Hyperlocal Mobile Monitoring of Particle-Bound Metals in Two Environmental Justice (EJ) Communities in the South Coast Air Basin

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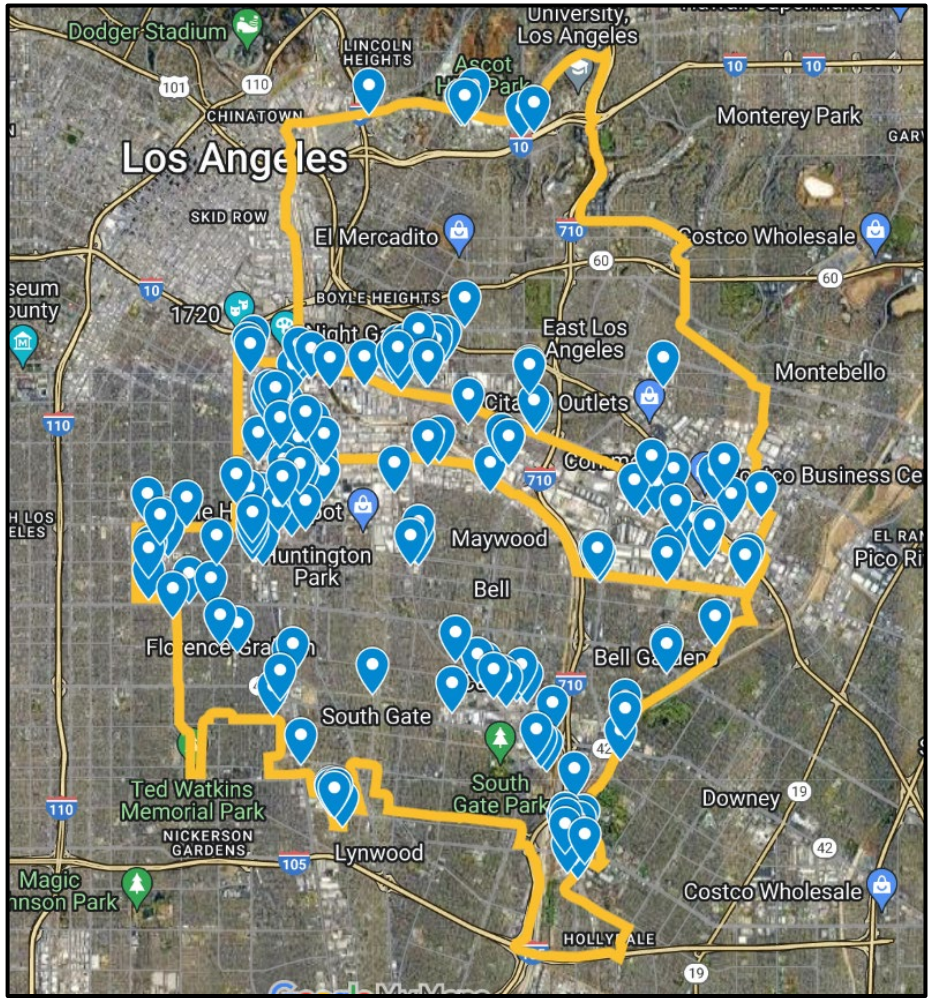
EAST LOS ANGELES (ELA) & SOUTHEAST LOS ANGELES (SELA) EJ COMMUNITIES

- More that 150 metal processing facilities in these two communities
- Mobile monitoring can be used to survey a large number of facilities quickly. This, in turn, can inform where to conduct in depth stationary measurements

Study Objectives:

- Develop two survey platforms, one for mobile and one for stationary measurements of metals
- Deploy the platforms for hyperlocal, near-source monitoring in ELA & SELA communities
- Perform supplementary measurements at air monitoring stations
- Perform source apportionment to identify major contributing sources



Community Boundary

Location of Metal Facilities

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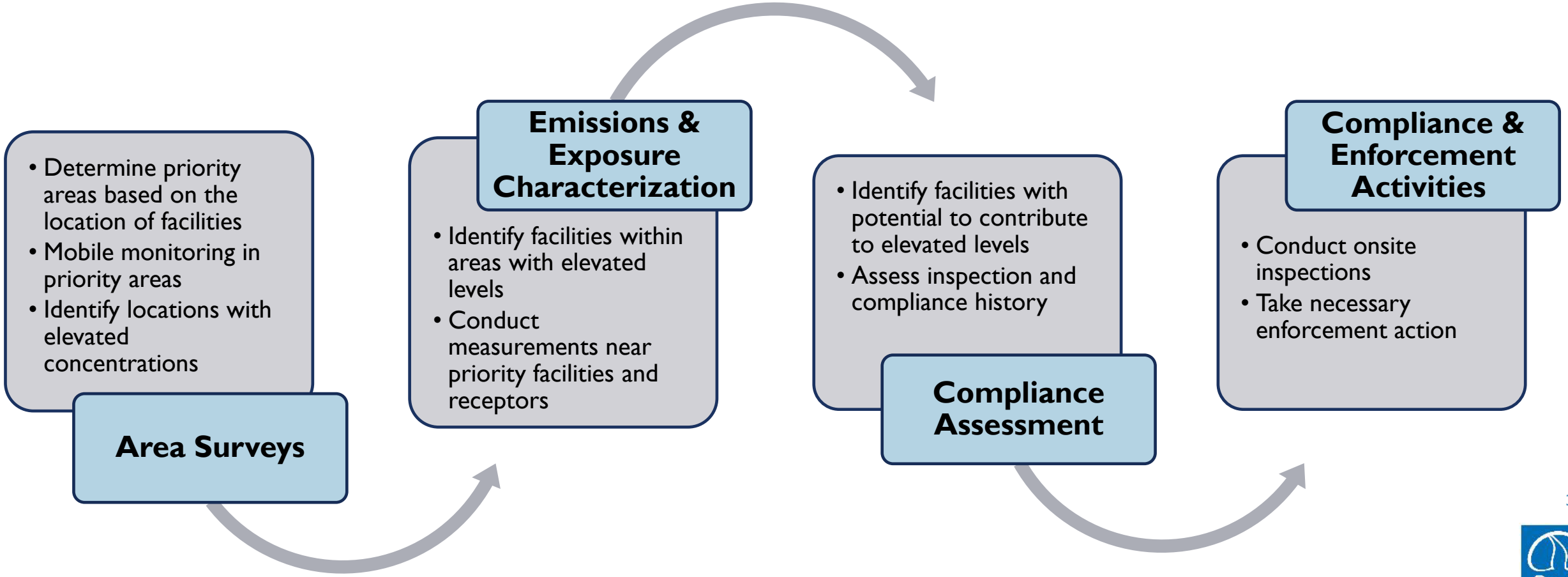
AIR MONITORING INVESTIGATIONS NEAR METAL PROCESSING FACILITIES



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MULTI-METALS SURVEY PLATFORMS

Multi-Metals Mobile Platform (MMMP)

Capabilities & Objectives:

- On-road mobile measurements
- Identify areas with elevated levels of air toxic metals
- Assess potential community impact

Stationary Multi-Metals Platform (SMMP)

Capabilities & Objectives:

- Larger battery capacity for longer-term measurements
- Characterize emissions & potential exposure near facilities (e.g.. diurnal patterns, day of week, etc.)

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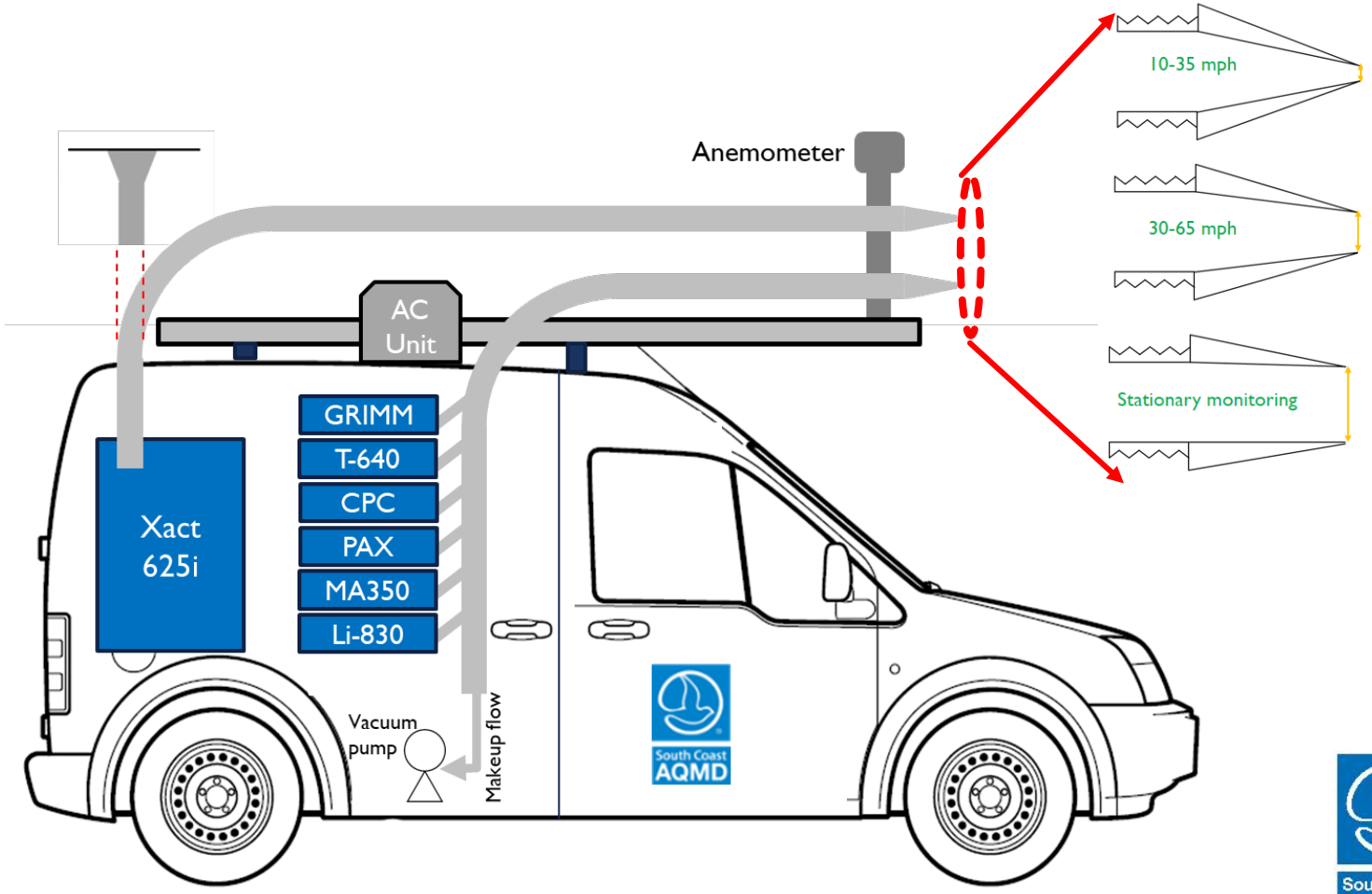
MULTI-METAL MOBILE PLATFORM (MMMP)



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MMMP Instrumentation

Modular design allows installation of other air monitors depending on monitoring objectives

Instrument	Pollutant measured	Time resolution	Manufacturer
Xact 625i	Particulate metals	5 min	Cooper Environmental LLC
GRIMM 11-D	PM_X, Number Size Distribution (0.25-35 µm)	6 sec	GRIMM Aerosol GmbH, Muldestausee, Germany
T-640	$PM_{2.5}$, PM_{10}	10 sec	Teledyne API, CA, USA
MAGIC Condensation Particle Counter (CPC)	Particle Number (PN)	1 sec	Aerosol Dynamics Inc., CA, USA
Photoacoustic Extinctiometer (PAX)	Black Carbon (BC)	1 sec	Droplet Measurement Technologies, CO, USA
MA-350	Black Carbon (BC)	1 sec	AethLabs, CA, USA
Li-830	CO_2	1 sec	LI-COR Biosciences, USA
Airmar 200WX	Wind Speed and Wind Direction	1 sec	Airmar Technology Corporation, NH, USA

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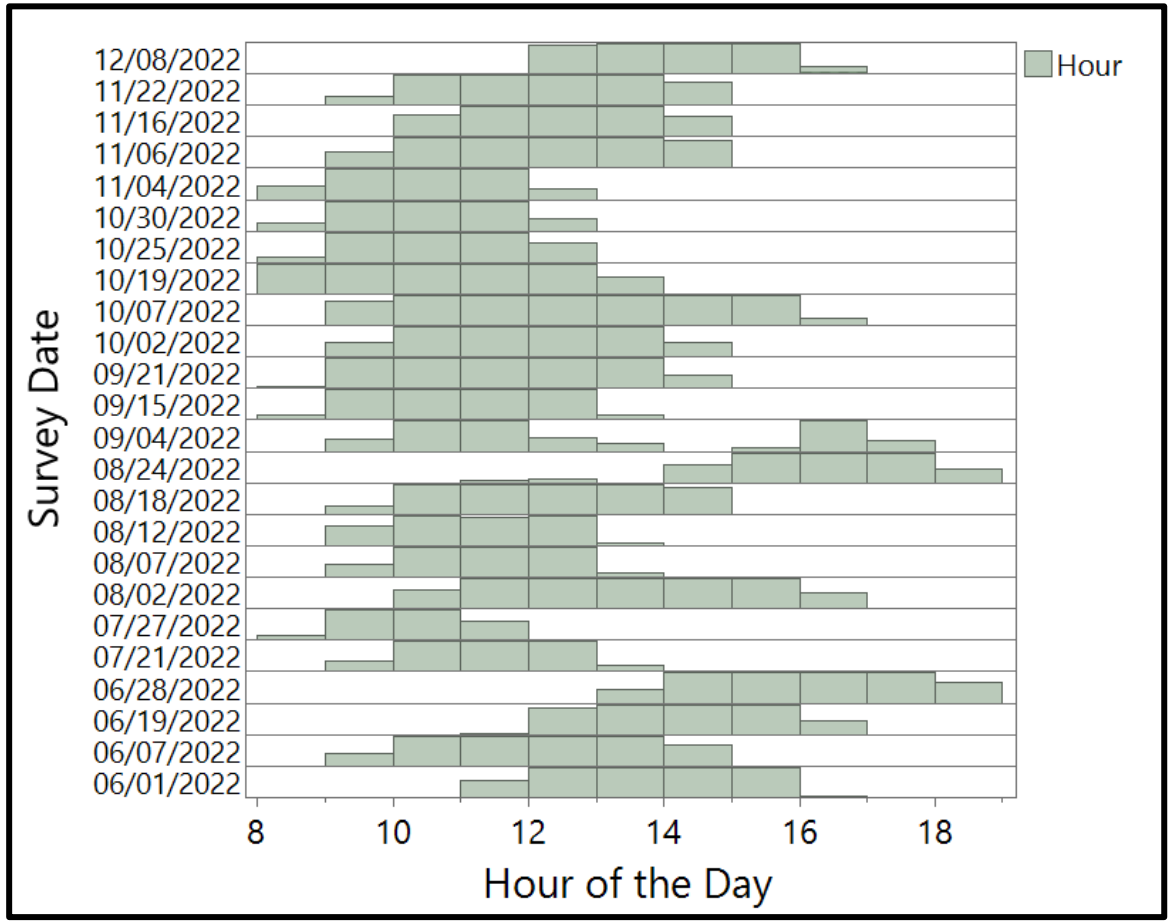
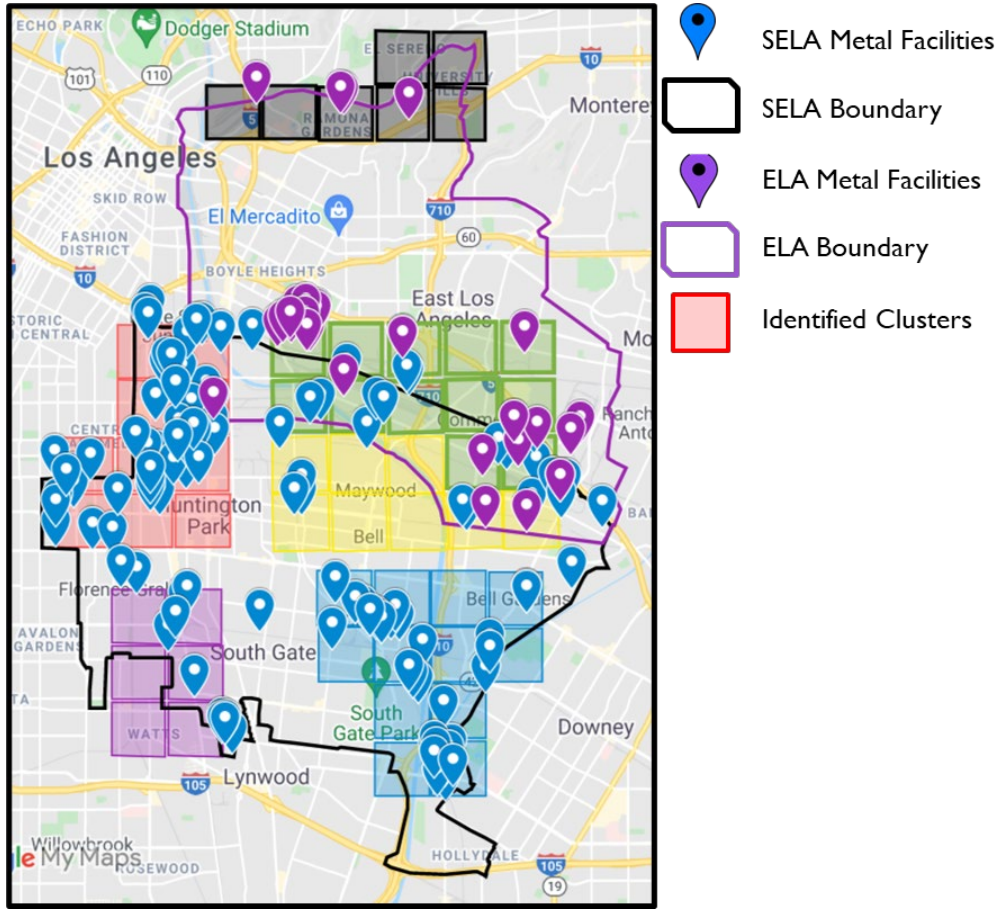
OVERVIEW & LOCATION OF MOBILE SURVEYS





24 survey days (June 2022 through December 2022)

> 130 hours of measurements within the community.

Measurements were conducted in AB 617 communities of ELA and SELA communities.

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Species	Soil Dust	Ind/Traff	Traffic	Traff/Ind	Ind/Traff
K	0.91	0.26	0.03	0.00	0.02
Si	0.90	0.18	0.01	0.00	-0.03
GRIMM Ccarse PM	0.87	-0.04	0.11	0.20	0.12
Ca	0.82	0.22	0.19	0.01	0.10
Ti	0.81	0.36	0.19	-0.04	0.06
GRIMM PM10-35	0.75	-0.09	0.14	0.09	0.11
Cr	-0.01	0.93	-0.04	0.01	0.17
Ni	-0.04	0.92	-0.03	0.01	0.15
Mn	0.36	0.82	0.07	0.00	0.15
Fe	0.46	0.77	0.29	-0.04	0.14
Cu	0.06	0.50	0.42	-0.12	0.04
V	0.23	0.44	-0.11	0.10	0.01
PAX-BC	0.18	-0.03	0.84	0.26	0.03
MA350-BC	0.13	-0.01	0.83	0.21	0.01
CO2	0.17	0.08	0.79	-0.01	-0.05
Ba	0.16	0.06	0.72	-0.20	-0.04
PN	-0.07	-0.03	0.42	0.13	0.09
GRIMM PM1	0.04	-0.01	0.16	0.94	-0.01
GRIMM PM2.5	0.23	-0.02	0.16	0.91	0.05
Zn	-0.04	0.06	0.00	0.74	-0.03
As	0.14	0.17	0.08	-0.02	0.86
Pb	0.11	0.25	-0.02	0.01	0.82

FACTOR ANALYSIS

Objectives

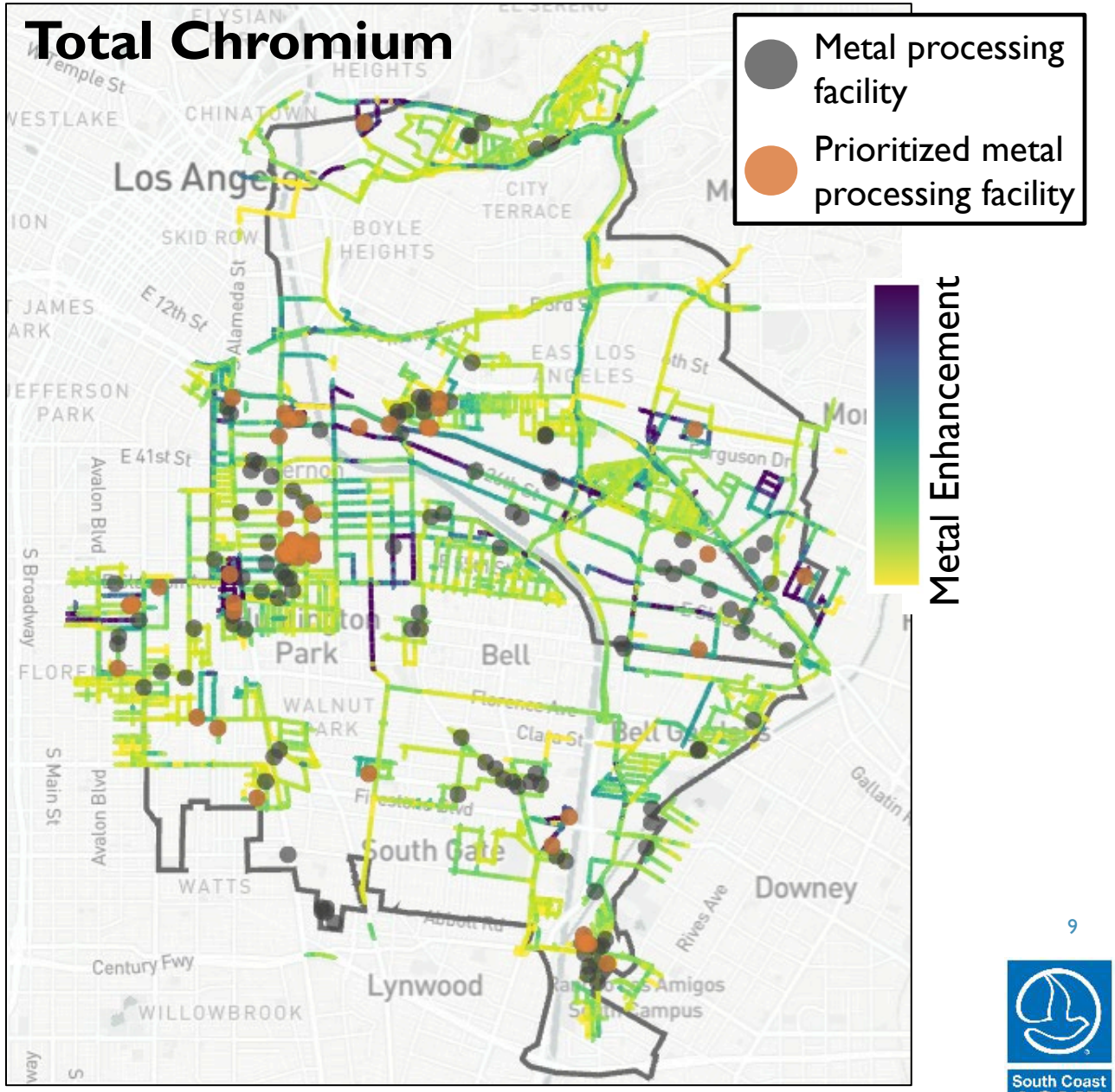
- Used as a preliminary source factor identification
- Used to group the analytes into factors that have a common source/nature
- Helps identify chemical markers for different emission sources

Source Factors

1. Soil dust
2. Traffic
3. Industrial / traffic

CONCENTRATION MAPPING

- Concentration enhancement maps are made for all metals measured
- Focus on air toxic metals and chemical tracers of different sources of metals emissions
- Areas with relatively elevated ambient levels of metals are determined
- Facilities within or in proximity of these areas are identified



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1. MINERAL/SOIL DUST (SOIL DUST): ONGOING EFFORTS AND NEXT STEPS

Elevated levels of mineral dust tracers highlight the impact of resuspended dust

- **Source identification:**
  - Natural sources can contribute to ambient levels of metals
  - The contribution of suspended mineral dust is much higher in rural areas
- **Source contribution:**
  - South Coast AQMD is conducting a source apportionment study to quantify the contribution of different sources to the measured metals levels
  - South Coast AQMD is conducting a comprehensive dust characterization study in East Coachella Valley as part of the Community Air Monitoring Plan (CAMP) implementation in this community

Learn more about this study at the Speciation Session later today at 1:30!
Physico-Chemical Characterization of Dust: A Comprehensive Study of Particulate Matter (PM) in the Environmental Justice (EJ) Community of Eastern Coachella Valley (ECV)

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2. RESUSPENDED ROAD DUST (TRAFFIC): ONGOING EFFORTS AND NEXT STEPS

Consistent elevated levels of metals were observed on freeways, major roadways, and on- and off-ramps

- **Source identification:**
  - Non-exhaust traffic emissions that deposit on roadways and become resuspended due to traffic and/or wind (e.g., brake, tire, clutch, and engine wear and abrasion of roads)
- **Near-road air monitoring (source characterization):**
  - A comprehensive road dust air monitoring study at two near-road sites will be conducted as part of South Coast AQMD's Multiple Air Toxics Exposure Study (MATES VI) (beginning early 2025)
- **Real-time metals monitoring:**
  - The real-time metals monitoring network has been expanded as part of the California Air Protection Program (AB 617)

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3. METAL PROCESSING FACILITIES (INDUSTRIAL): ONGOING EFFORTS AND NEXT STEPS

Relatively elevated levels of metals were observed near some clusters of metal processing facilities

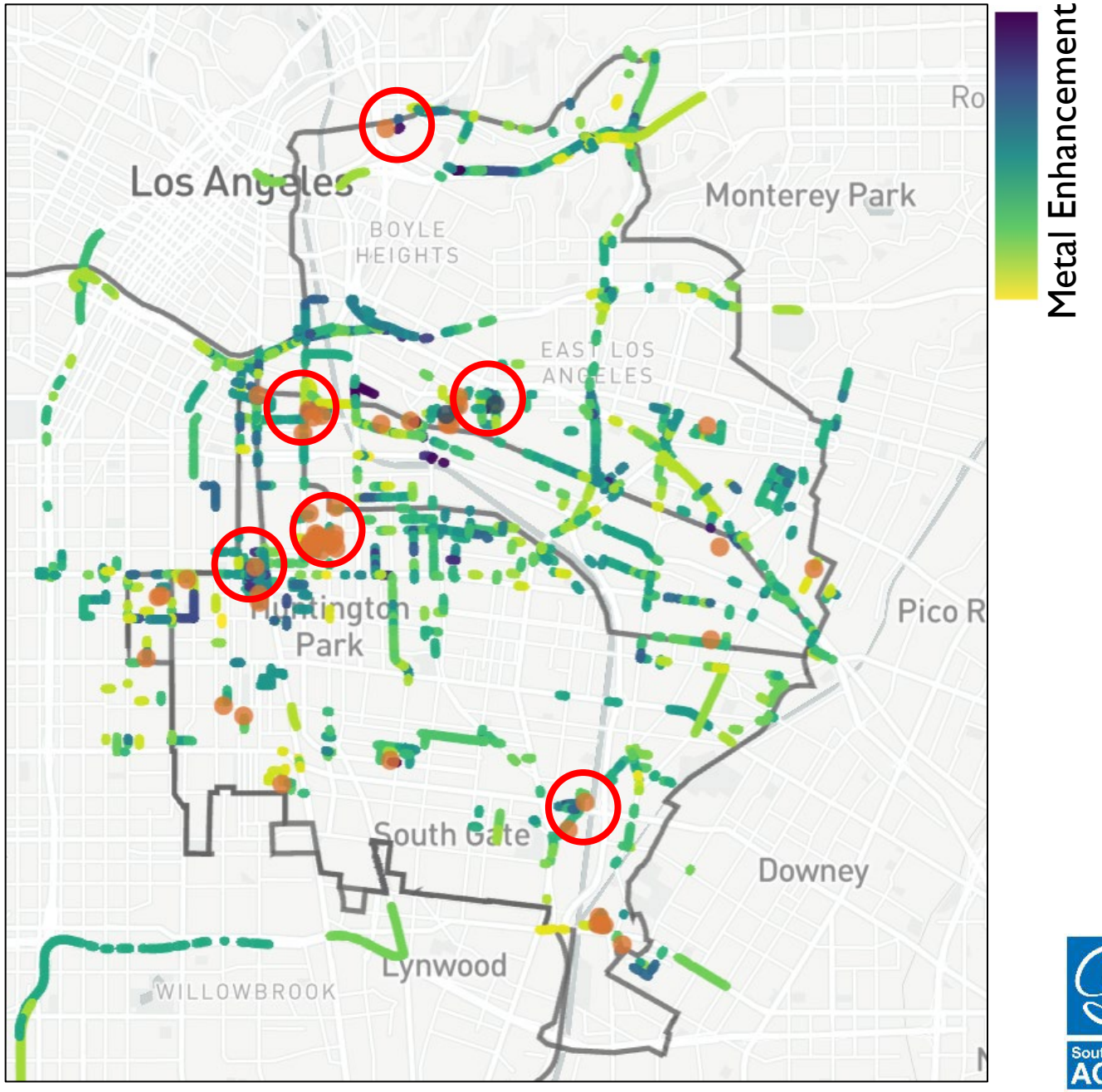
- **Follow up measurements:**
  - Perform follow-up stationary measurements in areas with elevated ambient levels of metals
  - Ambient levels were relatively lower in the residential areas
- **Identification of potential sources:**
  - All metal processing facilities located within or near areas with elevated ambient levels of metals were identified
- **Prioritization of compliance and enforcement activities:**
  - Air monitoring data has been used to better prioritize facility inspections leading to emission reductions
  - The MMMP will be available to support future efforts

FOLLOW-UP ACTIVITIES

Based on the results of the mobile monitoring surveys some facilities and areas have been identified for inspections and follow-up air monitoring

●	Prioritized facilities for inspection
○	Prioritized areas for follow-up stationary measurements

Prioritization Criteria: Concentrations of at least two metals (Cr, Ni, As, Pb) > 80th percentile



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COMPLIANCE AND ENFORCEMENT ACTIVITIES INFORMED BY AIR MONITORING EFFORTS

- A total of 52 inspections were conducted at the prioritized metal processing facilities
- The inspections led to
  - Notices of Violation to 4 facilities
  - Notices to Comply to 9 facilities
  - 5 facilities out of business and/or occupied by new businesses not requiring South Coast AQMD permits

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SUMMARY

- Hyperlocal mobile measurements of particulate metals were performed in two Environmental Justice Communities (East Los Angeles and Southeast Los Angeles)
- Preliminary factor analysis helped identify three main source factors:
  - Soil dust, Traffic (e.g., non-tailpipe emissions), Industry (e.g., metal processing facilities)
- Findings were used to inform compliance efforts to better prioritize facility inspections to potentially achieve emission reductions in these communities
- Information obtained in this study has led to the development of plans to perform full PM speciation at two near-road sites, as part of the next Multiple Air Toxics Exposure Study (MATES VI) conducted by South Coast AQMD (tentative starting date: early 2025)

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QUESTIONS & COMMENTS ?

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http://www.aqmd.gov/nav/about/initiatives/environmental-justice/ab617-134/ab-617-community-air-monitoring