

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	2/11/2019
REPORTING PERIOD	From: 1/1/2019 To: 1/31/2019	REPORT #	4

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

Working with TCEQ, we have downloaded all available radar wind profiler data for eastern Texas (Houston, Beaumont, DFW areas) for the period 2005-2018 from the NOAA online wind profiler database. The data is in a format that is already readable with software Dr. Nielsen-Gammon has used to analyze the 2005-2006 quality-controlled TexAQS-II profilers.

Task 2: Development of source and age-resolved CMAQ

Completed.

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

Based on Dr. Nielsen-Gammon's suggestion, Dr. Ying has started working the 2000 episode. The most vigorous wind rotation took place between August 25 and September 1, 2000. Emission and meteorology data for episode have been retrieved from data archive. In addition, we have downloaded NEI data necessary to model year 2013. We are preparing necessary files to run the SMOKE emission model.

Preliminary Analysis

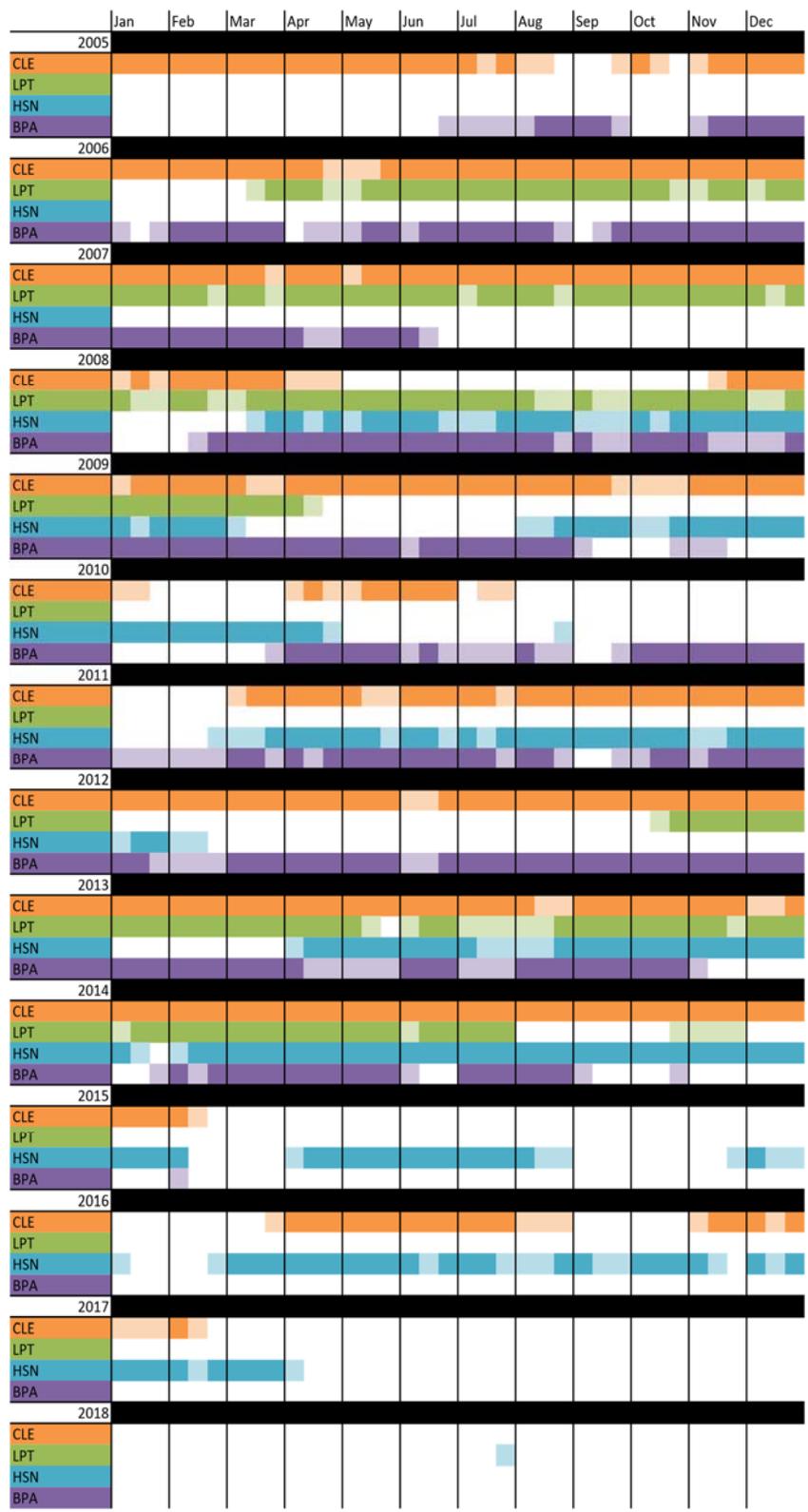


Figure 1. Wind profile data availability

The attached data inventory (Figure 1) shows the availability of data within the first, middle, and last third of each month from each of the four profilers (Cleburne, La Porte, University of Houston, and Beaumont-Port Arthur).

The target years for simulation are 2000, 2006, 2009, 2013, and 2017. The data inventory shows that no profiler data is available during the 2017 ozone season and parts of the 2009 ozone season, while coverage is good for 2006 and 2013. Data from 2000 was not archived in this database but the wind rotation characteristics from this period have been analyzed previously. We will therefore focus initially on analysis and simulations for 2006 and 2013, and use the resulting relationships between profiler-document wind rotation and surface wind patterns to identify wind rotation cases in the other key seasons.

Data Collected

Working with TCEQ, we have downloaded all available radar wind profiler data for eastern Texas (Houston, Beaumont, DFW areas) for the period 2005-2018 from the NOAA online wind profiler database.

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 start modeling exercise to determine 1) age distribution of NO_x, VOCs and O₃ and 2) source region of NO_x, VOC and O₃ for the August 25 - September 1, 2000 episode.

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 expected to start in February with an initial modeling for the year 2000. 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 February 11, 2018.

Principal Investigator

A handwritten signature in cursive script, appearing to read 'Qi Ying', is written below the text 'Principal Investigator'.