

AQRP Monthly Technical Report

PROJECT TITLE	Sources of Organic Particulate Matter in Houston: Evidence from DISCOVER-AQ data Modeling and Experiments	PROJECT #	14-024
PROJECT PARTICIPANTS	Lea Hildebrandt Ruiz and Ying Xu (The University of Texas at Austin) Greg Yarwood Bonyoung Koo (ENVIRON) Gookyoung Heo (University of California, Riverside)	DATE SUBMITTED	11/7/2014
REPORTING PERIOD	From: October 1, 2014 To: October 31, 2014	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 2. Environmental Chamber Experiments and Box Modeling

The UT Austin team ordered a controller from Aerodyne, which will be used to control the temperature of the thermodenuder (TD) and to switch valves between the TD and a bypass line. The TD and bypass will be set up with a pump so that air is always flowing through the TD and the bypass, maintaining a stable temperature in the TD and avoiding void volume. A schematic of the TD/bypass set-up with two automatic 3-way valves is shown below.

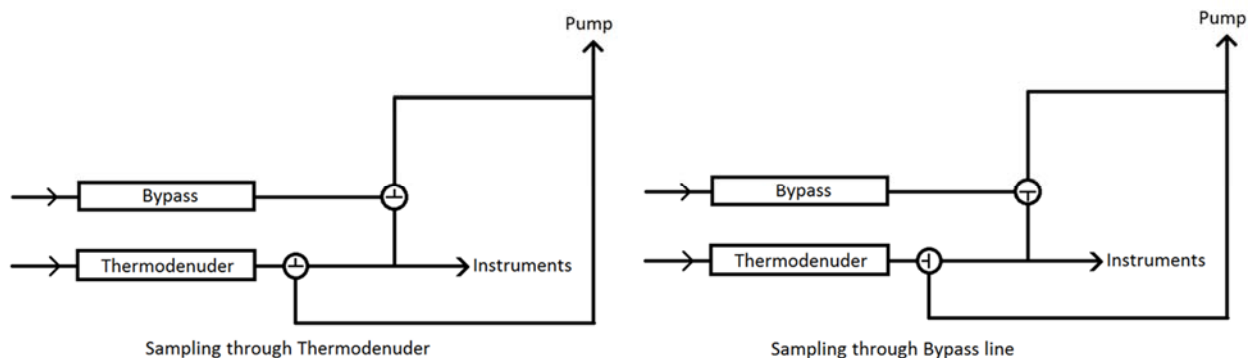


Fig. 1 Schematic of thermodenuder set-up with bypass line and pump.

UT Austin also finalized the gas chromatography and mass spectrometry methods for five target compounds and adjusted the Thermal Desorber program to analyze target compounds with Tenax-TA tubes. Trial analysis of two compounds was successful and the peaks were identified.

Task 4. Photochemical Modeling

ENVIRON worked on developing meteorological input data for CAMx simulations of the DISCOVER-AQ period. Model performance of Weather Research and Forecast (WRF) model simulations is being evaluated for wind speed/direction, temperature and humidity data within and outside of Texas. This activity is shared with AQRP project 14-016.

Task 5. Discover-AQ data analysis

The UT Austin team has continued quality assurance of DISCOVER-AQ data by, for example, comparing measurements from the ACSM to data analyzed from the HR-ToF-AMS (AQRP project 14-009) and data from filter analysis (AQRP project 14-029). Quality assurance and finalization of the data will not be completed until the filters have been analyzed for inorganic ions. UT Austin is now working with Dr. Sheesley (14-029) to cut the filters and send them to DRI for analysis as planned.

Task 6. Positive matrix factorization

UT Austin has been working on positive matrix factorization of the organic aerosol mass spectra measured by the ACSM to better understand the OA source and composition in Conroe, TX. We have completed preliminary analysis and are now at physical interpretation of the PMF factors.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

Task 5. Discover-AQ data analysis

Two uncertainties in quantification of ACSM data are the ACSM collection efficiency (CE), which is less than unity due to particle bounce on the vaporizer, and the relative ionization efficiency (RIE) of sulfate. We are working on determining the best estimates of these two variables using data from calibrations (which can measure the sulfate RIE), as well as comparison to data from our SEMS (which measures total PM₁ mass/volume and should therefore help in determination of CE) and comparison with other measurements including data from the HR-ToF-AMS and filter analysis.

Goals and Anticipated Issues for the Succeeding Reporting Period

Task 2. Environmental Chamber Experiments and Box Modeling

Trial analysis of the remaining three target compounds will be conducted using the finalized methods. After the trial analysis, calibration curves for these compounds will be obtained on the TD-GC/MS system prior to sampling. We expect that the first environmental chamber experiments will be conducted during this next reporting period.

Task 5. Discover-AQ data analysis

Filters will be sent to DRI for analysis of inorganic ions.

Task 6. Positive matrix factorization

PMF analysis will be continued.

Detailed Analysis of the Progress of the Task Order to Date

Progress to date has been appropriate. There have been delays, but overall we do not anticipate problems completing all project tasks by the end of the project period (June 30, 2015). We have not, yet, begun conducting environmental chamber experiments because it has taken longer than expected to develop the IVOC analysis procedures and to build the heated injector and the thermodenuder. We are now almost ready to start the environmental chamber experiments and intend to finish conducting and analyzing the experiments by the end of March, 2015.

Submitted to AQRP by: Lea Hildebrandt Ruiz

Principal Investigator: Lea Hildebrandt Ruiz