

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 Dederro, Yeaseul Kim, Zhenli Lai, Dr. Ying Qi, Hee Won Yim	DATE SUBMITTED	04/10/2023
REPORTING PERIOD	From: 3/1/2023 To: 3/31/2023	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 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.
2. Continuing to work on analysis of trace gases (Vocus) for the winter campaign.
3. Trained undergraduate students to use IgorPro software to analyze trace gas concentrations.

Data Collected

1. We have collected full suite of data of the trace gases (Vocus), particle phase chemical composition (AMS), CO, NO₂, O₃, 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 (NH₄⁺) mode and water cluster (H₃O⁺) 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.
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, NO₂, O₃, 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

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 additionally analyze the diurnal trend of VCP.

We are currently completing the initial data analysis for the gas phase compounds. From the initial analysis, Alana has identified more than 3000 compounds from the air in Houston. Once these compounds are identified, Alana has been working on the time series of some key VCP compounds.

Below are some of the important VCP compounds from the mobile measurements during the winter campaign. Figure 1 shows the m/Q of ~216 and the different compounds assigned to this peak. One of these compounds is Texanol (C₁₂H₂₂O₂), a compound found in water-based coatings and adhesives. Similarly, Figure 2 shows the peak for D4 siloxane (C₈H₂₄O₄Si₄), which is found in adhesives and insecticides, and Figure 3 shows the peak for D5 siloxane (C₁₀H₃₀O₅Si₅), which is found in personal care products. Next steps will include correcting for the calibration points, and converting the ions/s data to PPT.

Figure 1. Peak for Texanol

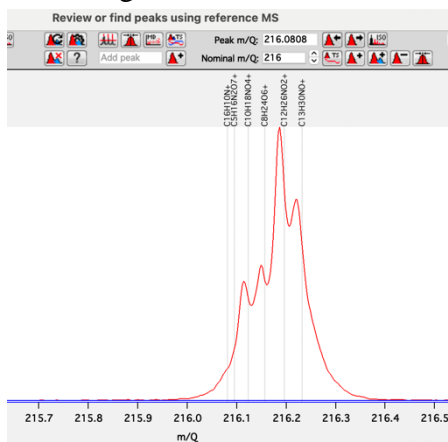


Figure 2. Peak for D4 Siloxane

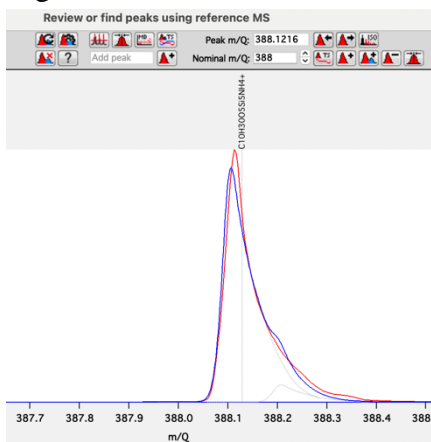
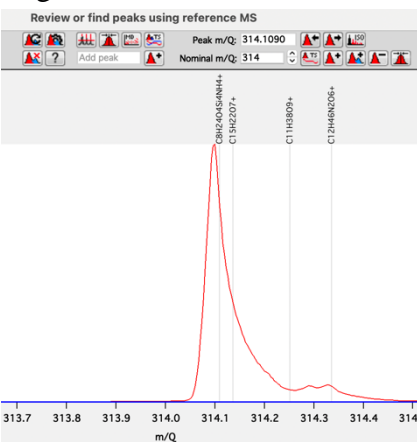


Figure 3. Peak for D5 Siloxane



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.

Submitted to AQRP by Alana Dodero and Dr. Yue Zhang