PM2.5 Monitoring Study at the Bridge of Americas

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Presented at the 91st Joint Advisory Committee

September 9, 2025

BE BOLD. Shape the Future.

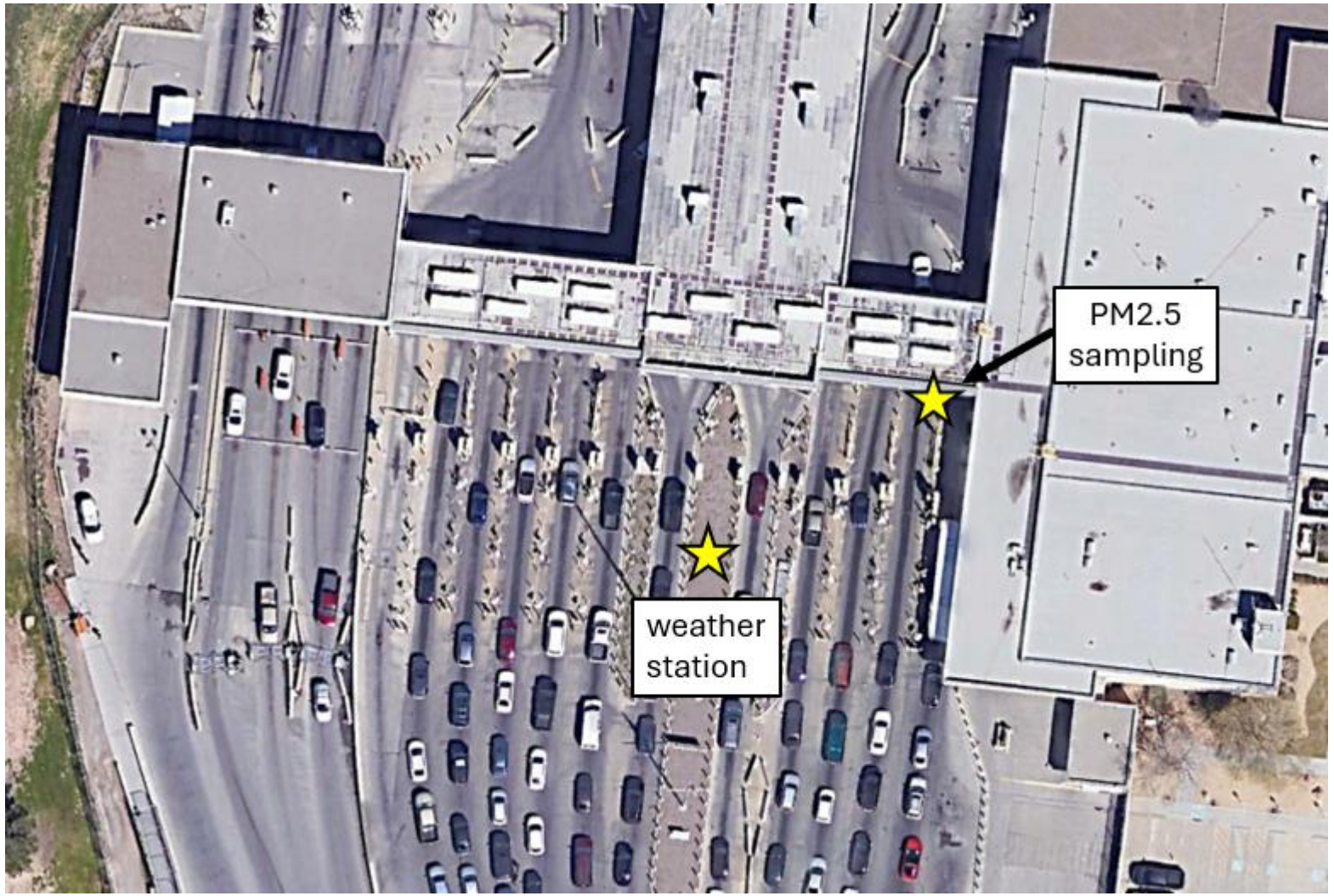
Photo taken 12 January 2023
2:53 pm MST

Monitoring goal and objectives

- Monitor and assess ambient PM2.5 at BOTA capturing mobile source emissions from idling vehicles going northbound
- Collect PM2.5 as close as possible to CBP staff working at booths
- Collect PM2.5 using continuous and filter-based methods
- Operate study from fall 2023 through early spring 2024

One monitoring location at land #1

Weather station located on island southwest of PM2.5 monitoring

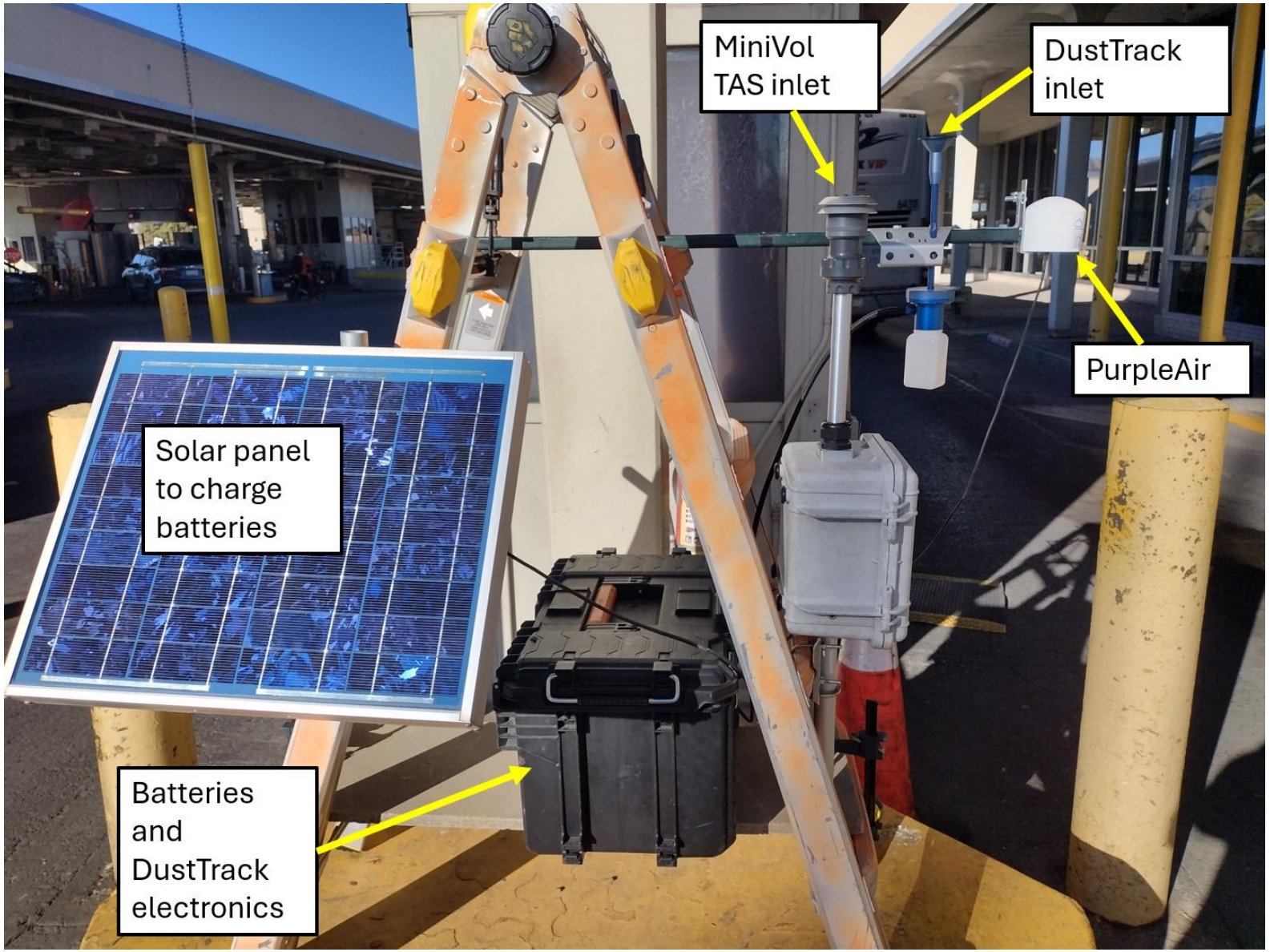


Equipment

Airmetrics MiniVol for 24-hr PM2.5 Teflon filter collection

TSI DustTrak model 8520 5-minute PM2.5

PurpleAir Flex 2-minute PM2.5



Measurements with USEPA 1-in-6

September 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

October 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

January 2024

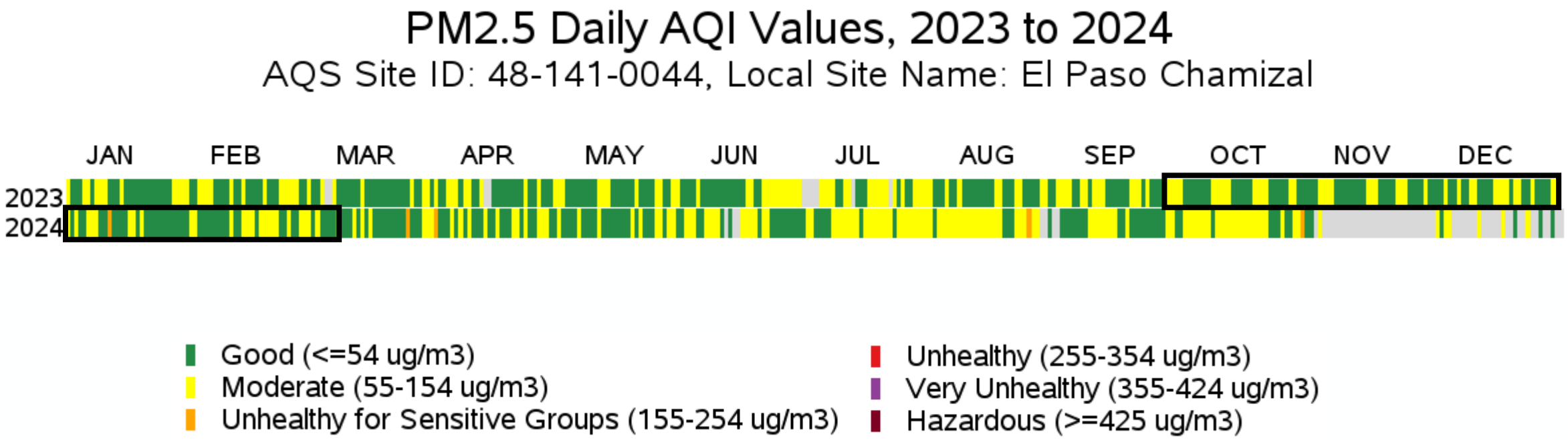
Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			
31						

February 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

PM2.5 AQI at Chamizal

Monitoring study: 15 Sept 2023 to 24 February 2024



Documentation and Metadata

Field data sheets, photo documentation

NM STATE Minivol Sampler Field Data Sheet | Network Name: BOTA | Site Name (code): | Sampler ID: 5361 | Technician: DuBois | Date shipped from NMSU: By: | Date shipped to NMSU: By:

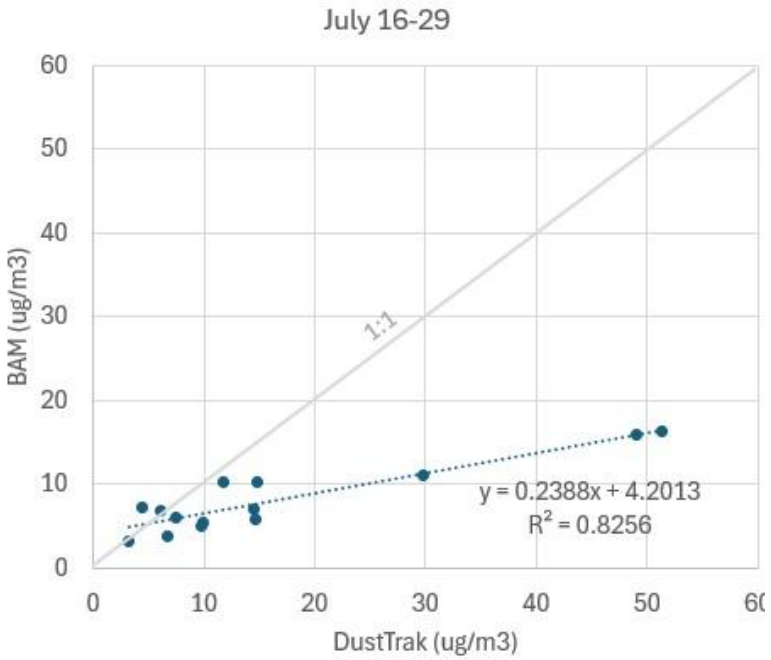
Filter ID	PM10 or PM2.5	Sampling Date (MMDDYY)	Sampling Period* HHMM to HHMM		Elapsed time on meter (HH.H) Start	Elapsed time on meter (HH.H) End	Flow Rate (lpm) Start	Flow Rate (lpm) End	Flag	Comments
DUPT045	2.5	091523	0000	2359	1302.7	1326.7	5.0	4.9		
DUPT046	2.5	092123	0000	2359	1326.7	1350.7	5.0	5.0		
DUPT047	2.5	092723	0000	2359	1350.7	1374.7	5.0	5.0		
DUPT048	2.5	100323	0000	2359	1374.7	1398.7	5.0	5.0		
DUPT049	2.5	100923	0000	2359	1398.7	1422.7	5.0	5.0		
DUPT051	2.5	101523	0000	2359	1422.7	1446.7	5.0	5.0		
DUPT052	2.5	102123	0000	2359	1446.7	1470.7	5.0	5.0		
DUPT053	2.5	102723	0000	2359	1470.7	1494.7	5.0	4.9		
DUPT054	2.5	110223	0000	2359	1494.7	1518.7	4.9	~~4.9~~ 5.0		

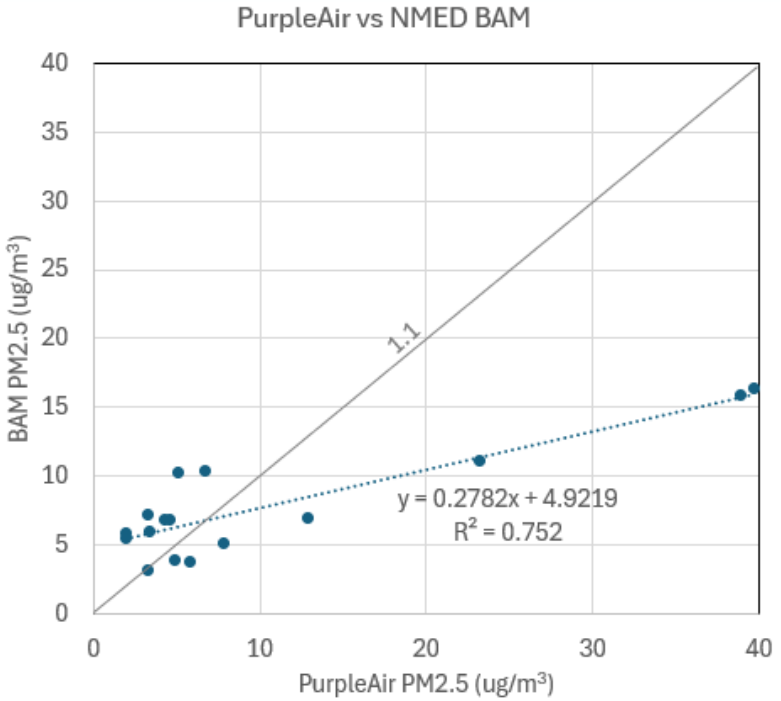
*Time of Day: Mountain (MST, MDT)

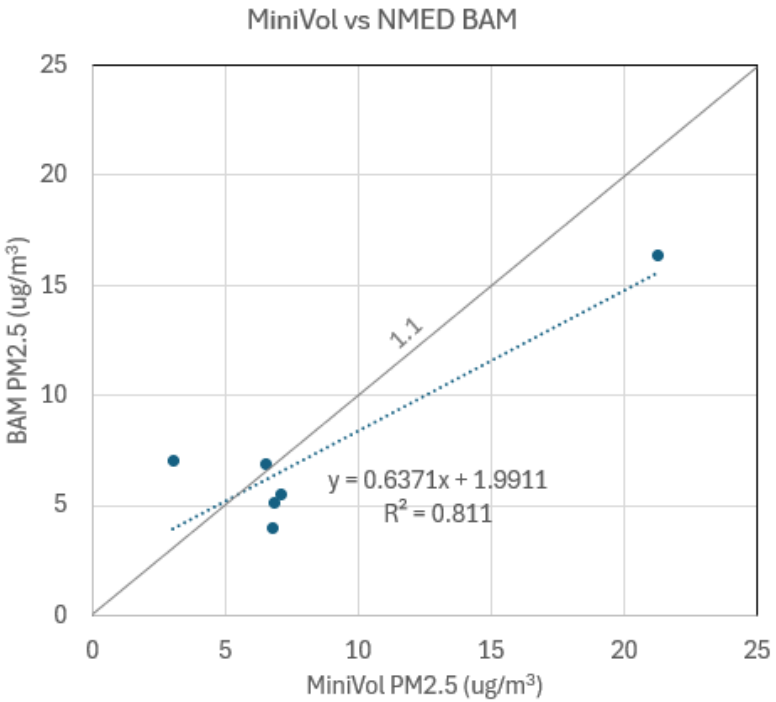
After data collection on October 27, 2023

Simple Bias Correction with FEM

Collocated our BOTA sensor suite with NMED AQB MetOne BAM 1022 in Las Cruces
Collected wildfire smoke episode during this period





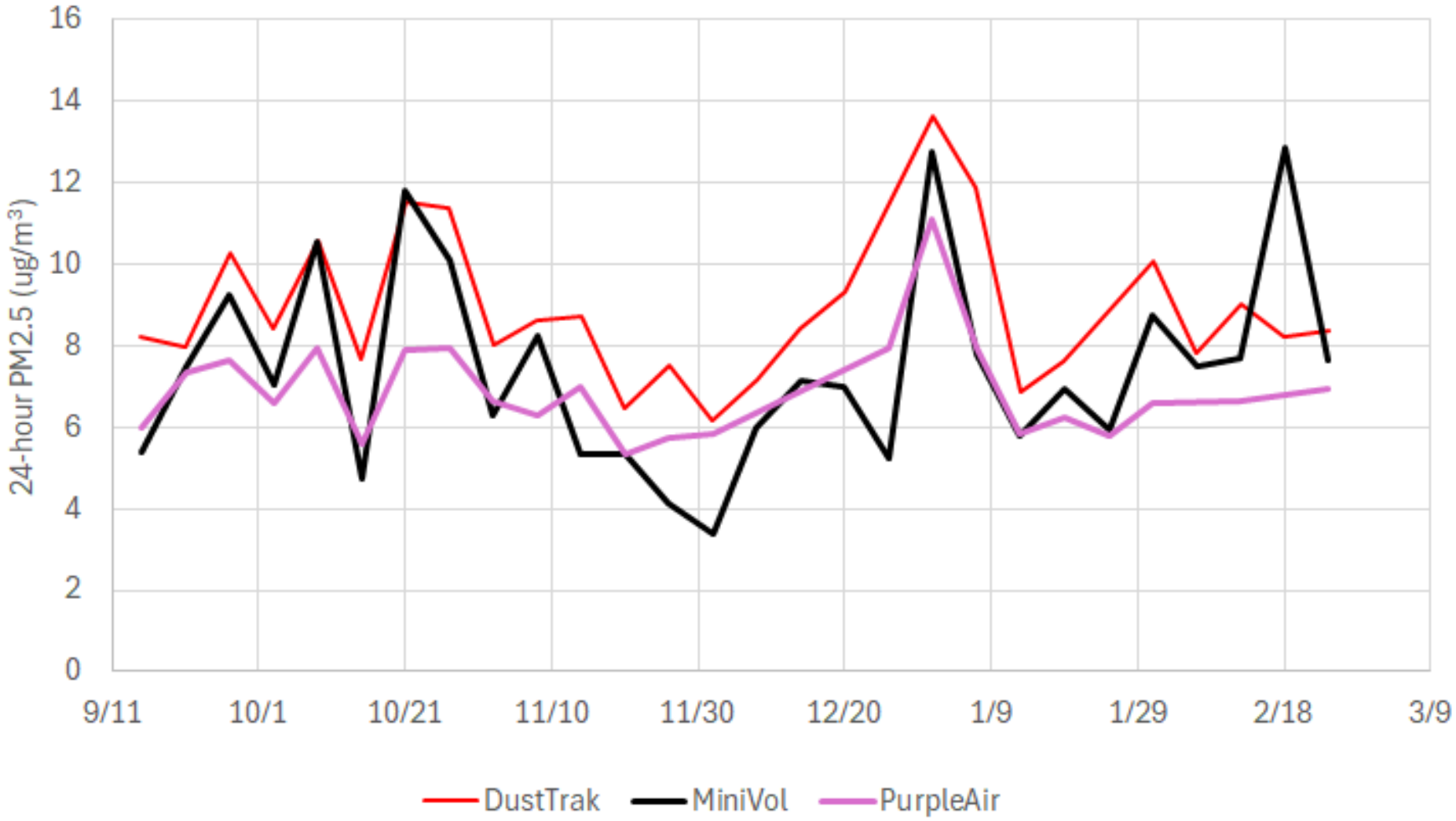


28 days of 24-hour PM2.5

No exceedances of 24-hr NAAQS at BOTA

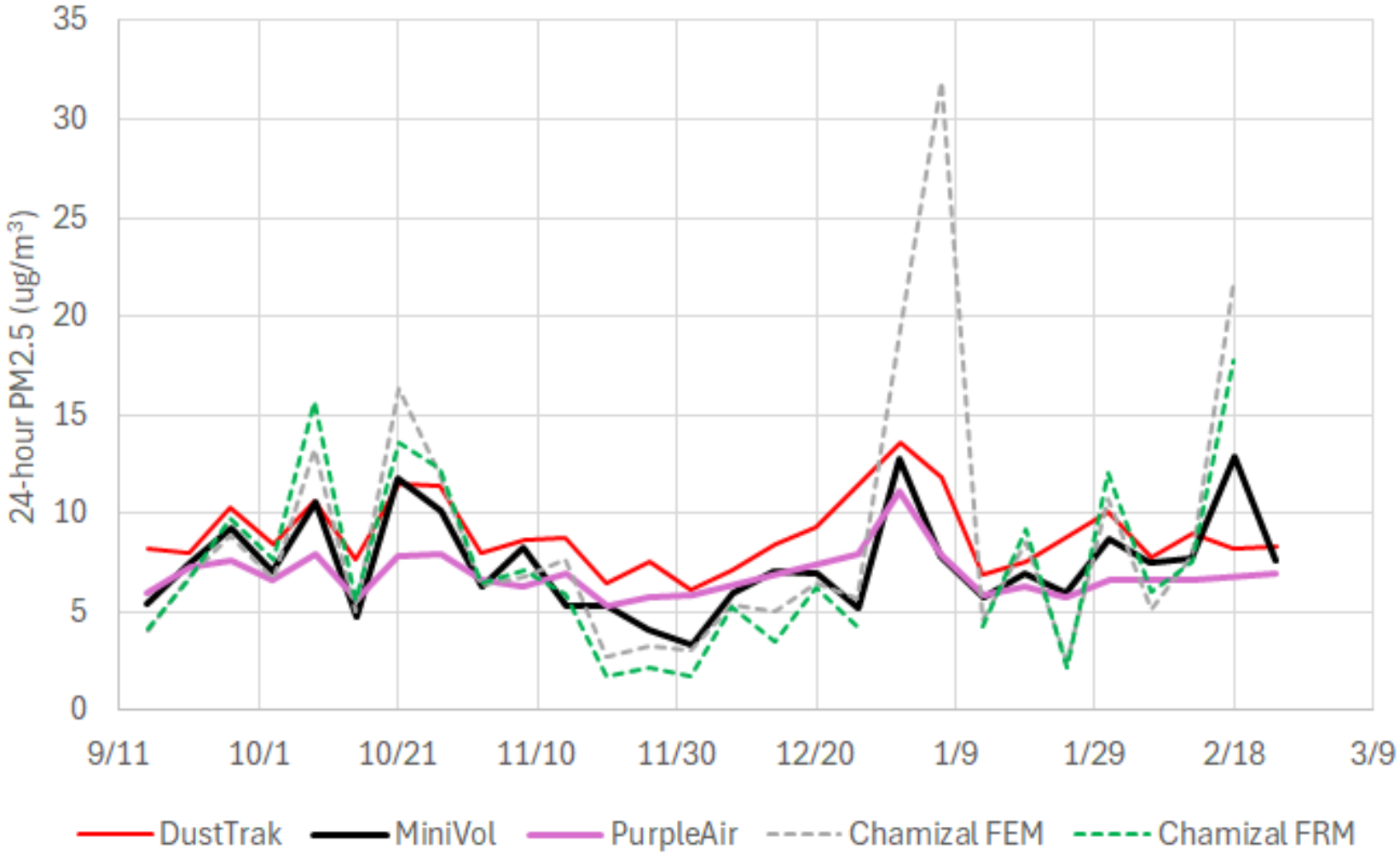
Peak MiniVol, 12.9 µg/m³ on 2/18/23

Peak DustTrak, 11.9 µg/m³ on 1/7/24

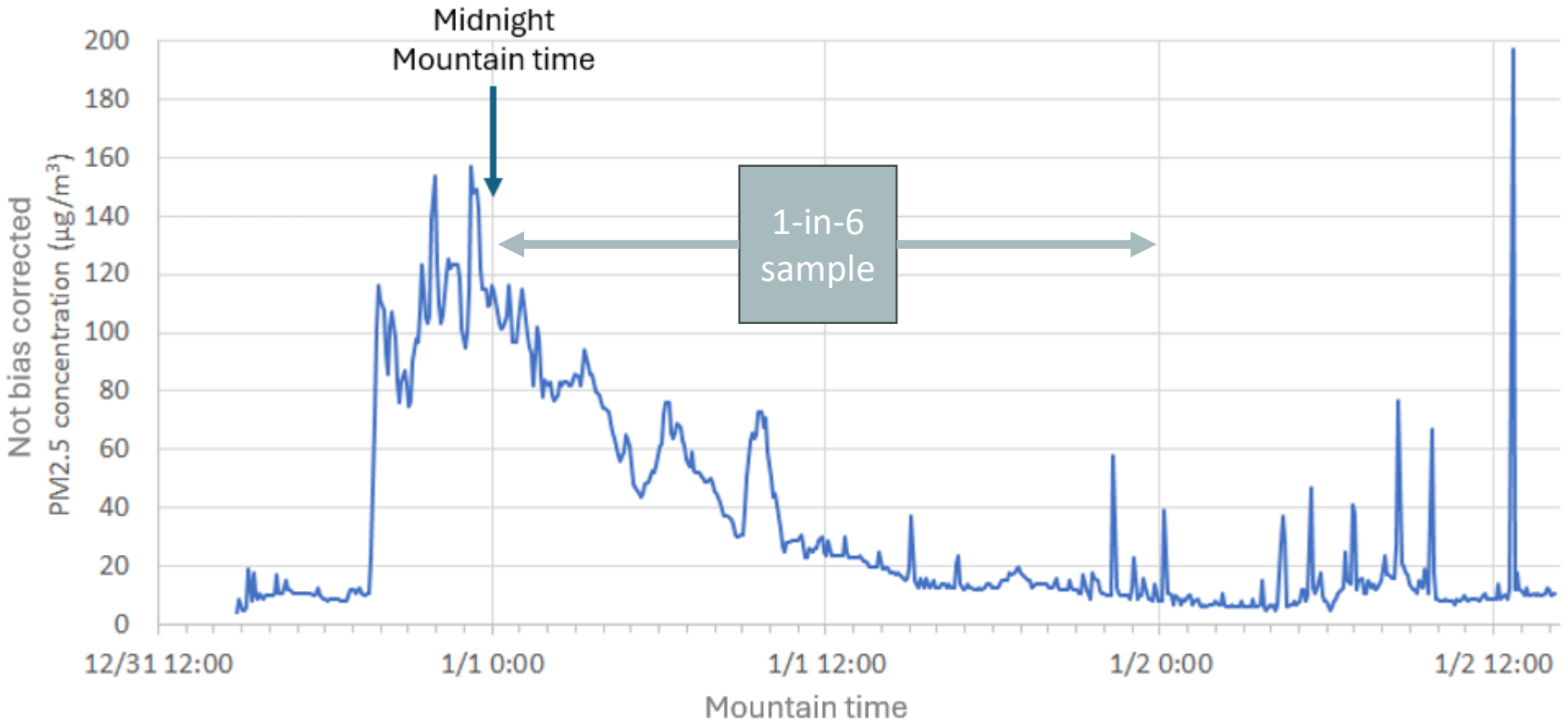


Including Chamizal monitor 48-141-0044
Both FEM and FRM
FRM did not capture the high value on 1 and 7 January 2024

Study mean 24-hour PM2.5 (µg/m3)
7.5 MiniVol
8.8 DustTrak
6.9 PurpleAir
8.8 FEM
7.2 FRM

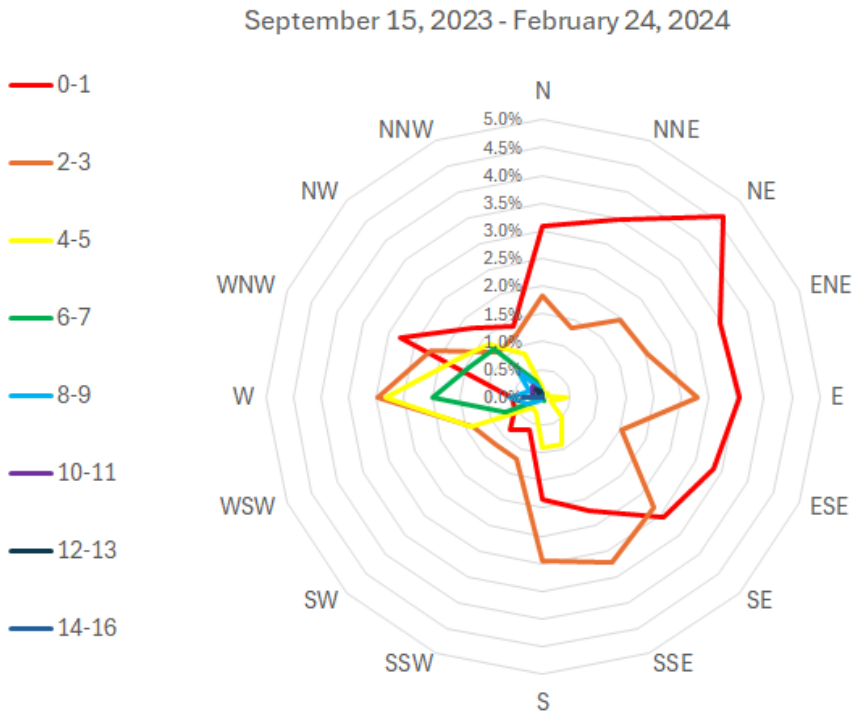


DustTrak captured New Years fireworks and short-term spikes in PM2.5

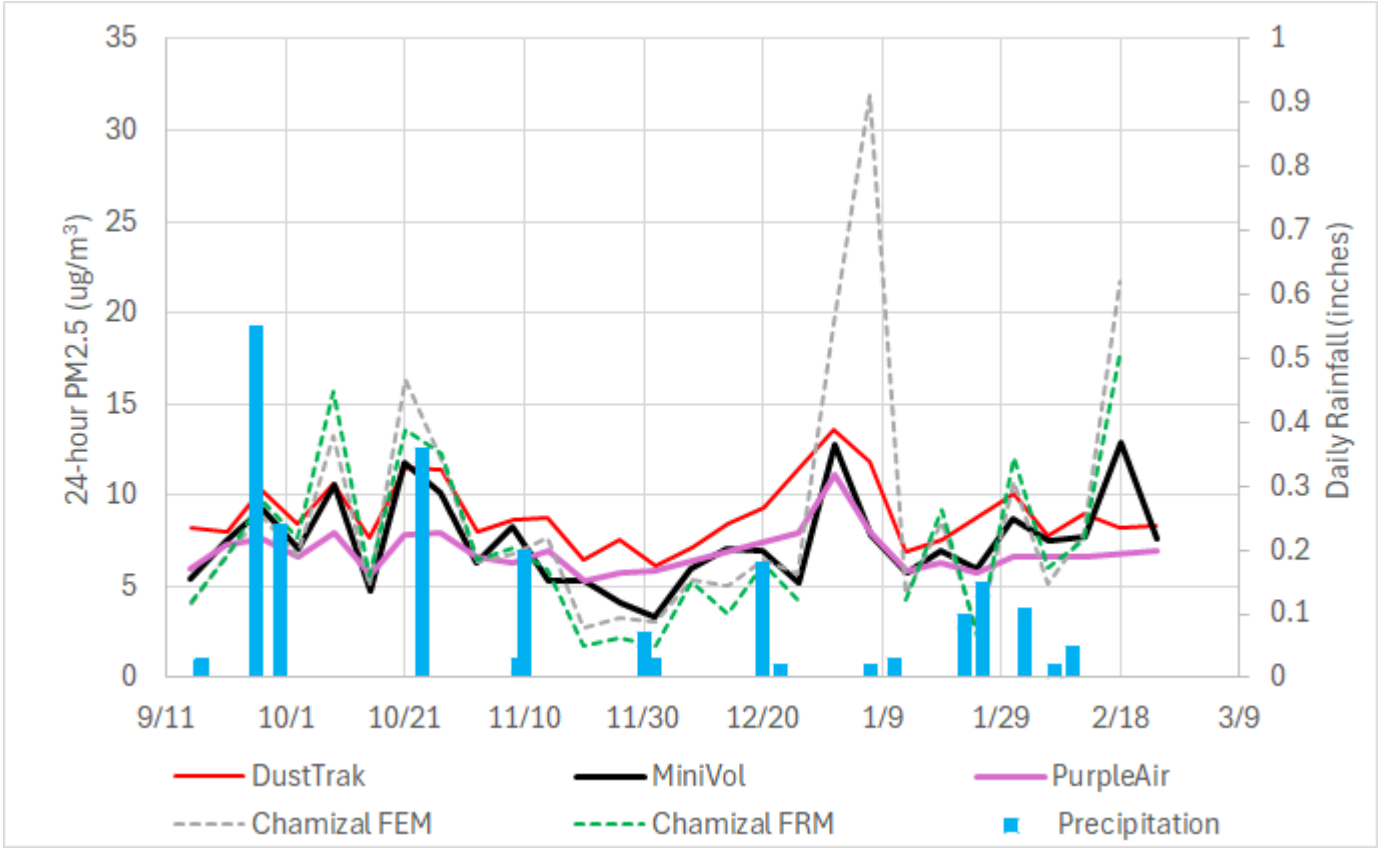


Weather impacts

Evidence of microclimate at BOTA



Rainfall impacts to reduce PM2.5 were minimal but noticeable



Summary

- No exceedances of 24-hour NAAQS at BOTA during our study
- Successfully integrated low-cost sensor along with filter-based methods
- Mean 24-hr PM2.5 over 28 days at BOTA comparable to Chamizal
- Captured many short-term spikes likely from individual vehicles and New Years fireworks

Acknowledgement

Project Director, Dr. Gabriel Ibarra-Mejia
Dr. Henry Van
Dr. Charles Boehmer

Field technicians
Natalie Franco, Eva Gulin, Shihab Uddin, Matias Coronado, Melissa Rivero, Colton Burns, Angel Cruz, Stan Engle

Funding from
North American Development Bank
USEPA

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