Wildfire Health Community Advisory Board

MEETING #2: AIR POLLUTION

6.10.25

Led by Dr. Katherine McNamara, Dr. Savanna Carson, and Dr. Arleen Brown

Please request before sharing slides.

Community!

LA FIRE HEALTH STUDY

Spiegel Family Fund

UCLA CTSI

UCLA Health

Community Engagement & Research Program

UCLA Fielding School of Public Health

County of Los Angeles Public Health

VERY Quick icebreaker

Name and…

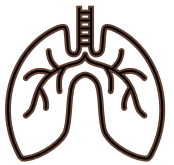
Pick one:

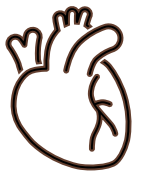
1. Anything you **did** or **didn’t do** to reduce your exposure to smoke during the wildfires?
2. What do you still want to **learn about** air quality during the wildfires?

Recap from last meeting (session #1):

Health Impacts of Wildfires

1. Wildfires and smoke harm air quality and health, affecting lung function, pregnancy outcomes, mental health, and heart health.
2. Exposure primarily occurs through breathing in wildfire smoke, as well as through dust, water, and other sources.
3. Exposure levels vary based on the fire and the person, making it challenging to measure one's exposure and health impacts.
4. Everyone should try to reduce exposure to wildfire smoke to reduce health impacts.
5. Pregnant individuals, children, the elderly, and those with chronic conditions or limited resources should take extra precautions.





Recap meeting #1: What we heard from you!

Technical health information shared after the fires can be hard to follow.

There is diversity in fire experiences, losses, vulnerability, and exposures.

There is a need for sharing health information about wildfires in a way that the community can understand.

Thinking Through Health and Fire Impacts

General timeline of priority health concerns, length of time when information or research is shared, and what the public may focus on over time.

Active Fire

Post Fire

Time

Immediate Health Concerns

- Physical safety
- Air quality and reducing smoke exposures

What we're covering today

Short and Long-term Health Concerns

- Water quality
- Ash, dust, and soil contaminants
- Mental health

Session #2: Learning & Discussion Objectives

1. How to monitor air quality during wildfires
2. Air quality during the LA fires (AQI, PM, and airborne metals)
3. Early data about the health impacts of air quality during the LA fires
4. Research from the LA Fire Study on air quality

Wildfire Air Pollution and Health

How do you measure air quality?

The **A**ir **Q**uality **I**ndex (AQI), uses US EPA monitors to track air pollution levels of:

- **Gases** (ozone, carbon monoxide, sulfur dioxide, & nitrogen dioxide)
- **Particulate matter**, or the tiny particles in the air, is measured by size (PM2.5 and PM10).

Example: A flashlight reveals larger particulate matter, but PM 2.5 and PM 10 are *too small* to be seen.

Los Angeles had an average AQI of **43** in 2024.

LA's transportation and smog typically raise the AQI. Wildfires worsen AQI by increasing PM from smoke, and therefore, PM2.5 is the most relevant measure during wildfires. **We will focus on both the AQI and PM2.5 as indicators of air quality during the fires.**

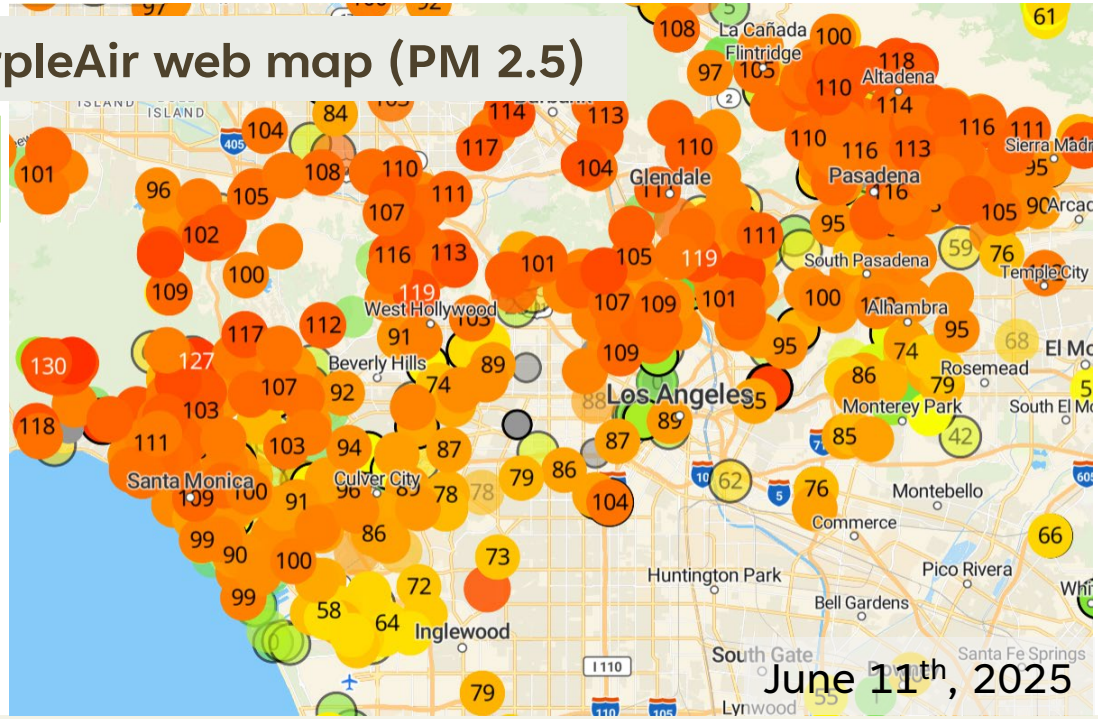
AQI	Health Rating	What to do:
0-50	GOOD	Play outside!
51-100	MODERATE	Consider mild impacts and slowing down for sensitive persons.
101-150	UNHEALTHY FOR SENSITIVE GROUPS	Sensitive groups, including children, should limit or slow down heavy outdoor activities. If applicable, carry an inhaler. Consider indoor and calm activities above this level.
151-200	UNHEALTHY	Heavy outdoor activity should be limited.
201-300	VERY UNHEALTHY	Restrict any outdoor activity. The risk of health impacts is increased for everyone.
301-500	HAZARDOUS	Avoid outdoor activity.

Limitations of the AQI during wildfires

The AQI shown on your smartphone's weather apps is calculated from high-quality EPA "AirNow" monitors, which appropriately use 1-hr, 8-hr, and 24-hr air pollution averages.

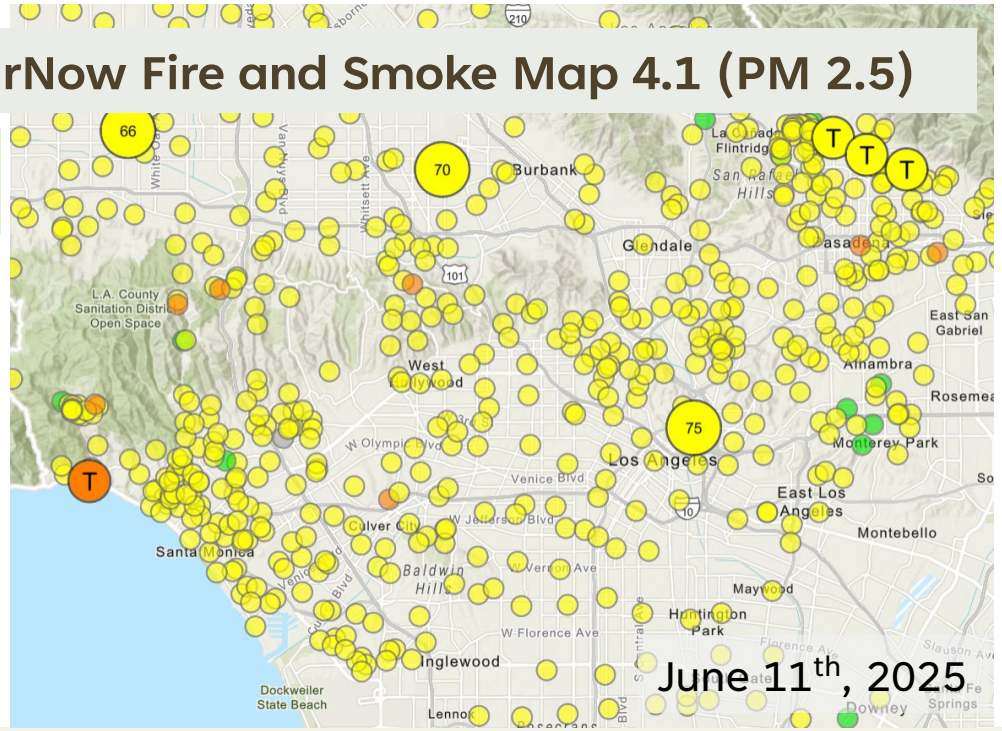
Sources that are more responsive to the ***rapidly changing air quality during wildfires*** incorporate low-cost PM2.5 sensors reporting results every few minutes (e.g. PurpleAir, IQ*Air)*. The **AirNow Fire & Smoke Map** combines & corrects both:

PurpleAir web map (PM 2.5)



https://map.purpleair.com/

AirNow Fire and Smoke Map 4.1 (PM 2.5)



https://fire.airnow.gov/#10/34.093/-118.3646

Daily cigarette comparison of PM 2.5

This chart compares health risks associated with air quality to the number of cigarettes smoked each day.

BUT! Fire smoke is *likely* even more harmful than cigarette smoke.

And wild/urban fires are different:

- Our homes and cars contain metals, paints, plastics, asbestos, and chemicals.
- PM 2.5 (or AQI) cannot measure the amount or individual ingredients of toxic contaminants.

Key point:

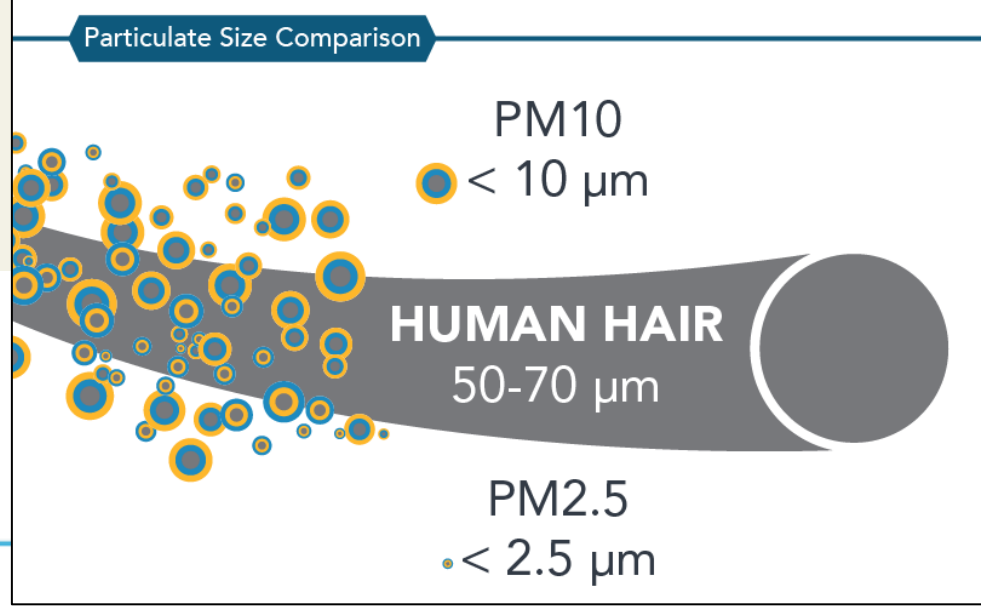
If PM 2.5 is at 200, breathing that air for a full day has a similar effect on your body as smoking 9 cigarettes. If at 500, it's like smoking a pack of cigarettes a day.

PM 2.5 µg/m³	Cigarette equivalent per day
50	2.3
100	4.5
150	6.8
200	9
250	11
300	13.6
400	18
500	23

Estimate provided as PM2.5 level of 22 µg/m³ = 1 cigarette by research from: https://berkeleyearth.org/air-pollution-and-cigarette-equivalence/

How wildfire air pollution travels in our bodies

Smoke contains both gases and particulate matter, or PM (tiny solids). Smaller PM can sometimes travel farther in our bodies, bypassing our defense systems. Gases can be absorbed into the lungs and enter the bloodstream.

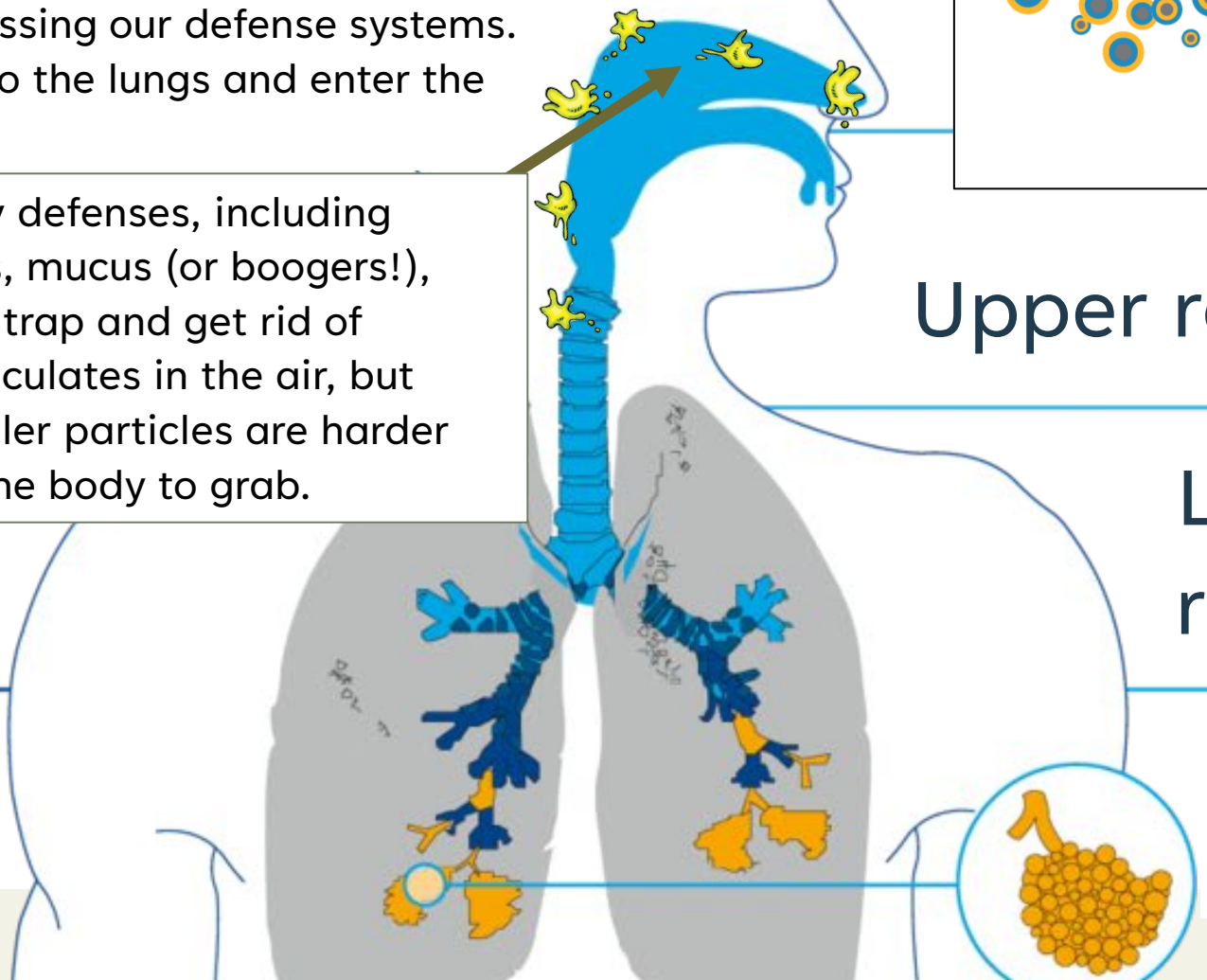


PM_{10}

$PM_{2.5}$

PM_{1}

Body defenses, including hairs, mucus (or boogers!), help trap and get rid of particulates in the air, but smaller particles are harder for the body to grab.



Upper respiratory track

Lower respiratory track

Deep lung air sacks (aveoli)

Image: https://www.freudenberg-filter.com/en/company/why-filtration/ and the California Air Resources Board

2025 Air Quality During Palisades & Eaton Fires

Los Angeles 2025 Fires

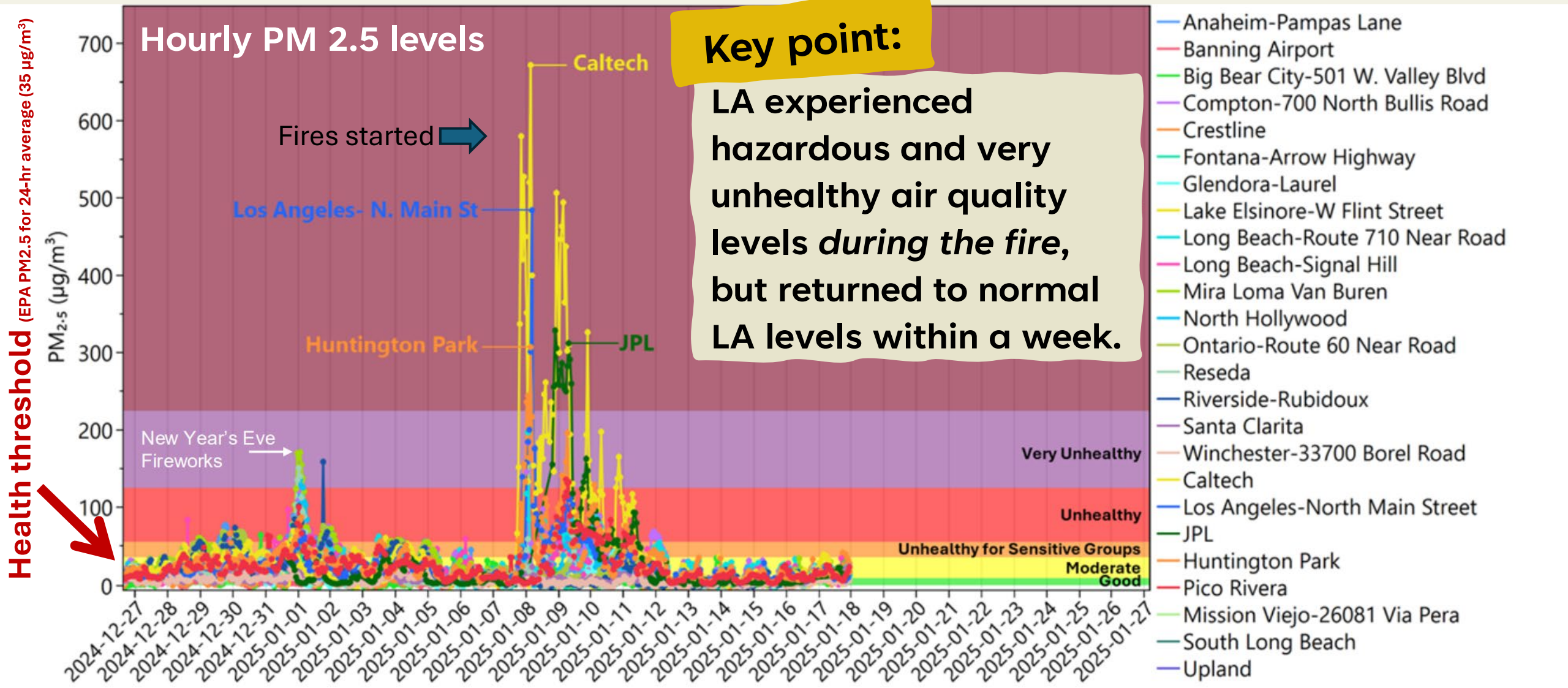
Satellite image from January 9, 2025 of Eaton and Palisades Fires

Key point:

Seen from space, wildfire smoke from the LA Fires traveled far, dispersing throughout the LA region and the ocean.

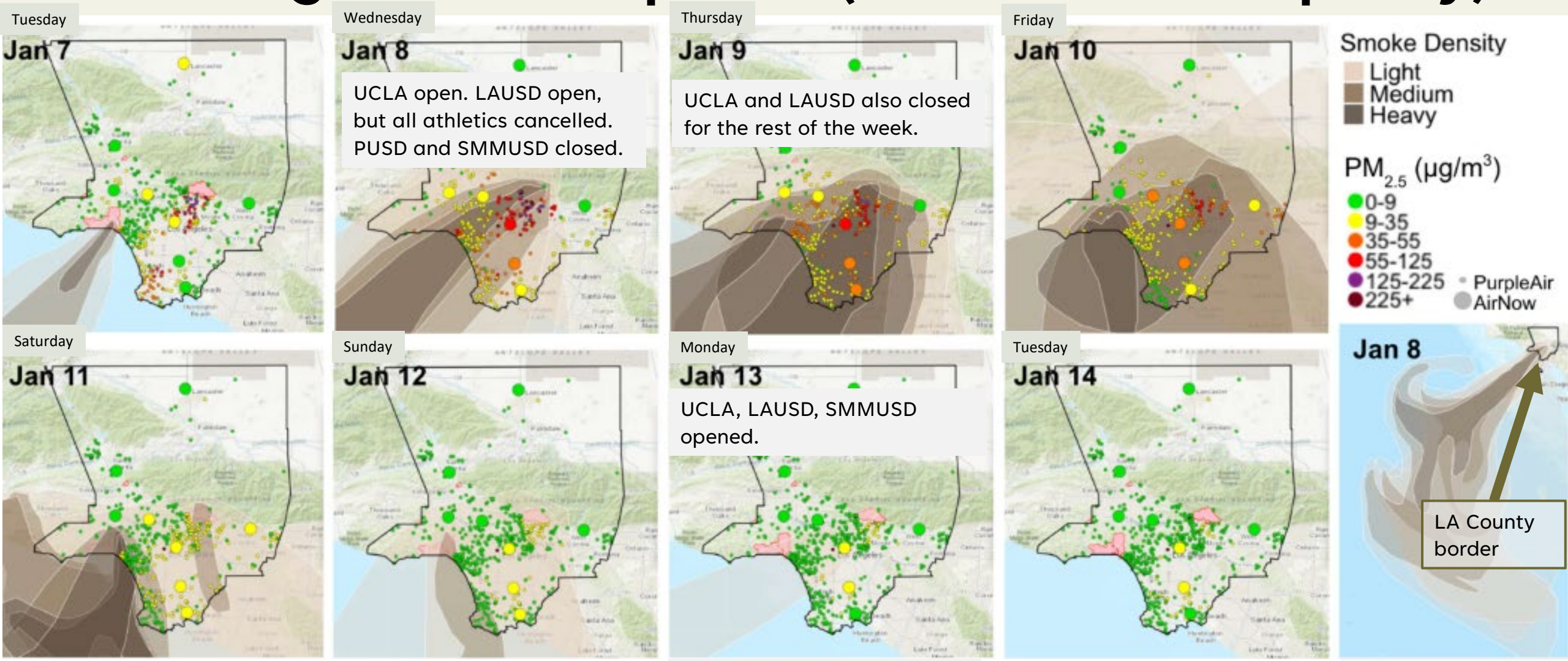
Image courtesy of the European Space Agency

How bad was the air quality? For how long?



Graphic: Sina Hasheminassab, Science System Engineer, JPL, from CalTech webinar Jan 3 2025 https://www.youtube.com/watch?v=VBg7wBCoSW8 using data sources from CARB's air quality and meteorological information system, Caltech's Dr. John Crounse, and the ASCENT network's Haroula Baliaka and Dr. Sally Na

Visualizing the smoke plume (and PM 2.5 air quality)



How far the smoke traveled due to Santa Ana winds!

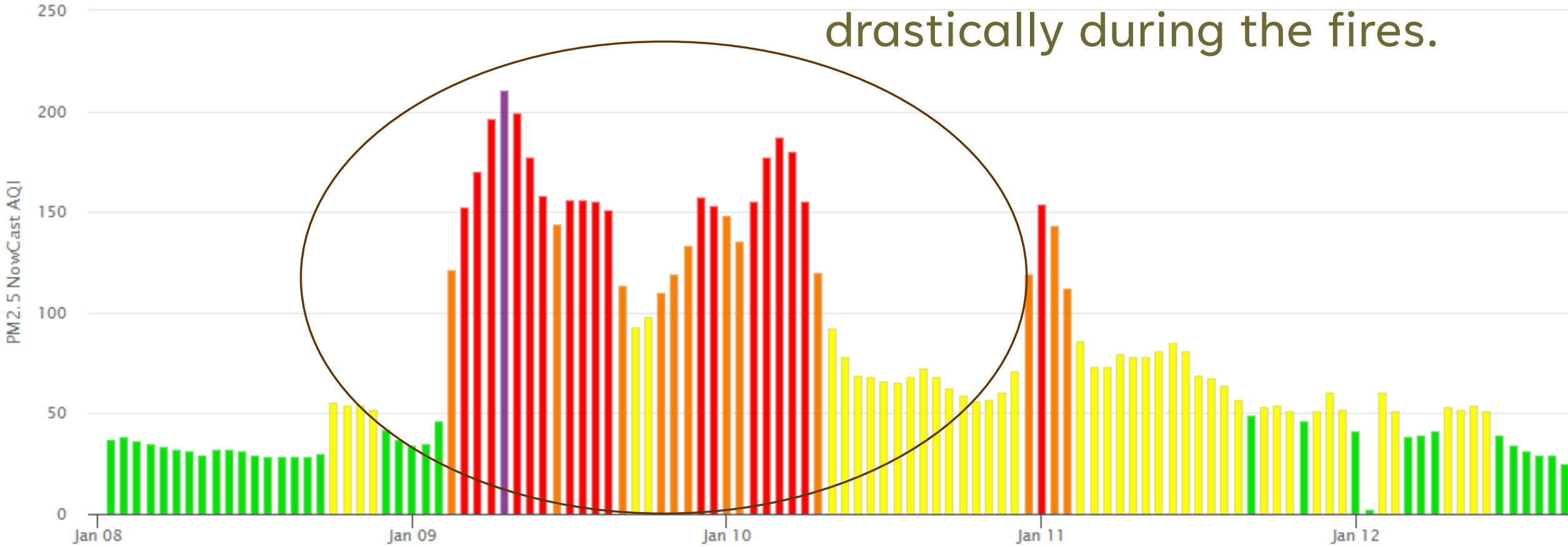
LAUSD = Los Angeles Unified School District
PUSD = Pasadena Unified School District
SMMUSD = Santa Monica Malibu School District

Schollaert C, Connolly R, Cushing L, Jerrett M, Liu T, Marlier M. Air quality impacts of the January 2025 Los Angeles wildfires: Insights from public data sources.

Air quality can change quickly!

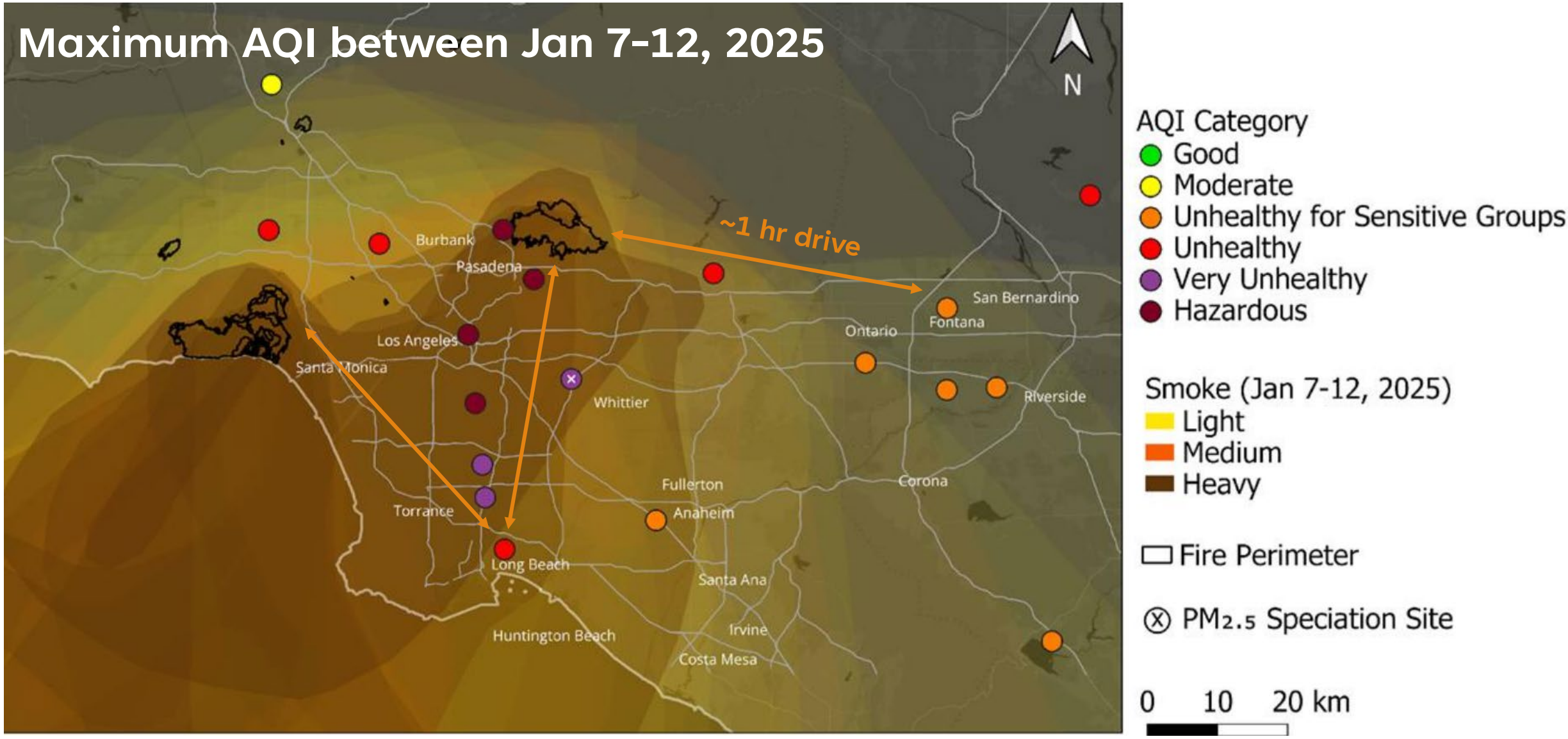
PM2.5 in Santa Monica during the Wildfires

In one day, air quality changed drastically during the fires.



Air now EPA

Local fire doesn't mean local pollution



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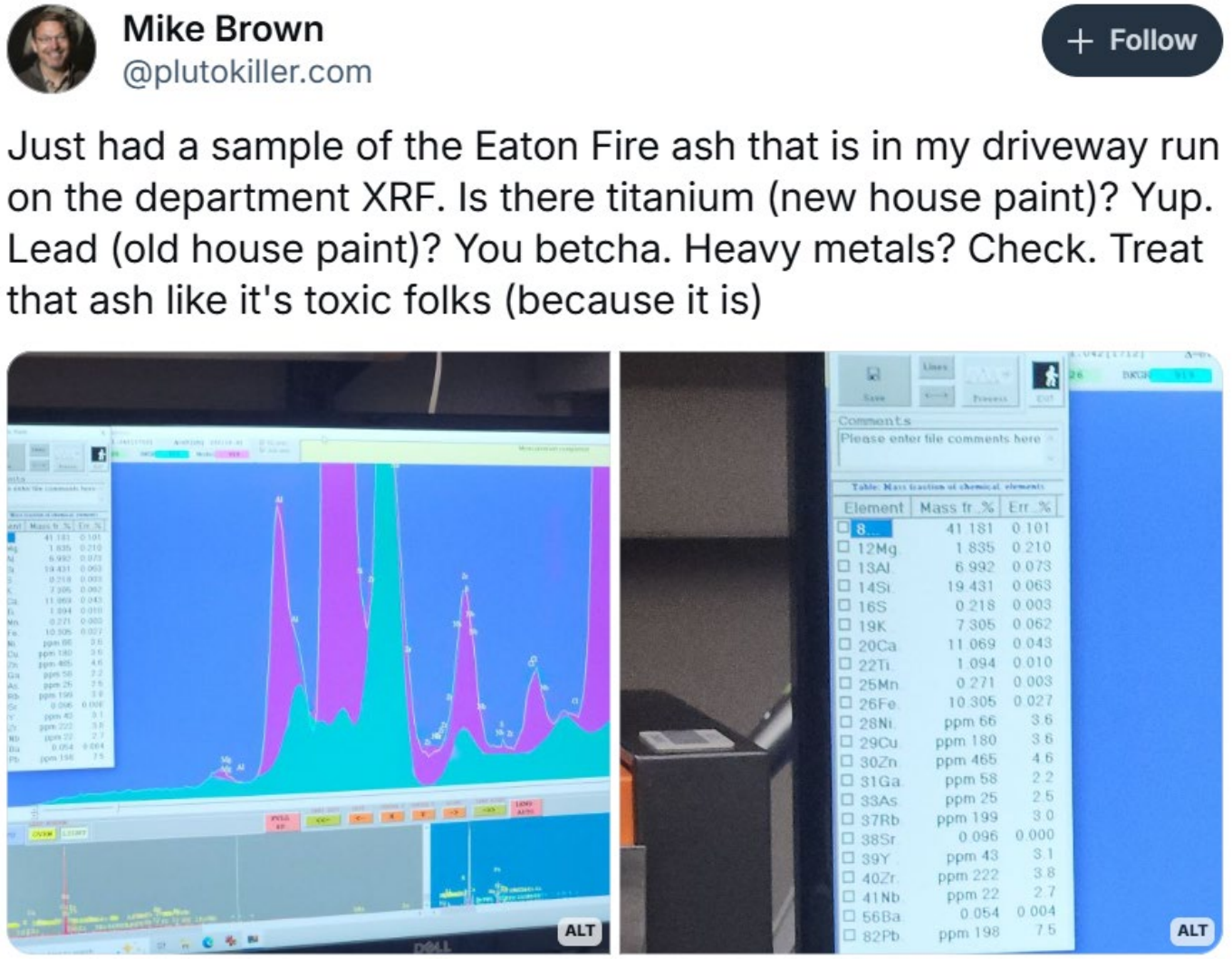
What we were unable to measure through the air quality index...



Some common TRACE metals found in air from wildfires:

- Arsenic
- Cadmium
- Chromium
- Copper
- Lead
- Magnesium
- Mercury
- Nickel
- Zirconium

Long-term exposure can cause health issues over time, including lung and heart health problems, brain damage, and increased risk of certain cancers.

Short-term exposures may lead to lung and skin irritation, headaches, nausea, and heart health issues (such as increases in blood pressure).

Lead levels in LA Wildfire smoke

CDC

Morbidity and Mortality Weekly Report (*MMWR*)

Notes from the Field: Elevated Atmospheric Lead Levels During the Los Angeles Urban Fires — California, January 2025

Weekly / February 20, 2025 / 74(5);69–71

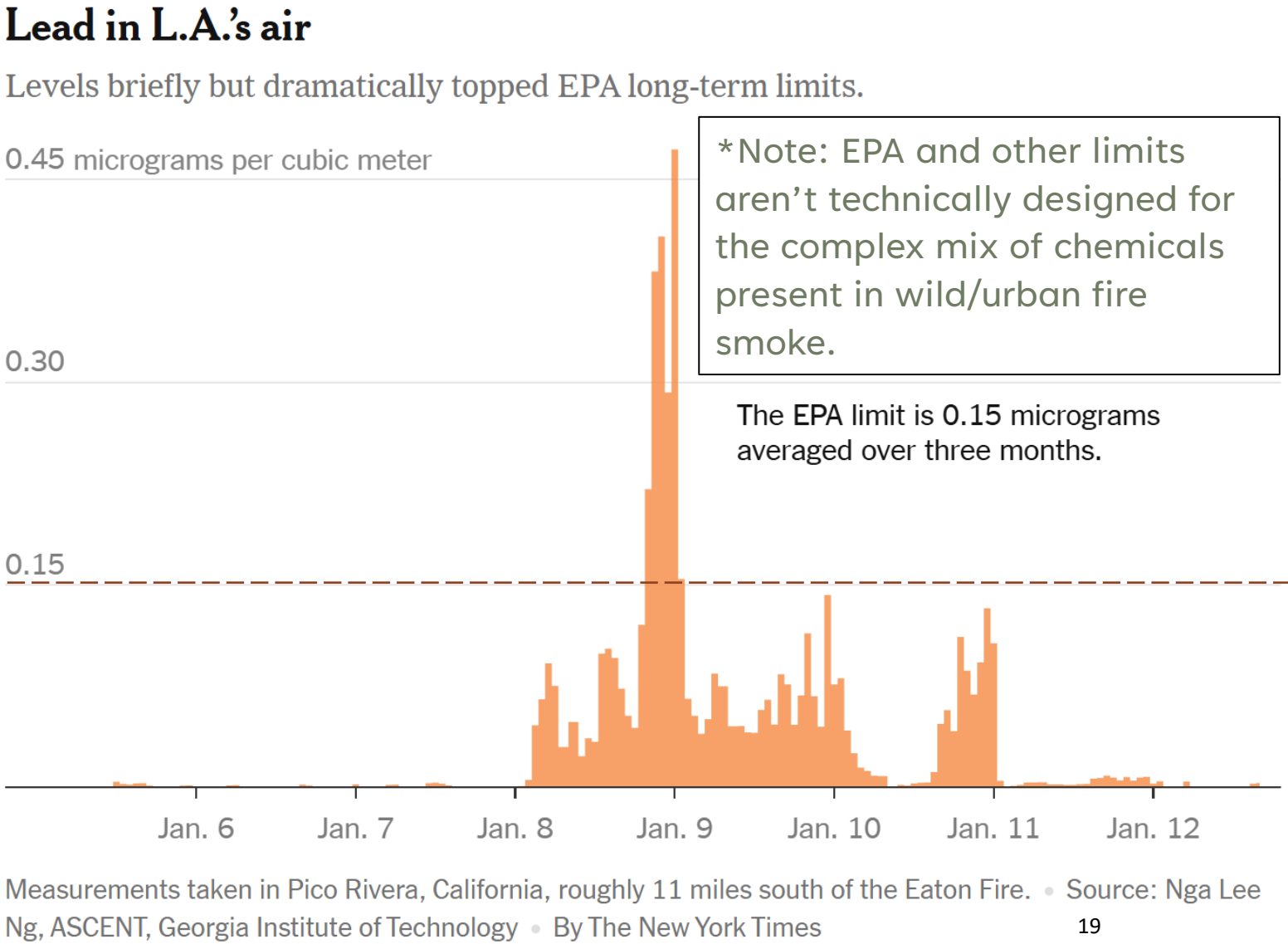
Summary

What is already known about this topic?

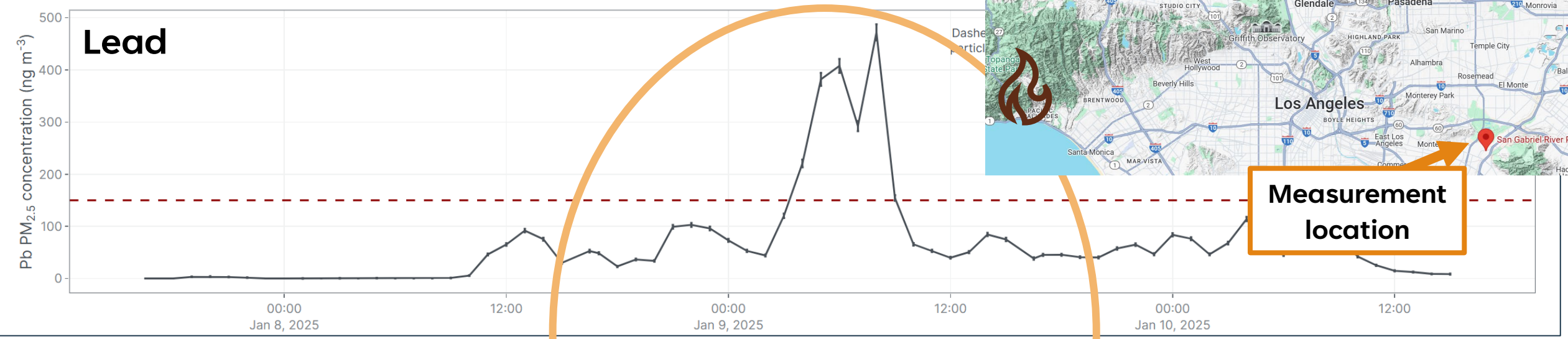
Smoke is a complex mixture of gases and airborne particulate matter; urban fires and conventional wildfires emit different air pollutants. The Atmospheric Science and Chemistry mEasurement NeTwork (ASCENT), a new, advanced air quality measurement network, provides real-time measurements of the chemical constituents in fine particulate matter ($PM_{2.5}$).

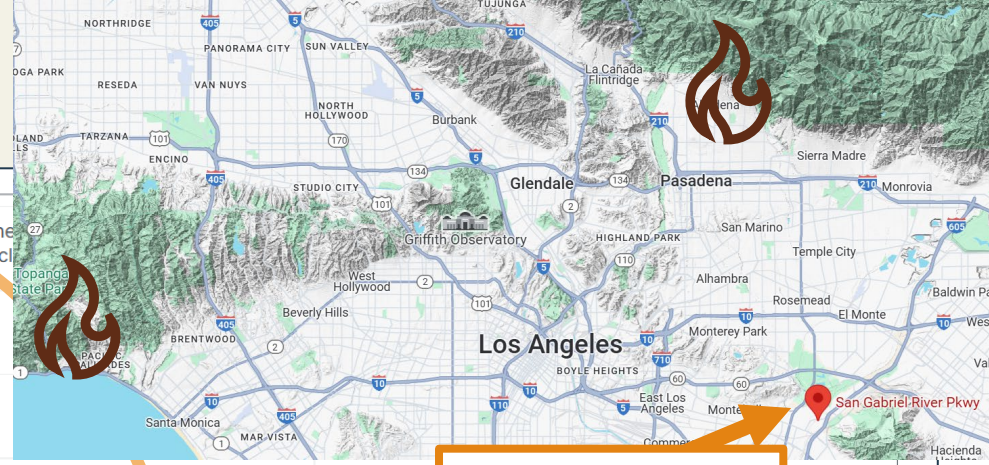
What is added by this report?

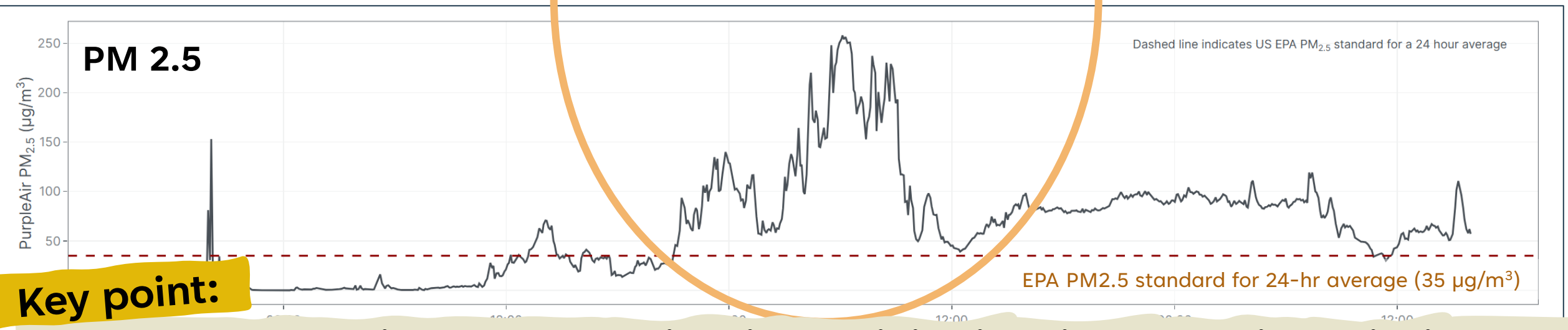
During the January 2025 Los Angeles fires, ASCENT recorded an approximate 110-fold increase in $PM_{2.5}$ lead levels compared with values from the previous few days.



Lead vs. PM 2.5: Pico Rivera





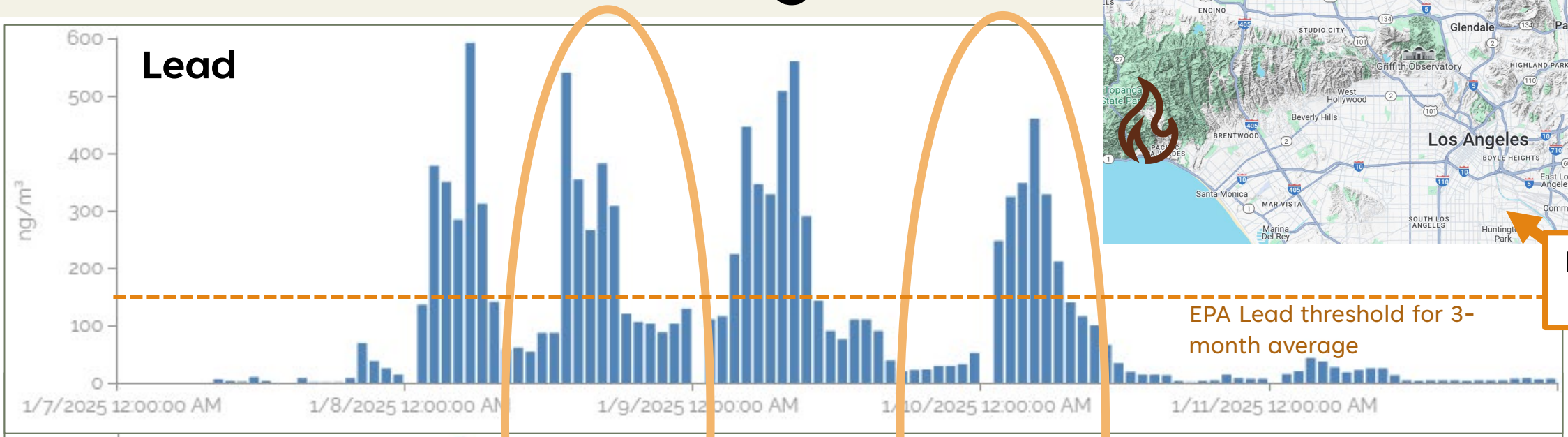


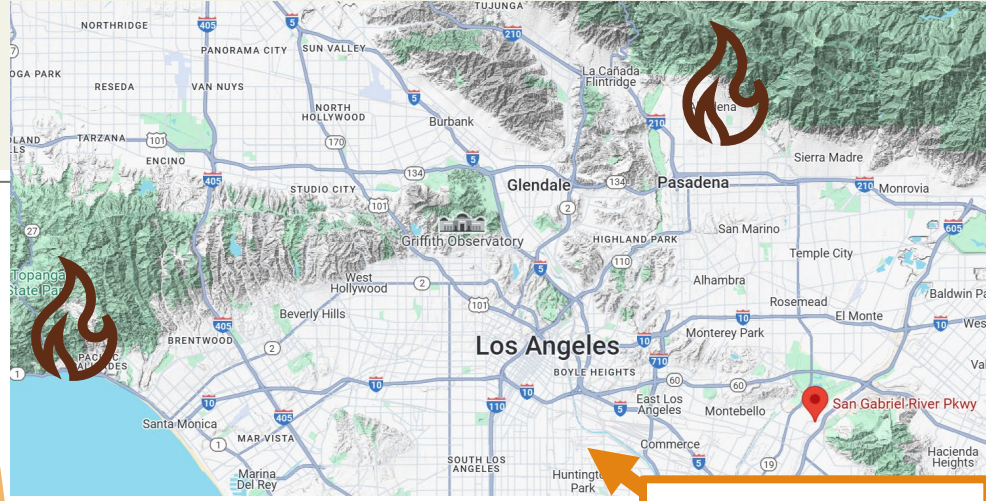
Key point:

When lead was at higher concentrations in the air in Pico Rivera, the air quality in that location was also poor.

ASCENT: https://aqrc.shinyapps.io/ascent_public_socal/

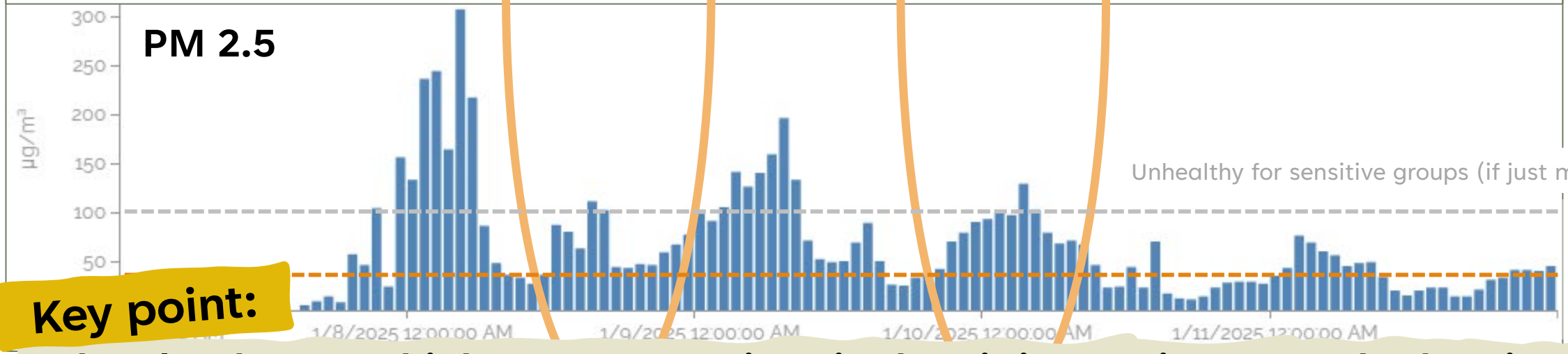
Lead vs. PM 2.5: Huntington Park





Measurement location

EPA Lead threshold for 3-month average



Unhealthy for sensitive groups (if just measuring PM 2.5)

EPA PM2.5 standard for 24-hr average (35 µg/m³)

Key point:

When lead was at higher concentrations in the air in Huntington Park, the air quality in that location was also poor, *but did not always show increased levels.*

South Coast Air Quality Management District: https://xappprod.aqmd.gov/AB617CommunityAirMonitoring/Home/HistoricalSearch/34

Airborne metals from wildfires

- Metals can be released into the air depending on what is burned and spread through smoke, ash, and dust.
- Special air monitors in Pico Rivera and Huntington Park measured elevated airborne lead levels during the first 2 to 3 days of the fires, but these levels decreased rapidly within 4-5 days. Currently, we don't know what the airborne lead levels were in all areas of L.A.
- PM 2.5 measurements may not capture metals after wildfires, as seen in LA and other large wild-urban fires.*
- Reducing your exposure to smoke helps reduce your exposure to metals and other harmful contaminants in wildfire smoke.

Key point:

It's a good idea to reduce smoke exposure as much as possible for a few days before and after fires, even if the air quality seems OK. This way, you can help protect yourself from breathing in any harmful metals and pollutants.

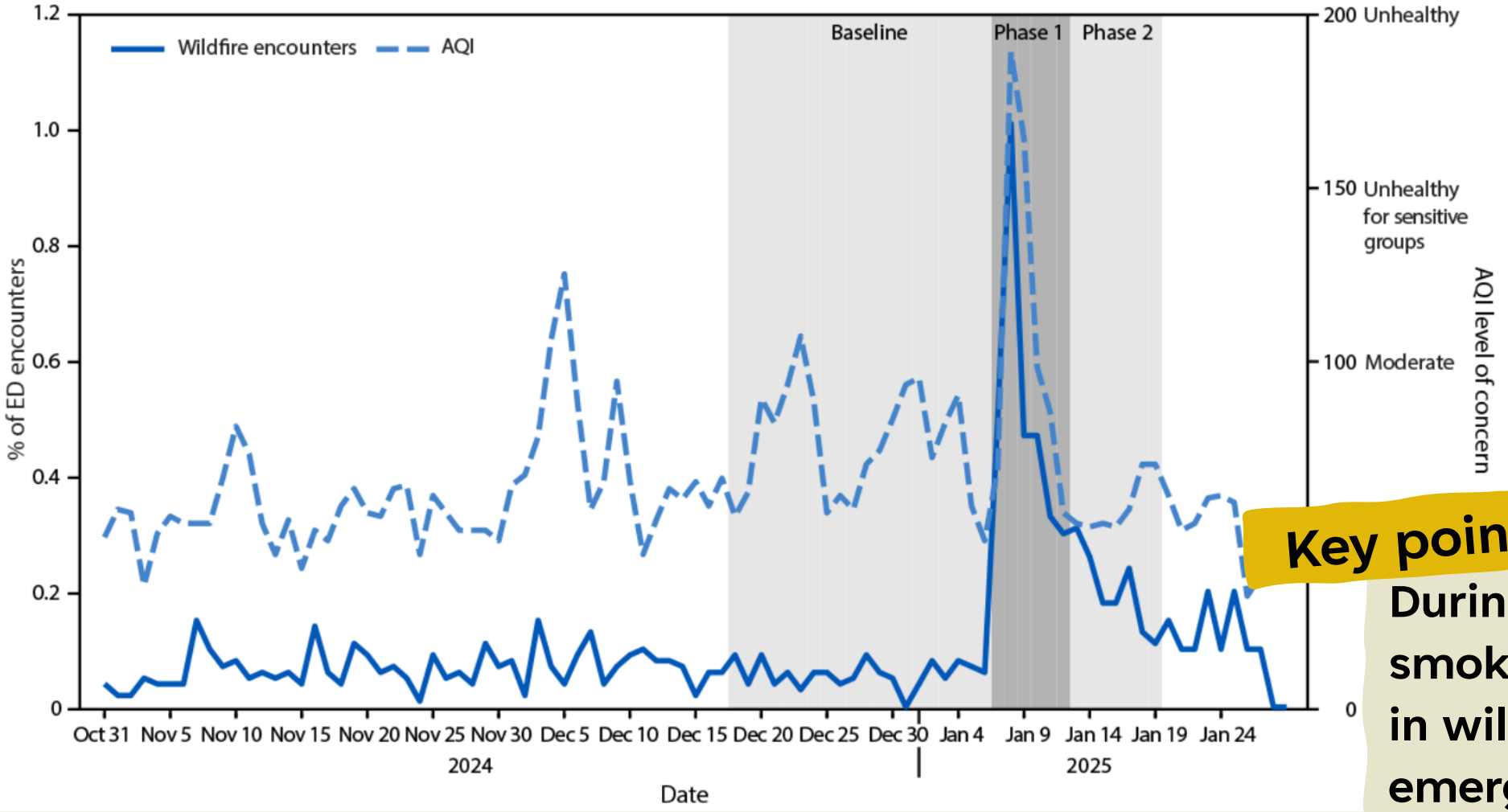
*Boaggio, K., LeDuc, S.D., Rice, R.B., Duffney, P.F., Foley, K.M., Holder, A.L., McDow, S. and Weaver, C.P., 2022. Beyond particulate matter mass: heightened levels of lead and other pollutants associated with destructive fire events in California. *Environmental science & technology*, *56*(20), pp.14272-14283.

2025 Health Impacts During Palisades & Eaton Fires *(Preliminary Data)*

Emergency Department Visits Aligned with the Air Quality Index (AQI)

County of Los Angeles Public Health

FIGURE. Daily percentage of emergency department encounters that were wildfire-associated and air quality index values* during three periods related to wildfires† — Los Angeles County, California, October 31, 2024–January 28, 2025



Abbreviations: AQI = air quality index; ED = emergency department.
†

Baseline period = 3 weeks before the fires
Phase 1 = first 6 days of fires (Jan 7–12)
Phase 2 = 7 days after Phase 1 (Jan 13–19)

Key point:

During the worst of the smoke, we saw increases in wildfire-related emergency room visits.

Kajita E. Notes from the Field: Emergency Department Use During the Los Angeles County Wildfires, January 2025. MMWR. Morbidity and Mortality Weekly Report. 2025;74.

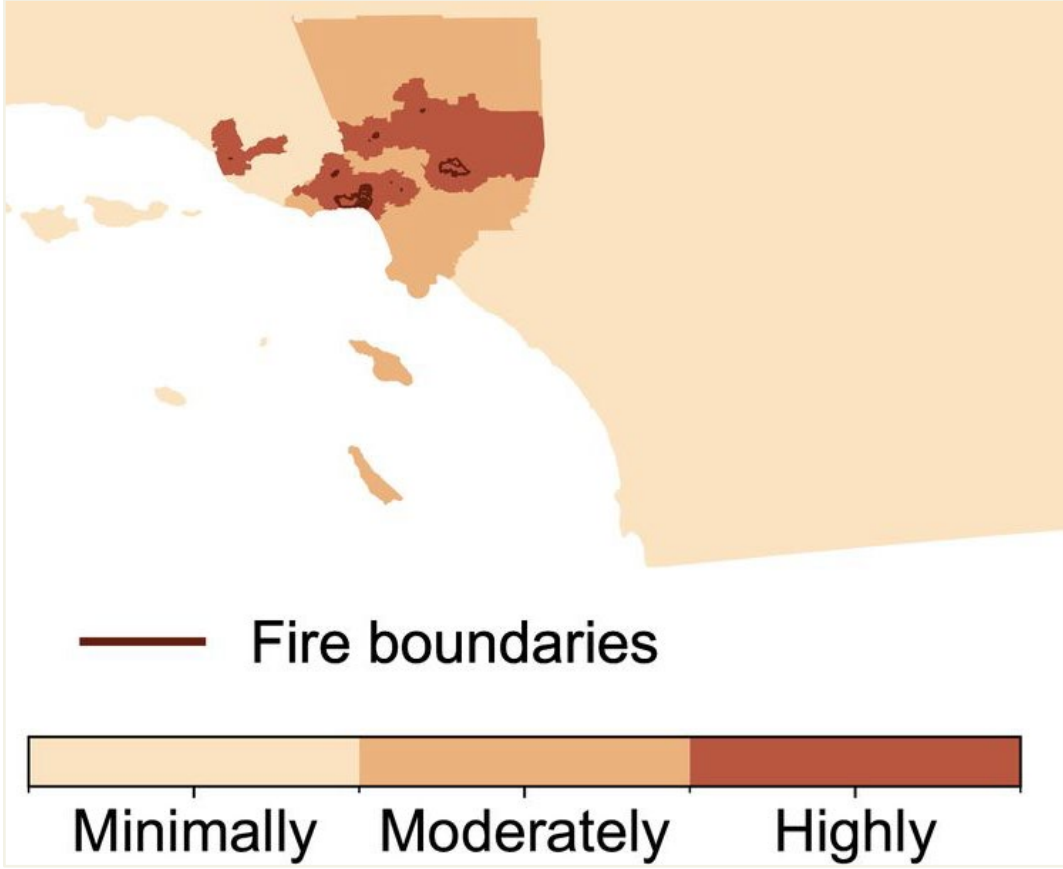
Increased outpatient care visits during the fires

For highly and moderately exposed groups, virtual visits during the week after Jan 7th:

- **Respiratory visits** were 34-41% higher (~3,000 excess visits)
- **Cardiovascular visits** were 35% higher

For highly exposed groups, on Jan 7th:

- **Outpatient and virtual injury visits** were more than 18% higher
- **Outpatient neuropsychiatric visits** were more than 18% higher



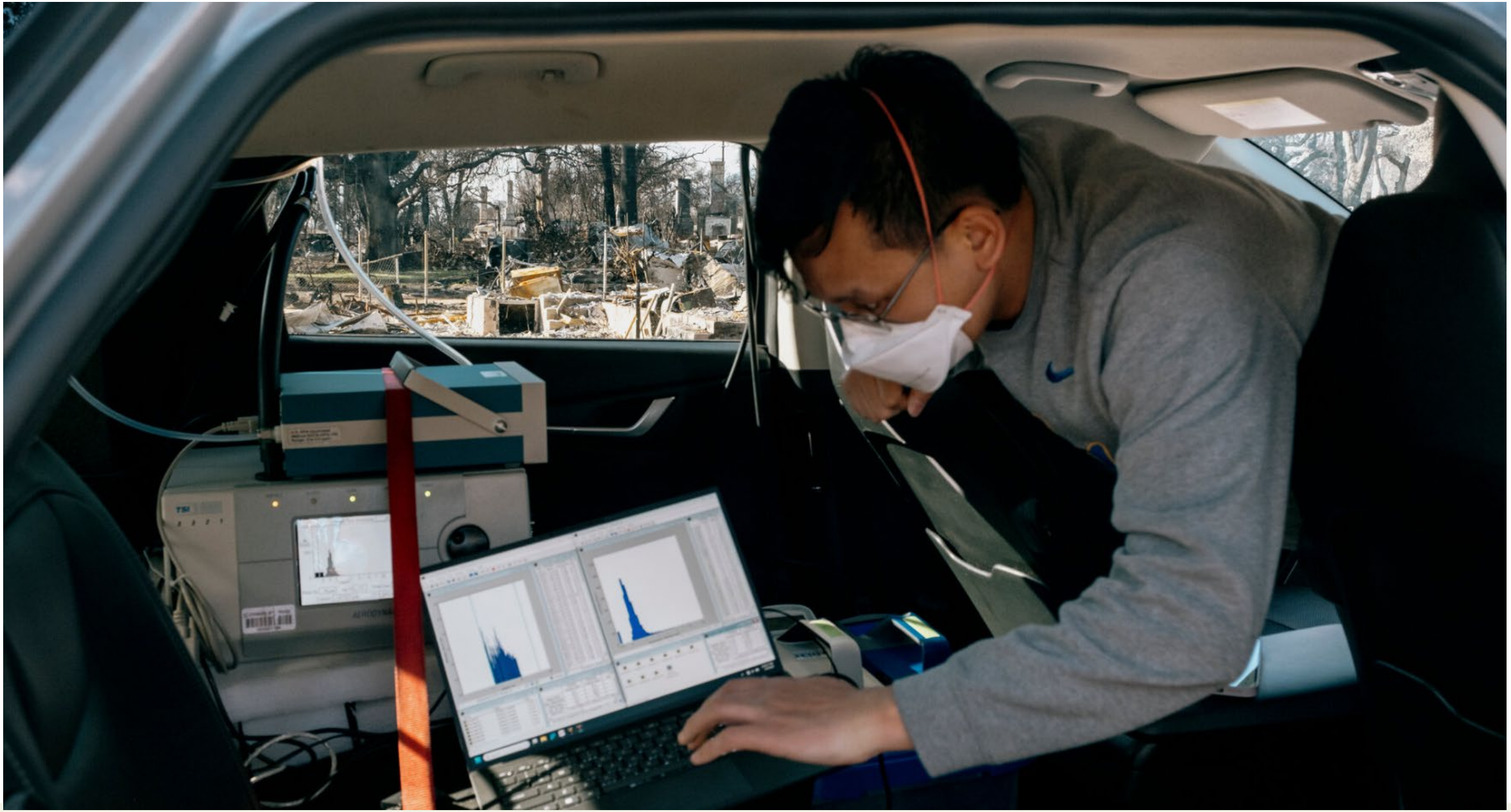
Key point:

During the worst of the smoke, one health system also saw increases in outpatient visits.

Casey JA, Gu YM, Schwarz L, et al. The 2025 Los Angeles Wildfires and Outpatient Acute Healthcare Utilization. *medRxiv*. 2025:2025.2003. 2013.25323617.

LA FIRE HEALTH STUDY

Recent Research Data Releases



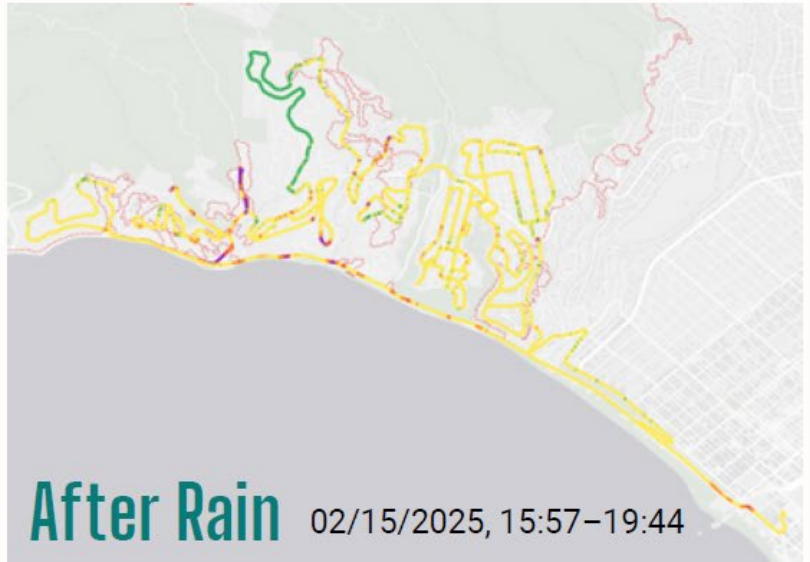
Albert Kyi, graduate student researcher at U of Texas, Austin

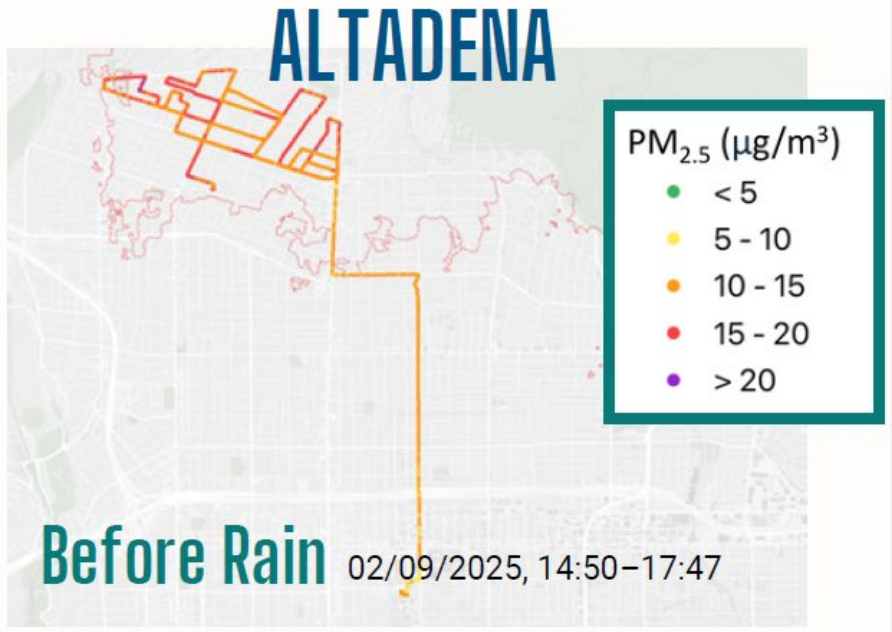
Was the air quality better after the rain?

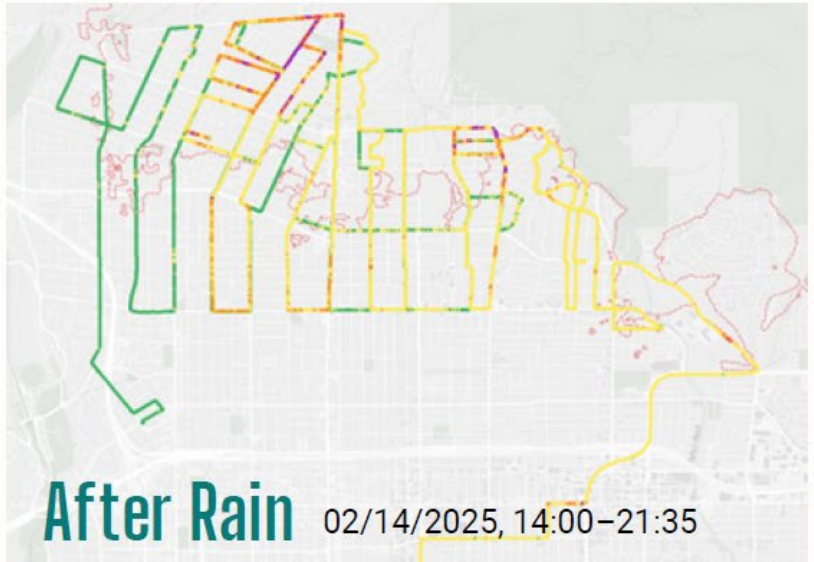
Active fires Jan 7-Jan 31

Mobile air quality monitors (on cars) took **very local** air pollution measures driving around 1-2 weeks after the fires in February.

Drs. Yifang Zhu, Yuan Yao, and Hauxuan Chen mobile sampling

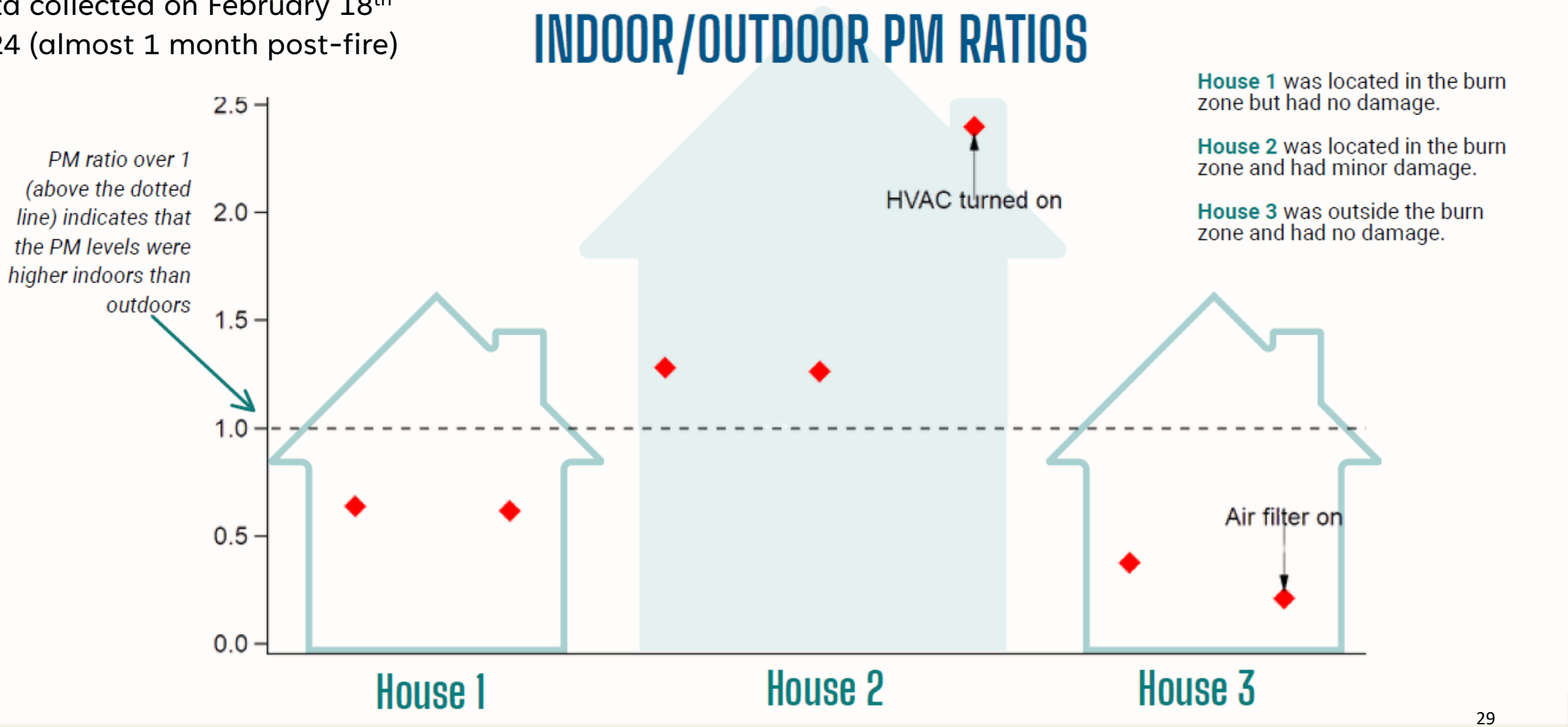






Does smoke get inside homes? Does it stay there?

Data collected on February 18th 2024 (almost 1 month post-fire)



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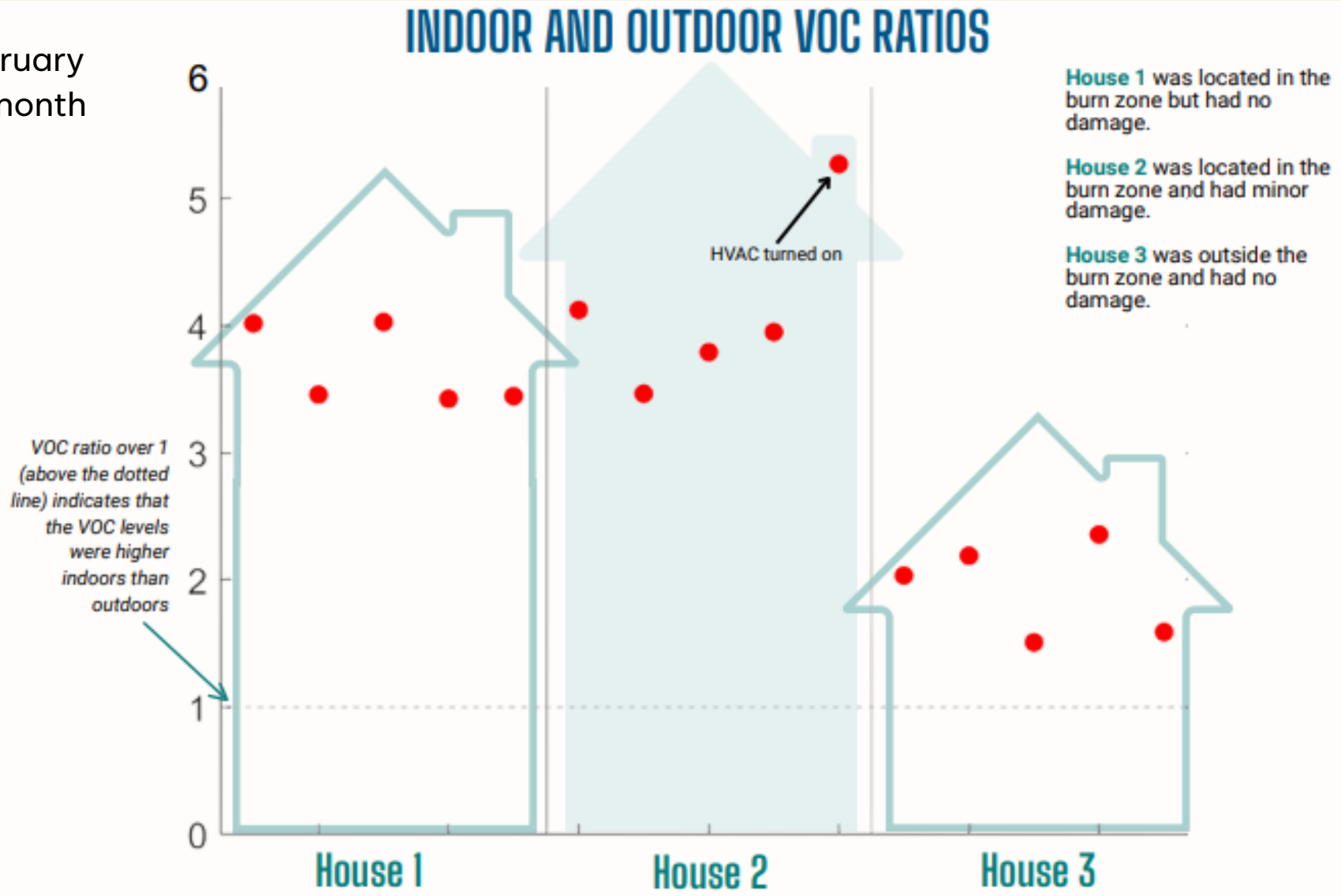
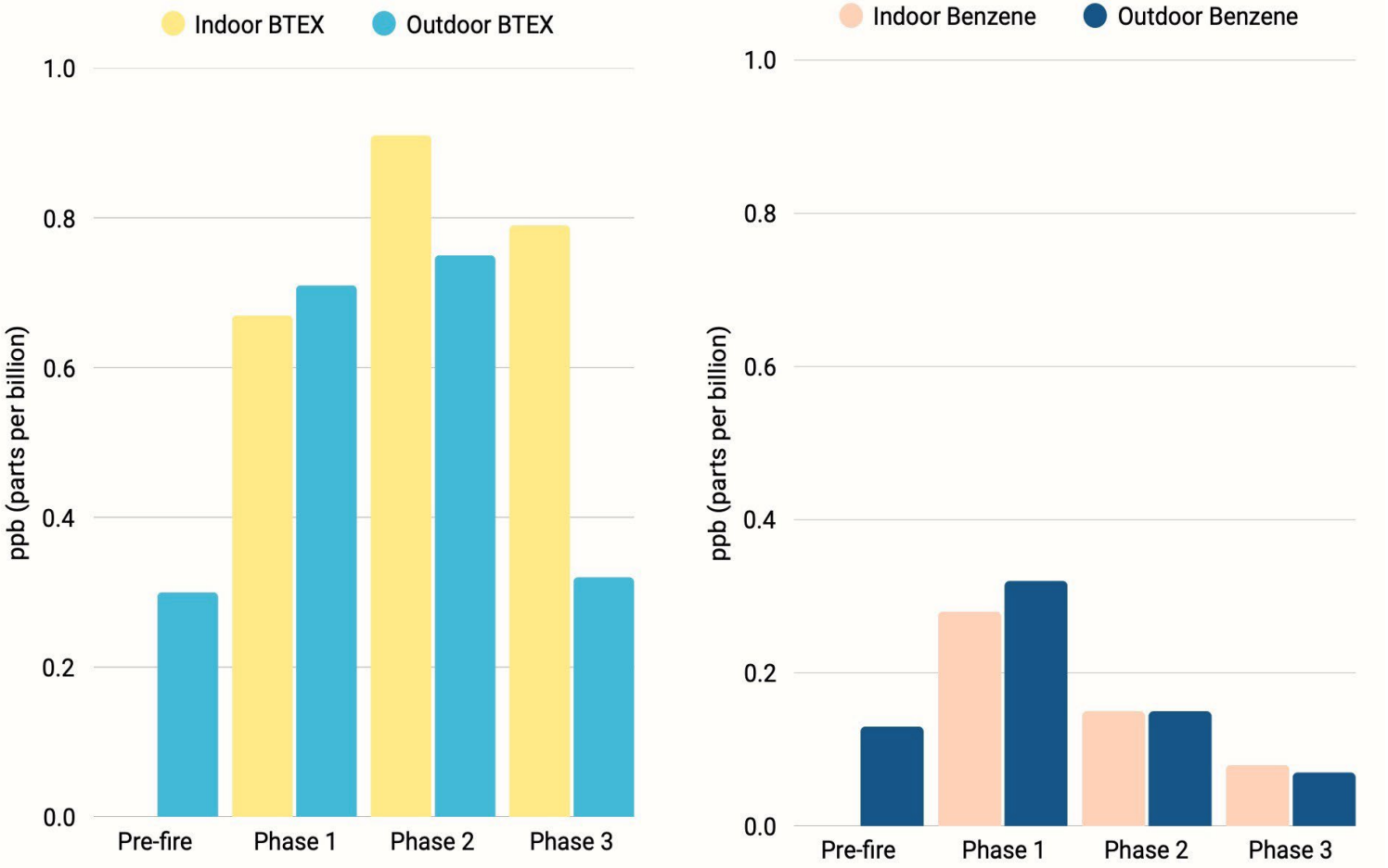


Indoor and outdoor gases during and after the fires:

Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)



Active burning, Phase 1: January 8–15, 2025 (N = 8)
Smoldering, Phase 2: January 24–31, 2025 (N = 6)
Off-gassing, Phase 3: February 11-18, 2025 (N = 11)

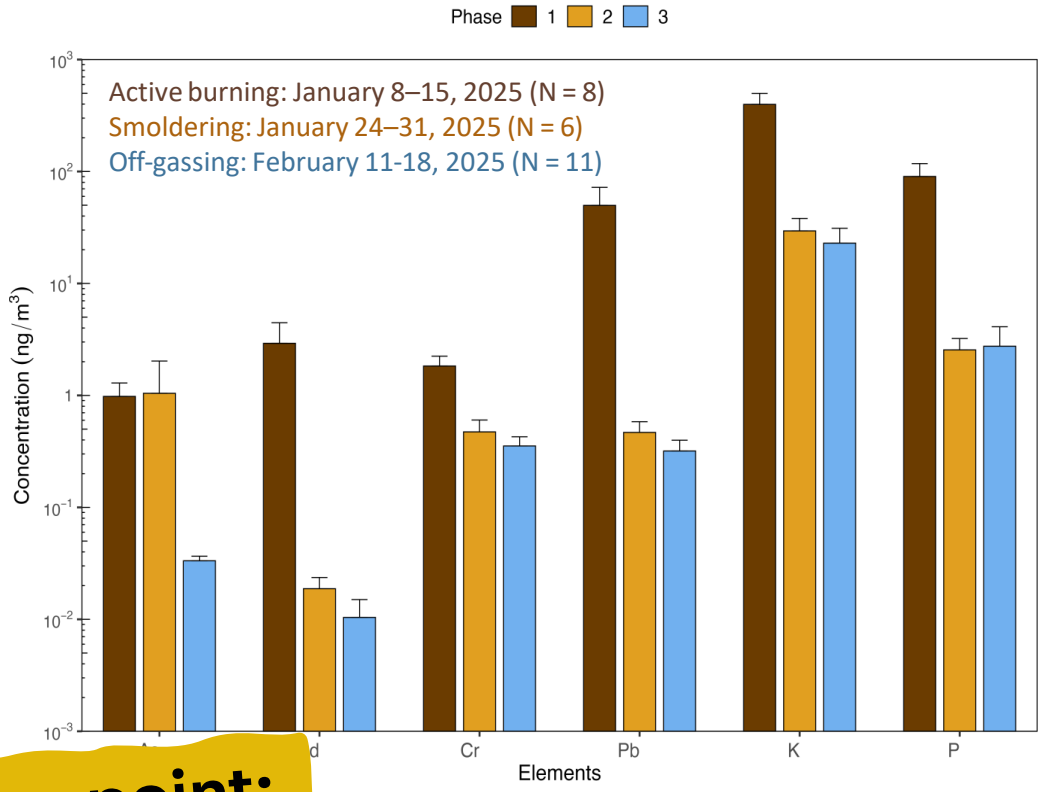
Key Takeaways:

- Outdoor VOC levels *during the fires* were elevated but generally remained **well below** CA and EPA thresholds for exposure.
- Indoor VOC levels remain higher than outdoors in the days and weeks after the fires.

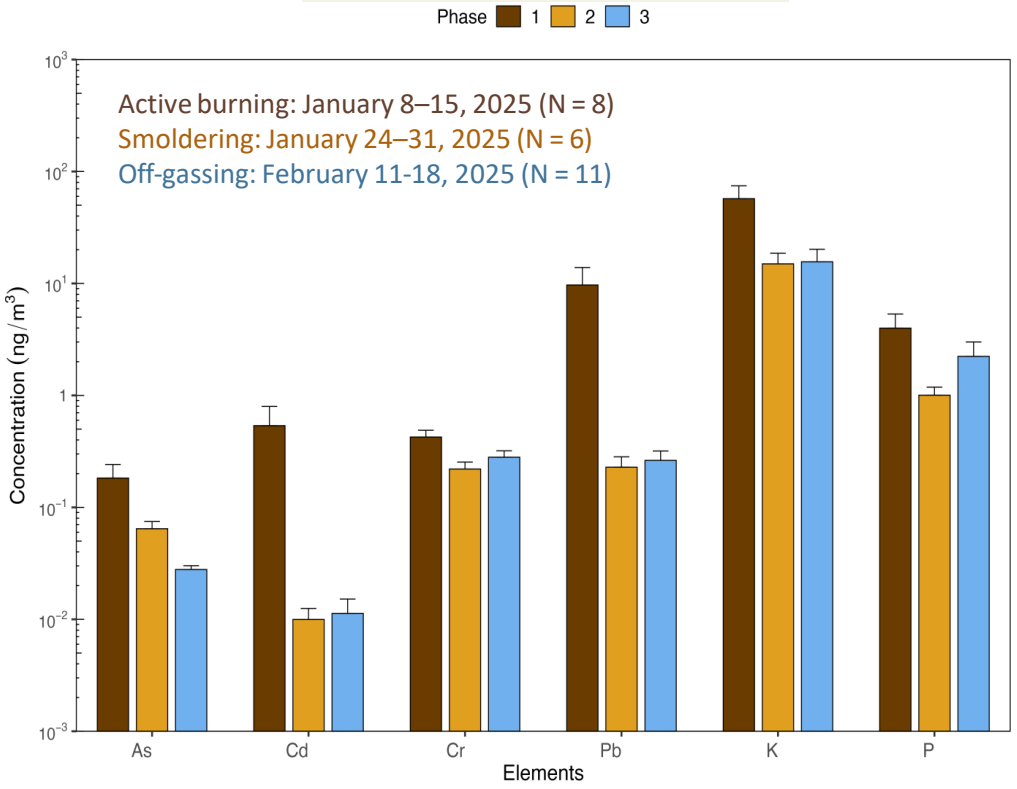
Indoor and Outdoor Elemental Concentrations

Measured airborne metals: Arsenic (As), Cadmium (Cd), Chromium (Cr), Lead (Pb), Potassium (K), and Phosphorus (P)

Outdoor metals



Indoor metals



Key point:

Airborne metals were highest during the active fires, were lower indoors, reduced after the fires.

South Coast AQMD. 2025 Wildfire Response. https://www.aqmd.gov/2025-wildfire-response
ACS EST Water 2025, 5, 4, 1620–1627. Fire retardants are an overlooked source of phosphorus to Western US ecosystems
Environ. Sci. Technol. Lett. 2024, 11, 11, 1247–1253. Metals in wildfire suppressants

What did we learn?

- We saw low levels of smoke components indoors. These were highest during active burning, but some small amounts of gases may linger indoors.
- Note: Data is somewhat limited. We don't know how air-tight the homes were, or if they were lived in or occupied (some may not have had the chance to "air out").

Key point:

When outdoor air quality has improved following the fires it's good practice to "air out" and clean homes that were near the fires.

Main takeaways!

- Los Angeles faced hazardous levels of smoke, containing lead and other toxins, during the fires.
- Wildfire smoke travels far, and the AQI may not fully represent harmful contaminants. Therefore, it is crucial to minimize local, regional, and broader exposures during wildfires.
- Fortunately, for the most part, air quality returned to normal levels within a week.

Reducing Exposure to Smoke + Health Risks

Levels of protection

*Up to 90% if a well-fitted mask, but nearly 0% if a poorly fitted mask

Modified from: Xu R, Yu P, Abramson MJ, Johnston FH, Samet JM, Bell ML, Haines A, Ebi KL, Li S, Guo Y. Wildfires, global climate change, and human health. New England Journal of Medicine. 2020 Nov 26;383(22):2173-81.

Discussion questions

- Did you try to reduce smoke exposure? Did your neighbors or communities?
- Did you rely on the AQI or other air quality measures during the LA fires? What websites did you use, and how did you learn about air quality during the fires?
- Do you think communities far away (i.e., Long Beach or …) took the air quality as seriously as closer neighborhoods?
- What could be improved in the communication and understanding of air quality?
- As always, what could be improved upon what we covered today, particularly for vulnerable or at-risk groups?

Summary and practical tips

- **Stay indoors and reduce smoke exposure during wildfires. Use air purifiers if possible, or ensure that the A/C or HVAC system isn't bringing in outdoor air.**
  - How to make your own at home for less than 100$: https://corsirosenthalfoundation.org/instructions/
  - During a wildfire, A/Cs and HVAC can bring outdoor air and smoke inside if they don't have filters. Consider recirculating air or inspecting and replacing your HVAC and A/C system filters.
- **Reduce bringing in dust/ash by leaving shoes outdoors.**
- **Create "clean air rooms" or clean spaces for babies and young children or vulnerable persons:**
  - https://superfund.oregonstate.edu/sites/superfund.oregonstate.edu/files/infographics/wildfire-smoke-and-your-baby.pdf or
  - https://www.epa.gov/emergencies-iaq/create-clean-room-protect-indoor-air-quality-during-wildfire
- **Use a wet wiping method to clean homes instead of using vacuums or dusting (this reduces the stirring up of dust).**
- **Eating a healthy diet can help support the body's response to reduce the absorption of heavy metals.**
- **When air quality is back to normal and at healthy levels, consider airing out and cleaning your home if you live close to the fires:**
  - https://lafirehealth.org/faq/#ventilate

Create your own air purifier!

Resources

- LA County FREE blood lead level testing:
  - http://publichealth.lacounty.gov/media/Wildfire/
  - http://publichealth.lacounty.gov/media/eaton-soil-testing/ - LEAD Blood Testing: http://publichealth.lacounty.gov/media/wildfire/#:~:text=FREE%20BLOOD%20LEAD%20TESTING
- LA County FREE soil testing:

  http://publichealth.lacounty.gov/media/eaton-soil-testing/
- USC free FREE soil testing: https://publicexchange.usc.edu/la-wildfire-soil-testing/

Visit Your Medical Provider

- Ask your doctor for a blood lead test.
- Testing is covered by most insurance plans, including Medi-Cal.

Go to a Quest Lab for a Free Blood Lead Test

- Dial 1-800-LA-4-LEAD to request a free appointment through Quest Labs.
- Simple, convenient, and confidential.

In-Person Mobile Blood Lead Testing

- For a limited time, Public Health is offering FREE mobile blood lead testing for those who may be concerned about exposure to lead from the wildfires. Upcoming events are listed below. Additional events will be added over the next few months.

Date: *Friday, June 6th*
Time: *9:00AM - 4:00PM*
Altadena Community Center
730 E. Altadena Dr.
Altadena 91001

Date: *Saturday, June 14th*
Time: *10:00AM - 4:00PM*
Malibu Library
23519 West Civic Center Way
Malibu, CA 90265

Date: *Friday, June 27th*
Time: *9:00AM - 4:00PM*
Altadena Community Center
730 E. Altadena Dr.
Altadena 91001