HEI Research Report 240

Predictive, Source-Oriented Modeling and Measurements to Evaluate Community Exposures to Air Pollutants and Noise from Unconventional Oil and Gas Development

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Additional Materials B: Chapter 4

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Additional Materials B: Chapter 4

Figure B-1. UT Austin Van co-locating with Franklin Group's Trailer.

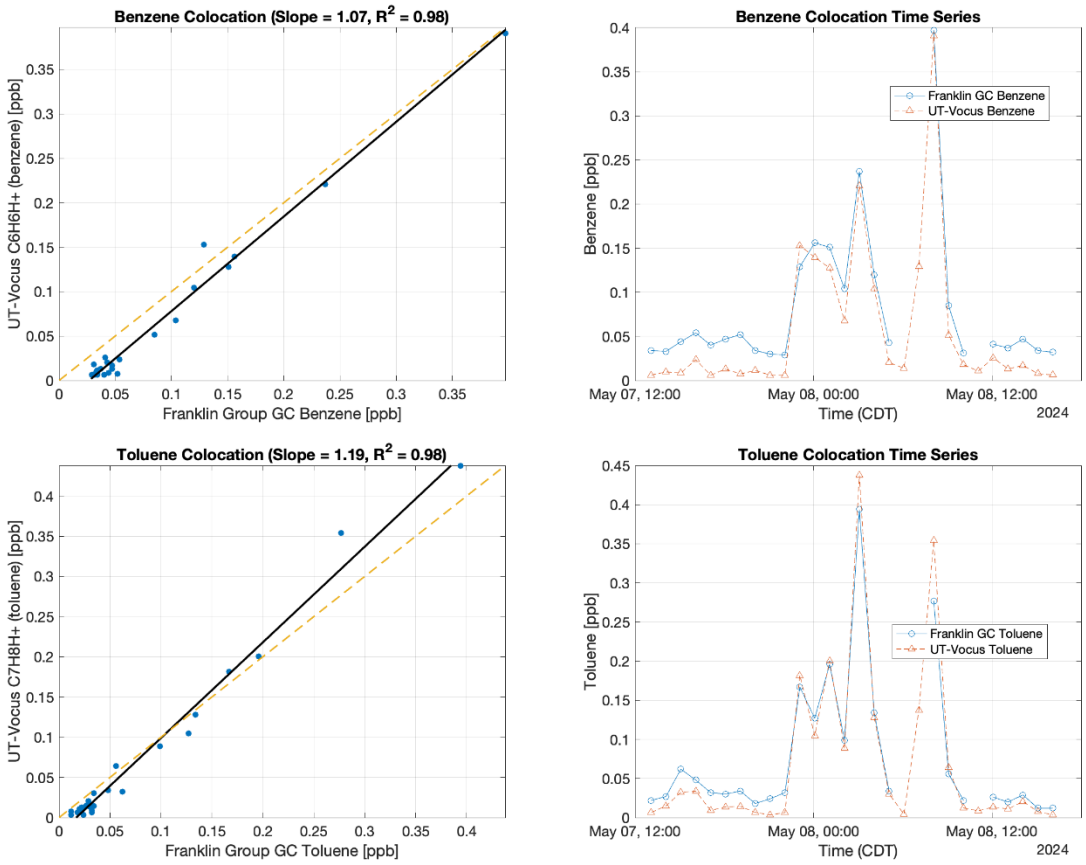

Figure B-2. Co-location results.

To validate instrument performance, co-location comparisons were conducted between Franklin's GC measurement and UT Vocus measurement. Benzene and toluene were analyzed. Franklin's data were matched to UT measurements using a ±5-minute window. Linear regression and Pearson correlation analyses (R^2) were performed to quantify the agreement between the two datasets. Scatter plots showed strong correlations, with benzene exhibiting a slope of 1.07 and R^2 of 0.98, and toluene showing a slope of 1.19 and R^2 of 0.98. Time series overlays further demonstrated that both instruments captured similar temporal trends, although some variability in absolute values was observed.

Here, we show some additional timeseries data from mobile measurements.

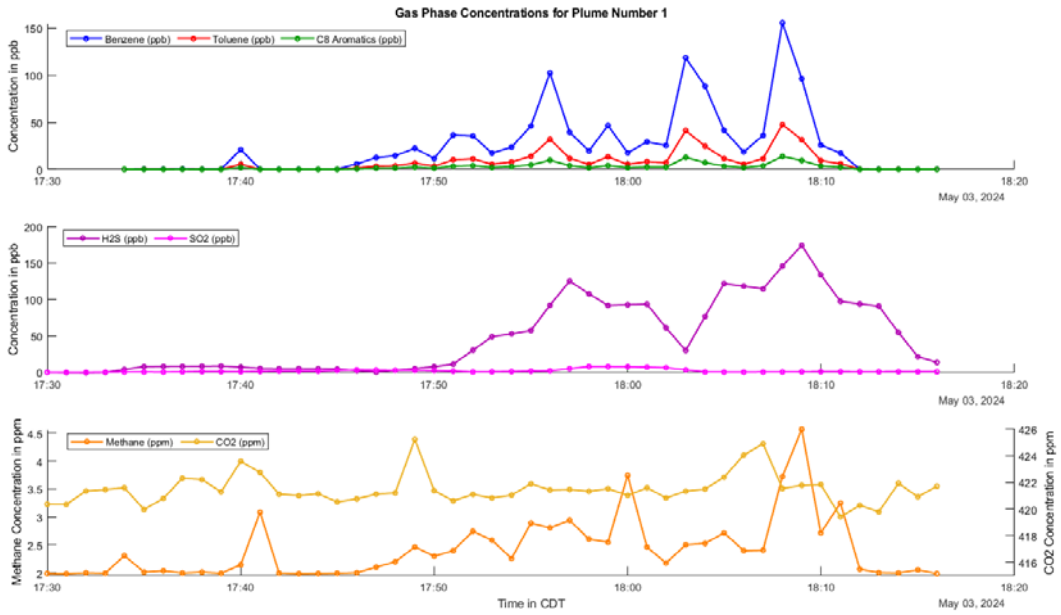

Figure B-3. Time series plot of H_2S, SO_2, methane, CO_2, benzene, toluene, and C8 aromatics mixing ratios as the van drives past mobile plume #1 (Drill Site).

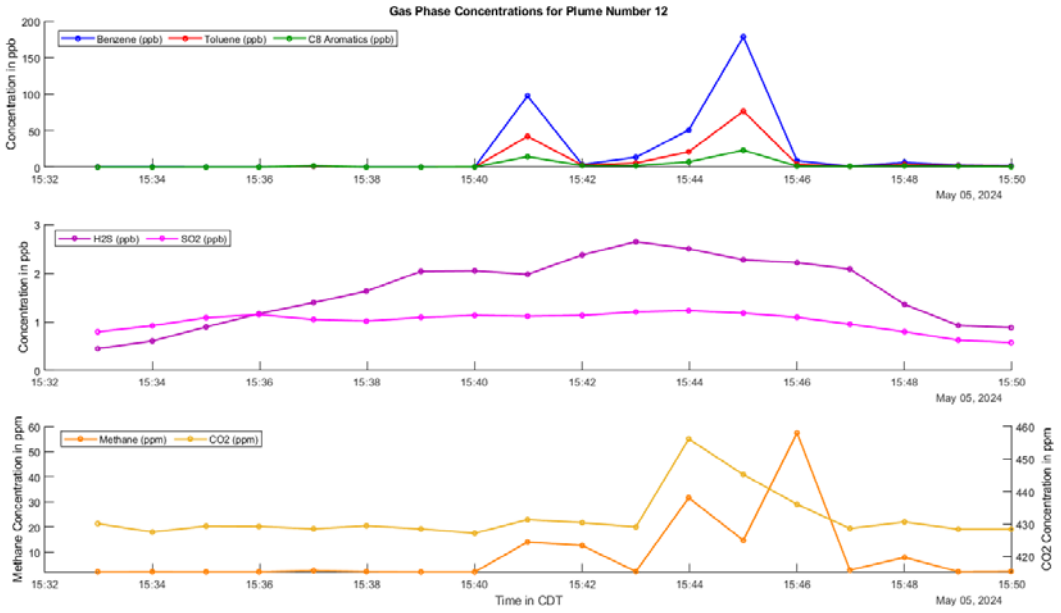

Figure B-4. Time series plot of H_2S, SO_2, methane, CO_2, benzene, toluene, and C8 aromatics mixing ratios as the van drives past mobile plume #12 (process plant/facility).

Note that for this plume (Figure A4), we do not see a significant increase in H2S accompanying the increase in VOC. Instead, we see elevated levels of both methane (reaching more than 50 ppm) and CO2 (reaching more than 450 ppm).

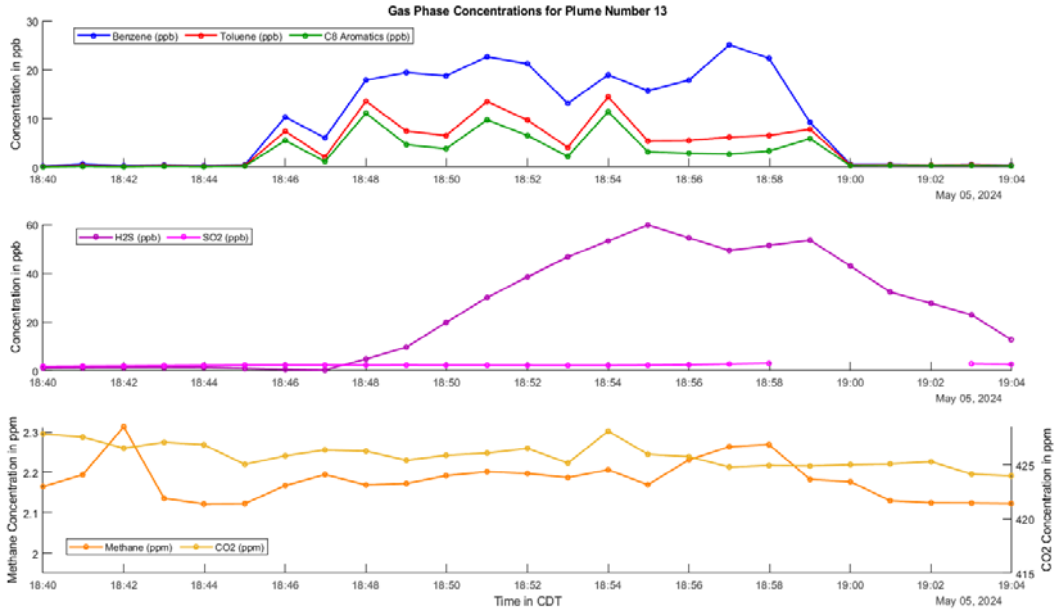

Figure B-5. Time series plot of H_2S, SO_2, methane, CO_2, benzene, toluene, and C8 aromatics mixing ratios as the van drives past mobile plume #13 (process plant/facility).

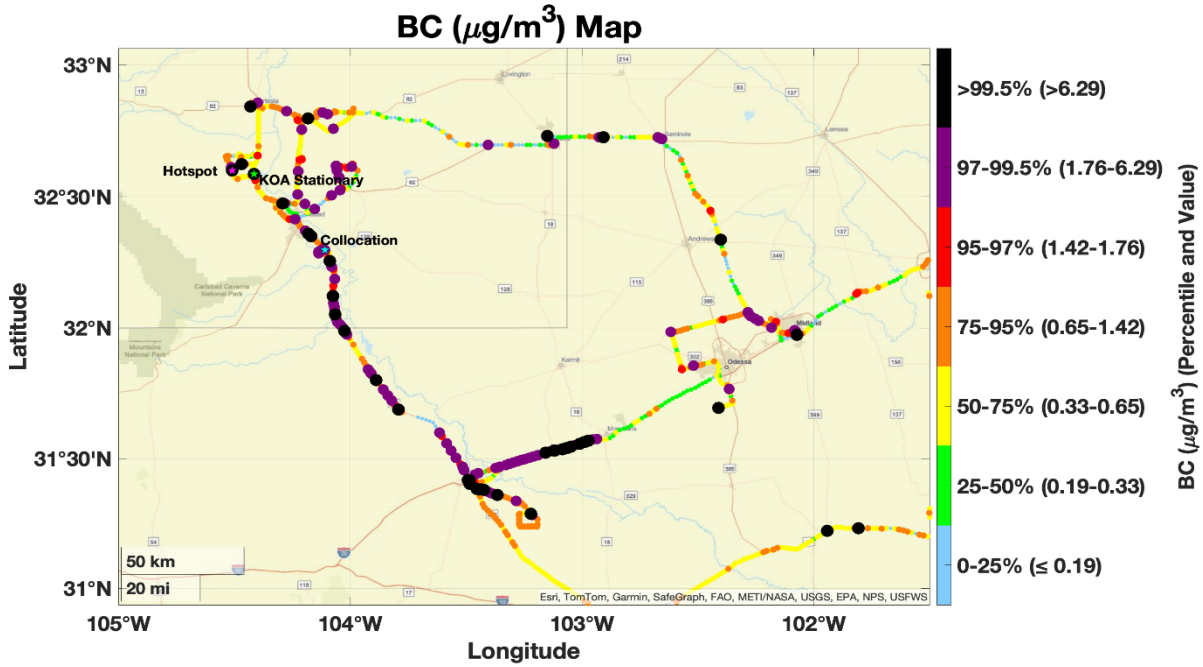

Figure B-6. Spatial map of BC.

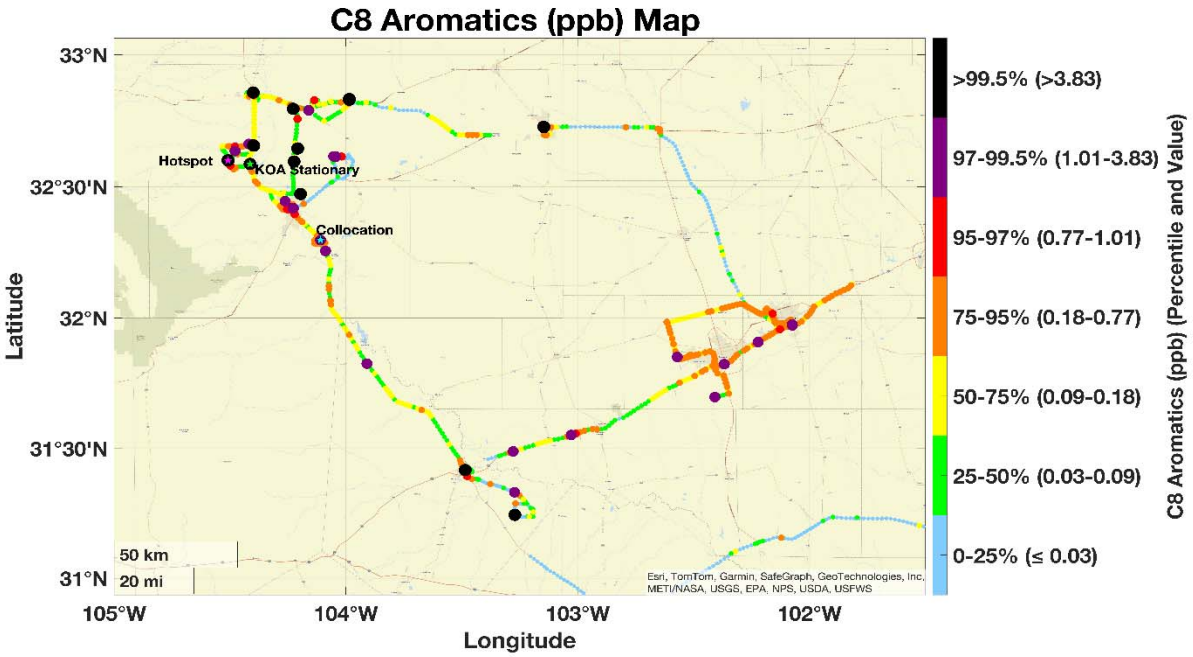

Figure B-7. Spatial map of C8 Aromatics.

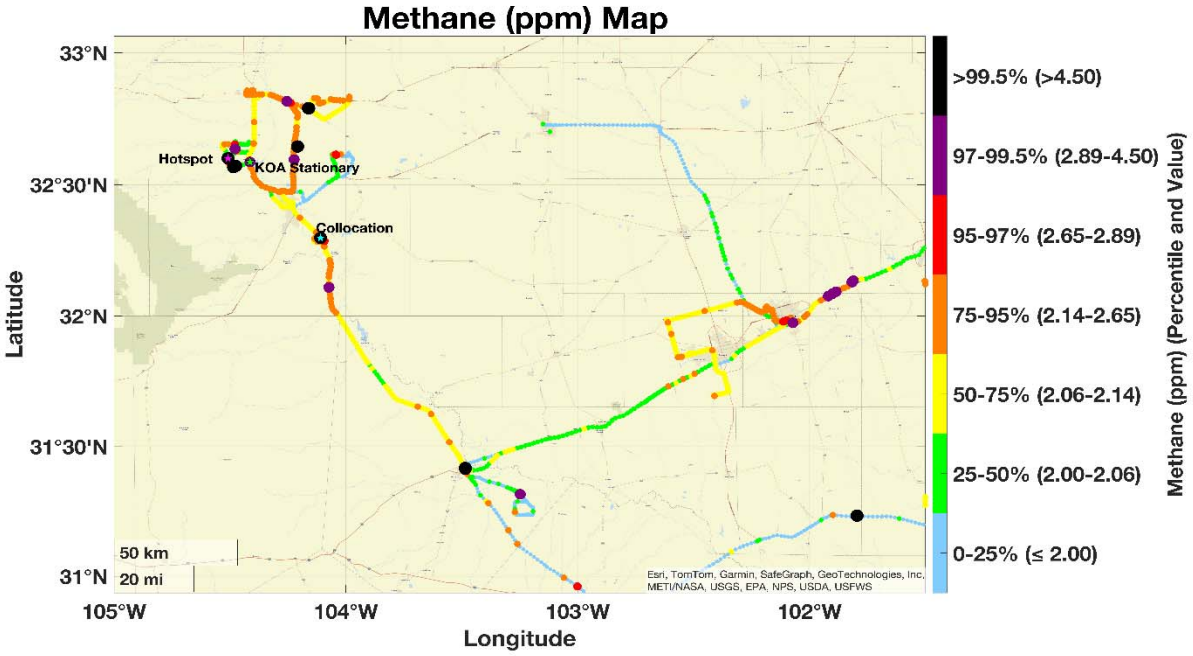

Figure B-8. Spatial map of Methane.

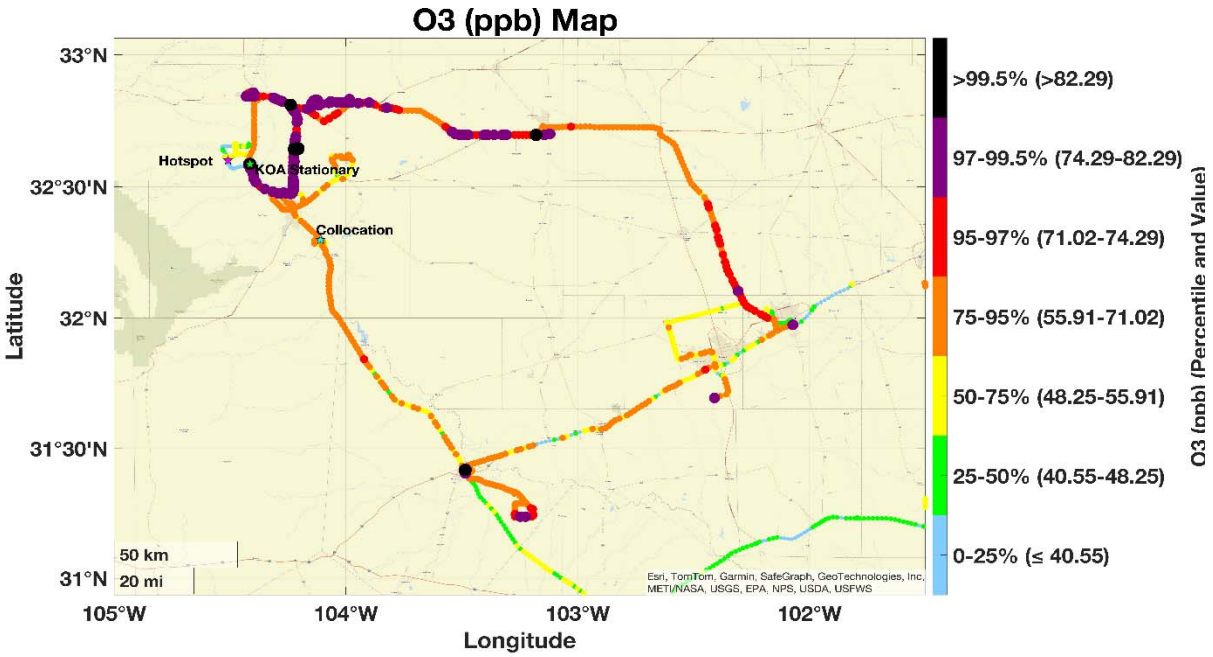

Figure B-9. Spatial map of Ozone.

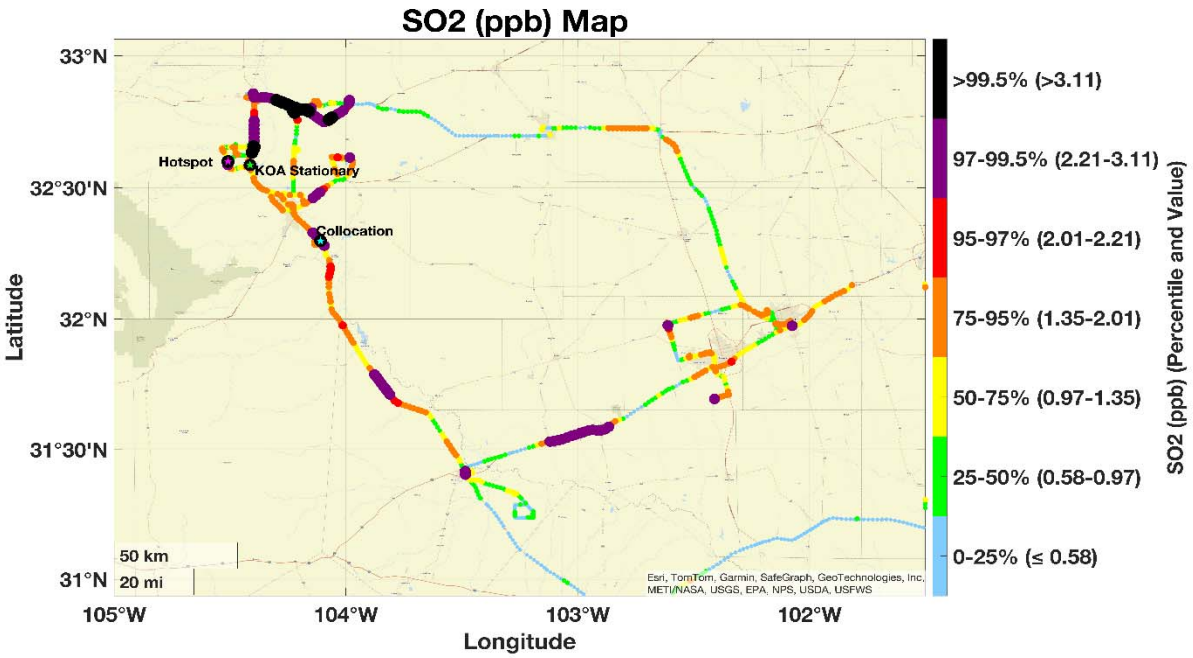

Figure B-10. Spatial map of SO_2.

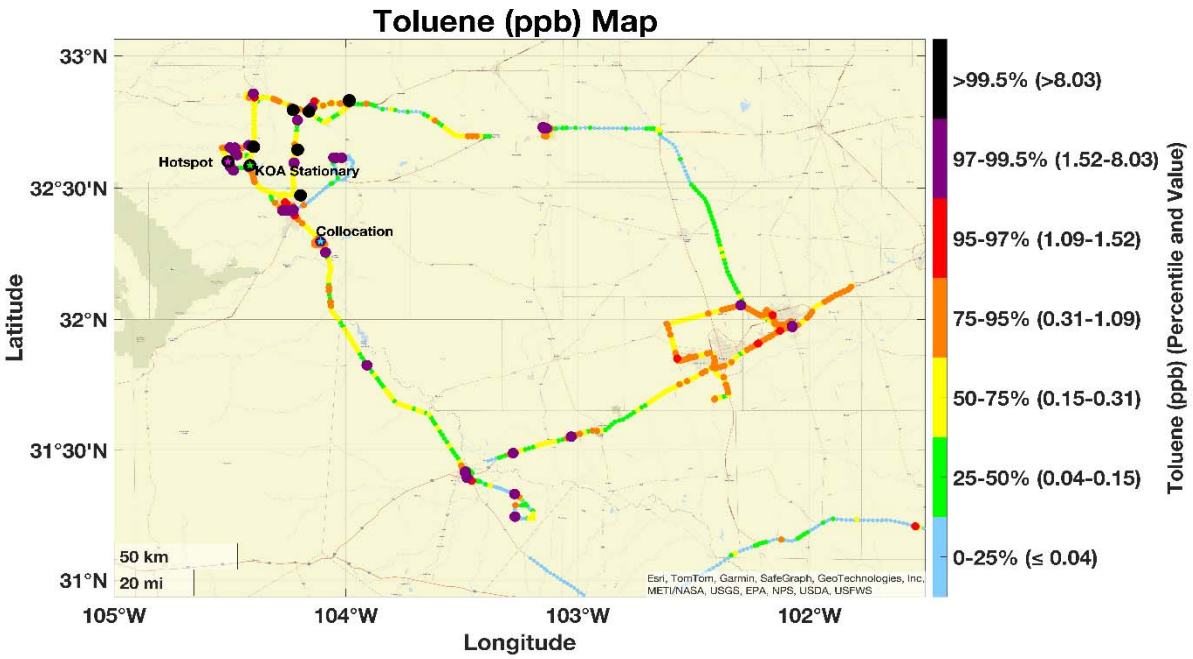

Figure B-11. Spatial map of Toluene.

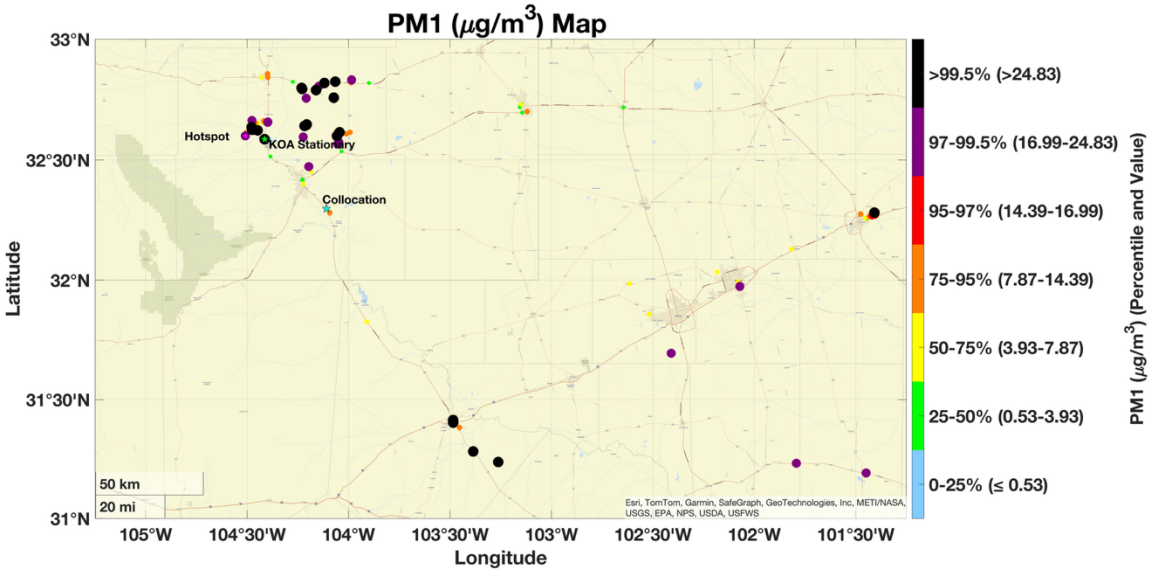

Figure B-12. Spatial map of PM_1, when the mobile van is stationary or moving <5 mph.

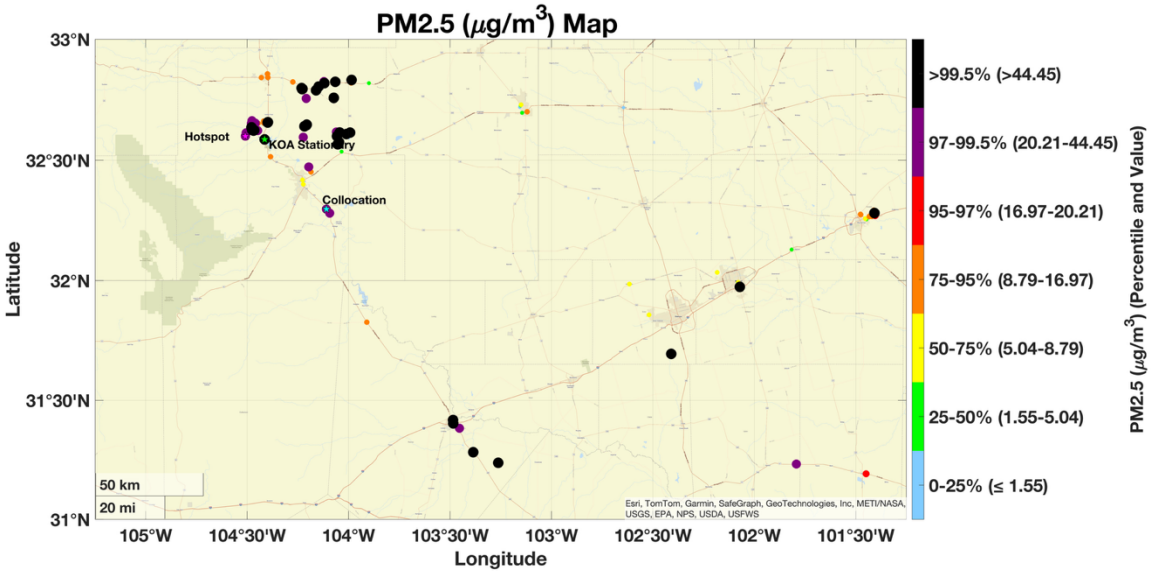

Figure B-13. Spatial map of $PM_{2.5}$, when the mobile van is stationary or moving <5 mph.

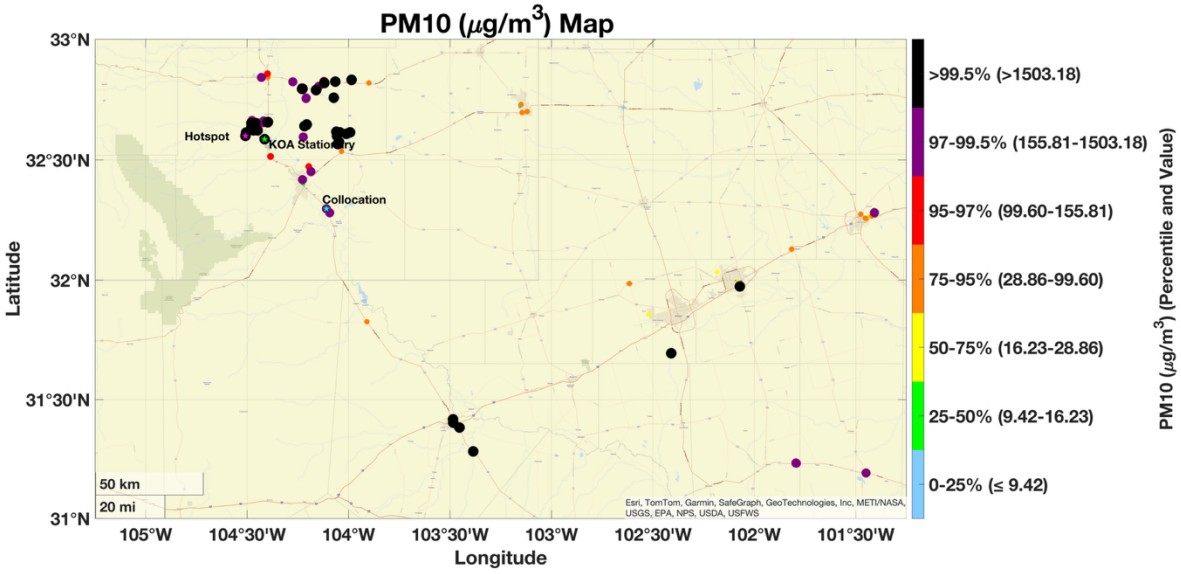

Figure B-14. Spatial map of PM_{10}, when the mobile van is stationary or moving <5 mph.

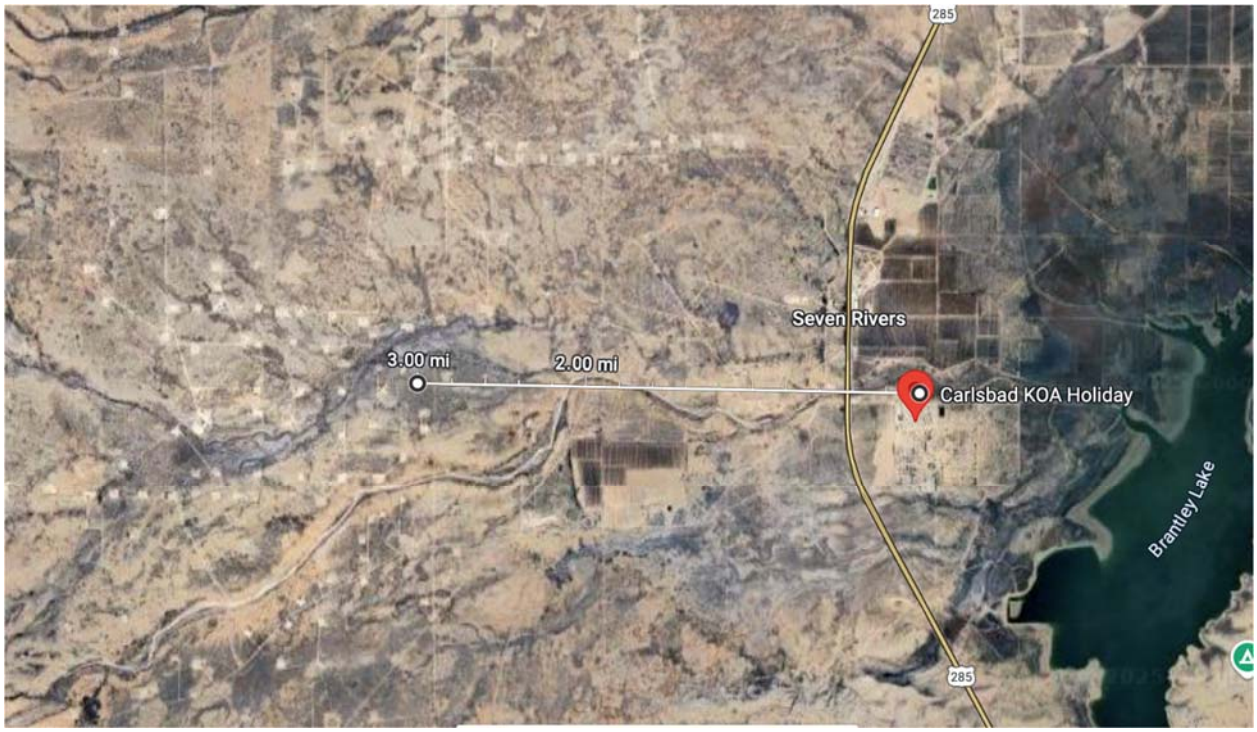

Figure B-15. Distance to Nearest Oil and Gas Development from Carlsbad KOA.