

AQRP Monthly Technical Report

PROJECT TITLE	Novel Observations and Quantified Source Apportionment of Ozone, Particulate Matter and Contributing Precursors in the El Paso Area	PROJECT #	24-024
PROJECT PARTICIPANTS	Pawel Misztal, Lea Hildebrandt-Ruiz, David Sullivan, Elena McDonald-Buller, Yosuke Kimura	DATE SUBMITTED	7/10/2025
REPORTING PERIOD	From: 6/1/2025 To: 7/1/2025	REPORT #	10

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

Task 2b:

The modeling team is currently focused on data analysis, quality assurance, and writing sections of the draft final report.

Tasks 3 and 4: Completed

All proposed mobile and stationary measurements were successfully conducted during two different seasons, as scheduled.

Task 5:

The observation team concentrated efforts on processing datasets from the field campaigns. Additional data were incorporated from monitoring stations that were collocated with, or adjacent to, the stationary instrument trailer at the new UTEP site. This site served as both a stationary measurement location and an overnight stop for the mobile lab during the summer campaign.

Data from the Vocus proton-transfer-reaction time-of-flight mass spectrometer (Vocus-PTRTOFMS) and the high-resolution time-of-flight aerosol mass spectrometer (HR-TOF-AMS) have been processed in accordance with AQRP workflows established in the previous campaign. These data are now being further analyzed and synthesized (Task 6) for inclusion in the final report. The full driving routes completed in both campaigns are shown in Figure 1.

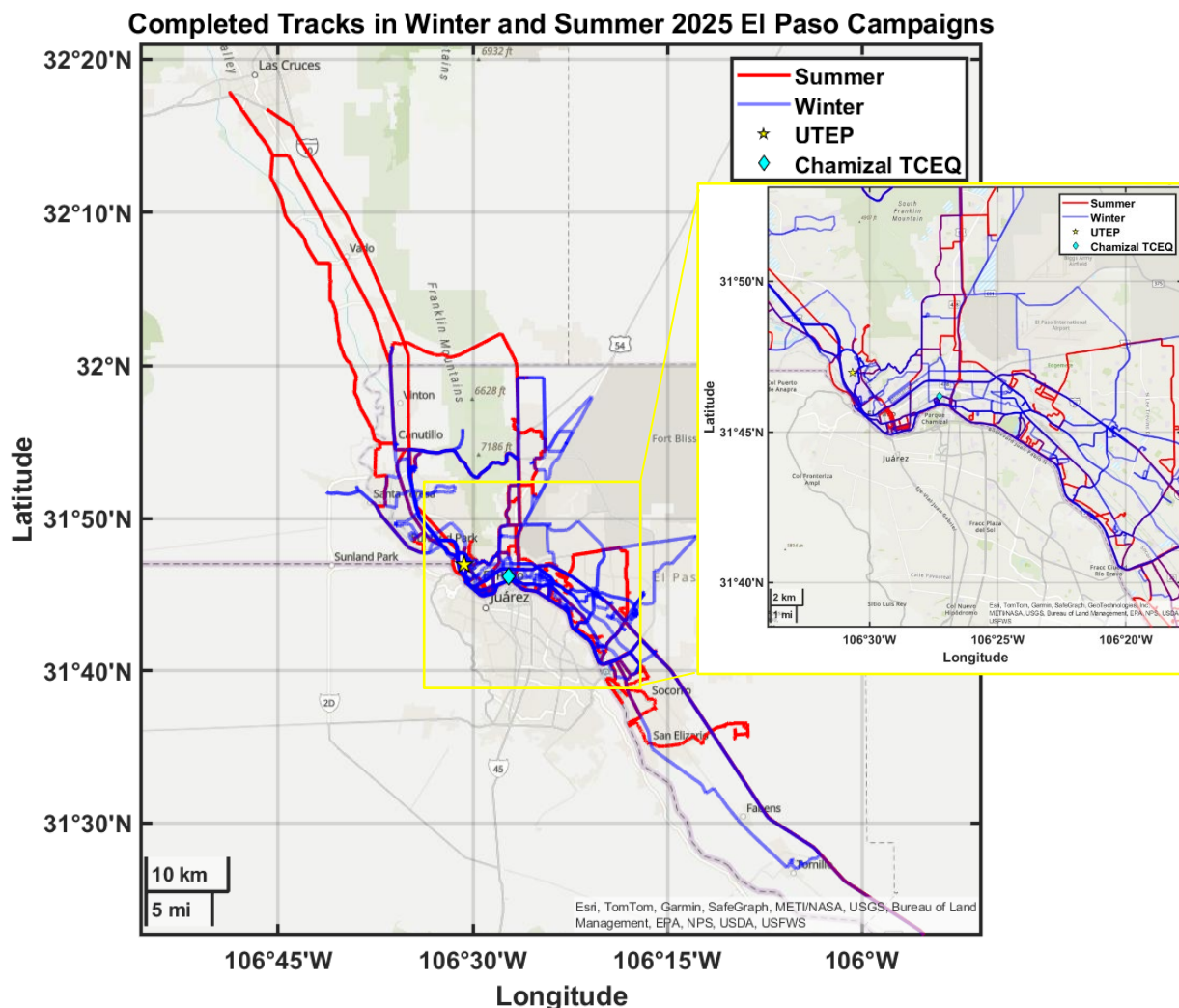


Figure 1. Completed mobile measurement tracks for the winter and summer campaigns. The star indicates the stationary UTEP site, and the diamond indicates the frequently collocated Chamizal station.

Preliminary VOC Abundance Maps from the Summer Campaign

Mobile measurements during the summer campaign were predominantly influenced by westerly winds, capturing emissions from Juárez along the US - Mexico border. As shown in Figure 2, toluene and C8 aromatics were elevated along the border. In contrast, ethanethiol plus dimethyl sulfide (DMS) exhibited different spatial patterns, with concentrations enhanced near wastewater treatment plants in Las Cruces and South El Paso, and in agricultural areas between Las Cruces and El Paso.

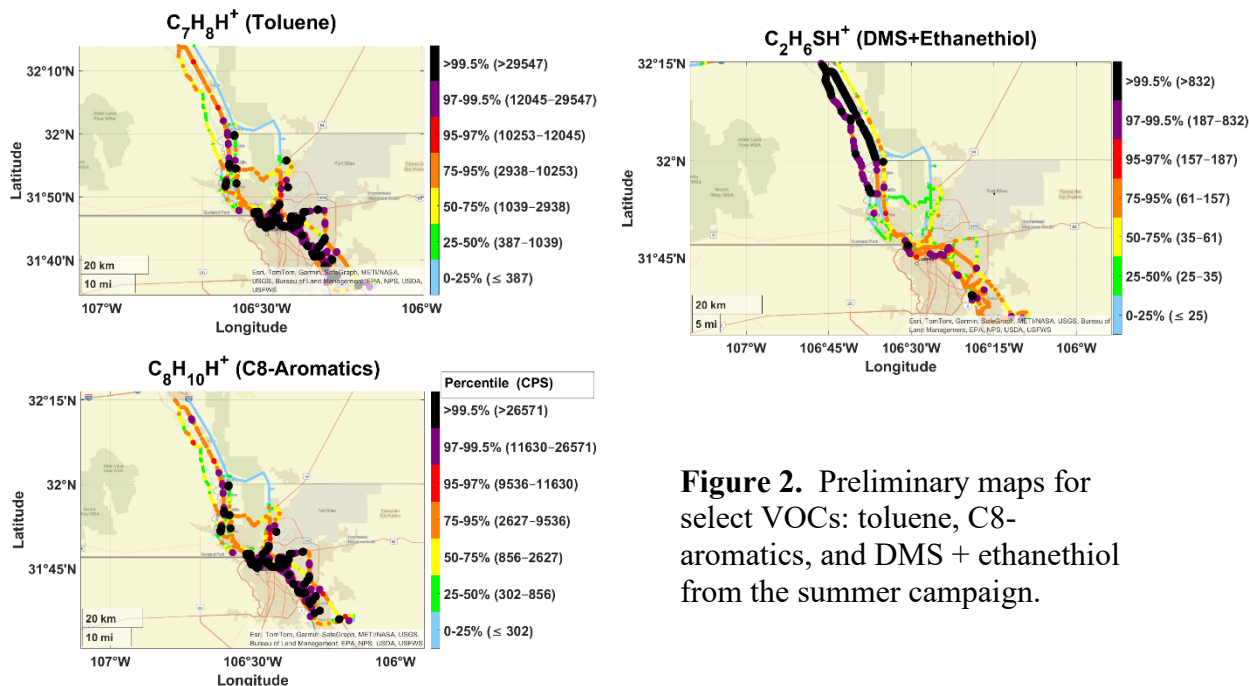


Figure 2. Preliminary maps for select VOCs: toluene, C8-aromatics, and DMS + ethaneithiol from the summer campaign.

Preliminary VOC Trends at the UTEP Site

During the second campaign, the UT mobile lab was collocated with the auto-GC trailer at the UTEP site. This included both intervals between mobile sampling and a dedicated period with over three days of continuous stationary measurements (Figure 3). Daytime temperatures often exceeded 90 °F, requiring the use of a portable AC unit.

Figure 3 displays preliminary time series for the same VOC tracers shown in the spatial maps. Day and night periods are based on actual sunset and sunrise times. Observed enhancements varied with wind direction and time of day. Notably, June 6 and 7 showed nighttime and early morning peaks. Toluene and C8 aromatics were often correlated, likely reflecting advected combustion and solvent use, but higher C8/toluene ratios in the late afternoon suggest tailpipe emissions associated with rush hour. Further analysis using the comprehensive calibrated datasets will quantify source apportionment more precisely.

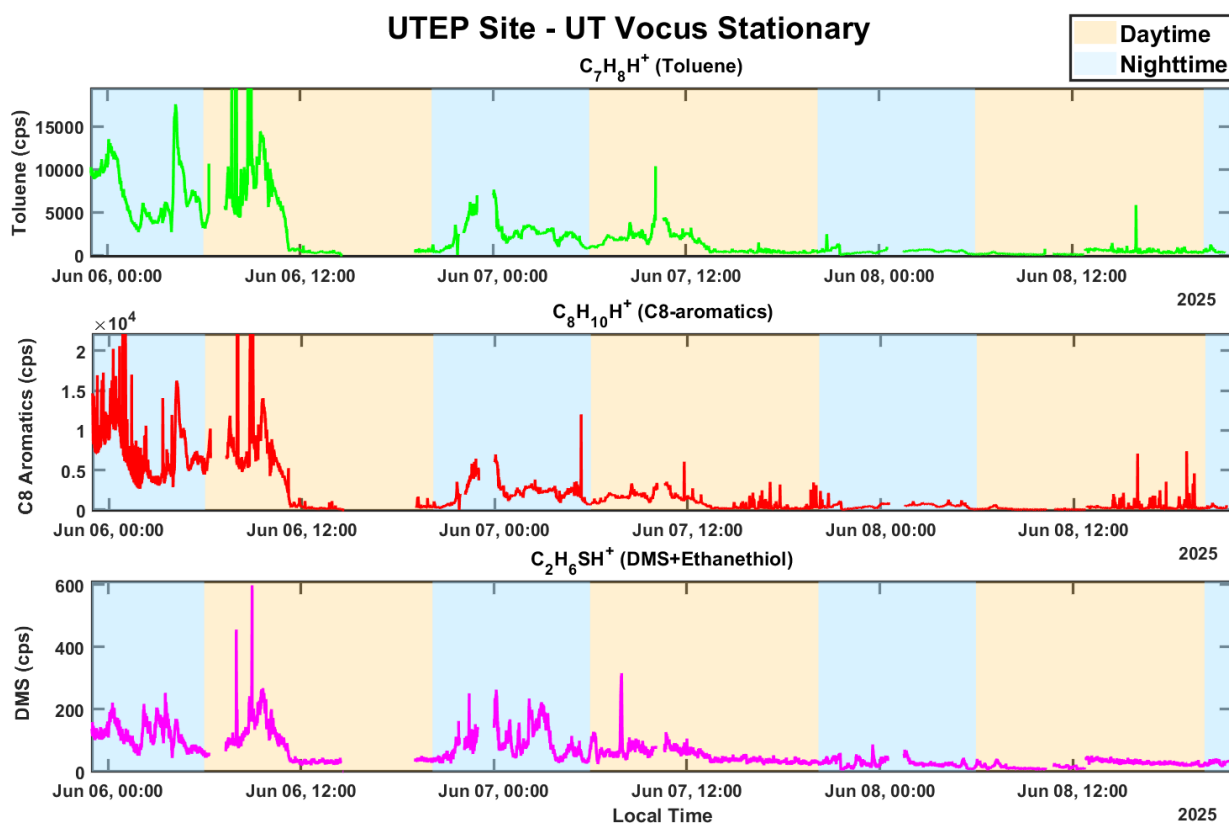


Figure 3. Preliminary time series of VOC abundance variability from stationary measurements at UTEP.

Task 6:

Results from both campaigns are currently being synthesized alongside additional datasets, including auto-GC observations from the UTEP trailer and routine measurements from TCEQ and City of El Paso (CoEP) monitoring stations. Preliminary source apportionment using a positive matrix factorization (PMF) analysis of speciated $PM_{2.5}$ data from the Chamizal station indicates that crustal material (Factor 2) is the dominant contributor, accounting for more than 30 percent of the total particulate mass. Fires (Factor 3) also contribute substantially, while emissions from motor vehicles are split between light-duty vehicles (Factor 4), contributing over 15 percent, and heavy-duty vehicles (Factor 5), contributing approximately 13 percent. Secondary inorganic aerosols are also present, with ammonium sulfate, likely associated with coal combustion, exceeding 12 percent, and ammonium nitrate, typically linked to agricultural activity, contributing around 3.7 percent. Overall, the $PM_{2.5}$ composition at Chamizal appears to be dominated by crustal sources, followed by motor vehicle emissions and biomass burning, with more modest but notable contributions from regional coal combustion and agricultural sources. Ongoing comparisons with HYSPLIT back trajectories and mobile source apportionment analyses will provide further validation and refinement of these initial source attributions.

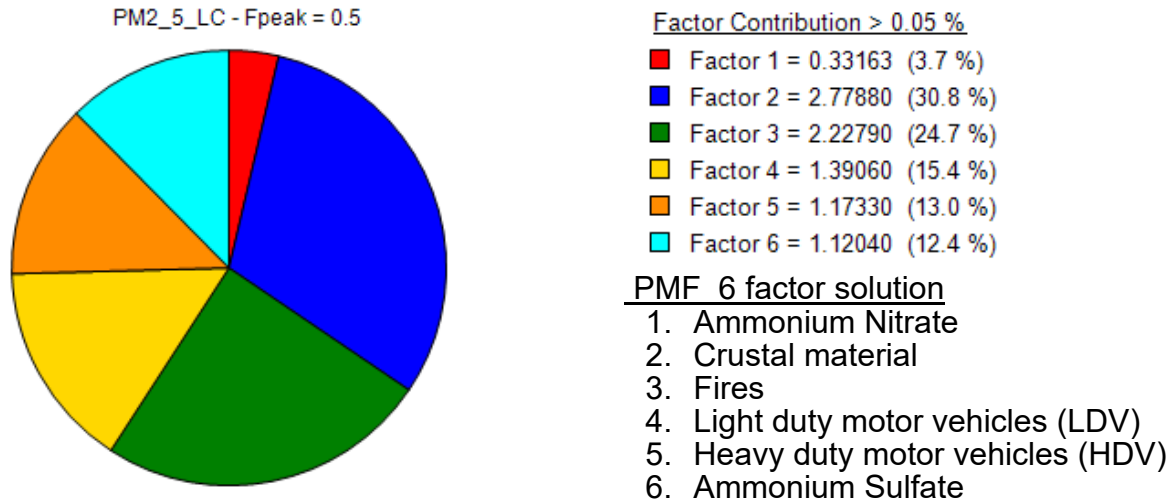


Figure 4. Preliminary source apportionment for PM_{2.5} at Chamizal station (6-factor PMF solution).

Data integration efforts also include modeling activities to complement observational results.

Preliminary Analysis

As described above.

Data Collected

No

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

None

Goals and Anticipated Issues for the Succeeding Reporting Period

During the next reporting period, the modeling team will focus on completing the draft final report while maintaining close collaboration with the field observation teams.

The observation team will finalize quality assurance and quality control processes using workflows established during the winter campaign, ensuring consistency for robust cross-seasonal comparisons. Analytical efforts will center on spatial mapping and source-resolved characterization of both gas-phase and particle-phase pollutants, with particular emphasis on identifying contributors to secondary PM formation. Comparisons between observations at the UTEP site and complementary measurements from the UT Austin trailer, including GC-based VOC speciation, will be conducted to strengthen interpretation. The team is also preparing a preliminary version of the final report for submission by the end of the month. In parallel, a meeting with TCEQ is planned to solicit input on analysis priorities and reporting preferences. Altogether, this coordinated effort aims to harmonize datasets from both field campaigns,

enabling a comprehensive assessment of seasonal variability, emission source profiles, and pollutant transport in the El Paso–Juárez airshed. The resulting insights will support improved source attribution, guide future mitigation strategies, and reinforce the scientific foundation of the final report.

Detailed Analysis of the Progress of the Task Order to Date

None

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**

Submitted to AQRP by
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