AQRP Monthly Technical Report

PROJECT TITLE	Quantifying the Emissions and Spatial/Temporal Distributions of Consumer Volatile Chemical Products (VCPs) in the Greater Houston Area	**PROJECT #**	22-020
PROJECT PARTICIPANTS	Dr. Yue Zhang, Alana Dedero, Yeaseul Kim, Zhenli Lai, Dr. Ying Qi, Hee Won Yim	**DATE SUBMITTED**	06/10/2023
REPORTING PERIOD	**From:** 5/1/2023 **To:** 5/30/2023	**REPORT #**	9

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

1. Completed the initial data analysis for the trace gases (Vocus) and the particle phase chemical composition (AMS) for both the fall and winter campaigns.
2. Continuing to work on analysis of trace gases (Vocus) to account for instrument calibration.

Data Collected

1. We have collected a full suite of data of the trace gases (Vocus), particle phase chemical composition (AMS), CO, NO_2, O_3, aerosol size distribution, GPS location through our deployment around Houston, Rockport, Corpus Christi, San Antonio, and Austin.
2. We have collected the above gas and particle information both during the day and at night, during weekends and weekdays, and on sunny, cloudy, rainy days, and during the fall and winter.
3. We also have collected Vocus data both in ammonia (NH_4^+) mode and water cluster (H_3O^+) mode.
4. We have obtained the organic concentration of particle phase compounds and have identified concentrations for VCPs for both the fall and winter campaigns.
5. We have identified concentrations for 61 different VCP compounds for the fall and winter campaigns.

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

N/A

Goals and Anticipated Issues for the Succeeding Reporting Period

1. Dr. Zhang's lab continues to work on the data analysis for all data collected from both the Fall and Winter field campaigns. Then the data will be paired with GPS locations to identify areas of high and low VCP concentrations. (The data includes trace gases

(Vocus), particle phase chemical composition (AMS), CO, NO_2, O_3, aerosol size distribution, and GPS location).

2. Dr. Qi Ying's lab continues to work on the CMAQ model simulation to prepare to analyze the VCP data collected from this deployment.

Based on the current progress, both goals are on track.

Detailed Analysis of the Progress of the Task Order to Date

We plan to complete the initial data analysis to determine spatial trends of VCPs in the Houston area. Then we will compare the fall and winter deployments to understand the seasonal variation of VCP and the impact vegetation has on VCP concentrations. We will identify the factors impacting days of high concentrations and areas with high concentrations. We will additionally compare the field measurements with CMAQ model simulations. Figures 1 and 2 show the average model concentrations for ozone and CO from 10/16/2022-10/31/2022.

Fig 1: Average O_3 concentration 10/16-10/31

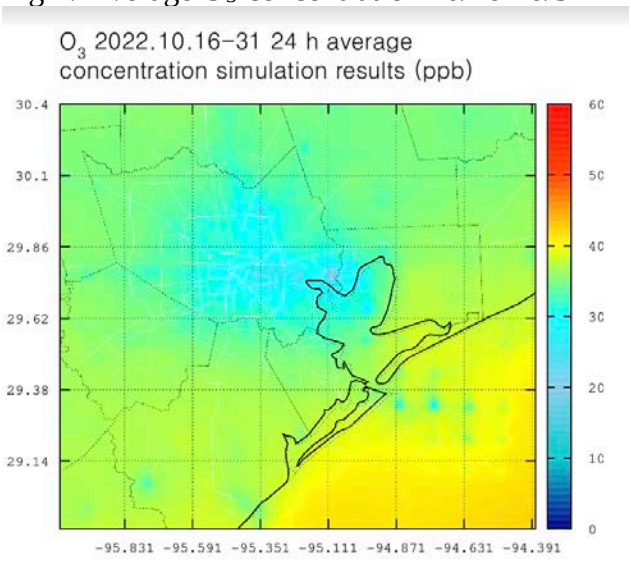
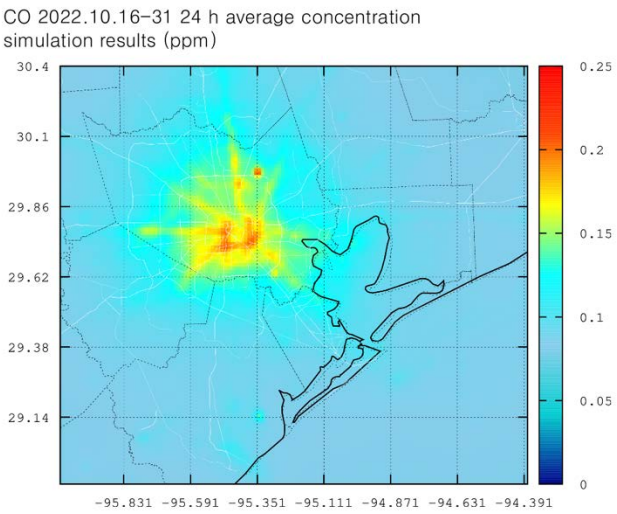


Fig 2: Average CO concentration (10/16-10/31)



Dr. Qi Ying's lab has added 29 different VCP compounds to their simulations. Once we have finished the analysis of the gas phase compound data, we will work with them to compare our measurements with their simulations. Additionally, we can compare our measured ozone, CO, and NO_2 data with their simulations.

We are completing the final steps for analyzing gas phase compounds. We need to account for the calibrations that occurred ~every hour during deployments. We next need to convert the gas phase compound data from ions/second to ppb. The figures below show the spatial distribution for monoterpenes (figure 3), texanol (figure 4), D4 siloxane (figure 5), and D5 siloxane (figure 6).

Fig. 3: Monoterpenes

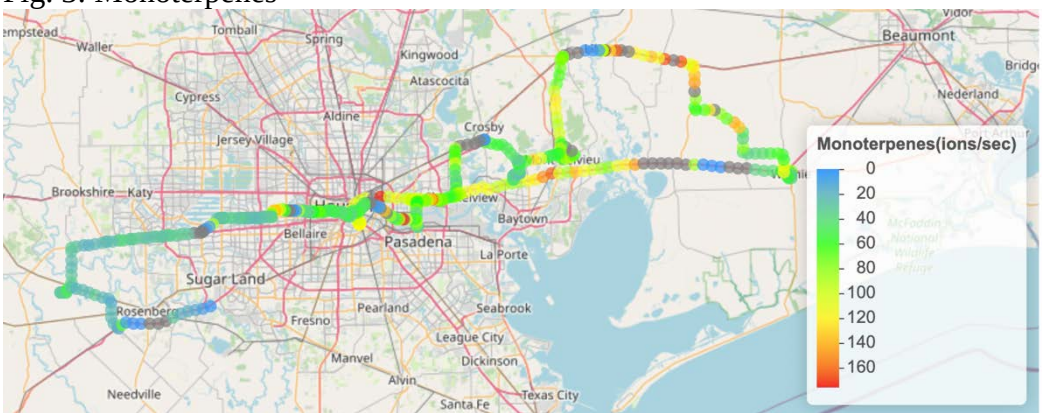


Fig. 4: Texanol

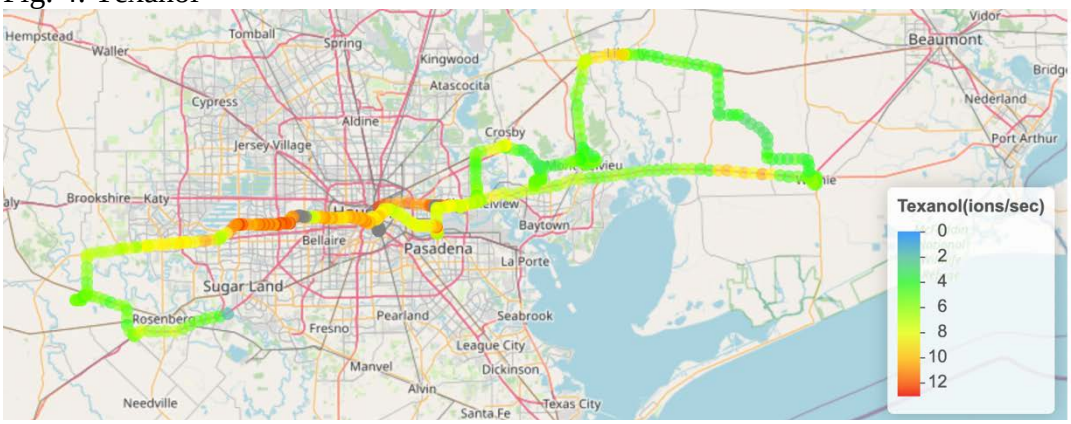


Fig. 5: D4 Siloxane

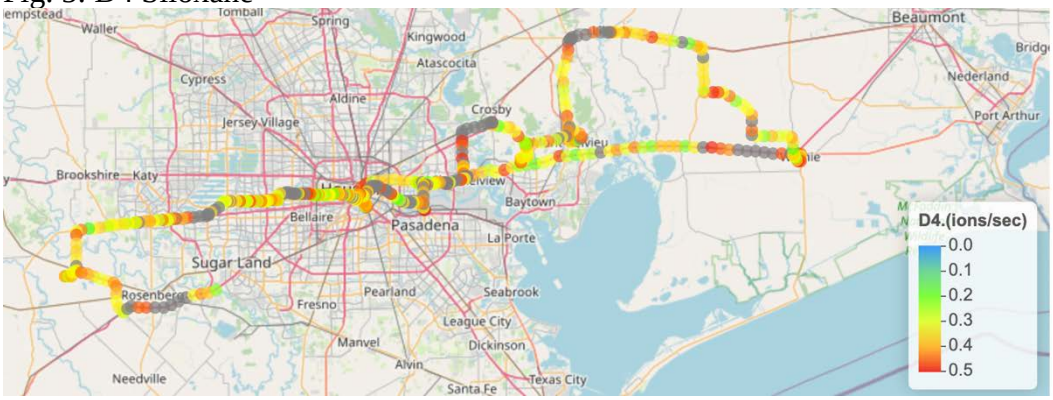
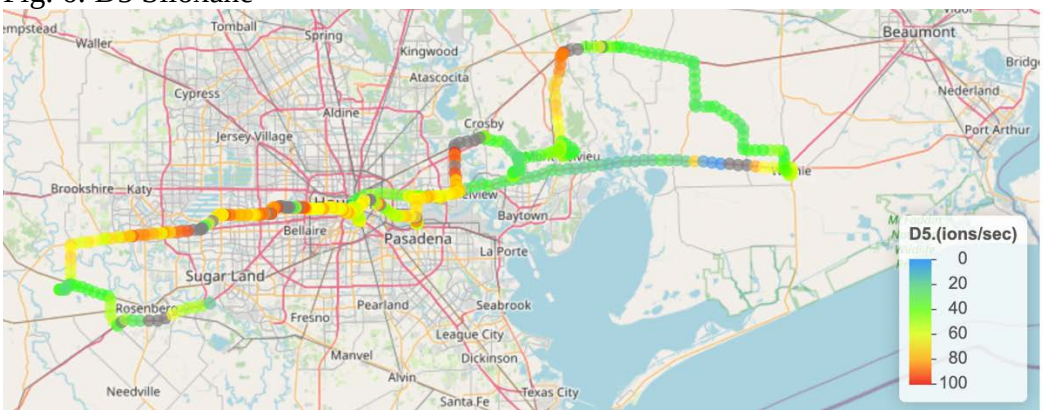


Fig. 6: D5 Siloxane



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**

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.

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**

The whole funding is expected to be used by the end of the project date.
