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, Sining Niu, Sahir Gagan, Yeaseul Kim, Zhenli Lai, Dr. Ying Qi, Hee Won Yim	**DATE SUBMITTED**	03/10/2023
REPORTING PERIOD	**From:** 2/1/2023 **To:** 2/28/2023	**REPORT #**	7

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 winter deployment and obtained 14 days of data in the Houston area to sample volatile chemical products (VCP). Data was collected from four different routes around the Greater Houston area.
2. Completed the initial data analysis for the trace gases (Vocus) for the fall campaign and the particle phase chemical composition (AMS) for both the fall and winter campaign.

Data Collected

1. We have collected 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 for both the fall and winter campaigns and have identified the concentrations of specific VCPs for the fall campaign.

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 expects to complete 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 CAMQ 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

Beginning in February, PI Zhang's lab completed the second field campaign for winter. PI Zhang's lab went to Houston, Corpus Christi, San Antonio, and Austin to sample. The Corpus Christi sample is to cross compare with the data obtained in the Houston to determine a background concentration, as shown in Figure 1. Graduate students Alana Dodero, Sining Niu, and Sahir Gagan have all participated in the project.

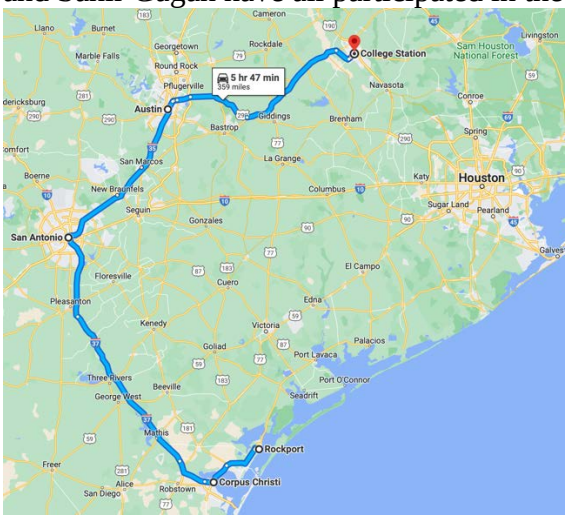

Figure 1. Deployment map during the field project in November 2022 (Rockport, Corpus Christi, San Antonio, and Austin route)

We are conducting 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 additionally analyze the diurnal trend of VCP.

We are currently completing the initial data analysis for the gas phase compounds. Below are preliminary results of the organic concentration of particle compounds in the Houston area shown in Figure 2. Additionally, Figures 3 shows the concentration of D5 Siloxane, a compound commonly used in personal care products. The peaks in concentration are due to calibration of Vocus, which occurred every hour. Next steps will include correcting for the calibration points, and converting the ions/s data to concentration (parts per trillion).

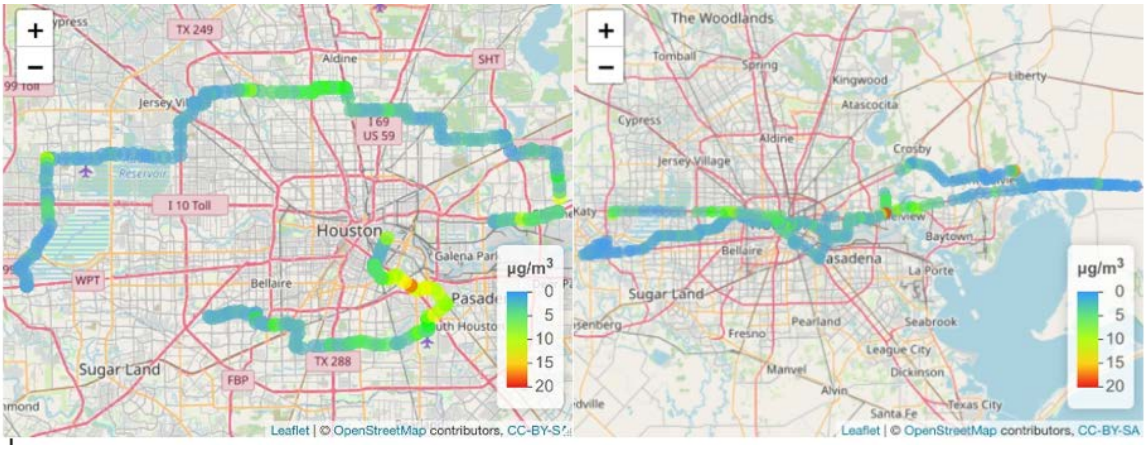

Figure 2. Organic concentration of particle compounds (AMS)

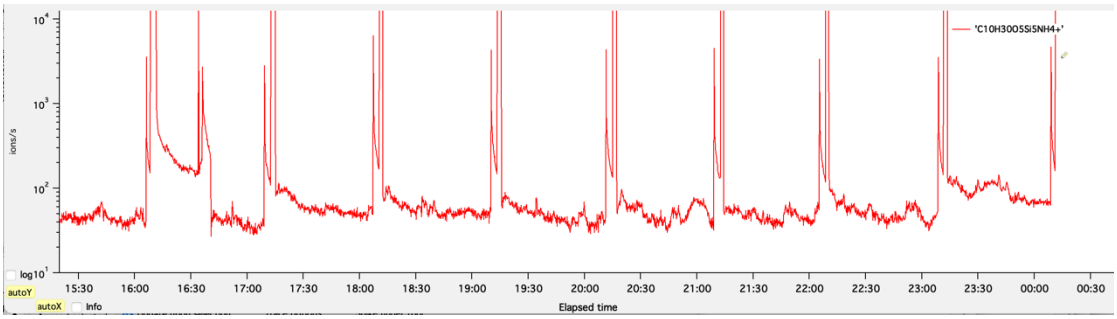

Figure 3. D5 Siloxane ambient concentration

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 the heavy workload and short turnaround time of the deployment, PI Zhang's team also includes two additional graduate students, Ms. Sining Niu and Mr. Sahir Gagan, to work on the mobile lab deployment and process initial data organization and analysis.

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.

Submitted to AQRP by Dr. Yue Zhang and team member Alana Dodero.