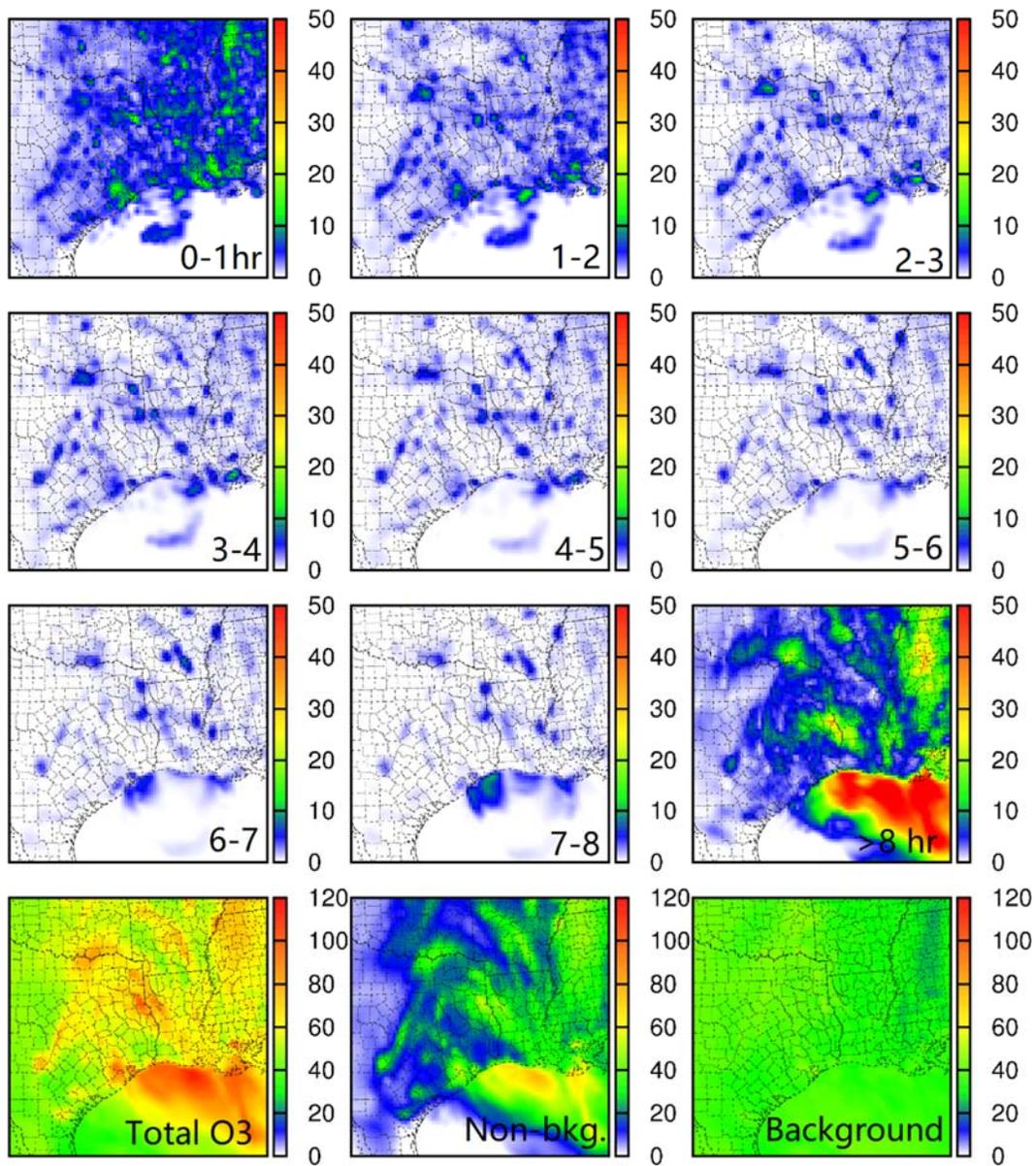


Figure 2 Atmospheric age distribution of non-background ozone (top three rows); total ozone, non-background ozone and background ozone (last row) concentrations on 1500-1600 CST, August 30, 2000. Units are ppb.

Data Collected

No additional data were collected during this period.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

None to report.

Goals and Anticipated Issues for the Succeeding Reporting Period

We plan to continue analyzing the age and source region contributions to NO_x, VOC and O₃ during this period. We plan to look at upper air vs. near surface transport of ozone and its

precursors during this period. We will also report modeling preparation for other ozone episode if additional such periods are identified.

Detailed Analysis of the Progress of the Task Order to Date

Task 2 (source and age resolved model development) has been completed. Task 1 is currently on-going with all necessary data retrieved. Task 3 is on-going for the year 2000 with good results. We believe that sufficient progress has been made in order to complete the project in time.

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

We are working on a manuscript with a preliminary title "Improve the computation efficiency of source-oriented chemical mechanisms for the source apportionment of secondary gaseous and particulate pollutants", which we plan to submit to Atmospheric Environment.

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

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 Qi Ying, on March 8, 2018.

Principal Investigator

