SUNDAY, APRIL 26, 2026

Announcing the Winners of HEI Awards and Fellowships

Amelia Wesselink
Boston University School of Public Health

Abhishek Anand
Columbia University

Yi-Ling Cheng
University of Illinois Chicago

Samuel Cliff
University of California, Berkeley

Jonah Hazelwood
North Carolina State University

Anna Oehlerking
Northwestern University

Kyan Kuo Shlipak
Northwestern University

HEI Summer Fellowship

A 10-week summer fellowship program with a stipend of $8,000 that pairs highly qualified undergraduate students (rising juniors and seniors) with volunteer mentors in the United States.

Opportunity to gain hands-on environmental health research experience to build skills and explore potential career pathways.

Students prepare a research proposal, present their work, and engage in professional development seminars.

In partnership with ISEE and ISES, with generous support from the American Chemistry Council, Burroughs Wellcome Fund, and individual donors.

HEI
Health Effects Institute

Summer Fellowship – Applications

	2023 Inaugural Year	2024	2025	2026
Applications	52	81	168	**197**
Rising Juniors	29	36	80	**98**
Rising Seniors	23	45	88	**99**
Number of Institutions	30	48	96	**103**
Number of States	16	14	30	**31**
Volunteer Mentors	17	20	26	**34**
Cohort Size	7 fellows	8 fellows	9 fellows	**8 fellows**

5% acceptance rate

Applications are reviewed based on motivation, skills, experience, and need for the opportunity.

Fellows come from majors primarily in the sciences, such as public health, environmental science, biology, chemistry, geography, and health informatics.
Handful of majors outside of the sciences, such as economics, mathematics, and law.

Steady growth of the program over time.

HEI
Health Effects Institute

Summer Fellowship 2026

Lydia Lung
Johns Hopkins University

Mentor: Elena Colicino, *Icahn School of Medicine*

Dalia Zizumbo
Northeastern University

Mentor: Robin Dodson, *Silent Spring Institute*

Gabriela Van Ausdale
Pitzer College

Mentor: Heather Holmes, *University of Utah*

Sheila McKinney
Howard University

Mentor: Shiwen Li, University of Hawaii at Manoa

Sydney Ma
University of California, Davis

Mentor: Jiachen Zhang, *University of Southern California*

Casey Coutin
University of California, Berkeley

Mentor: Guanyu Huang, *Stony Brook University*

Sophia Mao
University of Illinois Chicago

Mentor: John Molitor, *Oregon State University*

Gwyn Munroe
Mount Holyoke University

Mentor: Gary Adamkiewicz, *Harvard T.H. Chan School of Public Health*

HEI
Health Effects Institute

HEI Jane Warren Award

The Jane Warren Award supports early career graduate students and postdocs in attending and presenting at the HEI Annual Conference.

Up to 3 local researchers and 3 researchers based anywhere in the United States are selected each year for the award. The award covers registration costs for all awardees plus travel and accommodations for non-local winners. Winners present their work in a lightning talk and poster session during the conference.

The award is named in remembrance of Dr. Jane Warren who led HEI's scientific activities as the Director of Science from 1999 until her retirement in 2008.

HEI
Health Effects Institute

75 YEARS OF DISCOVERY
LAMONT-DOHERTY EARTH OBSERVATORY
COLUMBIA UNIVERSITY

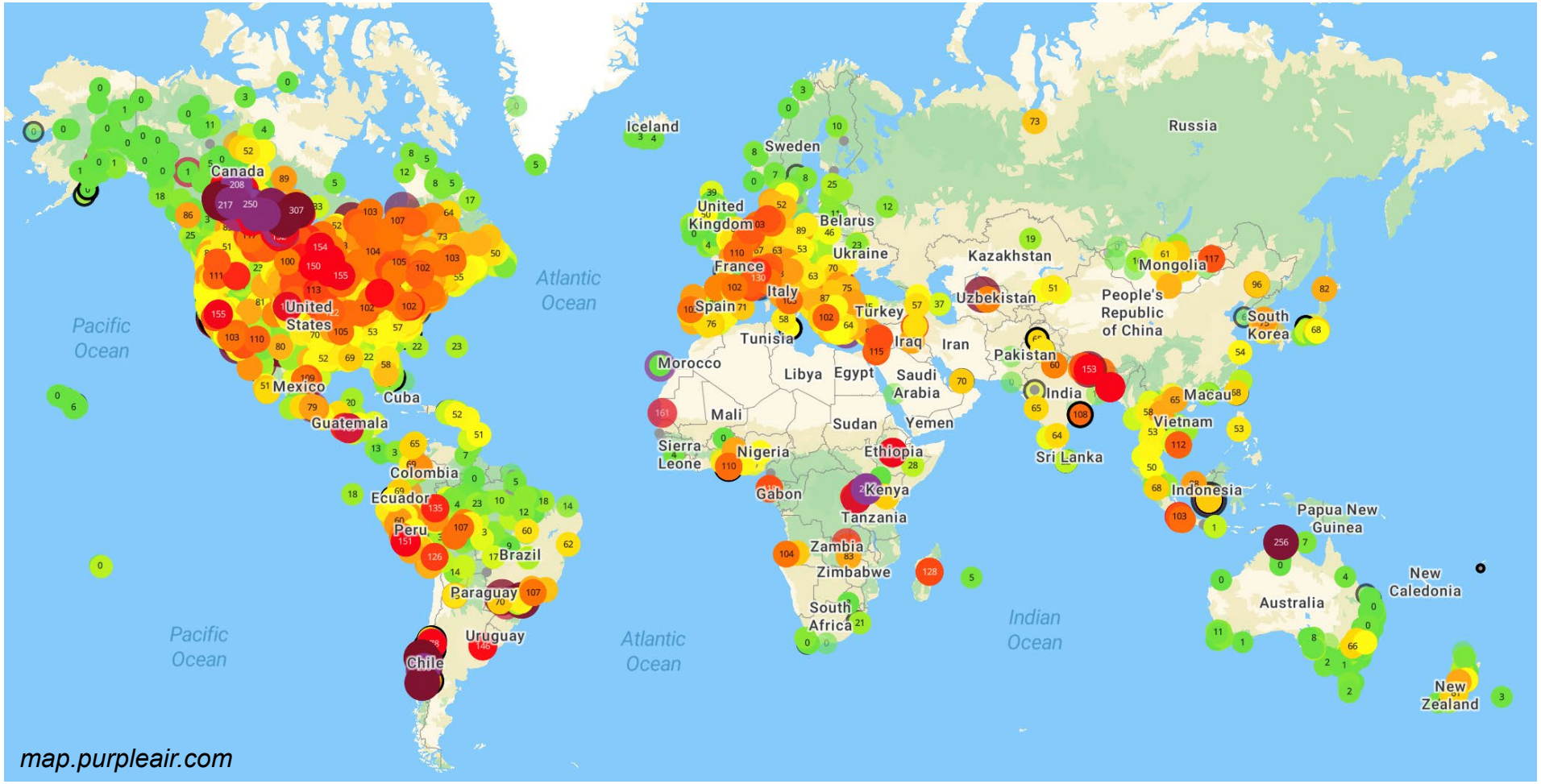
Mapping Two Decades of High-Resolution $PM_{2.5}$ Exposure and Health Impacts in Ghana Using Satellite Measurements and Machine Learning

April 26th, 2026

Abhishek Anand, Postdoctoral Research Scientist

Lamont-Doherty Earth Observatory, Columbia University

A significant data gap in Africa



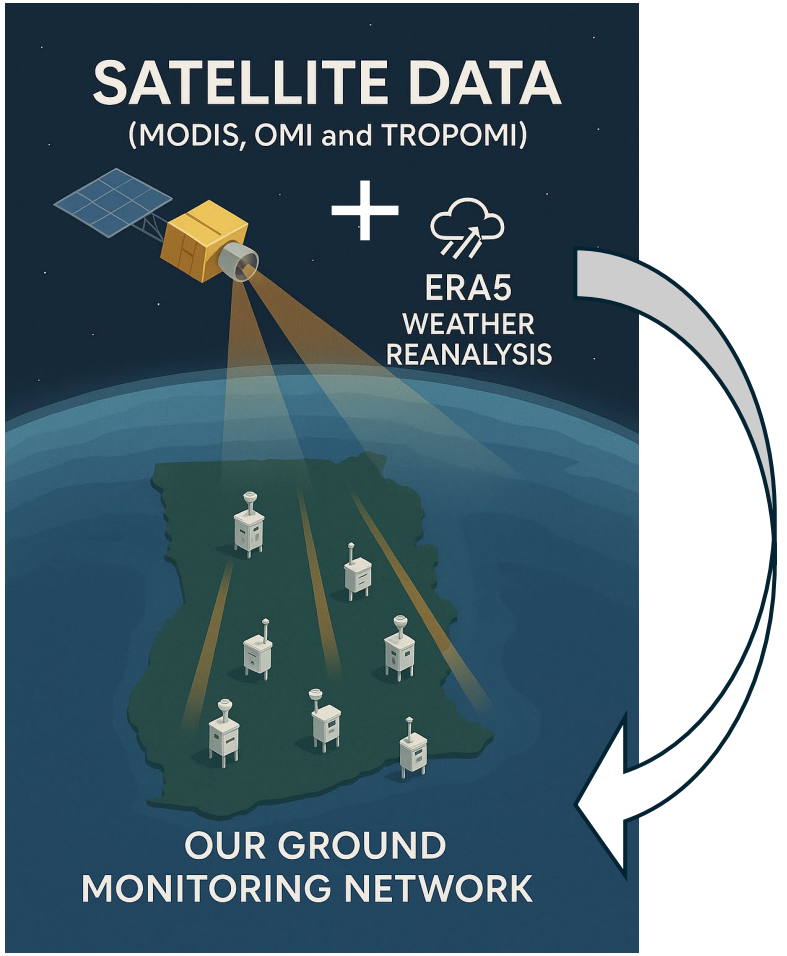
map.purpleair.com

A scalable framework for data-sparse regions

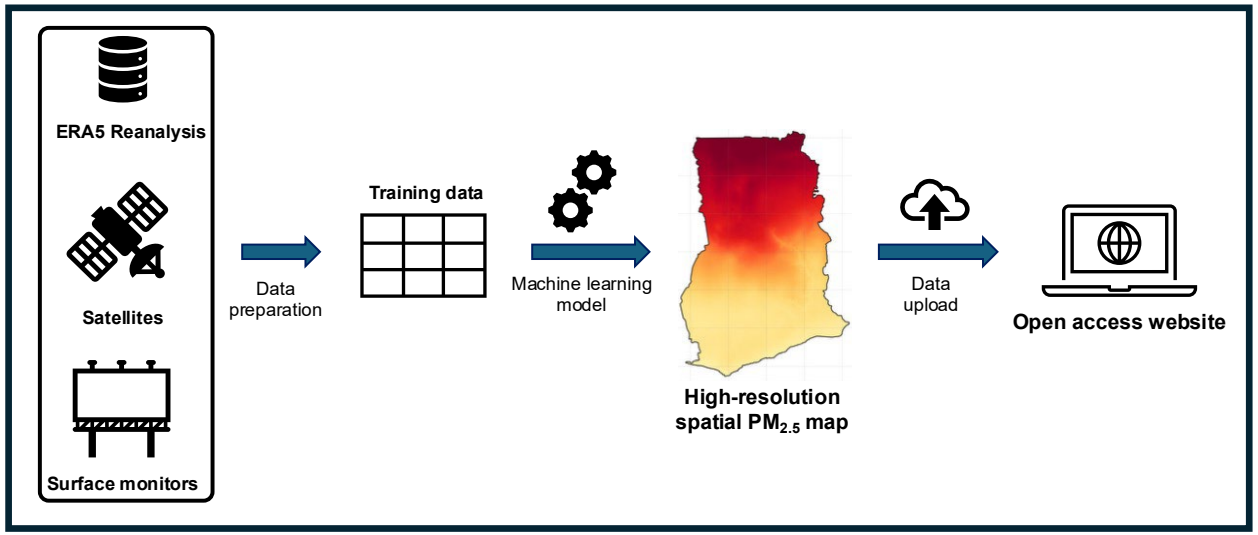
1. Utilize open-access remote sensing and reanalysis datasets
2. Add more surface monitors (low-cost)
3. Expand predictor features to capture formation and dispersion of ambient $PM_{2.5}$

Daily Level $PM_{2.5}$ at **<u>1 km resolution</u>**

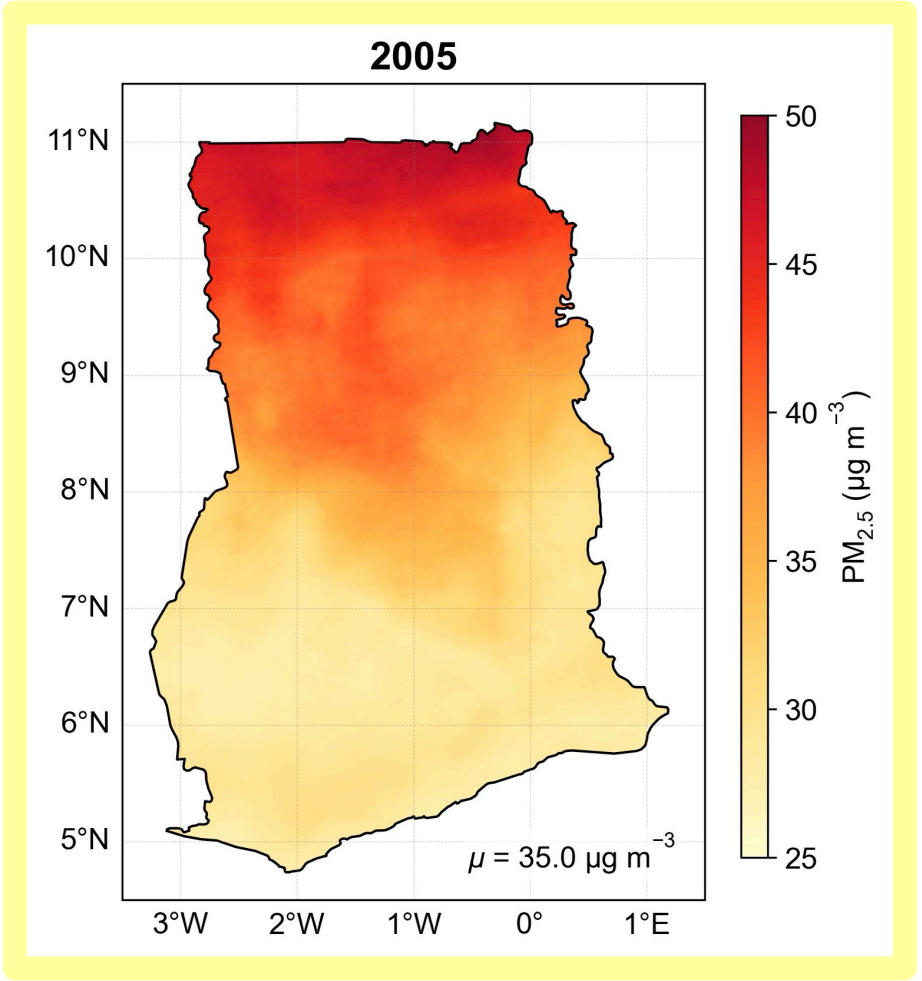
~ **f** (satellite & reanalysis datasets)



Model building & dataset specifications



- Finalized model: eXtreme Gradient Boosting
- Time period: **2005–2025**
- Temporal resolution: **Daily**
- Spatial resolution: **1 km × 1 km**
- Spatiotemporally complete (data imputation)

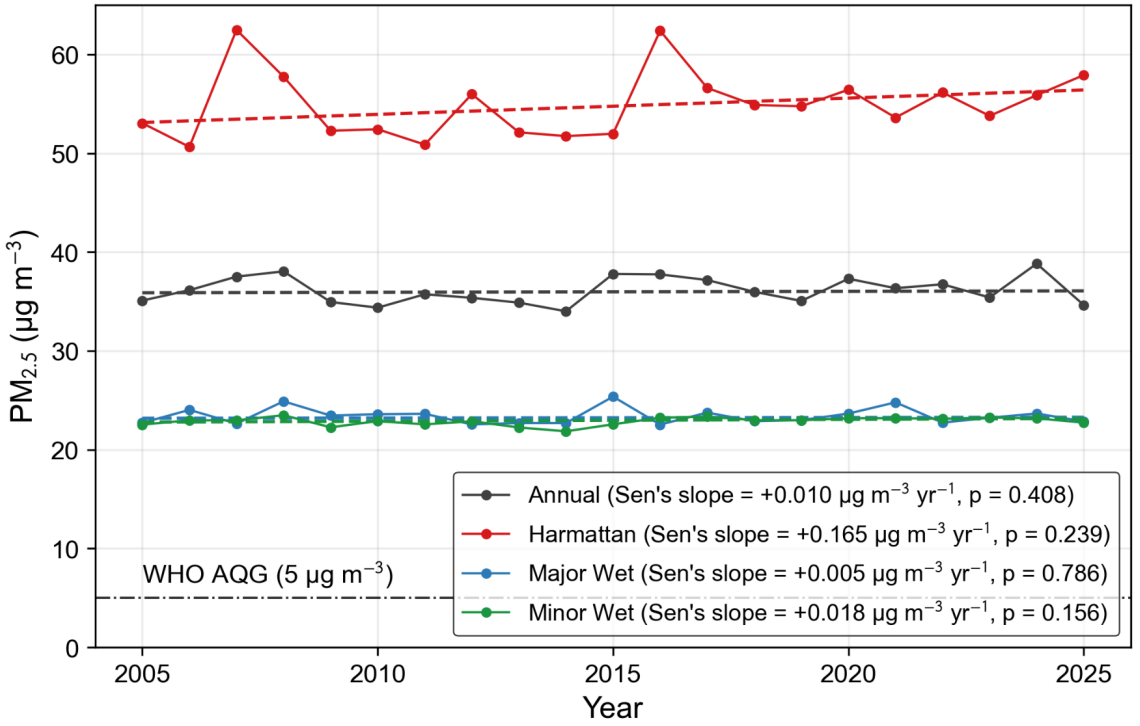


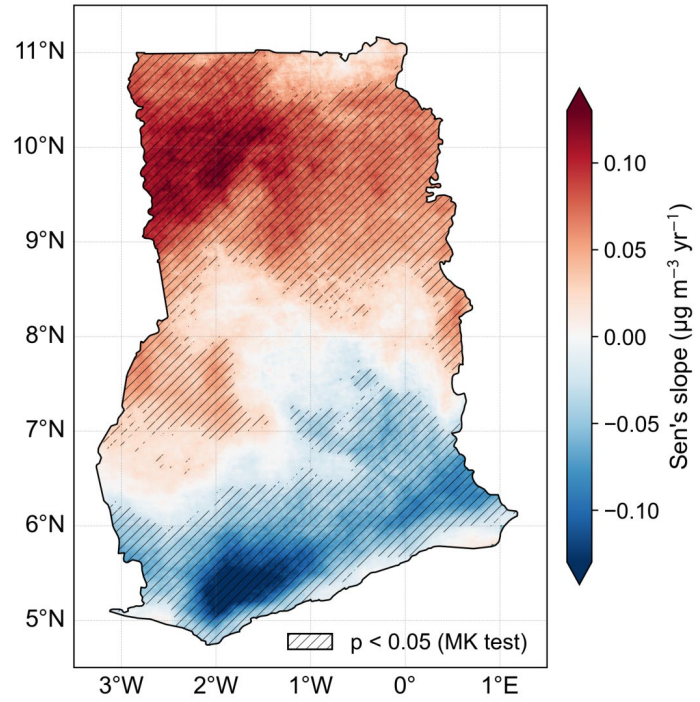
LAMONT-DOHERTY EARTH OBSERVATORY
COLUMBIA CLIMATE SCHOOL

Anand et al. *(in prep)*

Spatiotemporal distribution of $PM_{2.5}$ in Ghana

- **No statistically significant change in annual mean $PM_{2.5}$ was observed in Ghana.**
- **There is a widening North-South disparity in $PM_{2.5}$ exposure.**

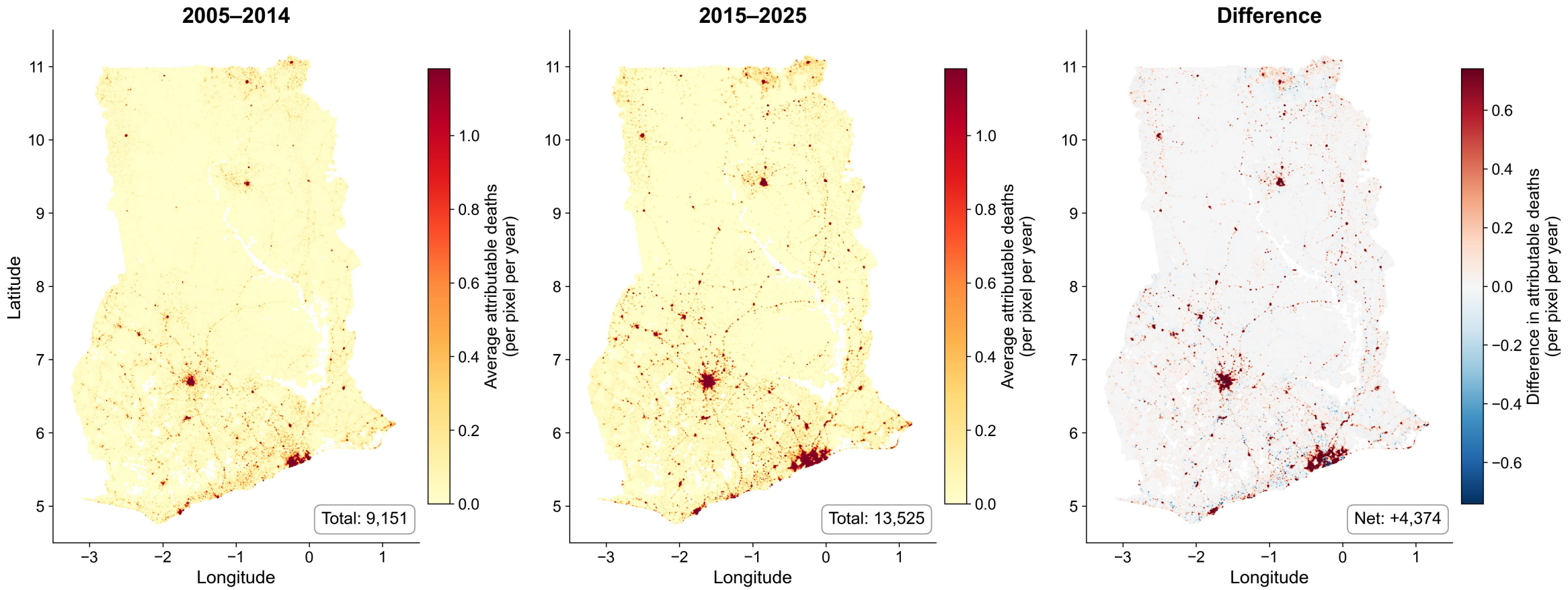




Anand et al. *(in prep)*

$PM_{2.5}$-attributed adult mortalities

Used the Meta-Regression—Bayesian, Regularized (MR-BRT) method developed by Institute for Health Metrics and Evaluation

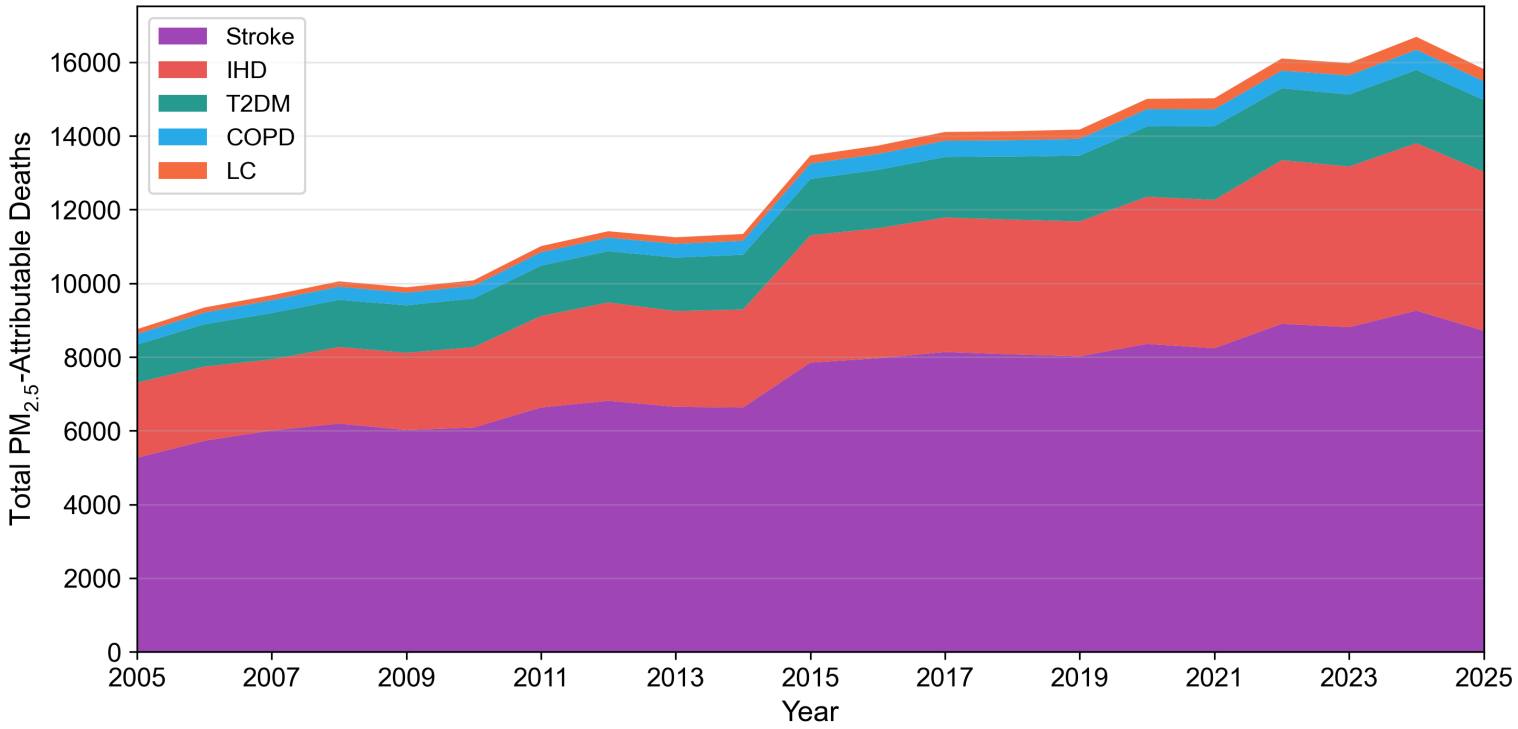


LAMONT-DOHERTY EARTH OBSERVATORY
COLUMBIA CLIMATE SCHOOL

Anand et al. *(in prep)*

$PM_{2.5}$-attributed adult mortalities

- **Allows quantification of disease-specific mortalities associated with $PM_{2.5}$ exposure.**
- **Diseases:** Stroke, Ischemic Heart Disease (IHD), Type-2 Diabetes Mellitus (T2DM), Chronic Obstructive Pulmonary Disease (COPD) and Lung Cancer (LC).



Anand et al. *(in prep)*

Thank you!

Westervelt Aerosol Group

CLEAN AIR FUND

Kintampo Health Research Centre

COLUMBIA
COLUMBIA UNIVERSITY
IRVING MEDICAL CENTER

epa

And many more local collaborators from Ghana…

Modeling Truck-Attributable PM2.5 and Health Risks in Little Village, Chicago, Pre- and Post-COVID-19

Yi-Ling Cheng, PhD Student
Division of Environmental and Occupational Health Sciences
School of Public Health | University of Illinois Chicago

HEI Annual Conference 2026 | April 26, Chicago, IL

UNIVERSITY OF ILLINOIS CHICAGO

Medium/heavy-duty trucks

- **~6%** of total US on-road vehicles but
- produce **~55%** of on-road PM2.5

Communities near freight corridors carry a **disproportionate burden**

Truck PM2.5 and health impacts at **neighborhood scale** are rarely quantified

How we estimated truck PM2.5 concentration

MOVES
Motor Vehicle Emission Simulator

AERMOD View™

Lakes Software

BenMAP
COMMUNITY EDITION

Truck Annual Average Daily Traffic (AADT) in Cook County between 2019 and 2023

$PM_{2.5}$ Emissions

$PM_{2.5}$ Concentrations

Trends of estimated truck PM2.5 concentration

“Truck emissions decreased, but **pollution hotspots and inequities persisted**.”

UNIVERSITY OF ILLINOIS CHICAGO

How does the reduction affect health?

Age 35+

0.60

preventable premature deaths/yr

(95% CI: 0.28-0.92)

→ **$5.2 M/yr**

Age 65+

0.12

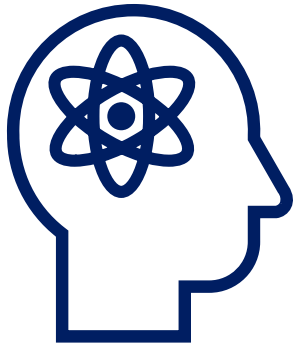
preventable premature deaths/yr

(95% CI: 0.1-0.13)

→ **$0.97 M/yr**

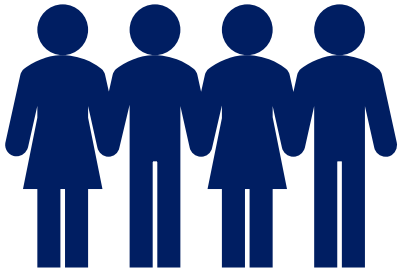
UIC UNIVERSITY OF ILLINOIS CHICAGO

What's next?



Data-adaptive exposure prediction modeling

- Scalable **truck-attributable emission $PM_{2.5}$ exposure modeling** (MOVES-AERMOD+ machine-learning models)
- Evaluate **targeted mitigation in EJ communities**



Expand study populations to broader Chicago area

- **Expand age groups**
- Include **additional health endpoints**

UNIVERSITY OF ILLINOIS CHICAGO

Acknowledgement

UNIVERSITY OF ILLINOIS CHICAGO
School of Public Health

UIC ENGINEERING
Civil, Materials, and Environmental Engineering

Illinois Department of Transportation

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Illinois Environmental Protection Agency

Thank you!

Poster Session 1 @3:30-5PM

Poster #3

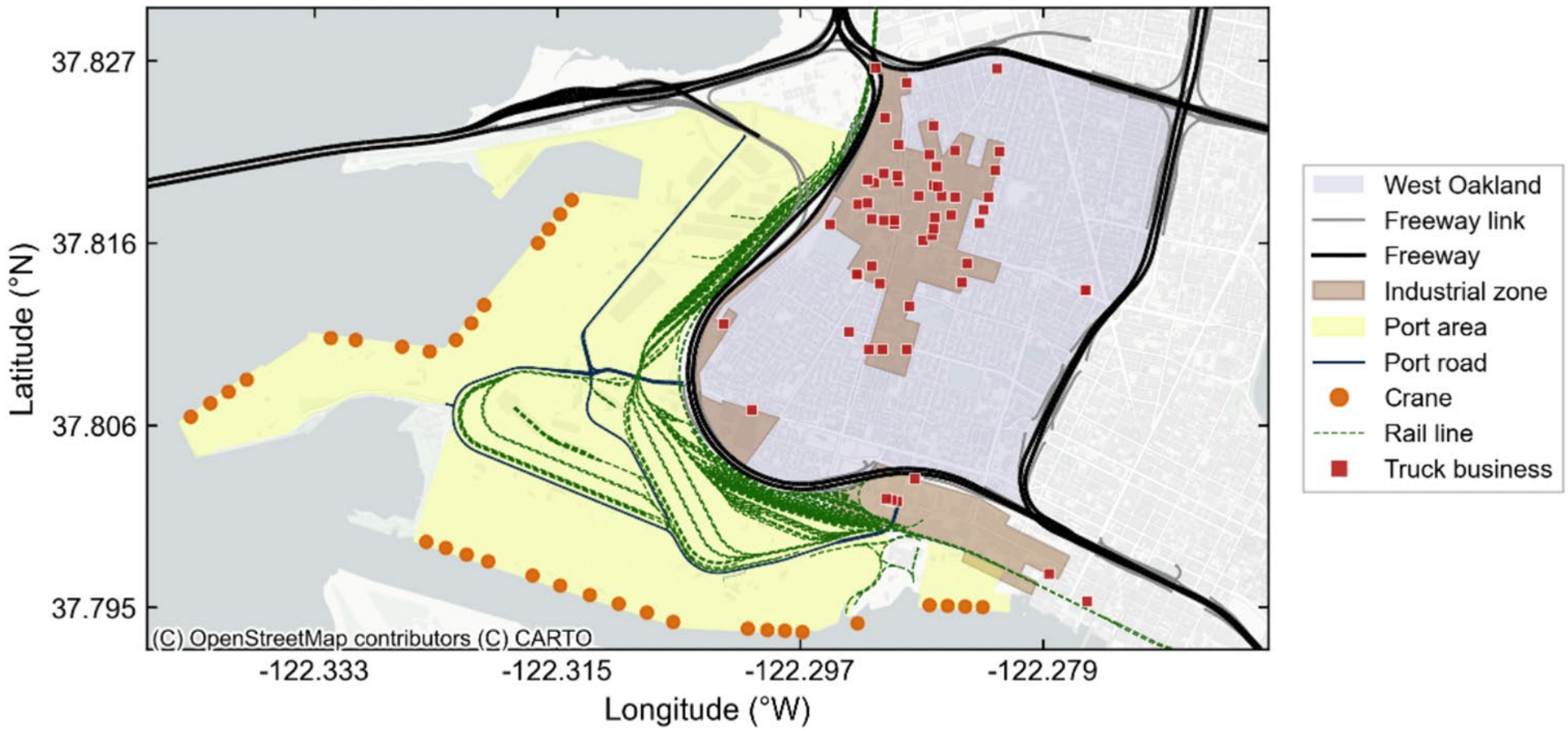
Hope to see you there! ☺

West Oakland, CA: A Decade of Air Quality Improvements sensed through mobile monitoring

Dr. Sam Cliff
Postdoctoral Researcher
University of California Berkeley

Berkeley

West Oakland community

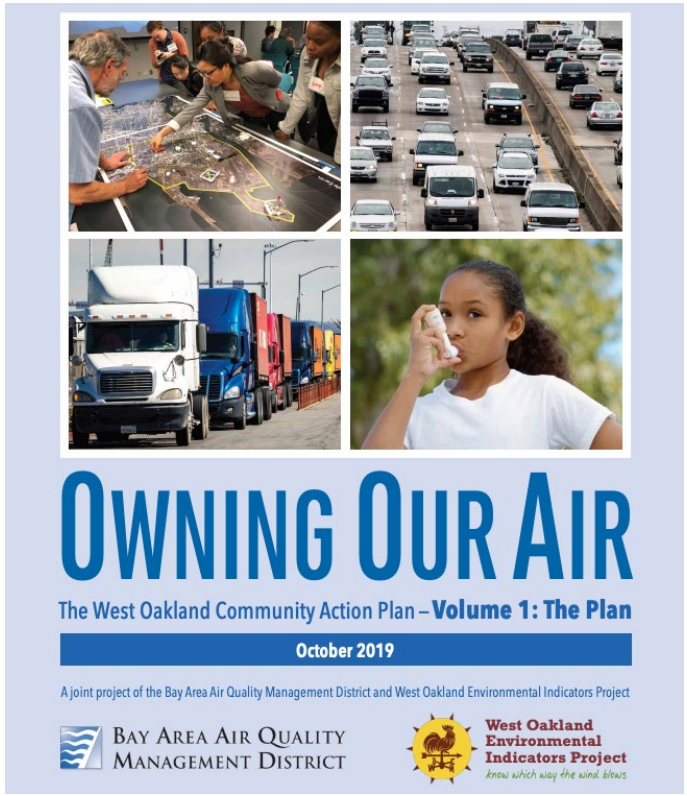


Berkeley

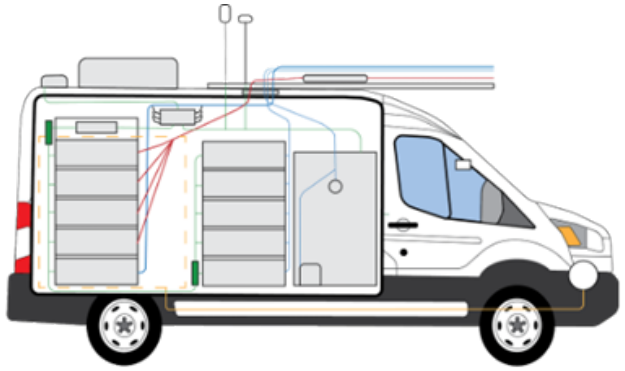
California air pollution mitigation strategies

Truck and Bus Regulation

Assembly Bill 617



Mobile measurements strategy



x 20

Four-season sampling

Repeatedly sample air pollution in community with mobile measurements

Generate high spatial resolution concentration maps

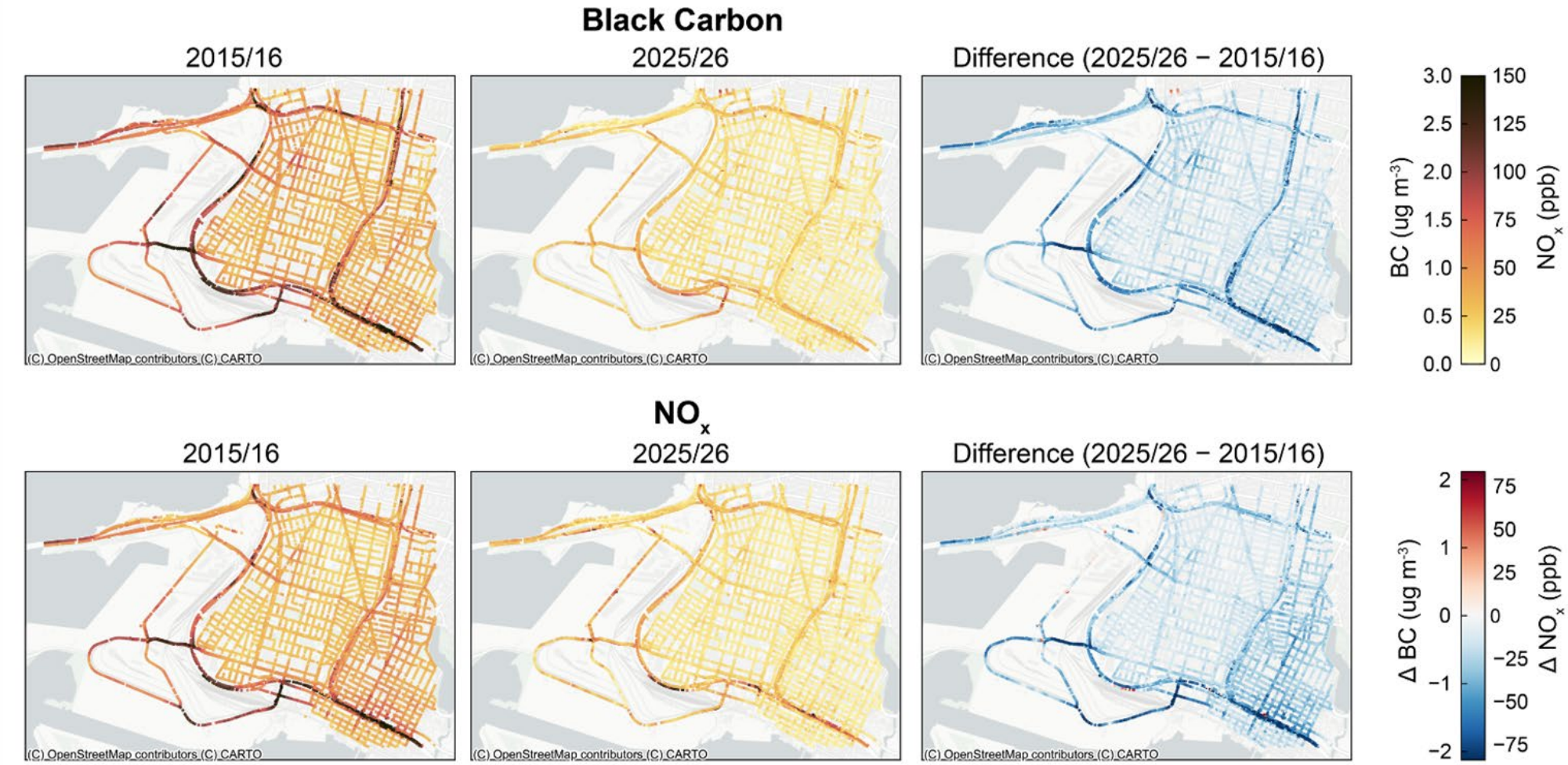
Street View

UC Berkeley Mobile Air Pollution Laboratory

2015/16 2025/26

Conduct a decade apart and study changes

Data products: concentration changes by 30m road segment



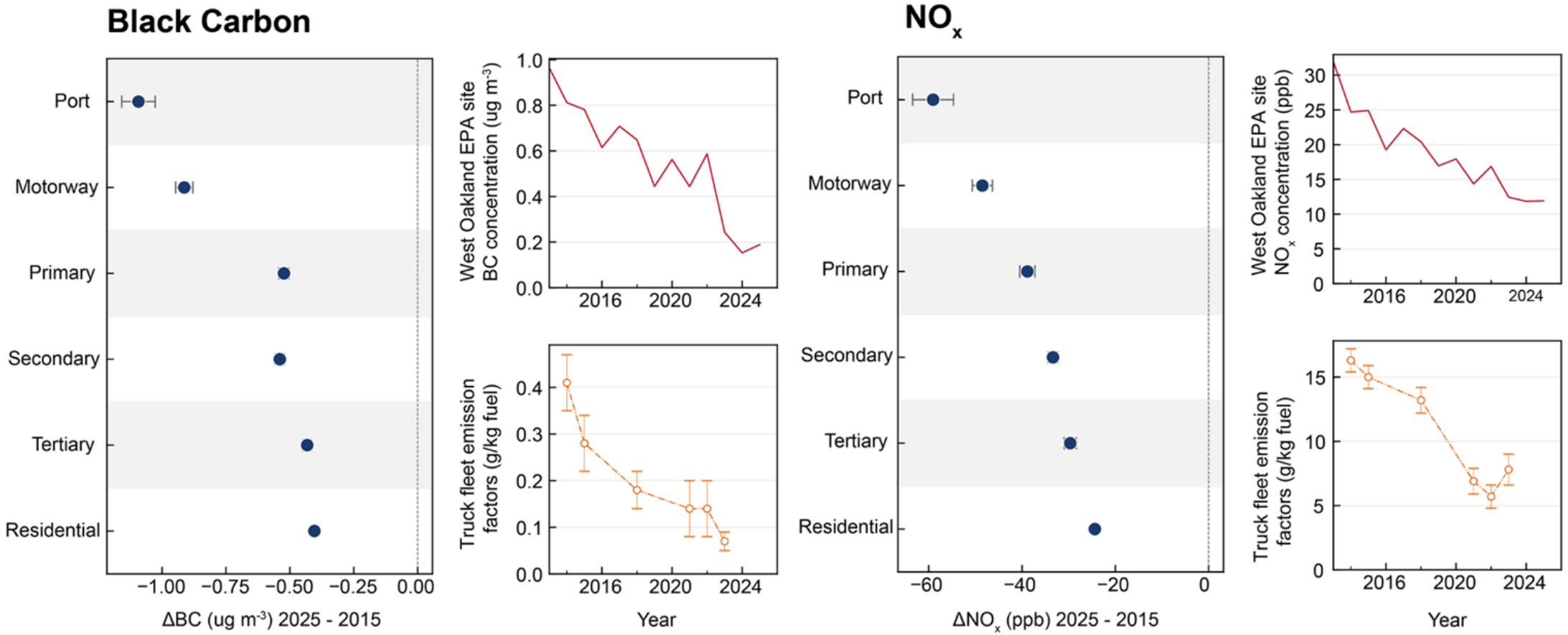
High density residential

↓ 60%

Berkeley

What has changed in the last decade? – Truck emissions regulations

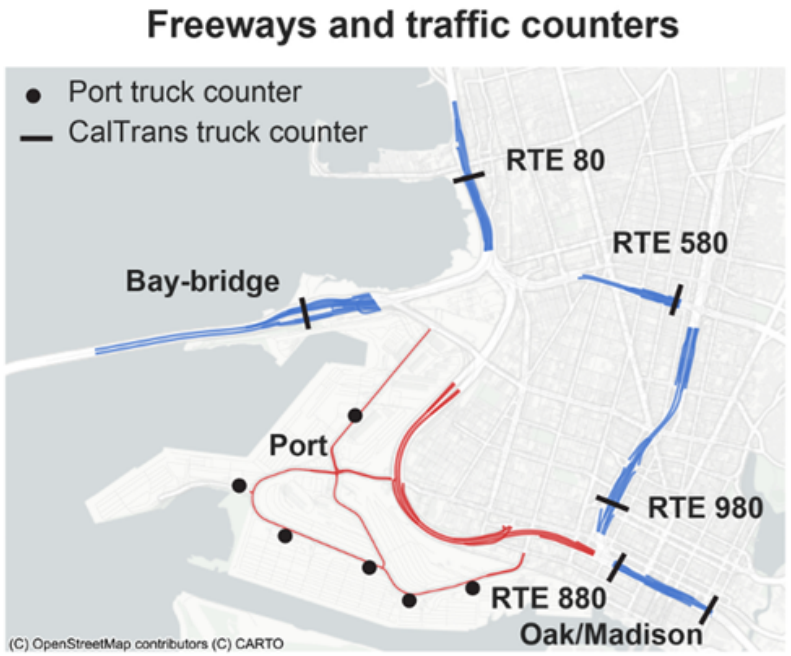
Truck emissions regulations are the major reason for exposure reductions

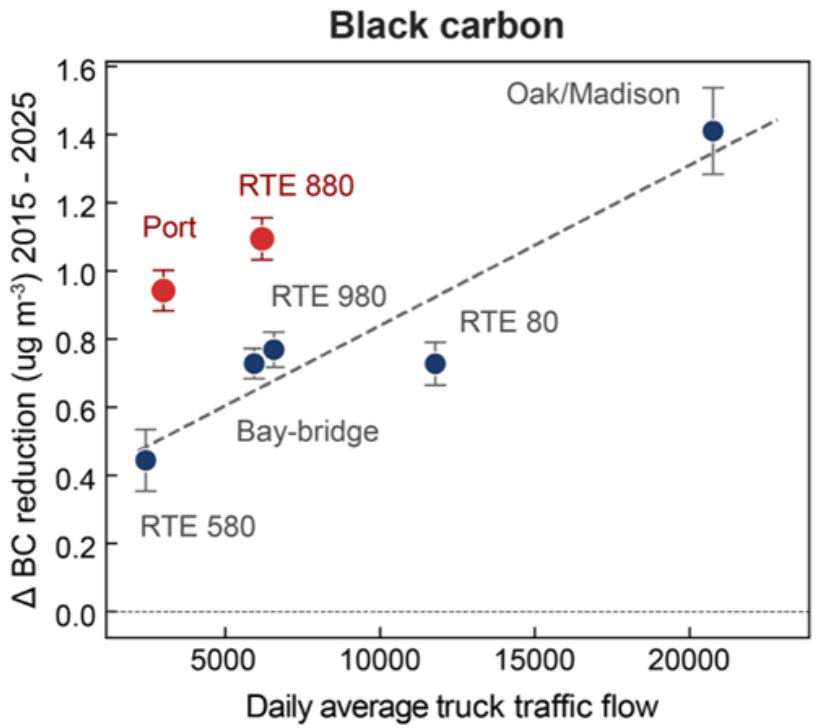


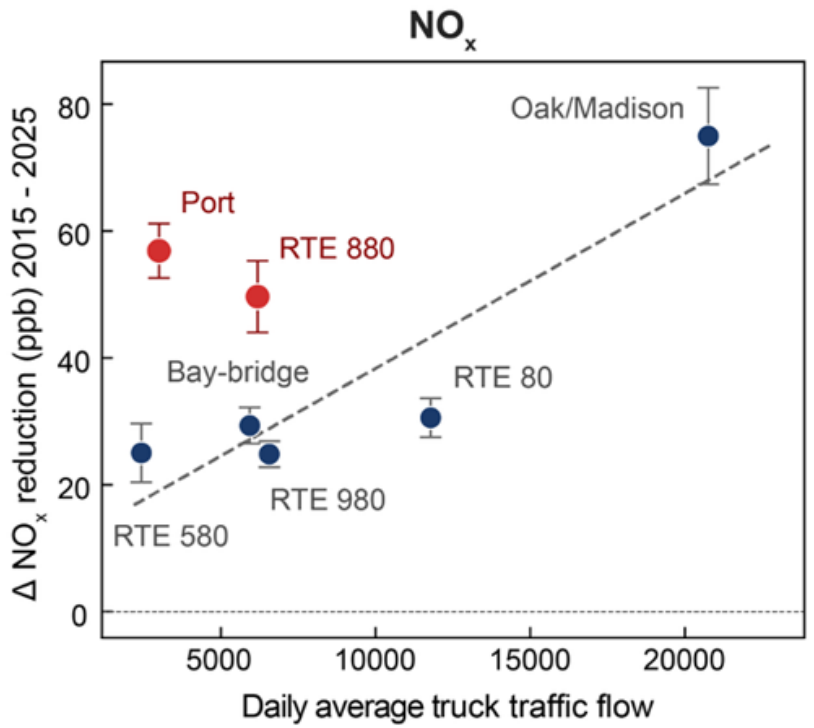
Berkeley

What has changed in the last decade? – AB617 port investments

AB617 investments: $40+ million into upgrading diesel-powered port equipment







Berkeley

Mapping the spatial distribution of sub-10 nm particles in Raleigh, NC

Jonah Hazelwood[1]

Contributing Authors: Nicholas Meskhidze[1], Lintong Cai[2], Stephanie Bachman[1], Markus Petters[2]

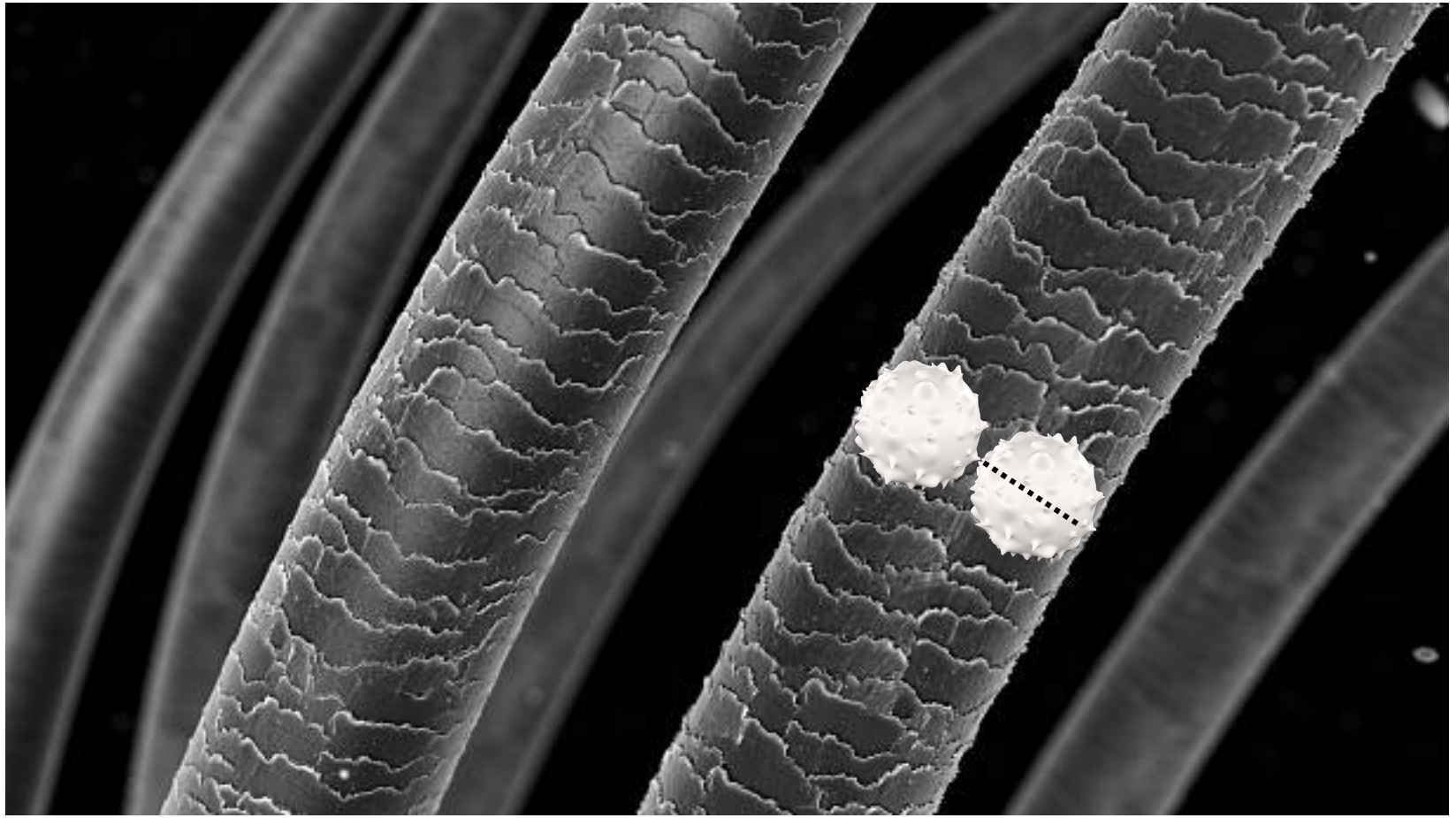
[1] *North Carolina State University*
[2] *University of California, Riverside*

Perspective of Size

Human Hair: 50 µm

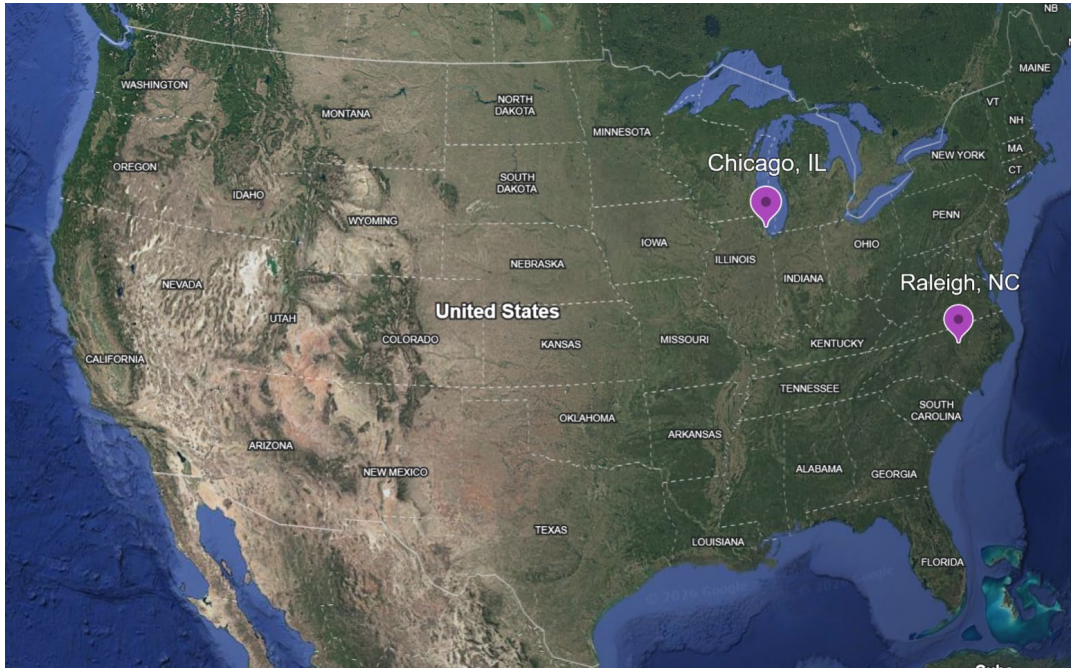
White Blood Cell: 25 µm

5000 10-nm particles to equal 1 human hair!



Objective

- Map the spatiotemporal distribution of sub-10 nm particles across Raleigh, NC
- Identify hotspots of sub-10 nm particles
- Source Attribution

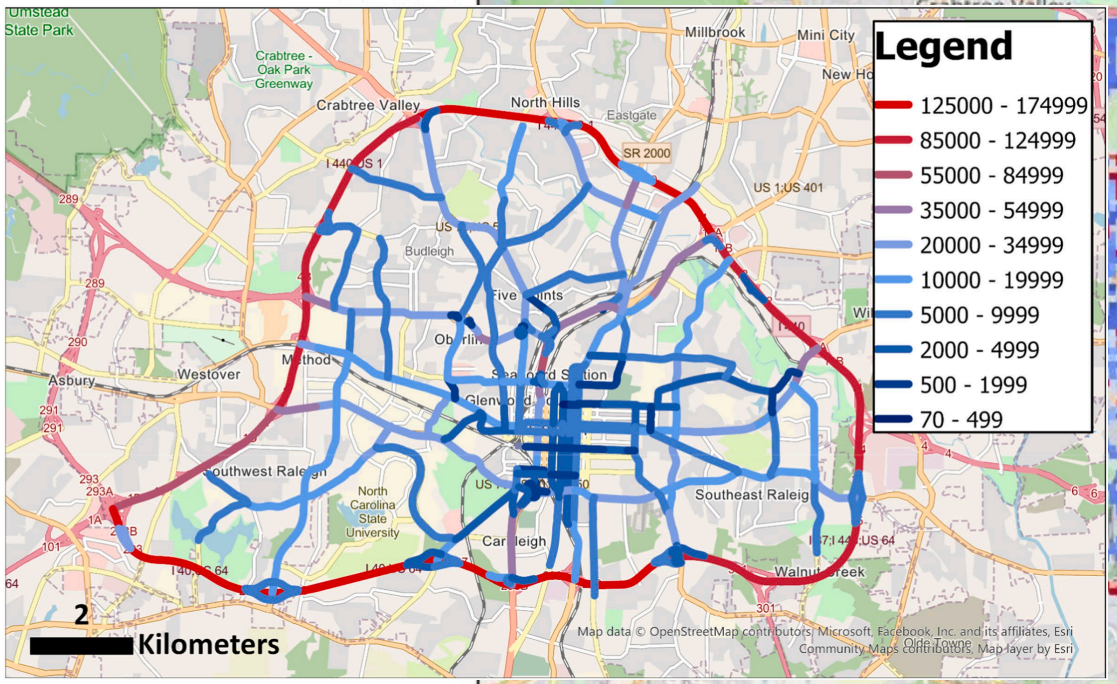


Results

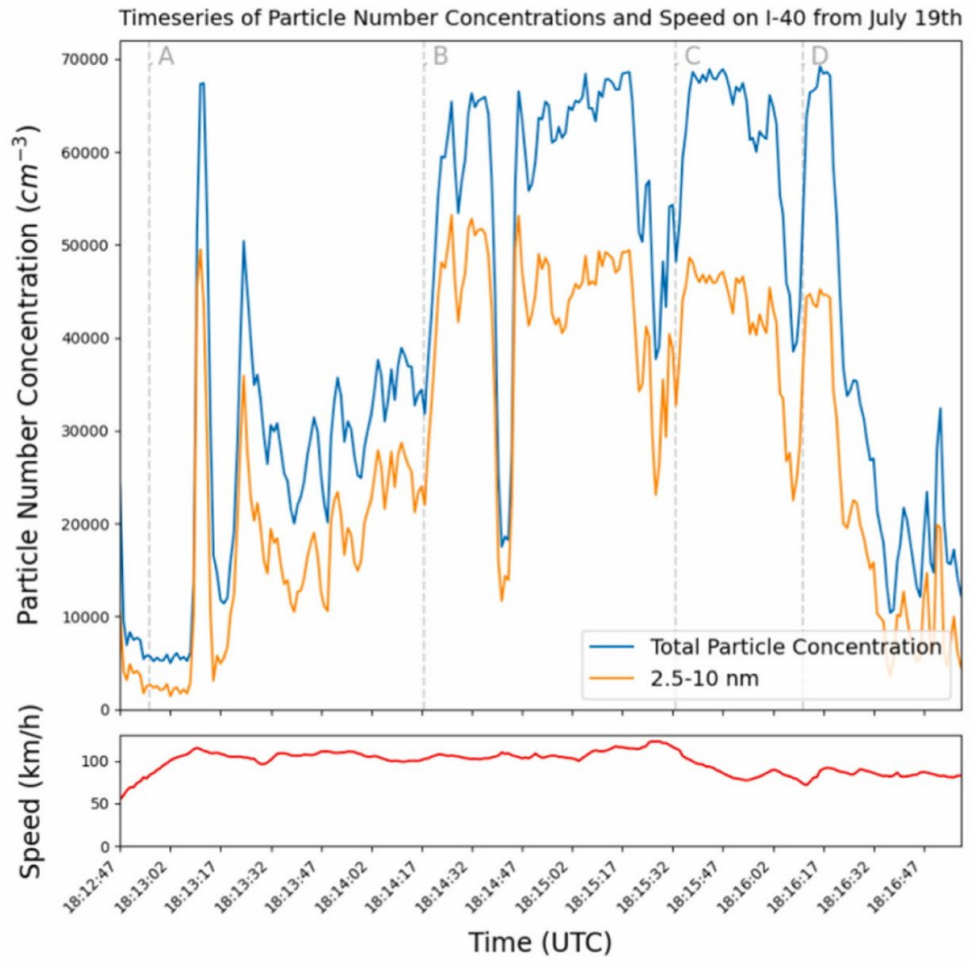
∗ 2.5-10 nm particle ∗ concentrations are dominated by vehicle emissions and traffic activity

Annual Average Daily Traffic (AADT) from NCDOT

Gridded averages of 2.5-10 nm concentrations for all research drives



Results



∗ Next: Diesel Additive Impacts on sub-10 nm Emissions ∗

∗ • High-emission events are closely correlated with diesel vehicles ∗
• More than 70% of total particle number is 2.5-10 nm
• Concs. drop to background a short distance from the interstate

NC STATE UNIVERSITY UC RIVERSIDE UCR CE-CERT

Conclusions

- 2.5-10 nm particle concentrations are dominated by vehicle emissions and traffic activity
- High-emission events are closely correlated with diesel vehicles
- More than 70% of total particle number is 2.5-10 nm
- Concentrations drop to background a short distance from the interstate

jdhazelw@ncsu.edu

This paper

Hazelwood et al., 2026

Related Papers

Bachman et al., 2026

Cai et al., 2026

References

- Chen, Y., Gu, P., Schulte, N., Zhou, X., Mara, S., Croes, B. E., et al. (2022). A new mobile monitoring approach to characterize community-scale air pollution patterns and identify local high pollution zones. *Atmospheric Environment*, *272*, 118936. https://doi.org/10.1016/j.atmosenv.2022.118936
- Rader, D. J., & Marple, V. A. (1988). A Study of the Effects of Anisokinetic Sampling. *Aerosol Science and Technology*, *8*(3), 283–299. https://doi.org/10.1080/02786828808959190
- ur Rahman, M. (2021). Chapter 2 - Sources of nanomaterials. In M. B. Tahir, M. Sagir, & A. M. Asiri (Eds.), *Nanomaterials: Synthesis, Characterization, Hazards and Safety* (pp. 15–29). Elsevier. https://doi.org/10.1016/B978-0-12-823823-3.00007-0
- Shin, D., Kim, Y., Joe, Y.-H., Lee, G., Hong, K., Park, I., et al. (2022). Development of a sampling probe with a small non-isokinetic sampling error in variable flow velocity environments. *Aerosol Science and Technology*, *56*(10), 906–916. https://doi.org/10.1080/02786826.2022.2100241

Development of an Emissions Inventory for Illinois Warehouses for Modeling the Implementation of an Indirect Source Rule

Anastasia Oehlerking[1], Victoria Lang[1], Samuel Becker[2], Robert Weinstock[3], and Daniel Horton[1]

[1] Northwestern Department of Earth, Environmental, and Planetary Sciences, Weinberg College of Arts & Sciences
[2] Environmental Defense Fund
[3] Northwestern Pritzker School of Law

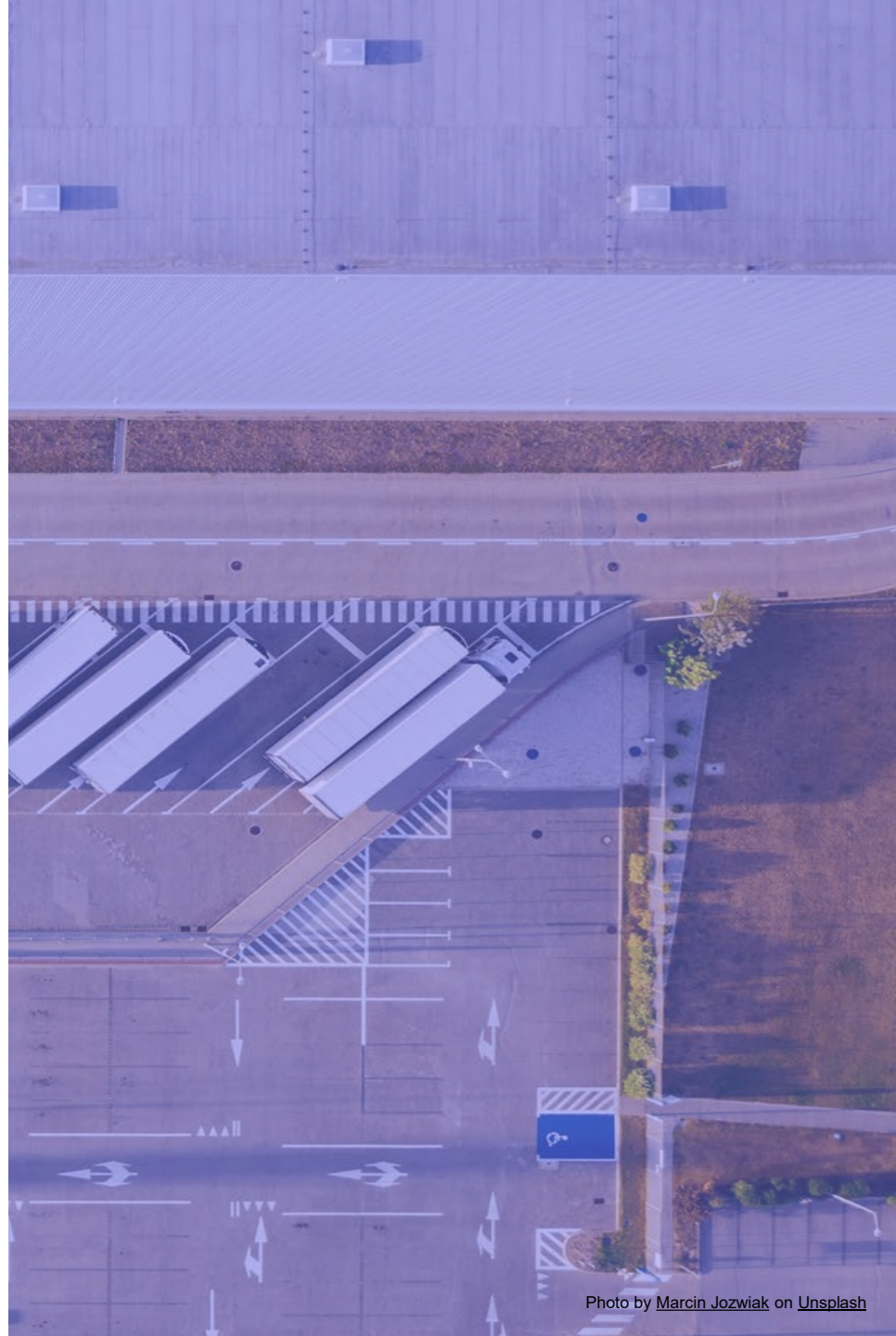
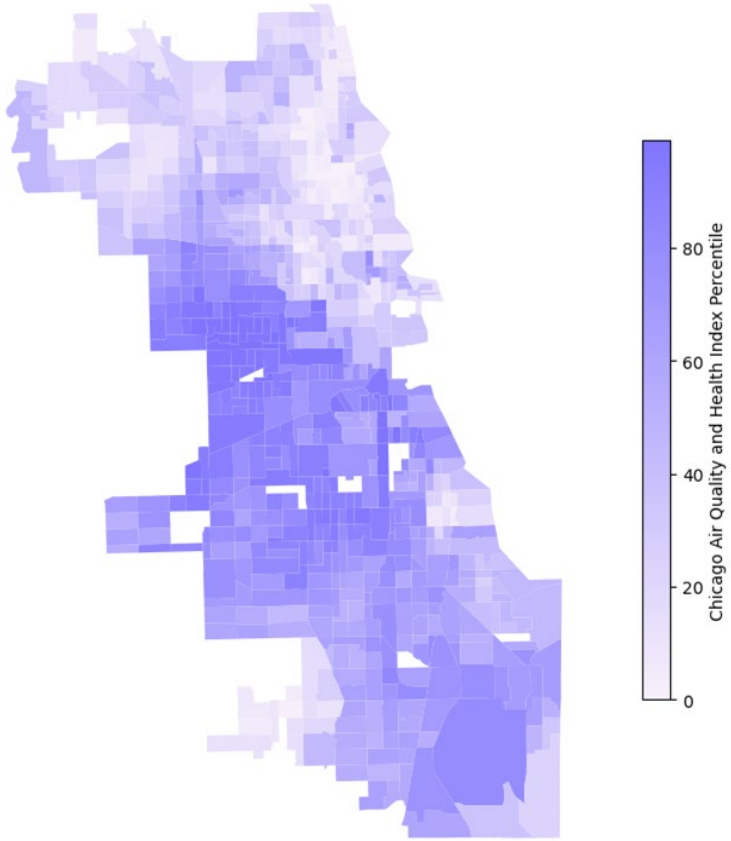
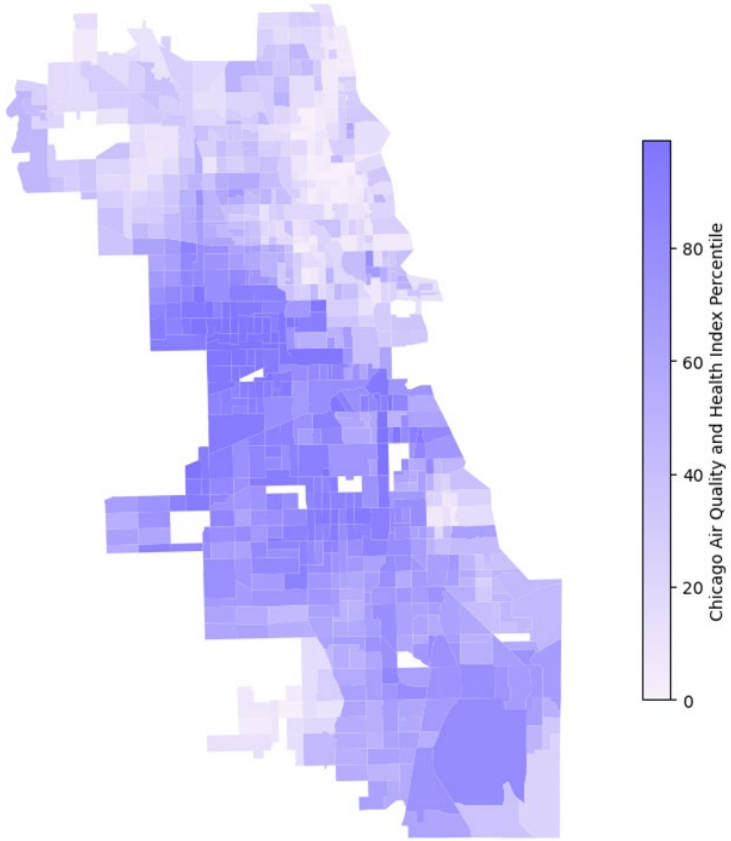


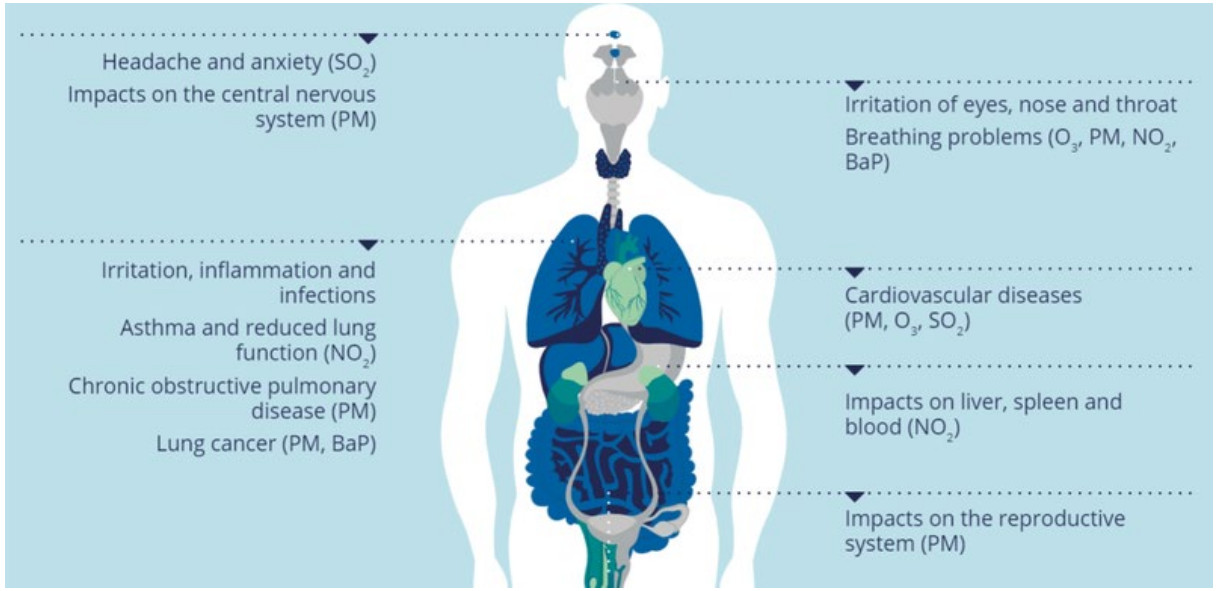
Photo by Marcin Jozwiak on Unsplash

Community-Level Air Quality Inequities



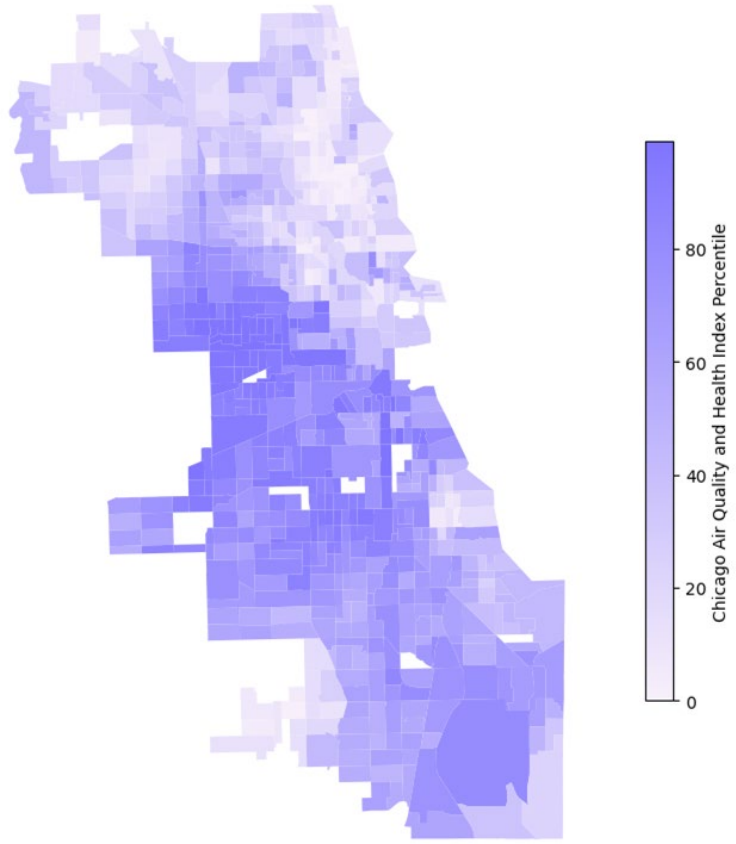
Community-Level Air Quality Inequities

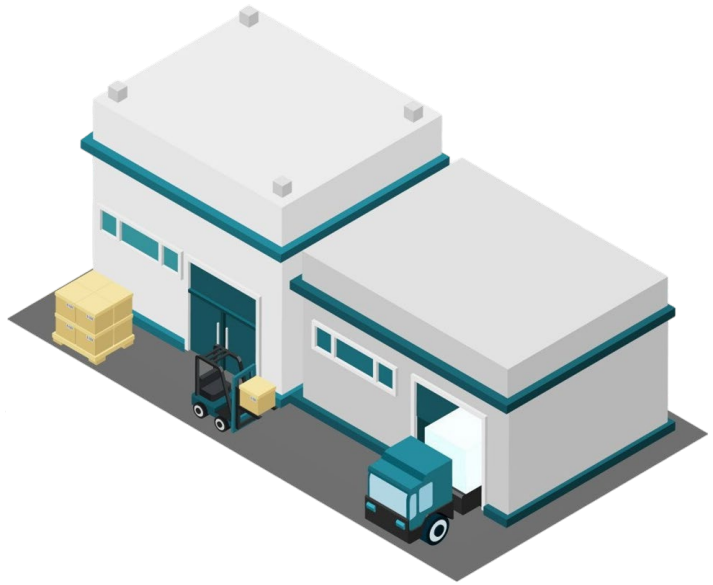




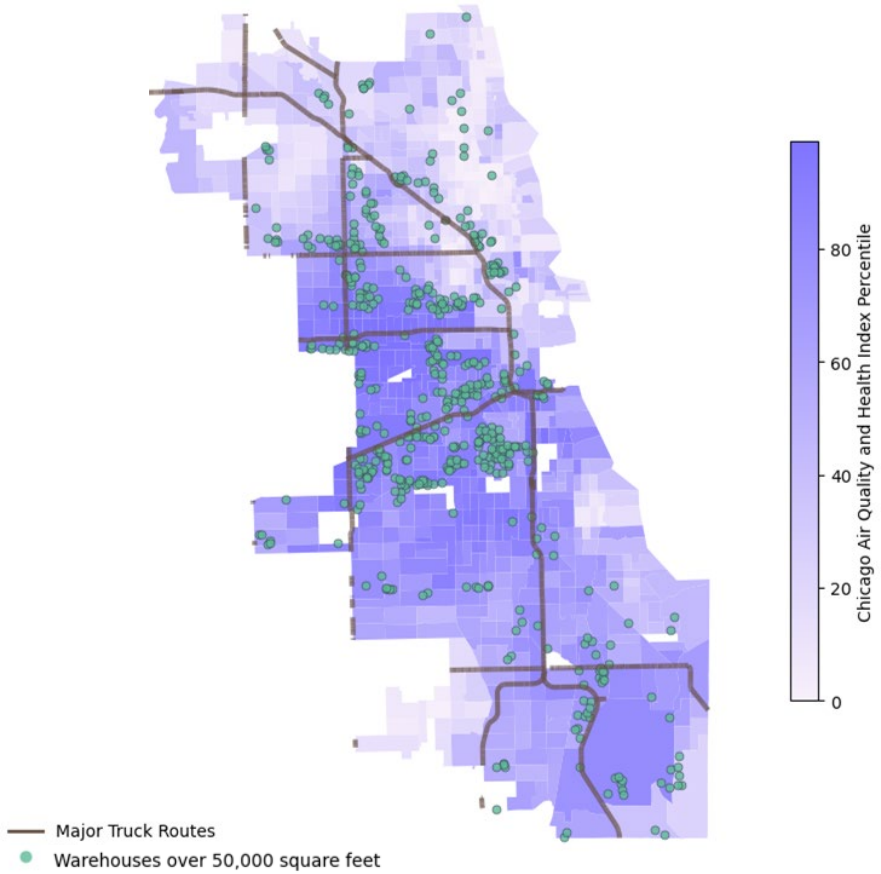
Source: European Environment Agency

Warehousing Emissions

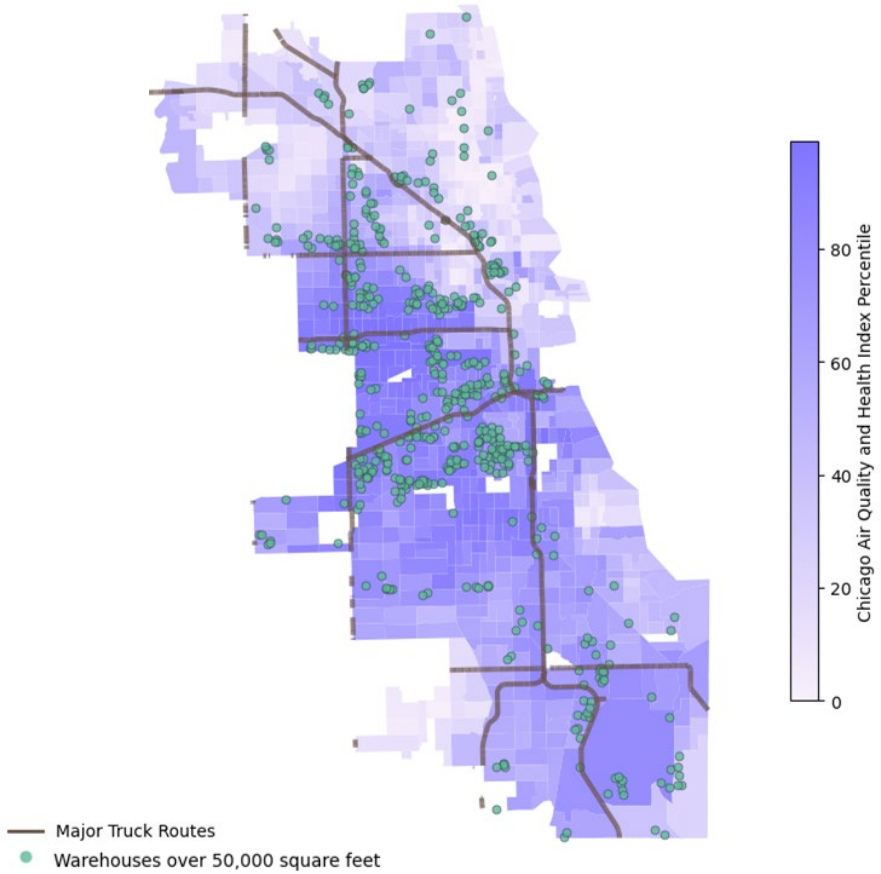




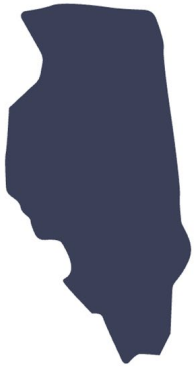
Warehousing Emissions



Warehousing Emissions and Policy Solutions

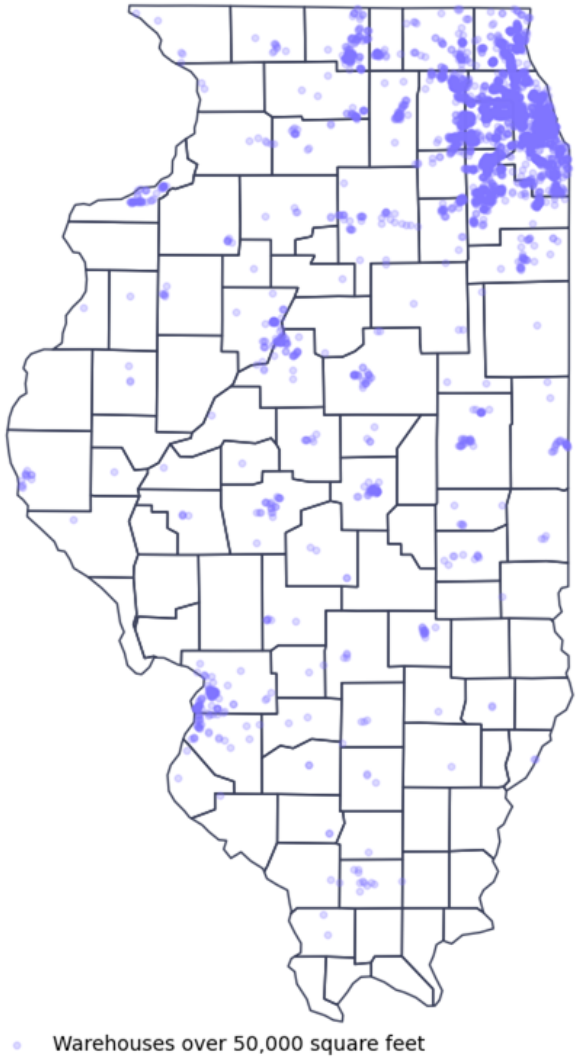


Indirect Source Rule (ISR)



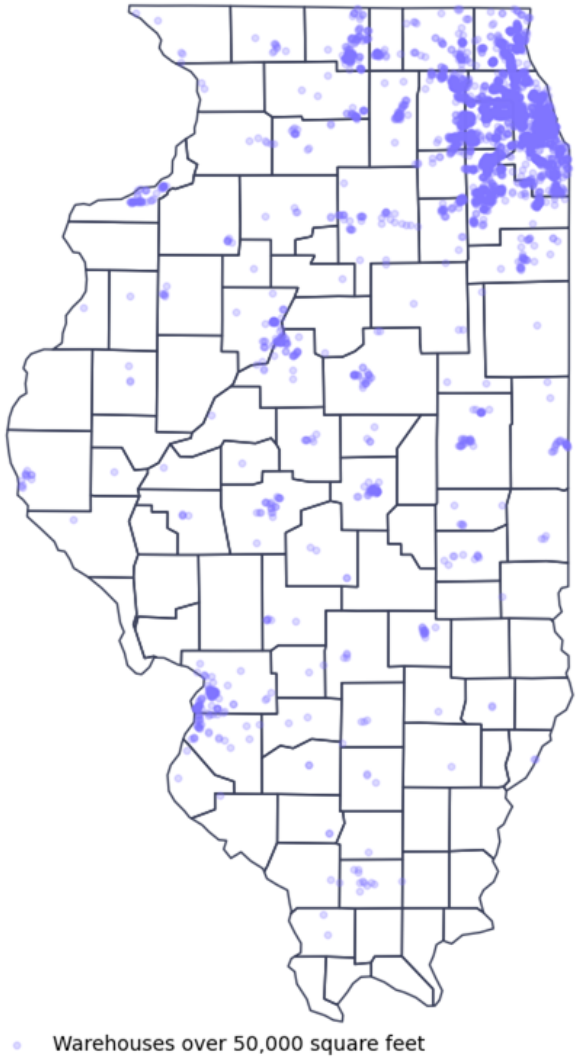
Warehouse Pollution Reduction Act (WPRA)

Project Methodology



Project Methodology

Warehouse Emissions =
Medium- and Heavy-Duty Trucks
+ *On-Site Vehicles*
+ *On-Site Building-Level Fuel Use*
+ *Truck Refrigeration Units (TRUs)*



Project Methodology

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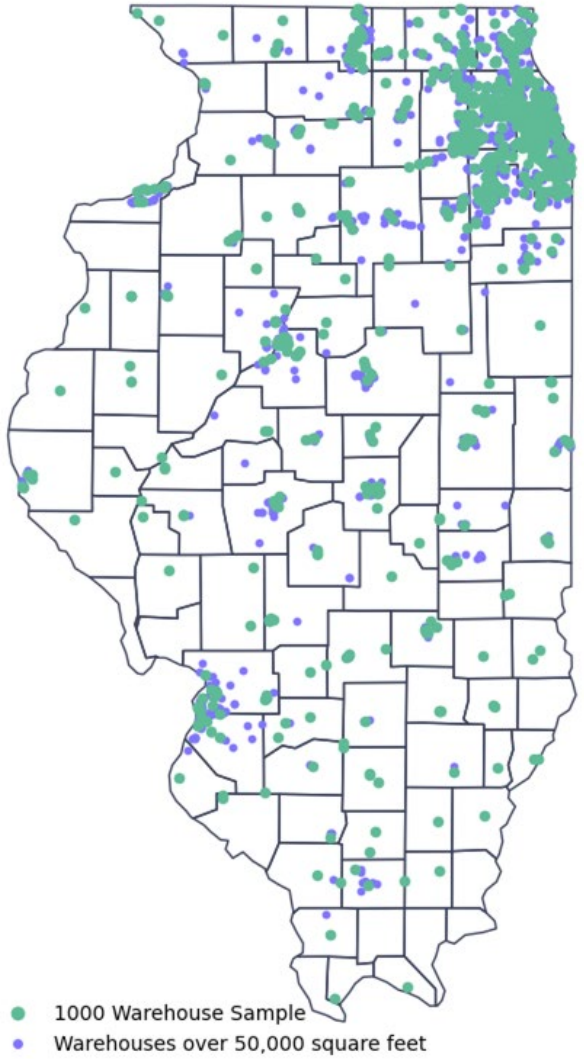


Project Methodology

South Coast AQMD

CoStar™

MOVES
Motor Vehicle Emission Simulator

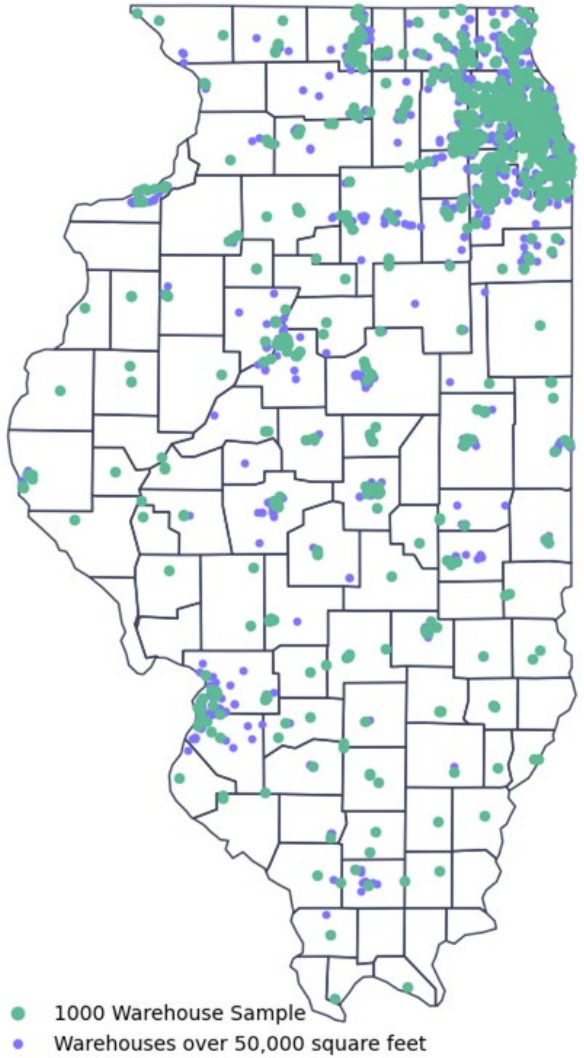
LADCO

eia

LOCUS

Warehouse Emissions =

Medium- and Heavy-Duty Trucks
+ On-Site Vehicles
+ On-Site Building-Level Fuel Use
+ Truck Refrigeration Units (TRUs)



Ambient Air quality and health impacts of $PM_{2.5}$ from US residential wood combustion

Kyan K. Shlipak, Sara F. Camilleri, Victoria A. Lang, Anastasia Montgomery, Jordan L. Schnell, & Daniel E. Horton

Earth, Environmental, and Planetary Sciences, Northwestern University, Evanston, IL, USA

Northwestern | McCORMICK SCHOOL OF ENGINEERING

Residential Wood Combustion

Woodstoves

Fireplaces

Furnaces

Residential Wood Combustion

28%

Winter $PM_{2.5}$ Emissions (NEI)

Residential Wood Combustion

28%

Winter $PM_{2.5}$ Emissions (NEI)

2%

Primary Heating

8%

Secondary Heating

Residential Wood Combustion

28%

Winter $PM_{2.5}$ Emissions (NEI)

2%

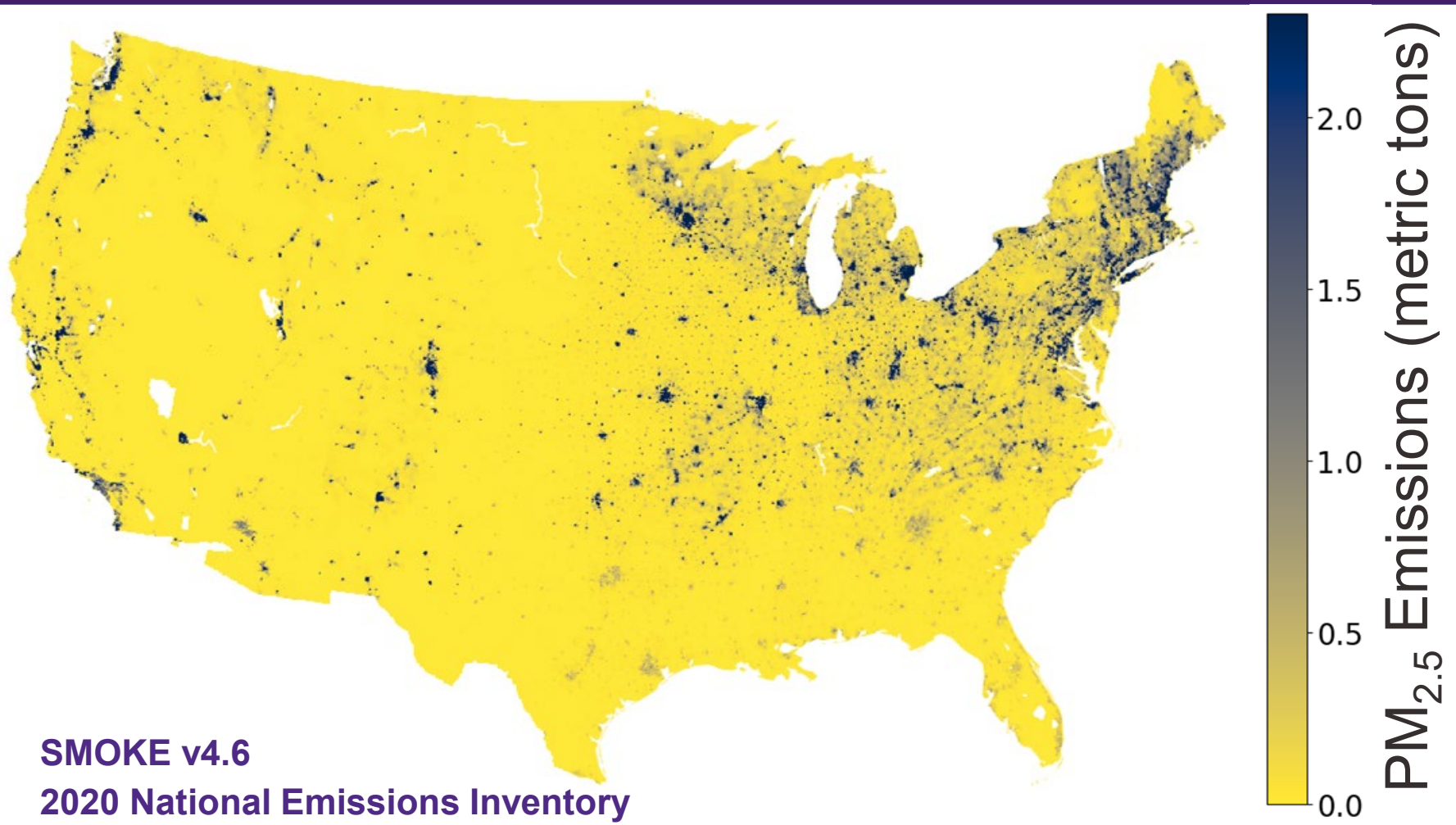
Primary Heating

8%

Secondary Heating

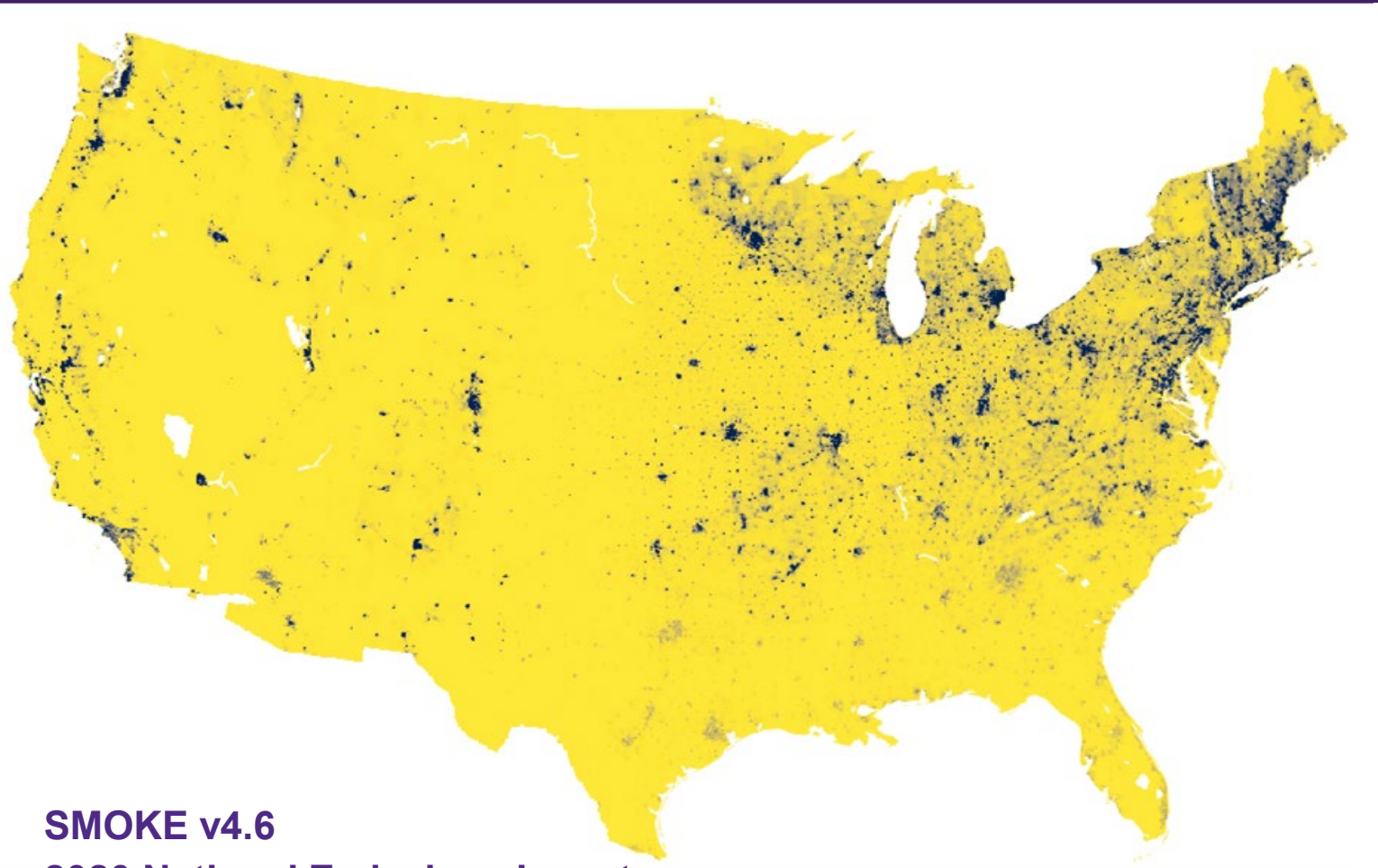
1. **Where** is the pollution
2. **What** are the impacts
3. **Who** is most impacted

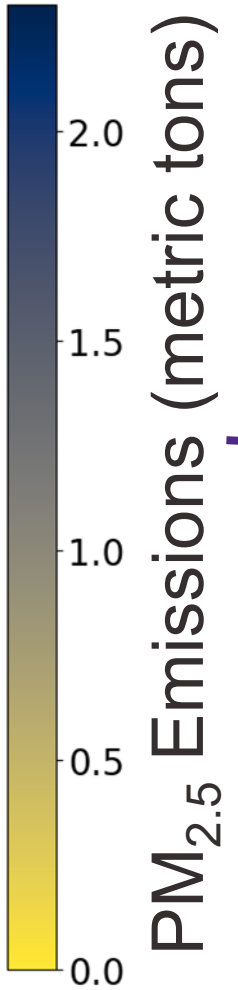
How Much Pollution and Where?



SMOKE v4.6
2020 National Emissions Inventory

How Much Pollution and Where?

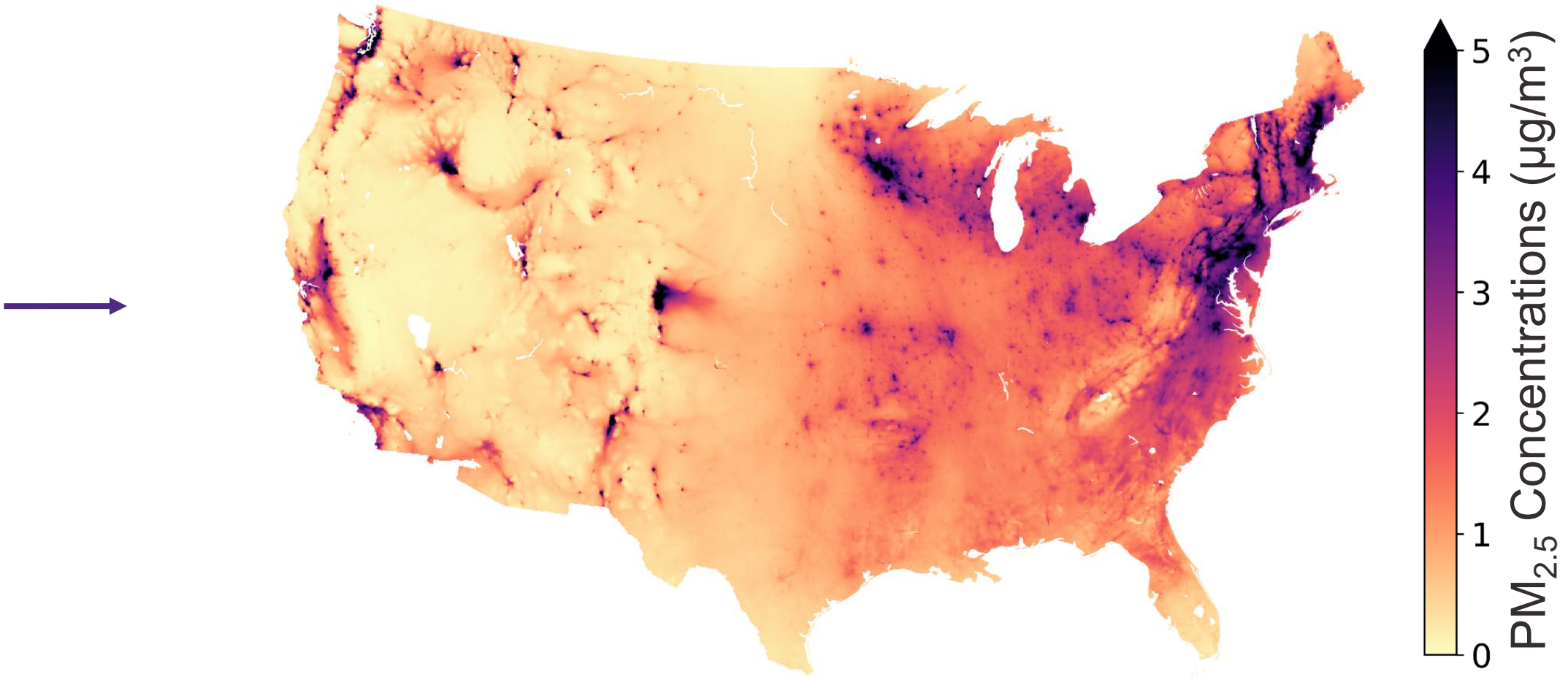




→ WRF-CMAQ

SMOKE v4.6
2020 National Emissions Inventory

How Much Pollution and Where?



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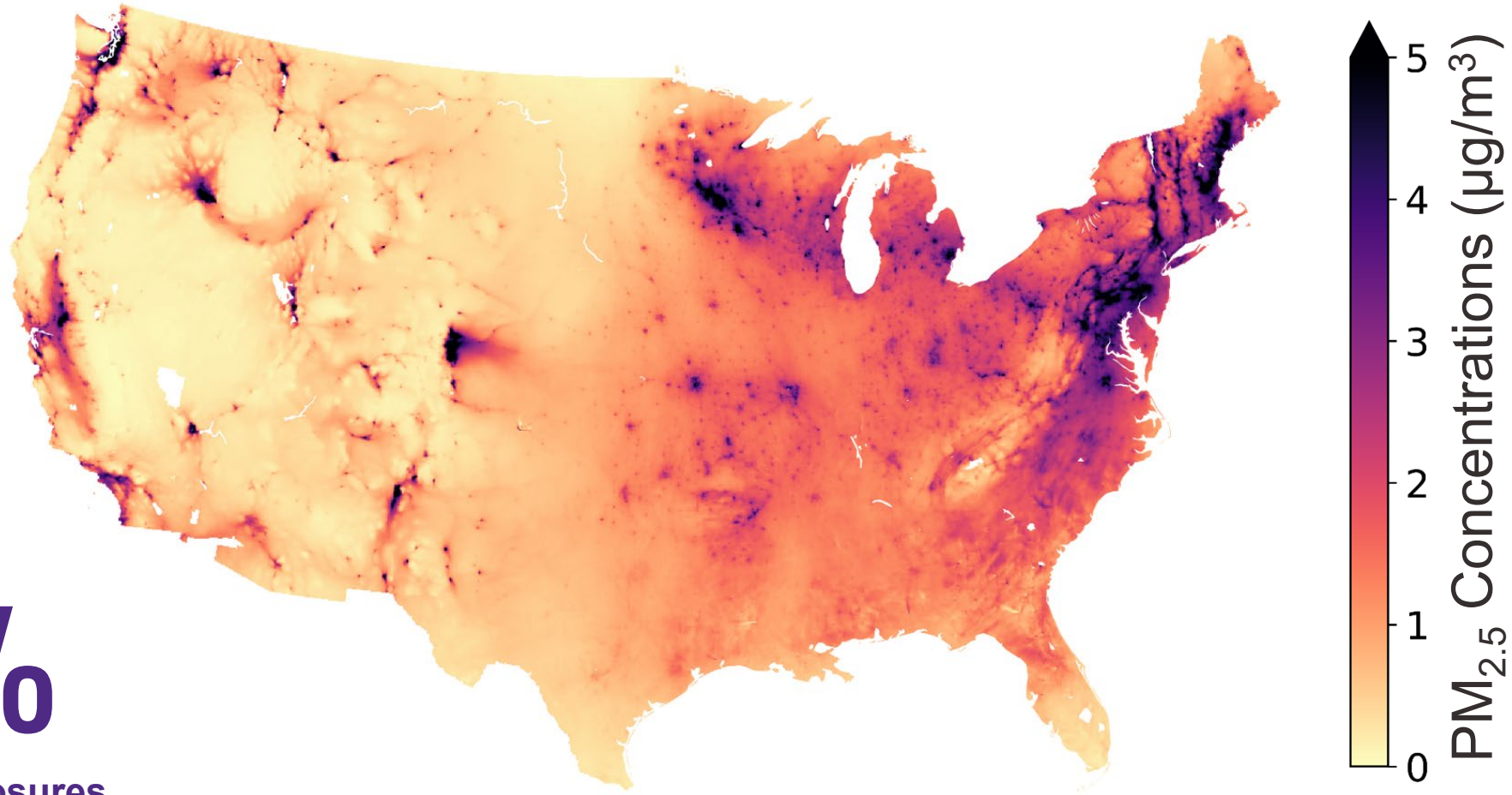
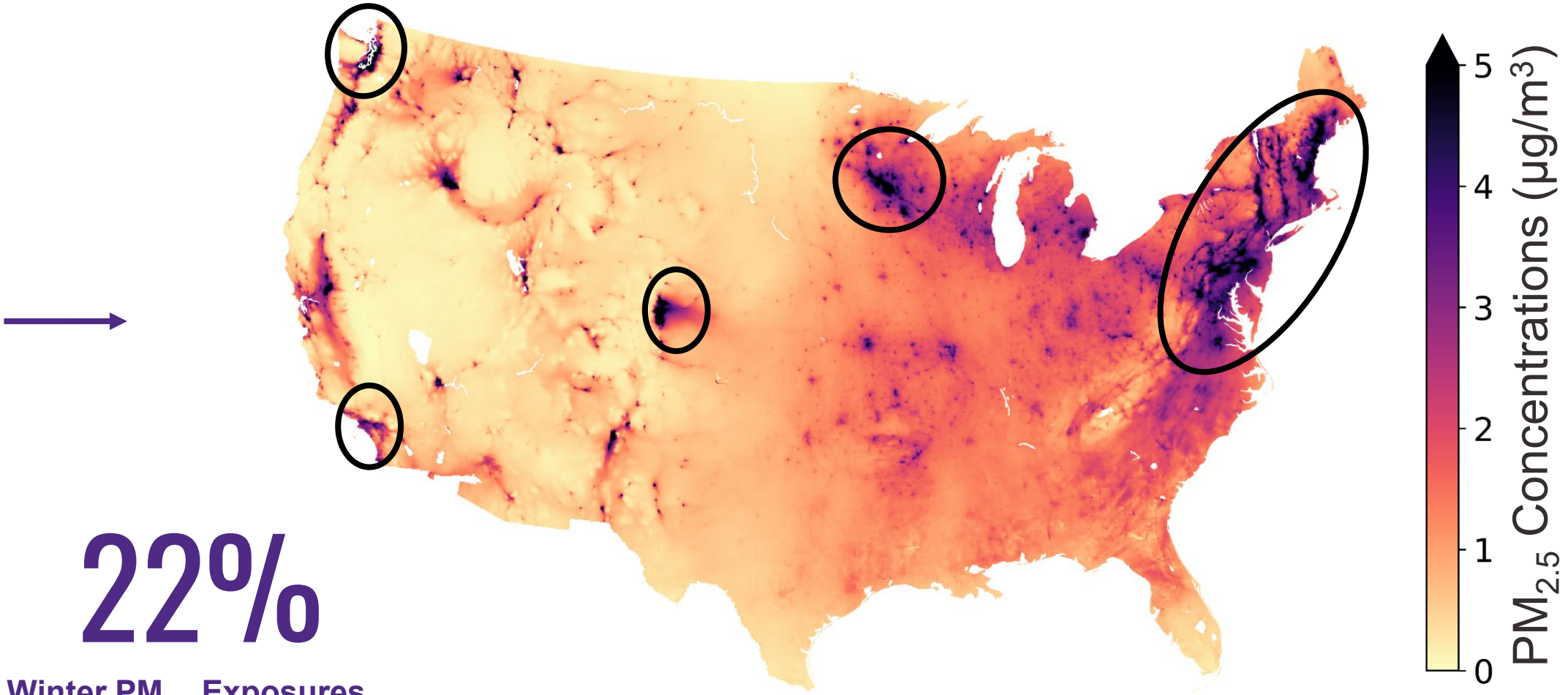


22%

Winter $PM_{2.5}$ Exposures

How Much Pollution and Where?



22%

Winter $PM_{2.5}$ Exposures

Who is Impacted?

Baseline mortality data

CRF (Chen & Hoek 2020)

8,600

Winter Attributable Mortalities

Who is Impacted?

Baseline mortality data

→

CRF (Chen & Hoek 2020)

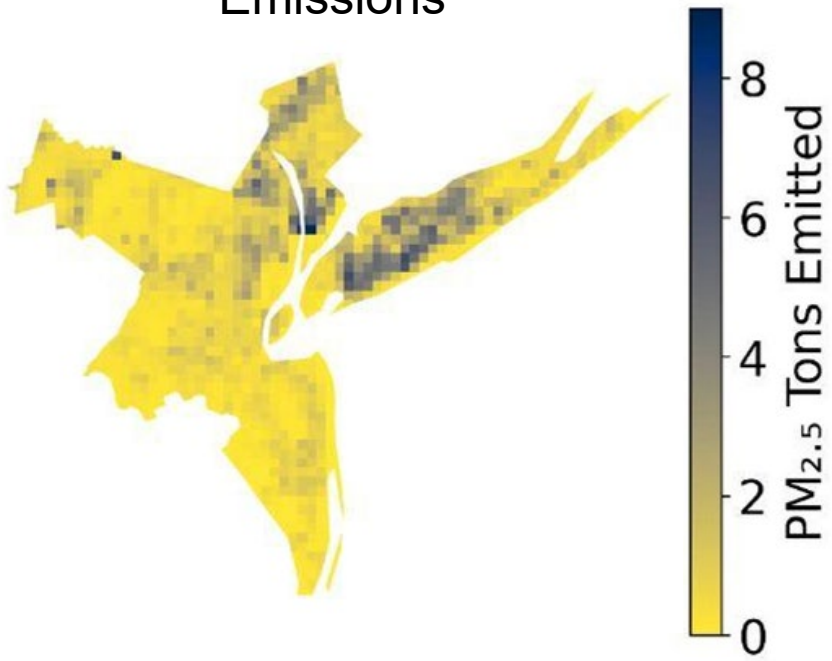
8,600

Winter Attributable Mortalities

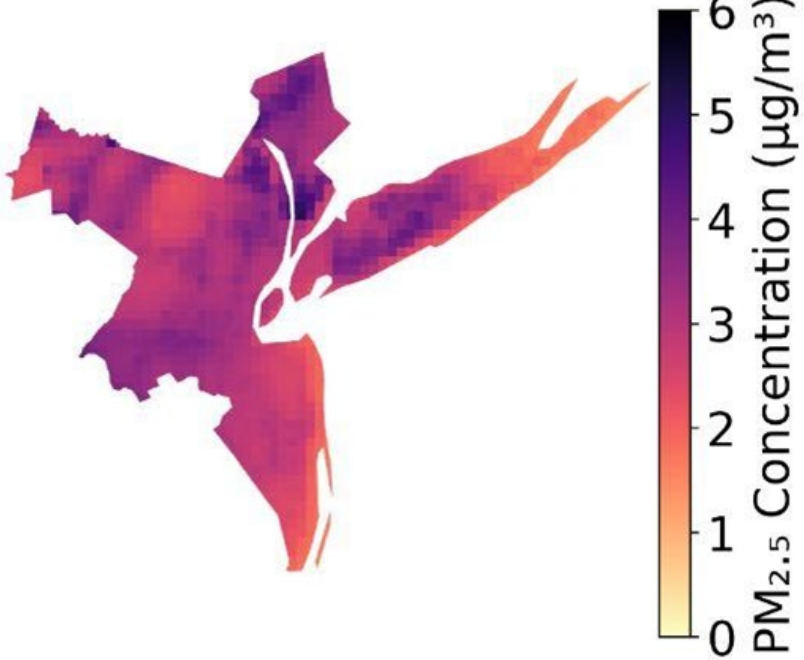
City	Attributable Mortalities
New York	545 (413, 610)
Philadelphia	308 (234, 345)
Los Angeles	300 (227, 336)
Chicago	207 (157,

New York City Case Study

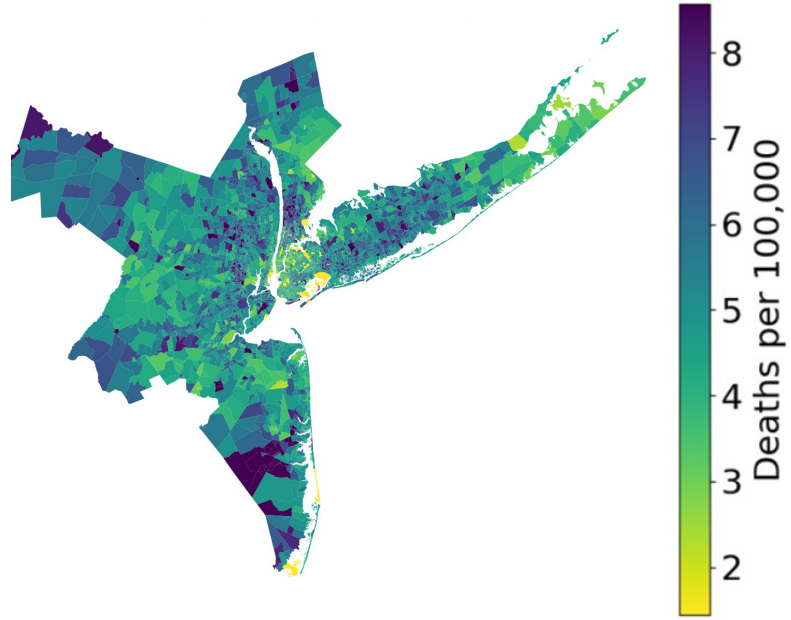
Emissions



Concentrations



Attributable Mortality Rate



Who is Impacted?

In the 20 most populated urban areas, people of color

Who is Impacted?

In the 20 most populated urban areas, people of color

15/20

Lower emissions

Who is Impacted?

In the 20 most populated urban areas, people of color

15/20 **Lower emissions**

18/20 **Higher exposures**

Who is Impacted?

In the 20 most populated urban areas, people of color

15/20	18/20	17/20
Lower emissions	**Higher exposures**	**Higher mortality rates**

Potential Mitigation Target

1. Little heat, lots of pollution
2. Residential wood burning contributes urban exposures
3. Thousands of deaths each winter
4. People of color bear a disproportionately large burden

CLIMATE CHANGE RESEARCH GROUP

Northwestern University

Thank you!

Full Study

Walter Rosenblith New Investigator Award

Named for Professor Walter A. Rosenblith (1913-2002), who served as the first Chair of HEI's Research Committee, and then as a member of the HEI Board of Directors.

The purpose of the award is to bring new, creative investigators into active research on the health effects of air pollution. It provides three years of funding for studies relevant to HEI's research interests to investigators with outstanding promise at the Assistant Professor or equivalent level.

HEI
Health Effects Institute

A prospective cohort study of air pollution and postpartum depression

AMELIA K. WESSELINK

HEALTH EFFECTS INSTITUTE ANNUAL CONFERENCE 2026

APRIL 26, 2026

Health Effects Institute

UNIVERSITAS BOSTONIENSIS CONDITA MDCCCXXXIX

Background & objectives

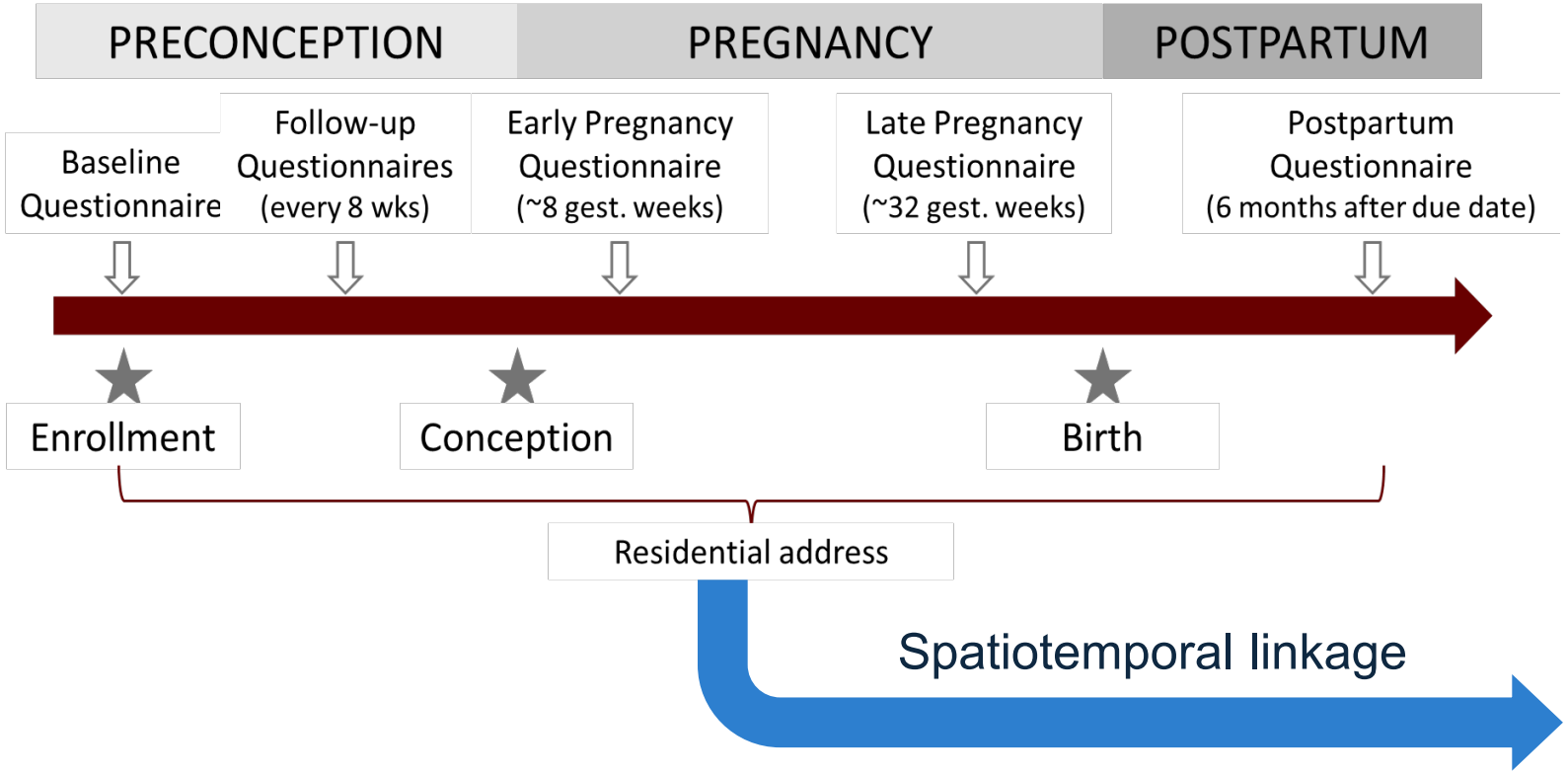
- Postpartum (perinatal) depression (PPD) is common, consequential, and understudied
- Environmental exposures – including air pollution – could influence PPD pathophysiological mechanisms
- Existing epidemiologic studies limited

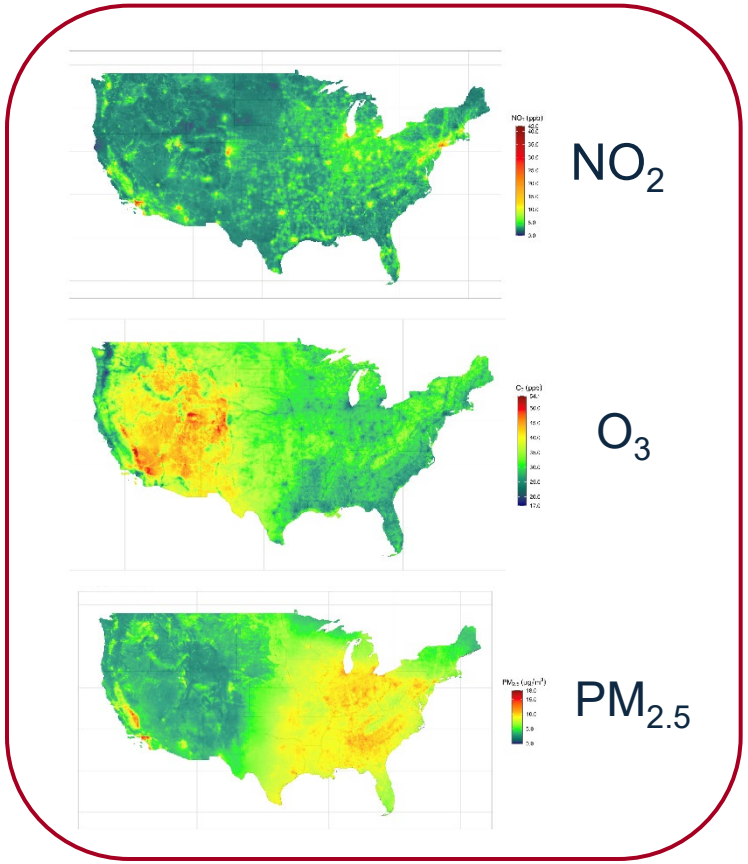
Bea Müller for the Washington Post

Objective: Assess the independent and joint effects of prenatal air pollution and heat on risk of PPD in a preconception cohort study

Pregnancy Study Online

- **Eligibility criteria**: aged 21-45 years, assigned female at birth, residing in U.S. or Canada, trying to conceive without fertility treatment





Approach

- Outcome: PPD, assessed via Edinburgh Postpartum Depression Scale score, self-reported doctor diagnosis, current treatment
- Exposures: Trimester-specific and gestational week-specific air pollutants ($PM_{2.5}$, NO_2, O_3) and temperature metrics
- Covariates: individual-level variables from PRESTO questionnaires, geospatial data linked to residential address (*e.g.*, green space, neighborhood disadvantage)
- Statistical models:
  - Modified Poisson regression
  - Distributed lag non-linear models
  - Probit Bayesian kernel machine regression

Acknowledgments

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- Perry Sheffield
- Jon Levy

PRESTO team

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- Mary Willis
- Kaylin Vrkljan
- Yael Nillni

UW collaborators

- Joel Kaufman

PRESTO participants

Funders

The research described in this presentation does not necessarily reflect the views of HEI, nor the views and policies of HEI's sponsors (US Environmental Protection Agency or motor vehicle and engine manufacturers).