SUMMER FELLOWSHIP

10- to 12-week summer fellowship program with a stipend of $6,500.

Fellowship available to undergraduate students (rising juniors and seniors) from backgrounds underrepresented in the environmental health sciences.

Students select mentors from a list of experts across the United States.

In partnership with ISEE and ISES and funded with support from the Burroughs Wellcome Fund, the Clinton Family Foundation, and individual donors.

HEI

SUMMER FELLOWSHIP 2023- INAUGURAL YEAR

Diana A. Cantoran-Perez
University of California, Berkeley

Mentor: Jun Wu, *University of California, Irvine*

Andrew Gallego
Boston University

Mentor: Sally Pusede, *University of Virginia*

Kai Kibilko
Brandeis University

Mentor: Jon Levy, *Boston University*

Thomas E. Ealey
Savannah State University

Mentor: Yang Liu, *Emory University*

Alyssa A. Kamara
University at Albany

Mentor: Yanelli Nunez, *PSE Healthy Energy*

Kyara Ralliford
Columbia University

Mentor: Robin Dodson, *Silent Spring Institute*

7 outstanding fellows selected from **52** applicants representing **30** institutions and **16** states.

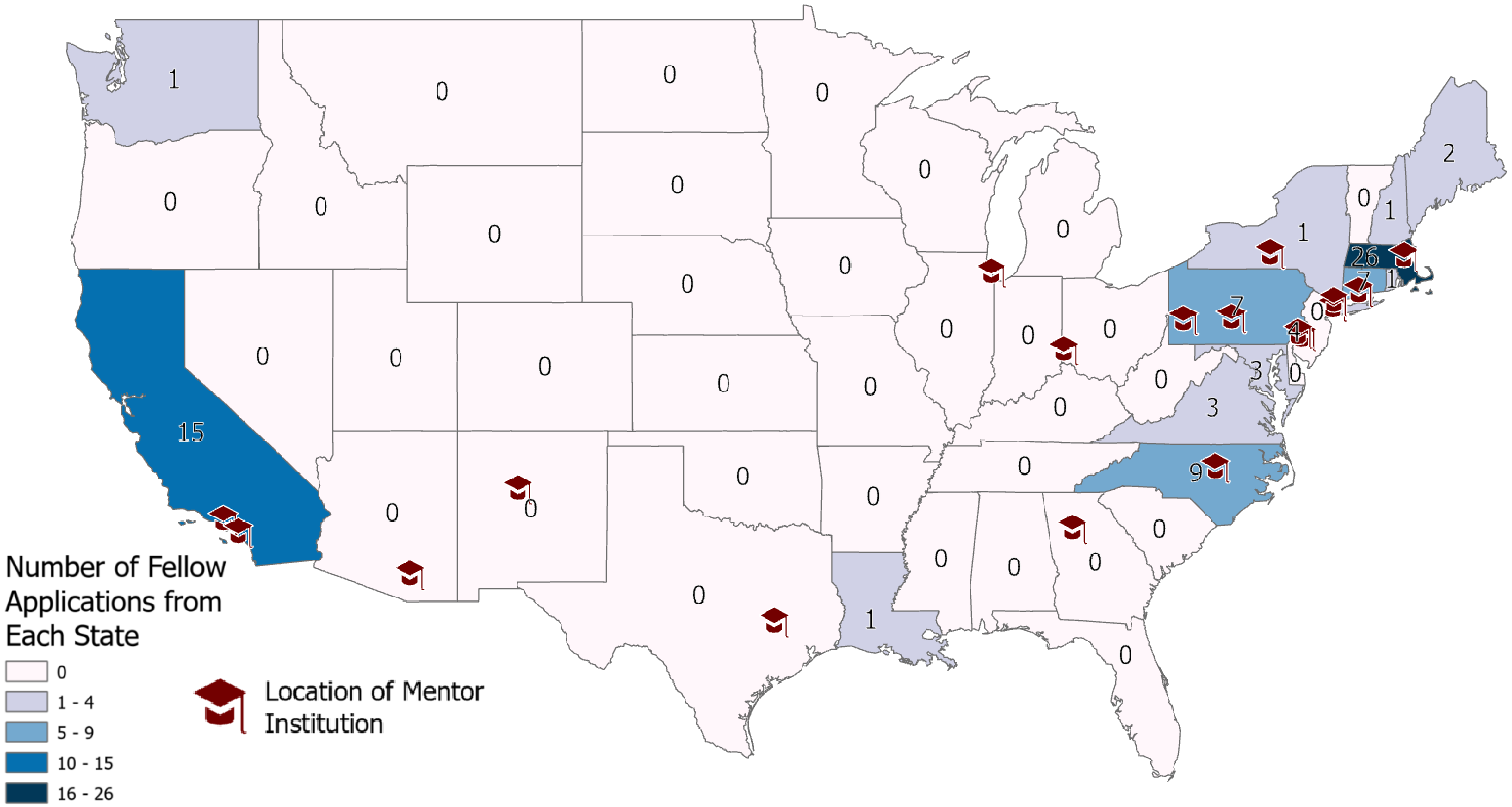
17 mentor opportunities

Lawrence Tran
University of California, Los Angeles

Mentor: Regan Patterson, *University of California, Los Angeles*

HEI

SUMMER FELLOWSHIP 2024



9 outstanding fellows selected from **81** applicants representing **48** institutions and **14** states.

20 mentor opportunities

HEI

SUMMER FELLOWSHIP 2024

Alejandro Jimenez
University of California, Los Angeles

Mentor: Daniel Carrión, *Yale University*

Nikki Capinpin
Boston University

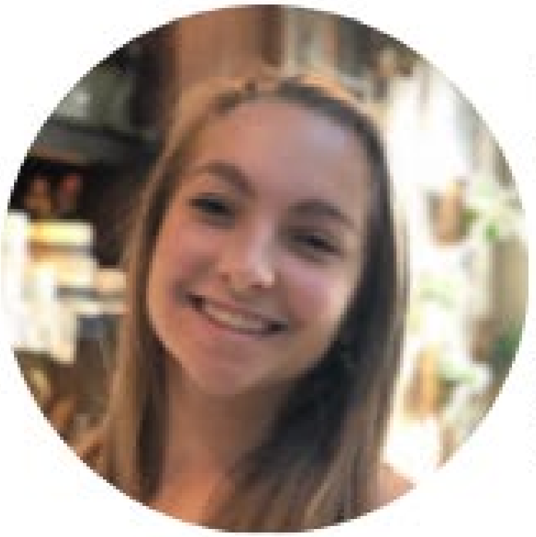
Mentor: Jon Levy, *Boston University*

Avery Mathews
University of North Carolina, Chapel Hill

Mentor: Jennifer Richmond-Bryant, *North Carolina State University*

Julia Godinez
San Diego State University

Mentor: Regan Patterson, *University of California, Los Angeles*



Marta Symkowick
Williams College

Mentor: Marianthi-Anna Kioumourtzoglou, *Columbia University*

Vivian McNally
California Polytechnic San Luis Obispo

Mentor: Colleen Rosales, *OpenAQ*

Ava Grace Carfaro
University of North Carolina, Chapel Hill

Mentor: Robin Dodson, *Silent Spring Institute*

Melissa Retana
Wellesley College

Mentor: Jun Wu, *University of California, Irvine*

Chelsea Lam
University of California, Berkeley

Mentor: Ted Russell, *Georgia Institute for Technology*

HEI

HEI Jane Warren Award

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

The award provides travel assistance to 3 researchers from anywhere in the United States and registration costs for 3 local researchers.

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

Maternal and Placental Metabolomic and Epigenetic Alterations Associated with Gestational Exposure to Polycyclic Aromatic Hydrocarbons

Jagadeesh Puvvula, Joseph M. Braun, Emily A. DeFranco, Shuk-Mei Ho, Yuet-Kin Leung, Shouxiong Huang, Ann M. Vuong, Stephani S. Kim, Zana Percy, Aimin Chen

Puvvula et al., Metabolomics 2023, PMID: 38095785 Puvvula et al., Epigenetics communications, in peer-review

Perelman School of Medicine, University of Pennsylvania — Department of Biostatistics, Epidemiology & Informatics; School of Public Health; University of Kentucky College of Medicine; University of Cincinnati; UAMS University of Arkansas for Medical Sciences; UNLV School of Public Health; BATTELLE

Generated using BioRender.com

Summary

- **Metabolome**
  - Fatty acids, vitamins, amino acids, carbohydrates, energy (**fetal growth**)
  - Xenobiotics, nucleotides, and organic compounds (**fetal development**)
  - Lipids (**fetal neurodevelopment**)
  - Glycan (**protein function**)
- **Epigenome** (*LEPR, LIG4, SFRS12, ZNF229, ACSL5, ZNF354C, CCDC63, MFSD2A*)
  - Fatty acid metabolism and ferroptosis – placenta
  - HSV-1 infection-related pathways – pregnant individuals

Acknowledgments

- Study participants for their time and efforts.
- Staff – Department of Obstetrics and Gynecology at the University of Cincinnati facilitated participant recruitment.
- Funding agencies
  - NIEHS (P30ES006096, P30ES013508, R01ES032675, R01ES028277, R01ES033054, R01ES032836)
  - Veteran Affairs (VA-I01BX005395, VA-IK6BX006182)
  - Department of Defense (DoD-W81XWH-22-1-0152)
  - National Science Foundation (RII Track-2 FEC, Award #2217824)

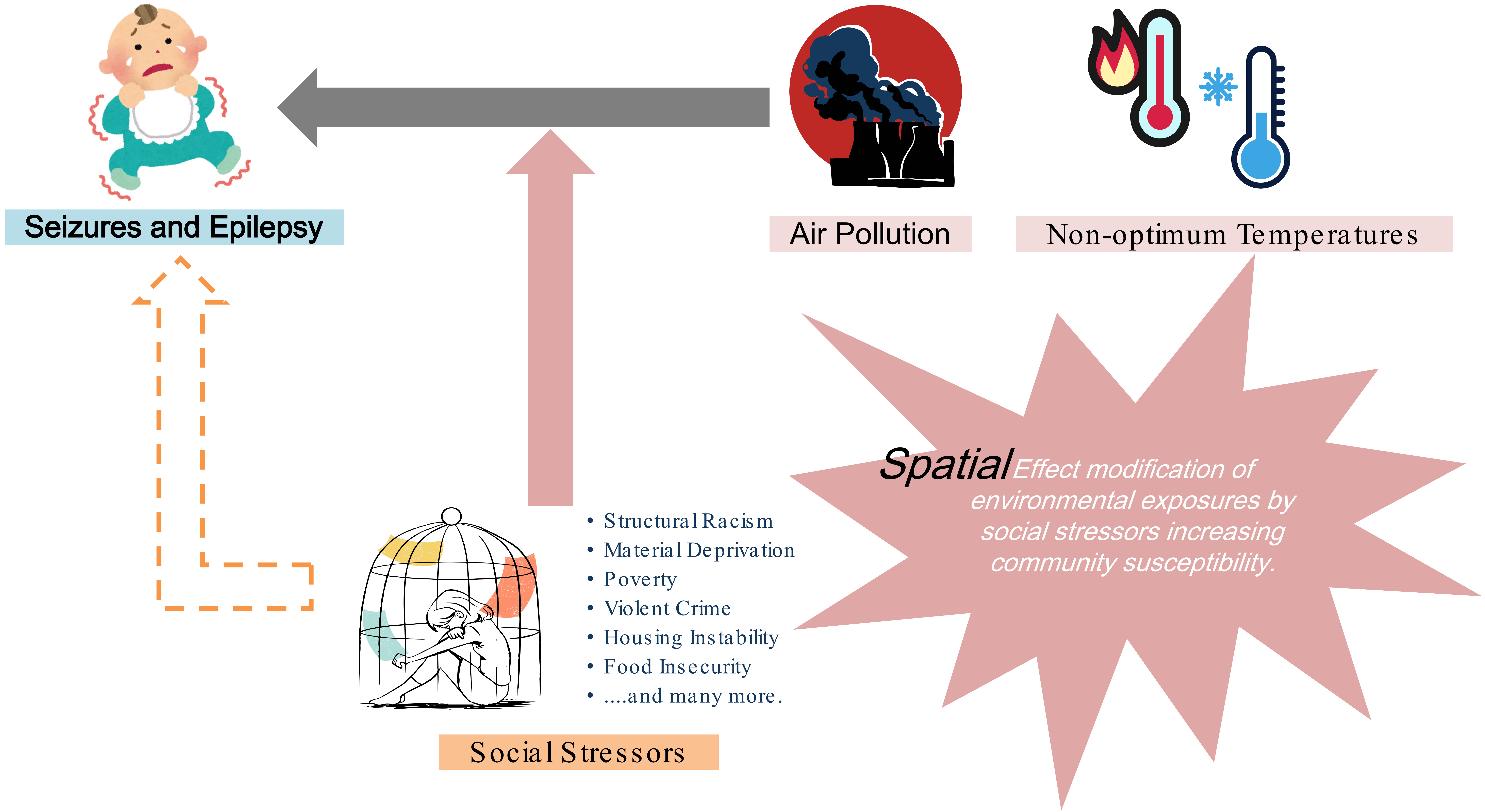
Spatial variability in the acute effects of ambient air pollution and temperature on pediatric seizures and epilepsy across New York

Rachit Sharma, Lisa Frueh, Aritra Halder, Ellen J Kinnee, Allan C Just , Perry E Sheffield , and Jane E Clougherty

Drexel University

Icahn School of Medicine at Mount Sinai

University of Pittsburgh



Seizures and Epilepsy
Air Pollution
Non-optimum Temperatures
Spatial Effect modification of environmental exposures by social stressors increasing community susceptibility.
• Structural Racism
• Material Deprivation
• Poverty
• Violent Crime
• Housing Instability
• Food Insecurity
• ....and many more.
Social Stressors

NEW YORK STATE

SPARCS
Statewide Planning and Research Cooperative System

Emergency Department (ED) visits
for seizures and epilepsy
among children aged 0-4 years
from 2005 to 2019

+

Satellite and ground-based measurements

1 x 1 km predictions

Block-group level, daily estimates of outdoor fine particulate matter ($PM_{2.5}$) and minimum temperature (Tmin)

1. Time-stratified, case-crossover design
2. Spatial Bayesian Hierarchical Model
3. Social stressors as potential predictors of observed spatial variability

Census tract level associations across 7 lag days (case day and 6 preceding days).

↓

Examine spatial variation in the daily effects.

↓

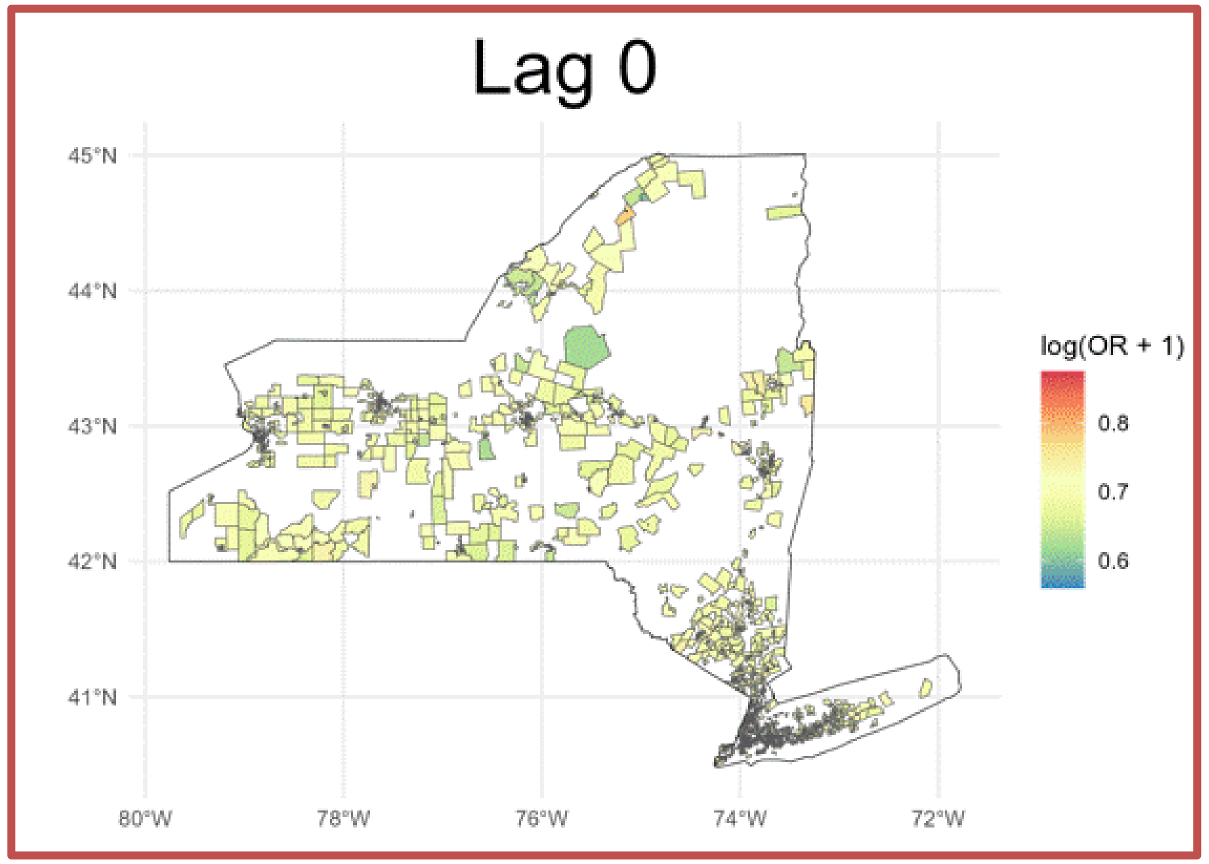
Identify social stressors

(from 19 American Community Survey and CrimeRisk indicators)

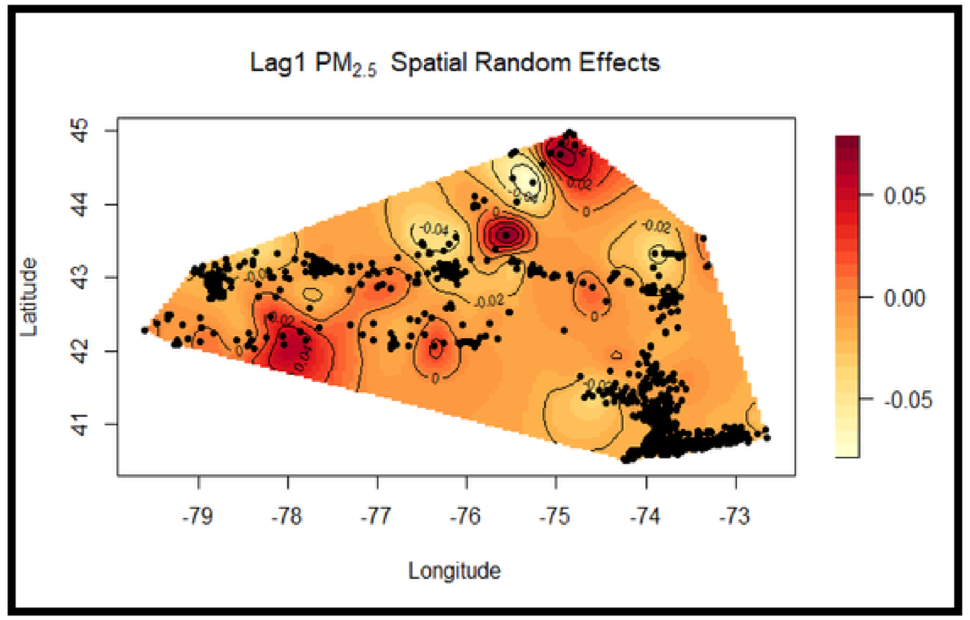
predicting observed spatial variability while adjusting for spatial-autocorrelation among stressors.

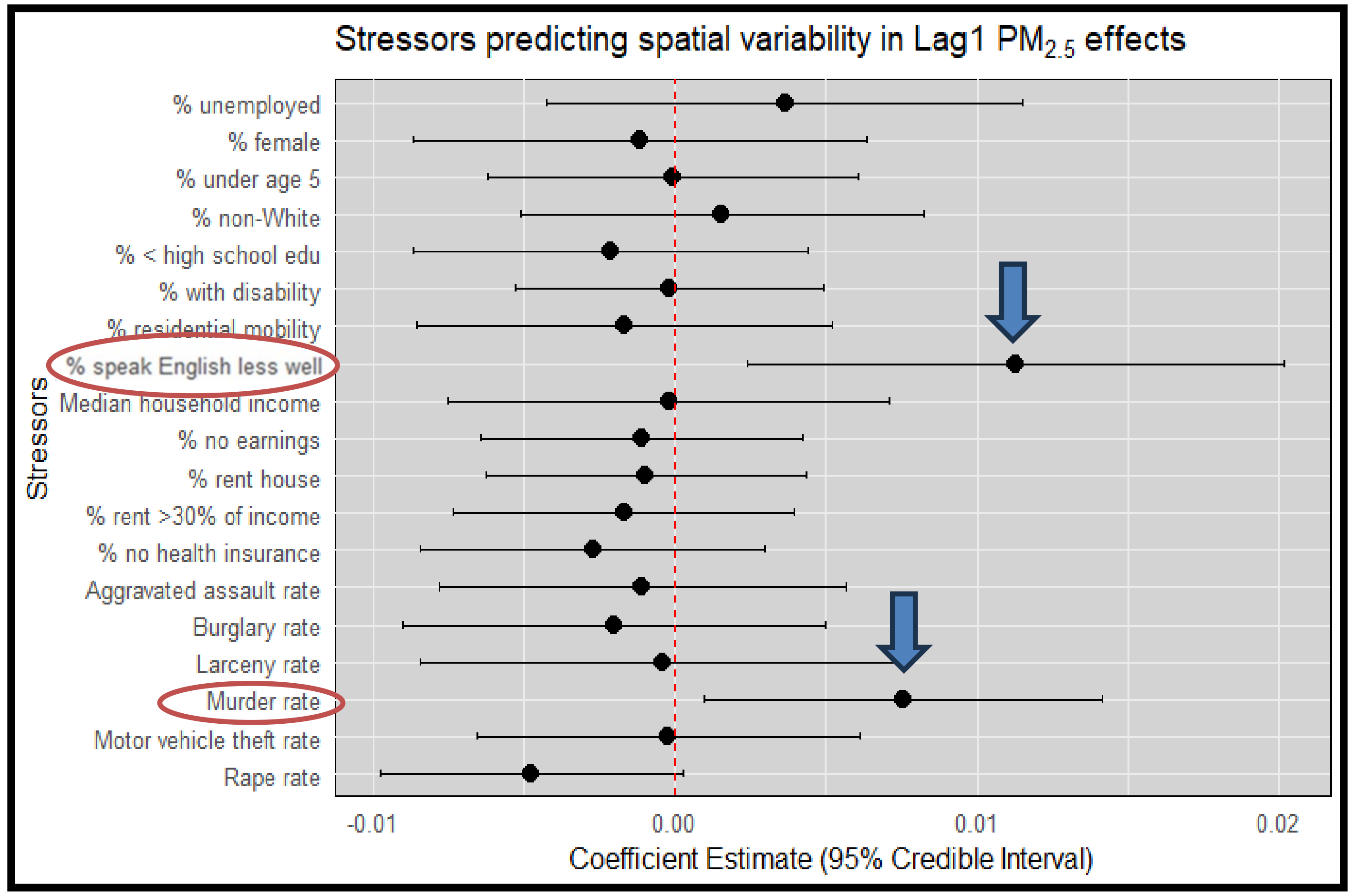
Variability in $PM_{2.5}$ effects

Showing tracts with at least 50 cases



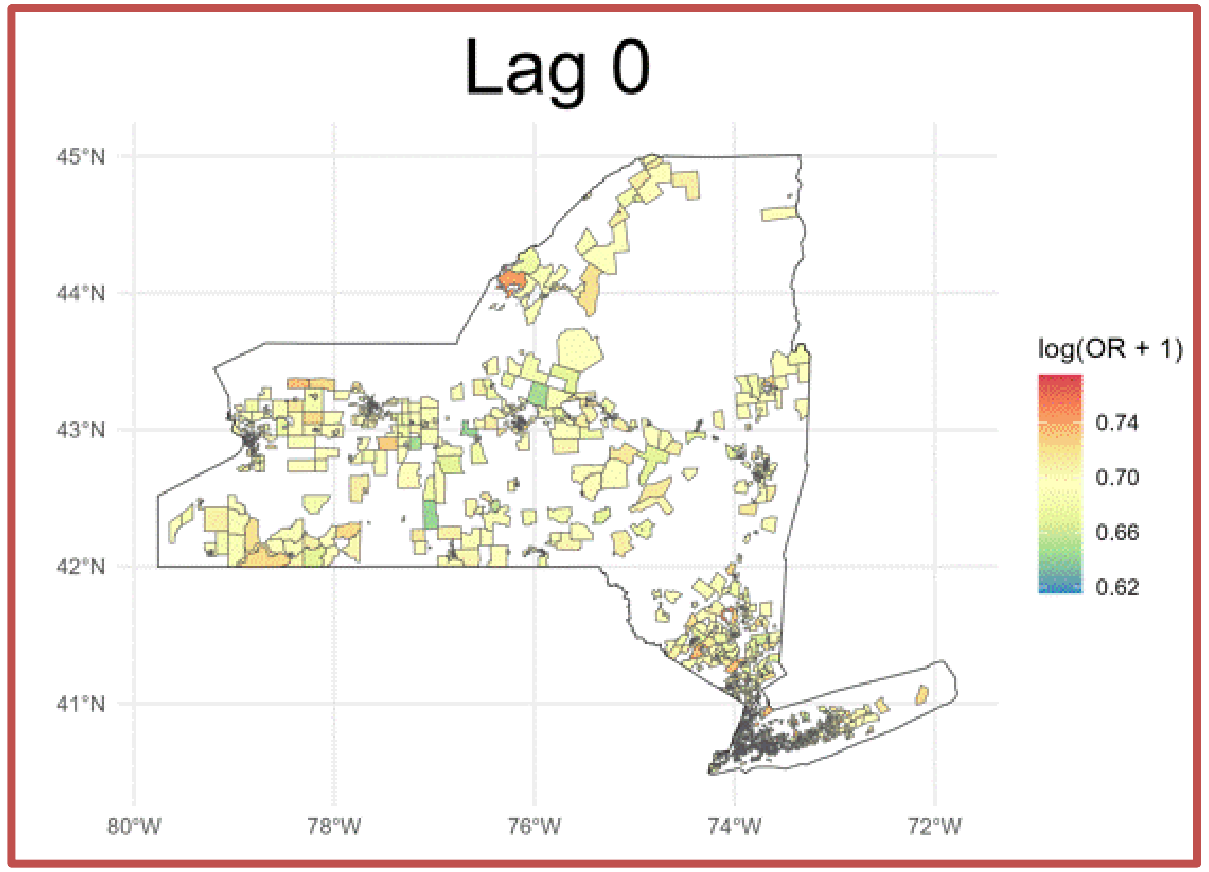
Lag 1 $PM_{2.5}$



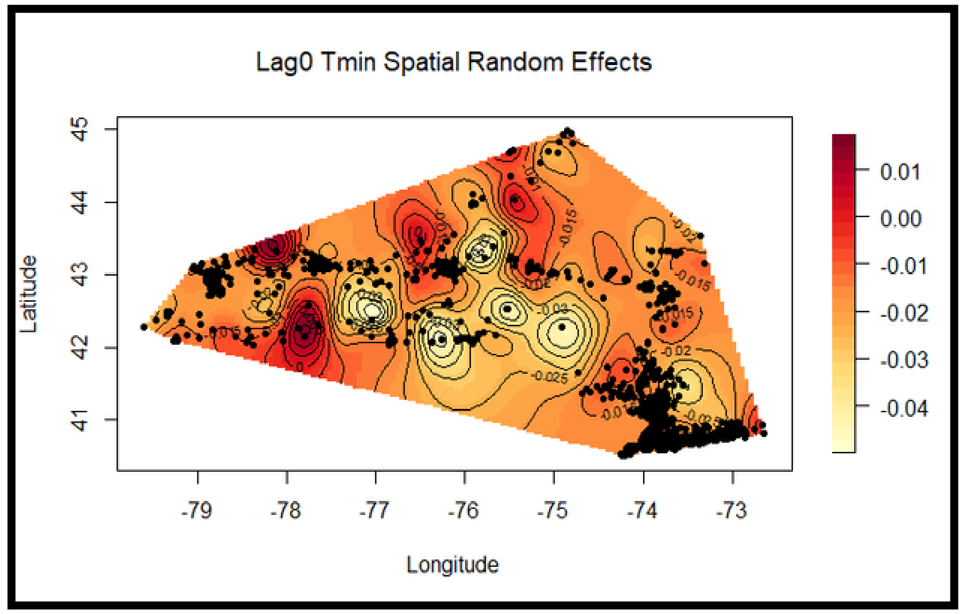


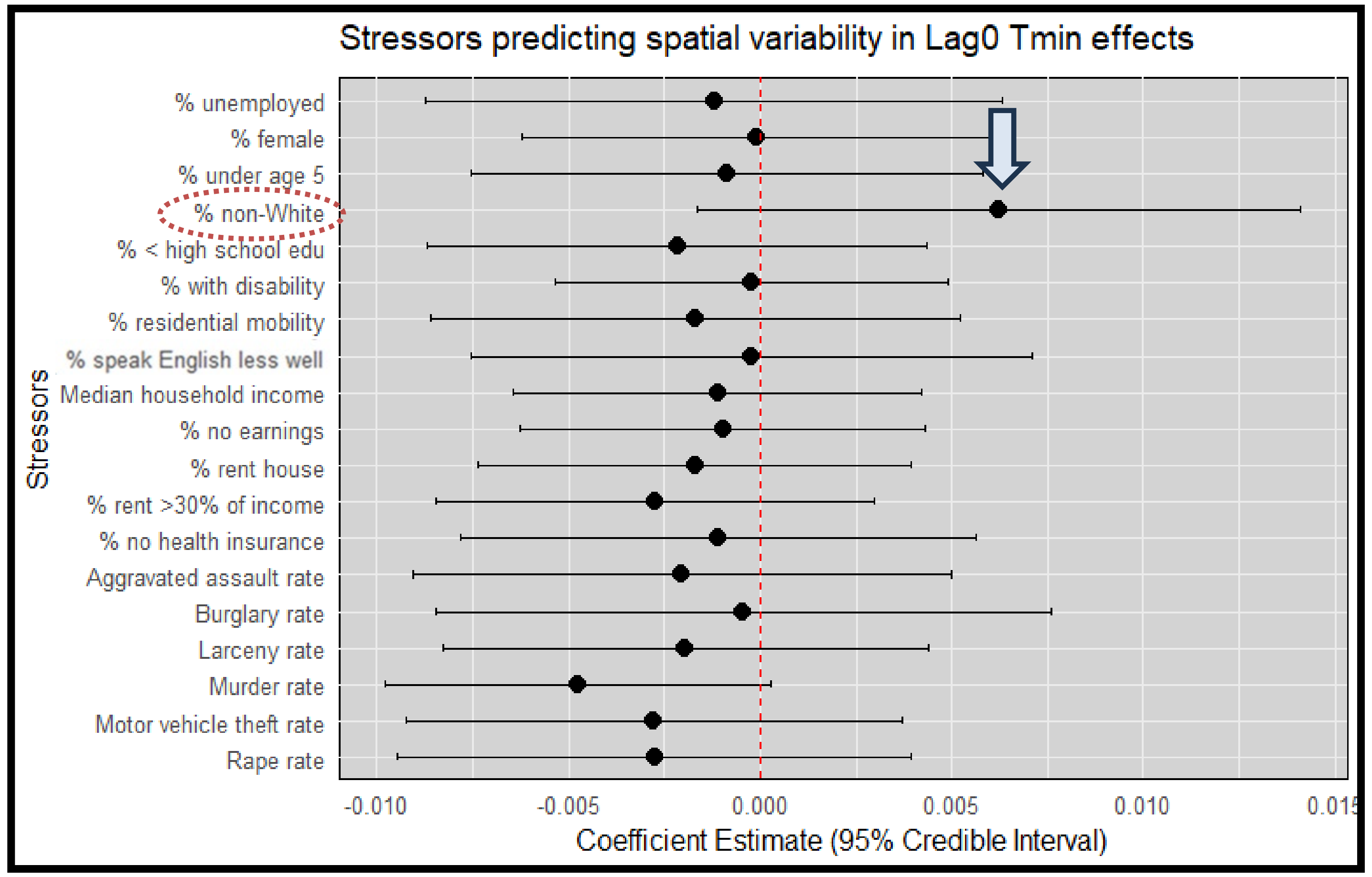
Variability in Tmin effects

Showing tracts with at least 50 cases



Lag 0 Tmin

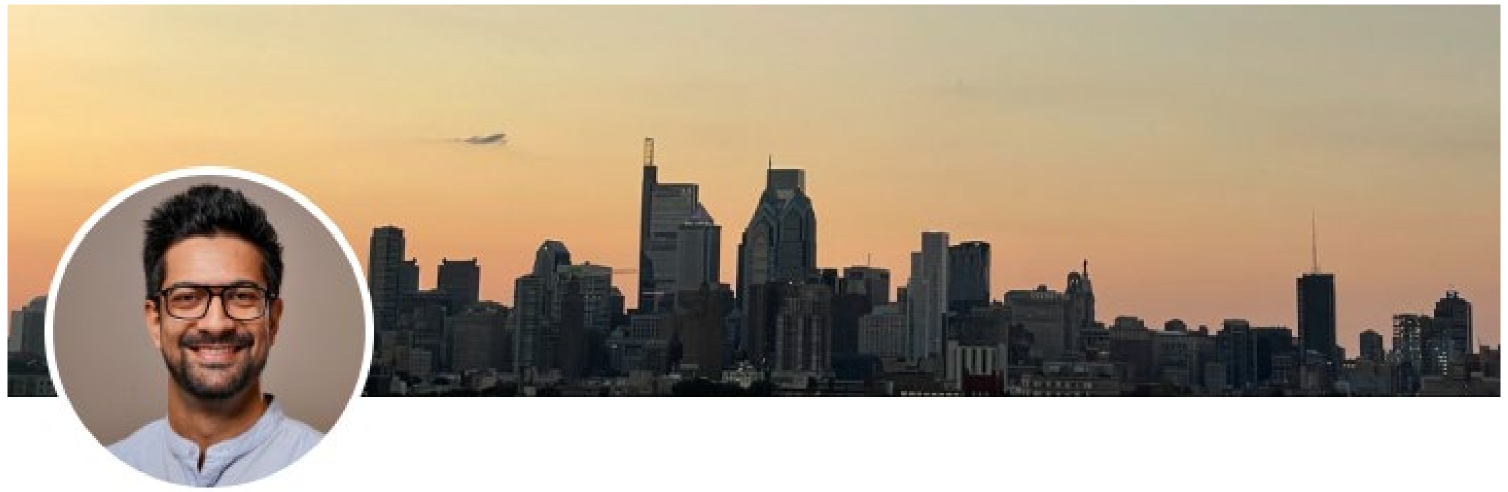




See you at the poster session!

@DrRachitSharma

Linkedin



Rachit Sharma (He/Him)

Health equity-focused physician and environmental epidemiologist.

Philadelphia, Pennsylvania, United States · Contact info

6,489 followers · 500+ connections

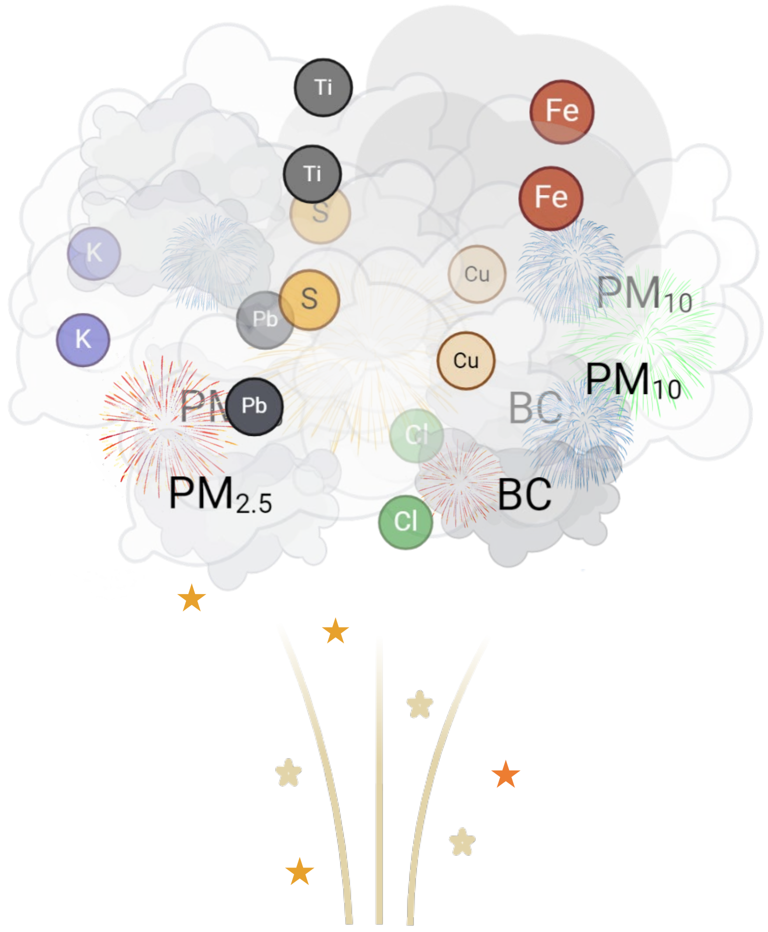
rachit.sharma@drexel.edu

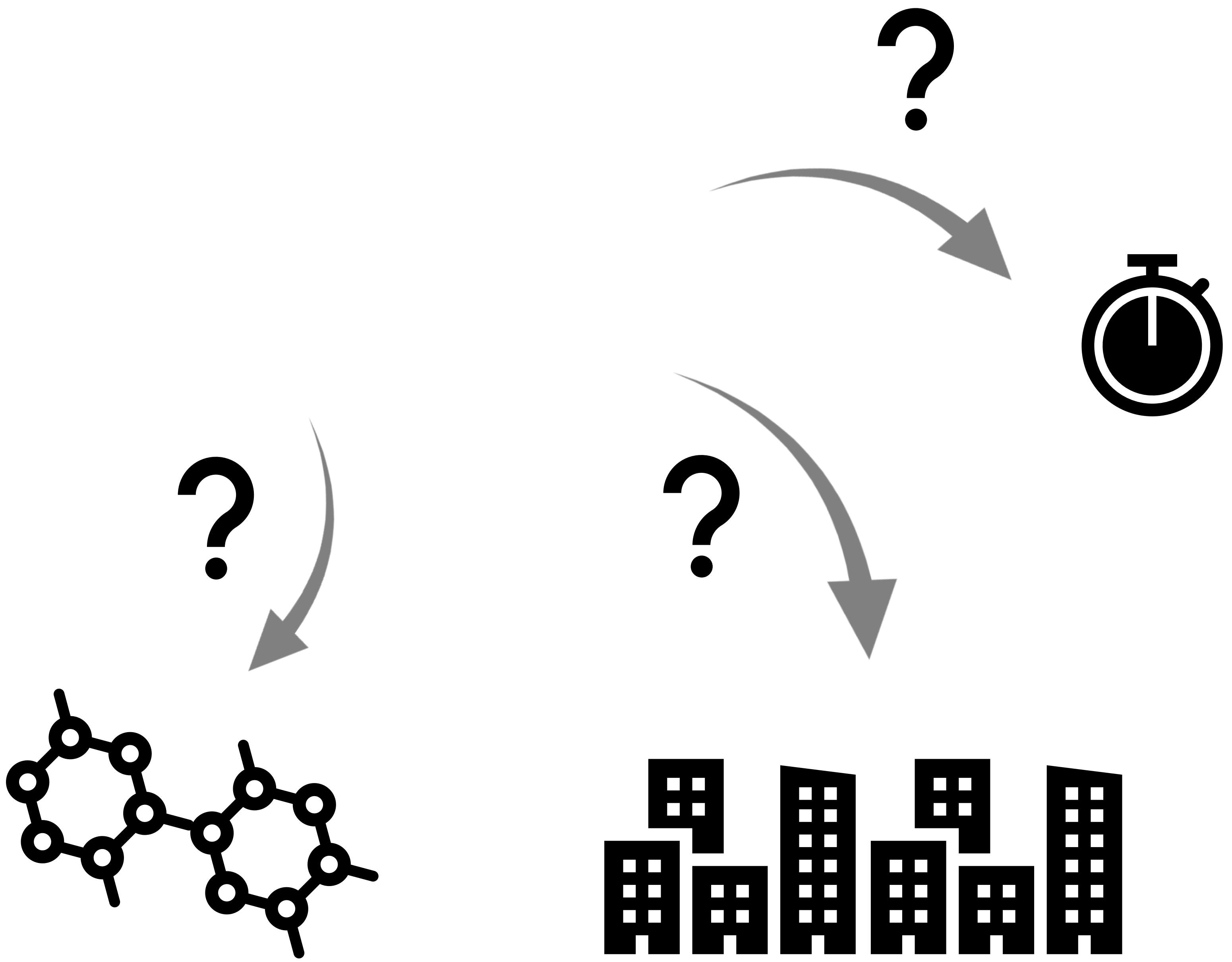
Skyrocketing Pollution: Assessing the environmental fate of July 4th Fireworks in New York City

Antonio F. Saporito, David Luglio, Beck Kim, Tri Huynh, Rahanna Khan, Amna Raja, Kristin Terez, Nicole Camacho-Rivera, Rachel Gordon, Julie Gardella, Maria Katsigeorgis, Rodney Graham, Thomas Kluz, Max Costa, Terry Gordon

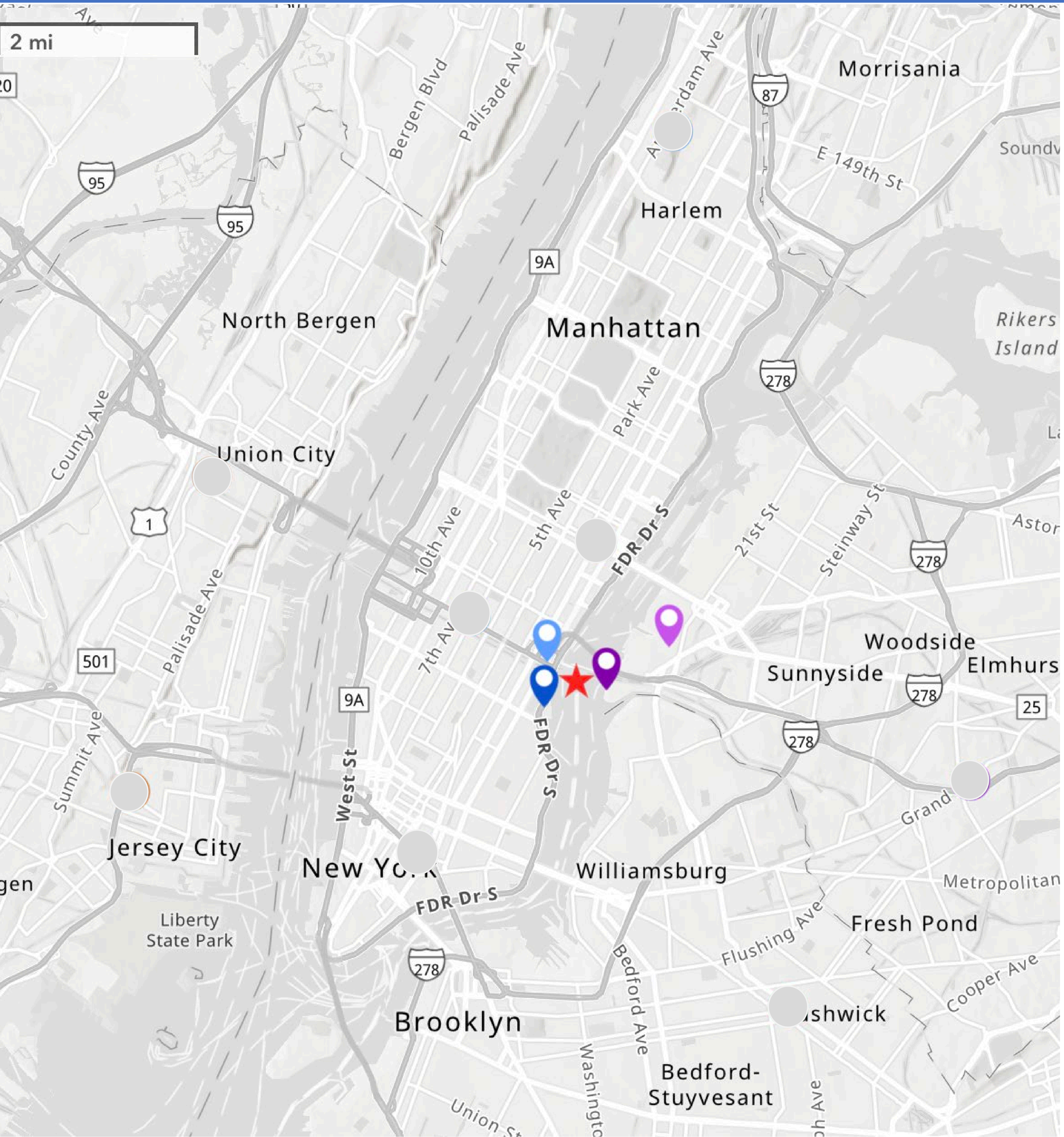
Environmental Medicine

Pyrotechnic displays can often reduce air quality.

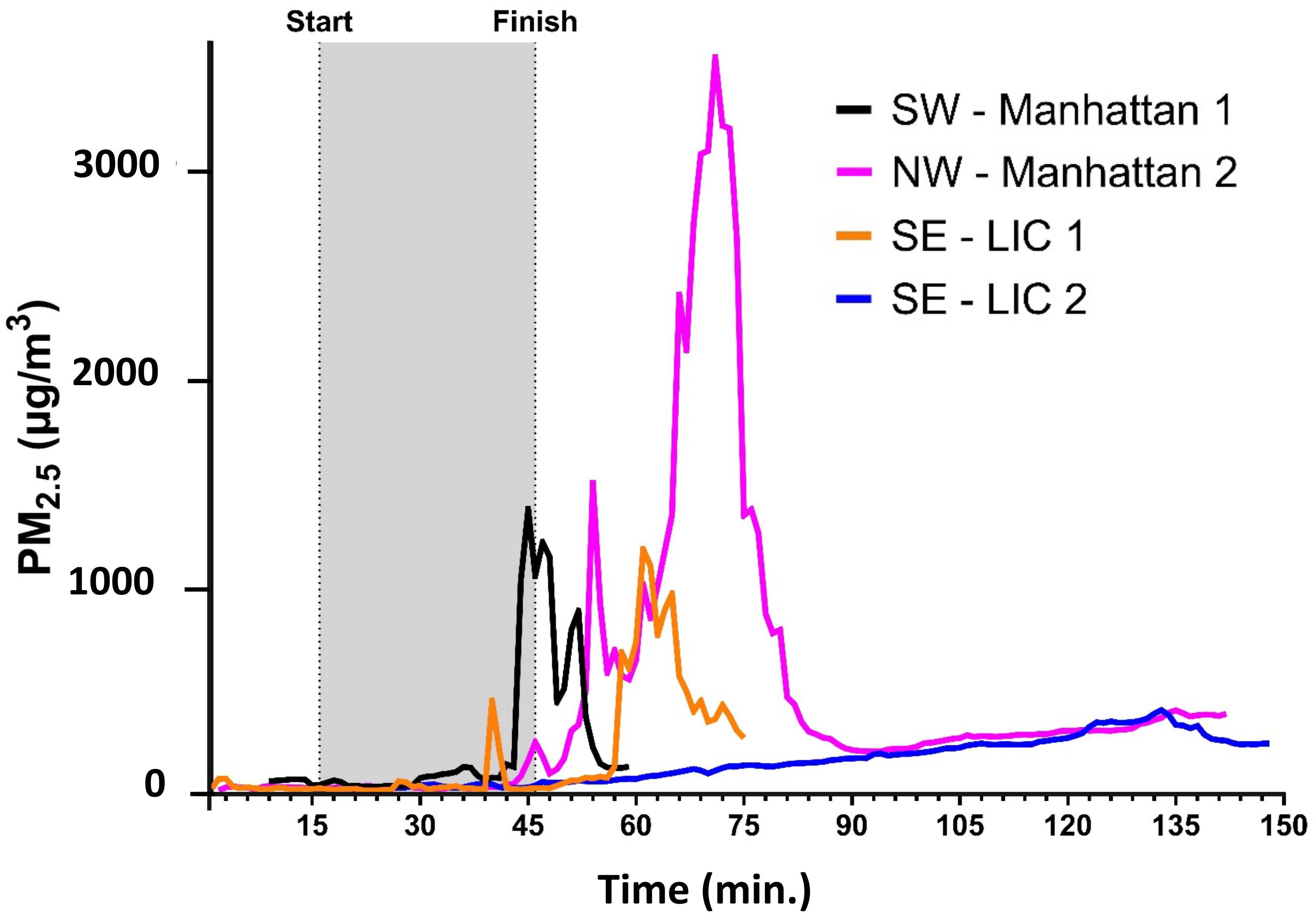




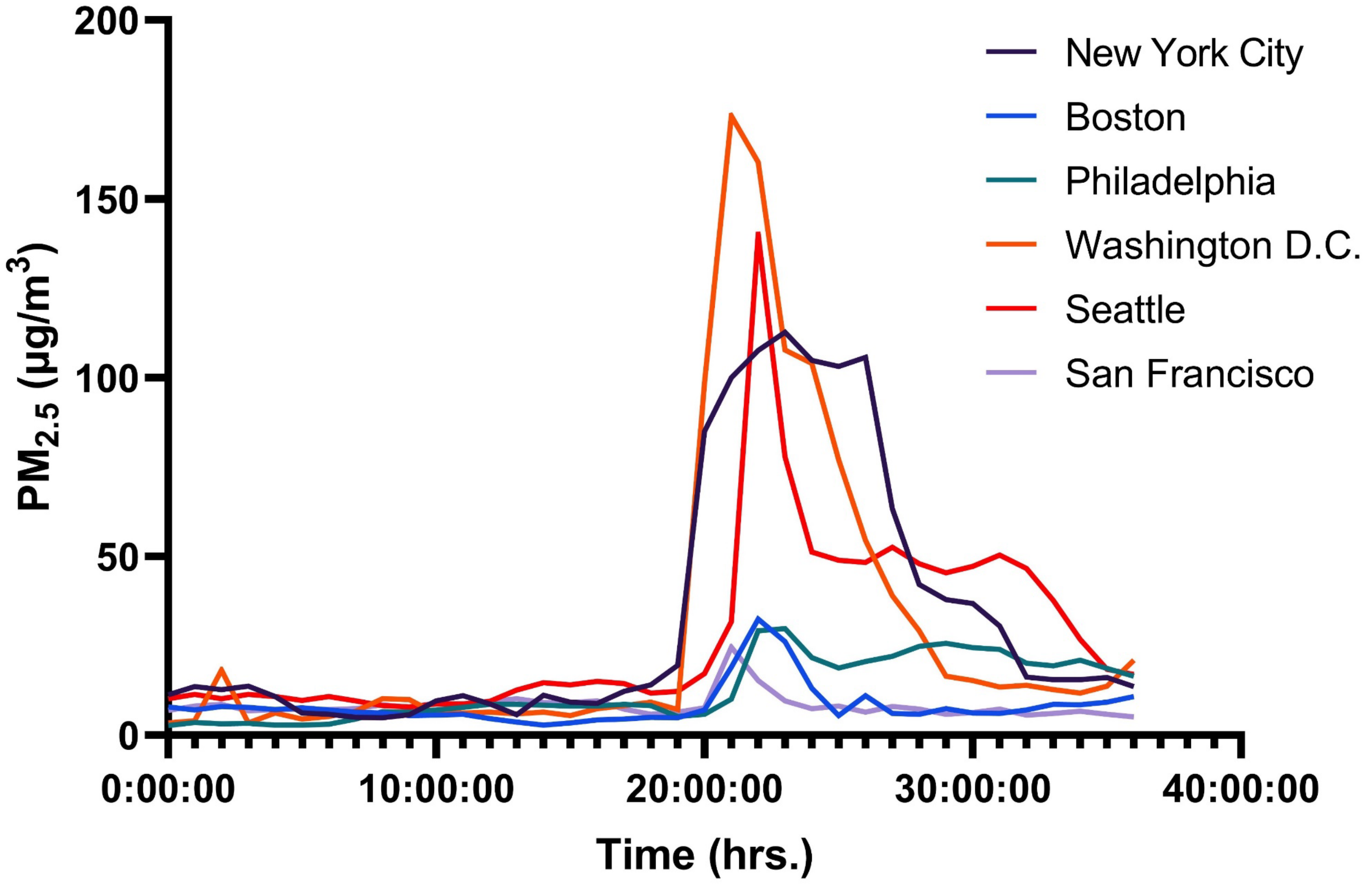
New York City exposure assessment



Fireworks had considerable effects on both air…

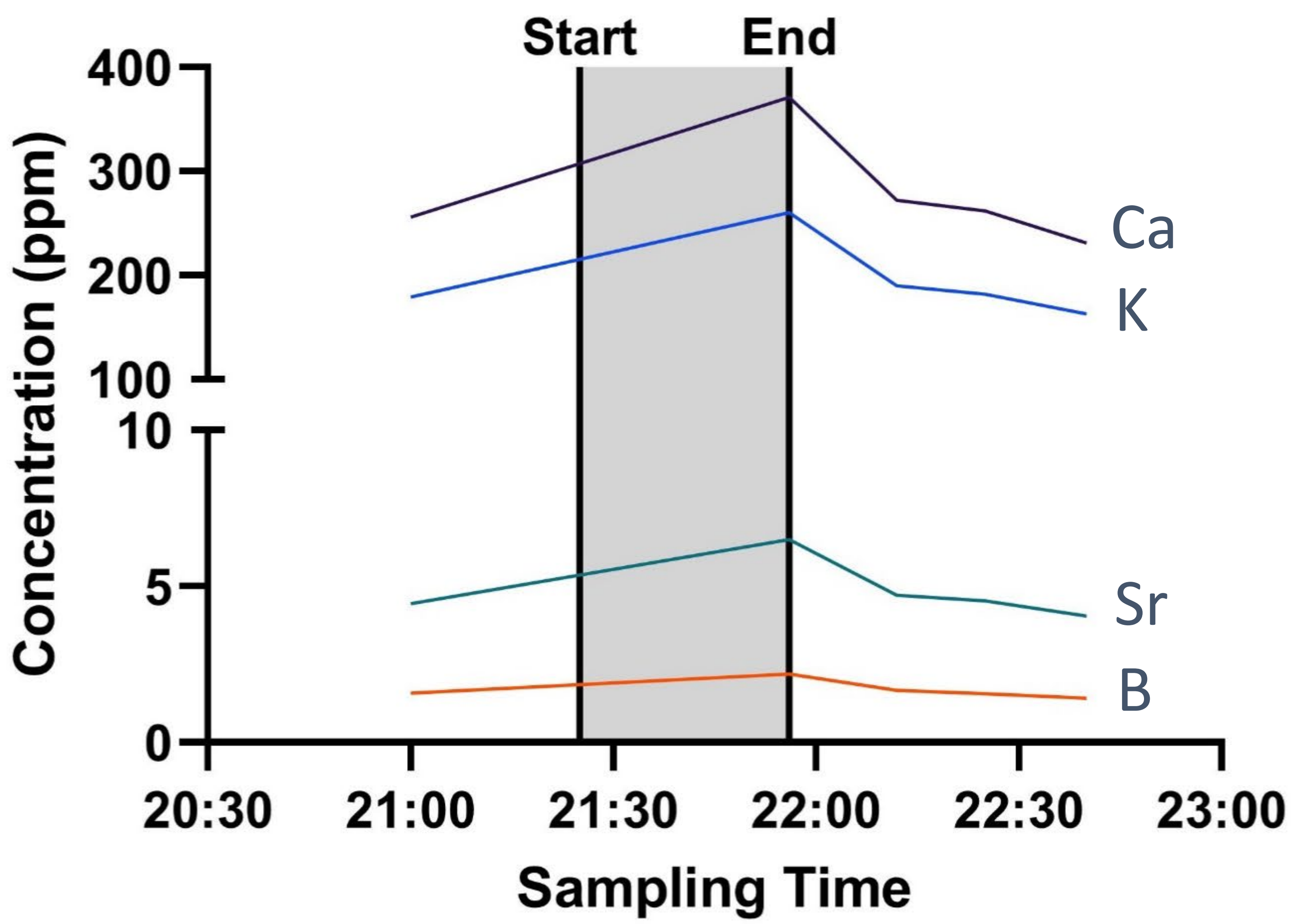


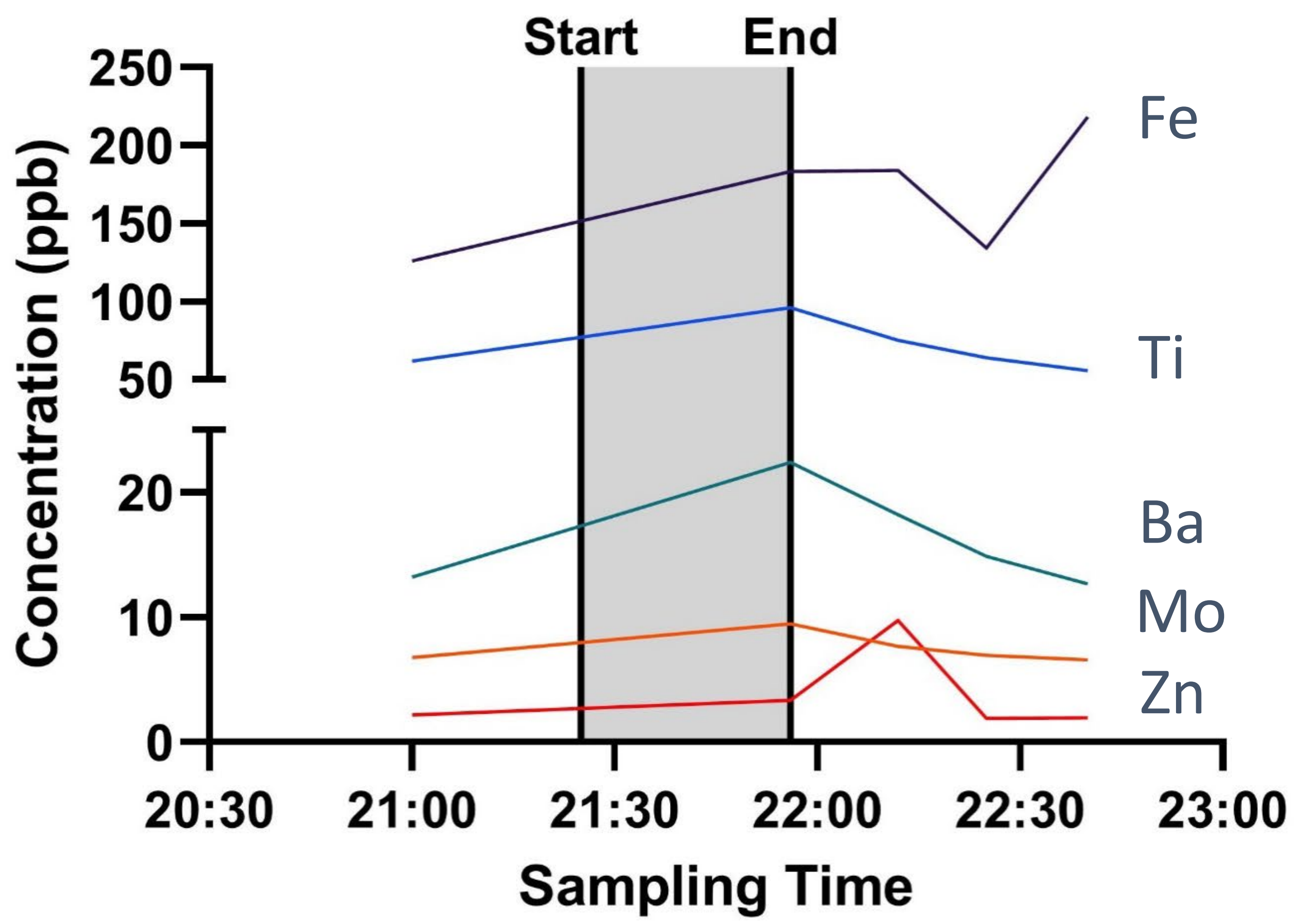
- a) Real-time $PM_{2.5}$ concentrations for NYC



- b) Average AQS $PM_{2.5}$ concentrations across select cities

…and water quality.





- a, b) Metal concentrations in water samples measured by ICP-MS

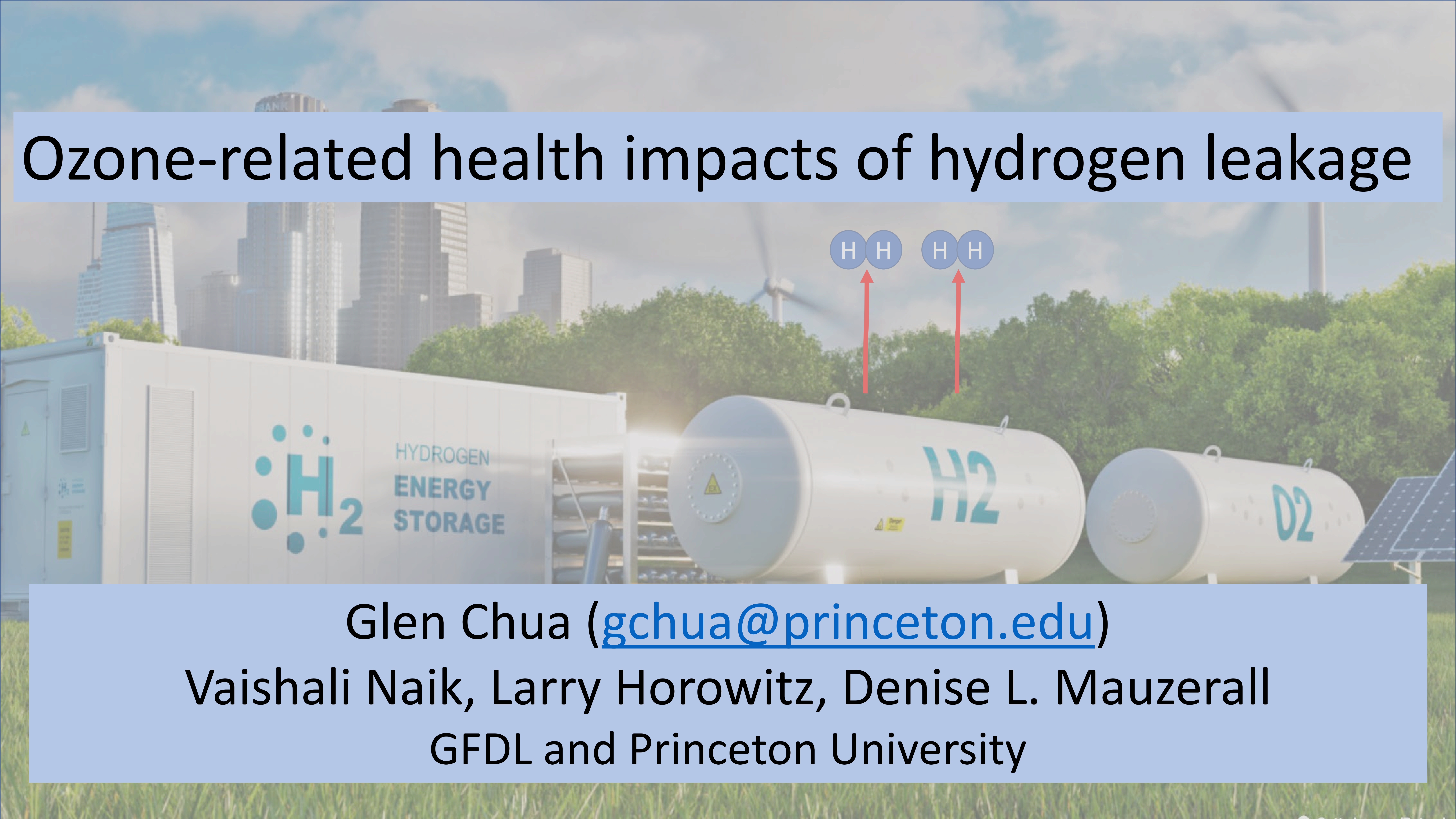
NYU Langone Health

Thank you

Antonio.Saporito@nyulangone.org

Environmental Medicine

Ozone-related health impacts of hydrogen leakage



Glen Chua (gchua@princeton.edu)
Vaishali Naik, Larry Horowitz, Denise L. Mauzerall
GFDL and Princeton University

Hydrogen leakage enhances surface ozone levels

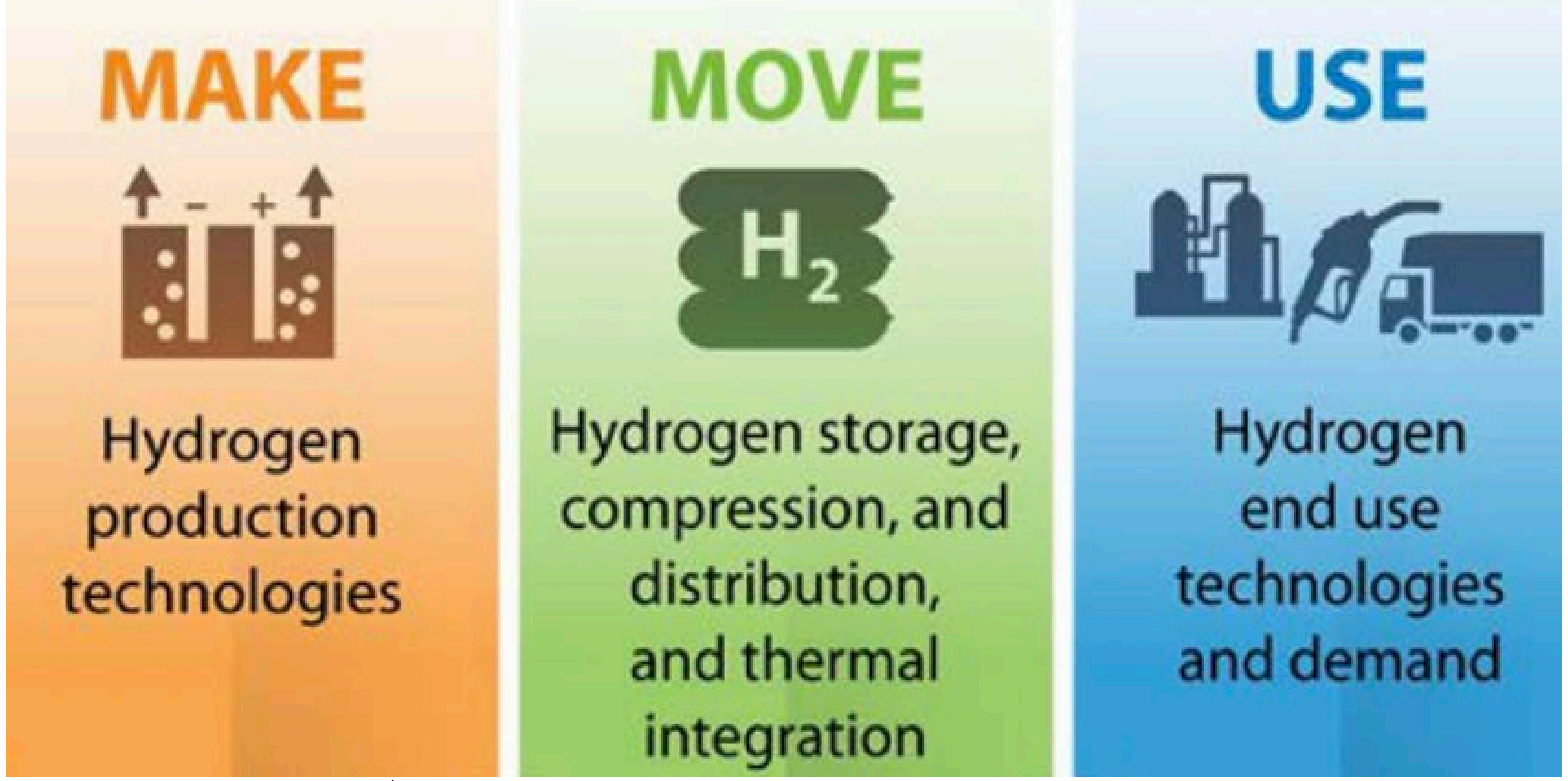
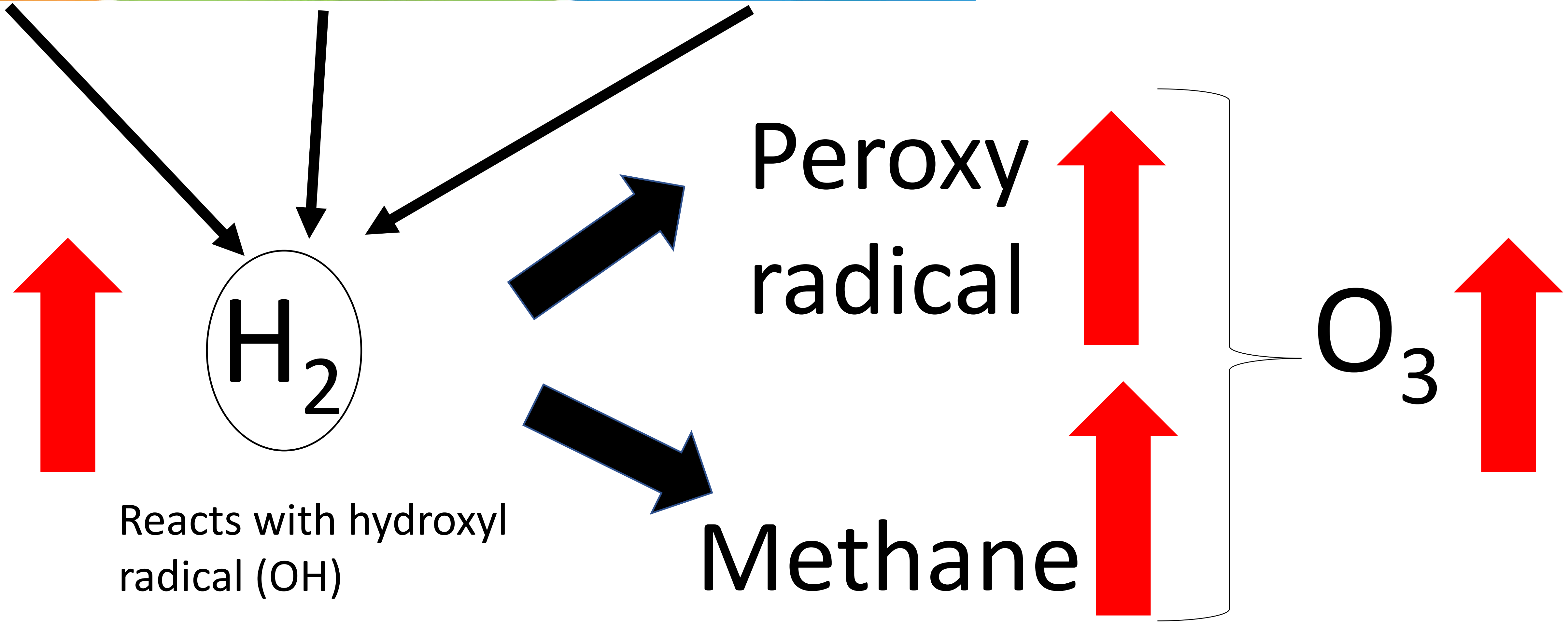
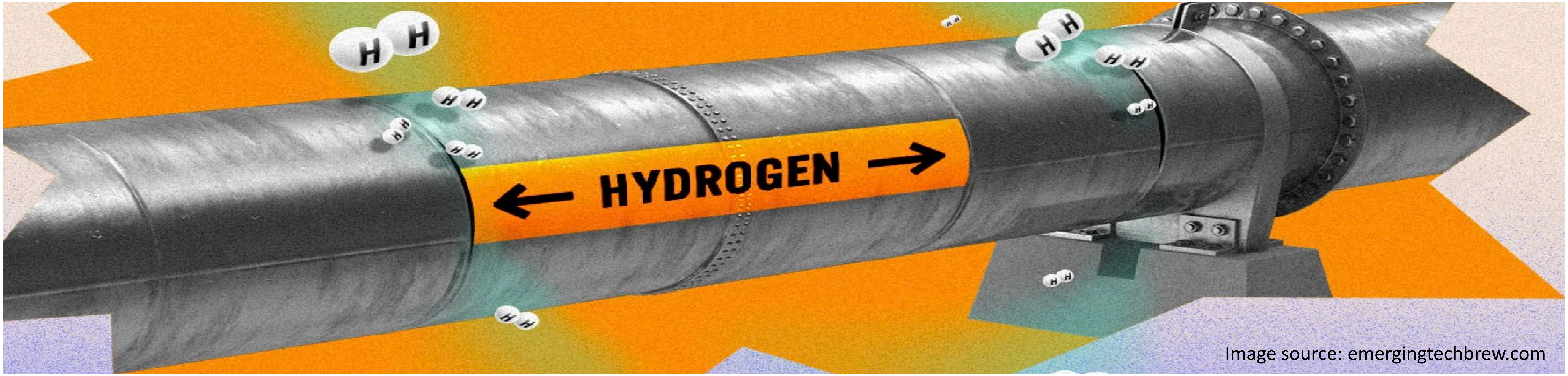


Image source: National Renewable Energy Laboratory (2018)

- Hydrogen can leak from all facets of the supply chain, similar to natural gas
- Due to complex chemistry reactions, hydrogen leakage can enhance surface ozone



Linkage between H_2 leakage, climate and air quality impacts increasingly recognized



H2

- Indirect greenhouse gas via extending CH4 lifetime, H2 GWP_{100} ~ 12 (Sand et al., 2023)
- **Tropospheric ozone precursor**
- **Climate impacts of H_2 leakage recently quantified, but ozone-related impacts of H2 leakage have not**

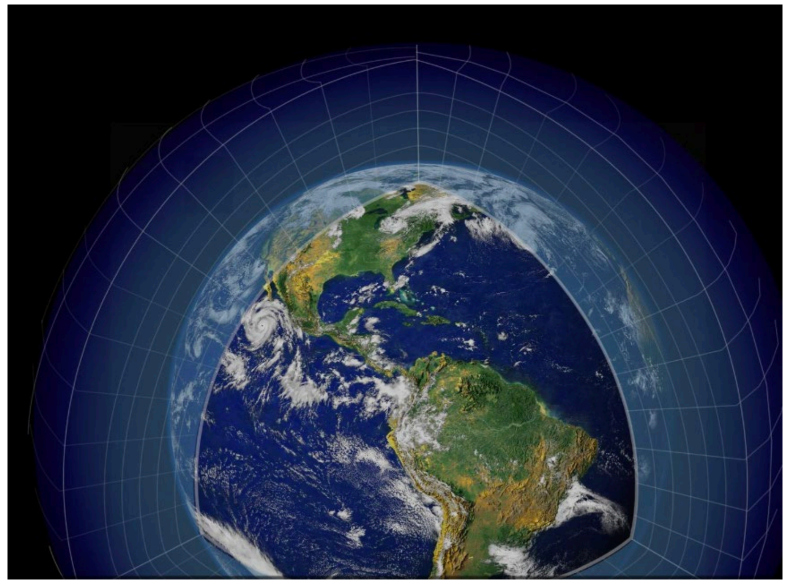
CH4

- Greenhouse gas, GWP_{100} ~ 28 (IPCC AR6, 2021)
- Tropospheric ozone precursor
- Cost of methane-related ozone damage has been quantified, helping to motivate policy action on methane mitigation.

Key research questions

- **How does hydrogen leakage affect surface ozone?**
- **What effect does this change in surface ozone have on human health?**

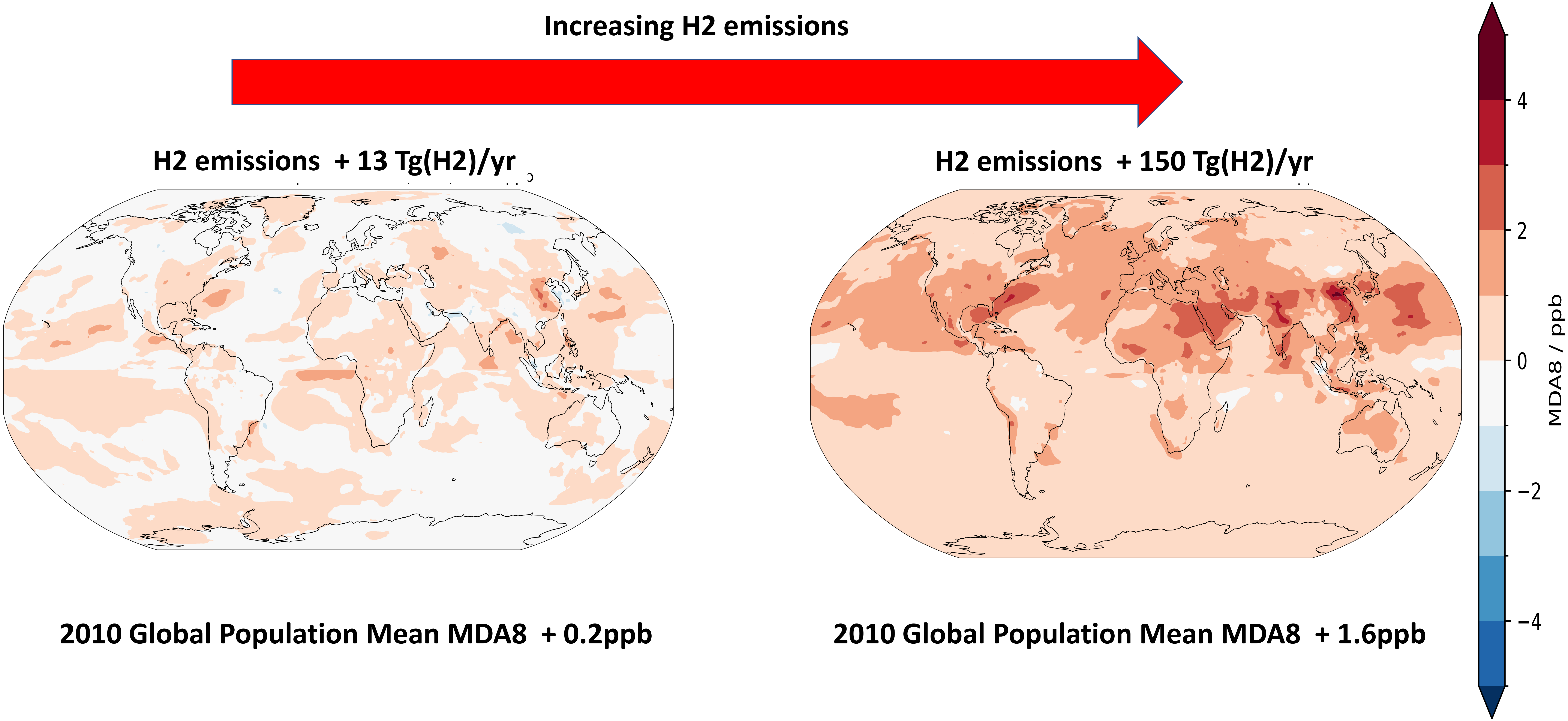
Overview of methods



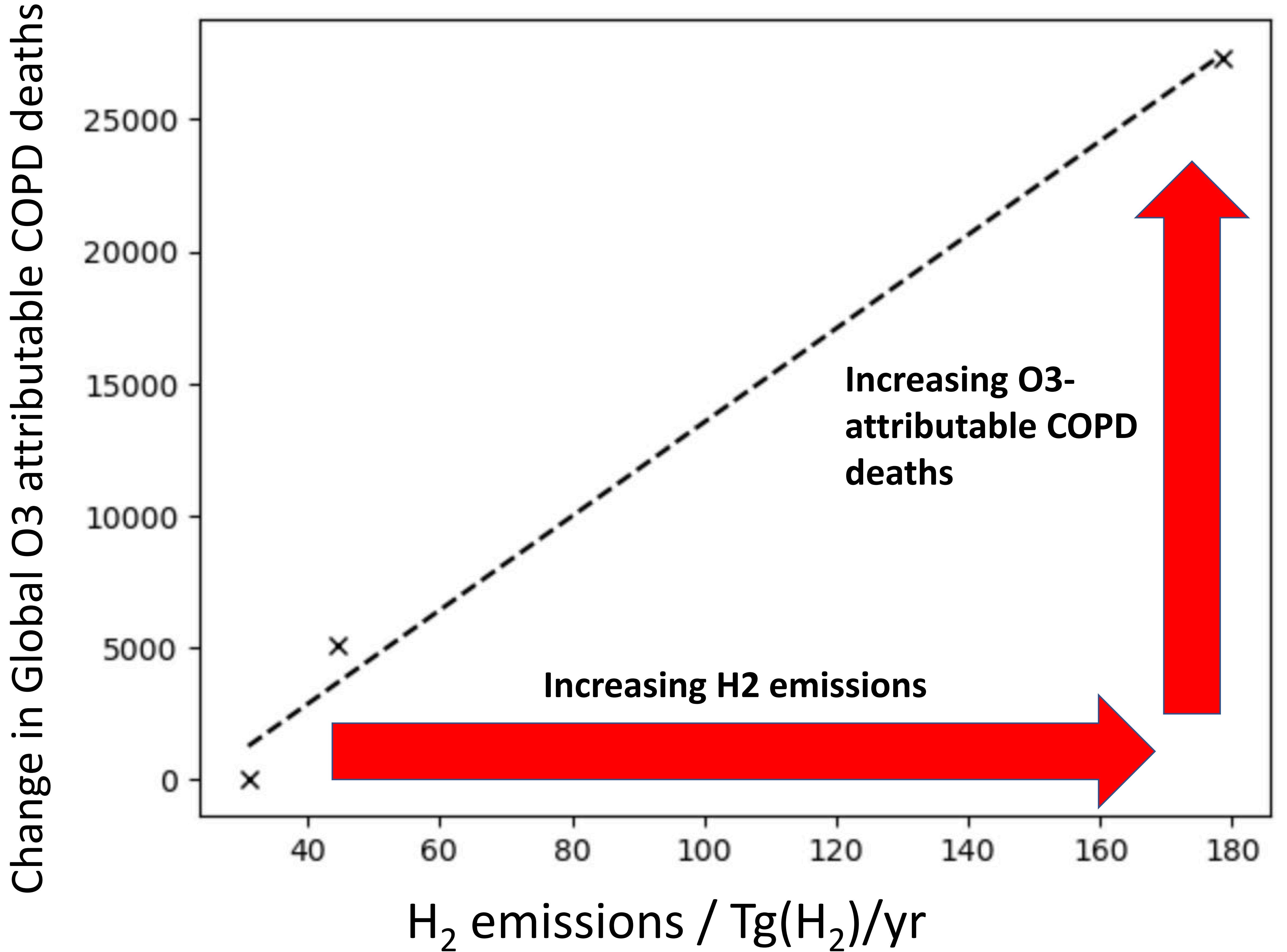
GFDL AM 4.1
Chemistry Climate Model

→ Gridded global surface O3 under different H2 emissions → O3- attributable chronic obstructive pulmonary disease (COPD) deaths

Increased hydrogen emissions increases population-mean MDA8 O3



Increases in surface ozone due to increased H_2 leakage increases ozone-related mortality



177 O3-attributable COPD deaths for every 1Tg/yr increase in H_2 emissions under 2010 population conditions

c.f. 740 respiratory-related deaths for every 1 Tg/yr of CH4 emissions under 2015 population conditions (UNEP/CCAC, 2021)

- Hydrogen leakage is an overlooked contributor to elevated ozone concentrations which adversely impact public health

- Efforts to prioritize H2 usage to applications without good alternatives and minimal transport are needed

- Efforts to minimize leakage are critical

Glen Chua (gchua@princeton.edu)
Vaishali Naik, Larry Horowitz, Denise L. Mauzerall

Oxidative potential of particulate matter and its association to respiratory health endpoints in high-altitude cities in Bolivia

Lucille Borlaza-Lacoste[1,a], Valeria Mardoñez[1,2,b], Anouk Marsal[1], Ian Hough[1], Dinh Ngoc Thuy Vy[1], Pamela Dominutti[1], Jean-Luc Jaffrezo[1], Andrés Alastuey[3], Jean-Luc Besombes[4], Griša Močnik[5,6,7], Isabel Moreno[2], Fernando Velarde[2], Jacques Gardon[8], Alex Cornejo[9], Marcos Andrade[2,11], Paolo Laj[1,10], and Gaëlle Uzu[1]

[1]Institute des Géosciences de l'Environnement, Université Grenoble Alpes, CNRS, IRD, Grenoble INP, Grenoble, France
[2]Laboratorio de Física de la Atmósfera, Instituto de Investigaciones Físicas, Universidad Mayor de San Andrés, La Paz, Bolivia
[3]Institute of Environmental Assessment and Water Research (IDAEA), CSIC, Barcelona, Spain
[4]Université Savoie Mont Blanc, CNRS, EDYTEM (UMR 5204), Chambéry 73000, France
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[6] Haze Instruments d.o.o., 1000 Ljubljana, Slovenia
[7] Department of Condensed Matter Physics, Jozef Stefan Institute, 1000 Ljubljana, Slovenia
[8]Hydrosciences Montpellier, Université de Montpellier, IRD, CNRS, Montpellier, France
[9]Viceministerio de Promoción, Vigilancia Epidemiológica y Medicina Tradicional (VPVEyMT), La Paz, Bolivia
[10] Institute for Atmospheric and Earth System Research (INAR), and Department of Physics, University of Helsinki, 00014 Helsinki, Finland
[11] Department of Atmospheric and Oceanic Science, University of Maryland, College Park, MD, USA
[a] now at: State University of New York, 1220 Washington Ave, Albany, NY 12226 , USA
[b] now at: Istituto si Scienze dell'Atmosfera e del Clima – Consiglio Nazionale delle Ricerche (ISAC-CNR)

UGA Université Grenoble Alpes

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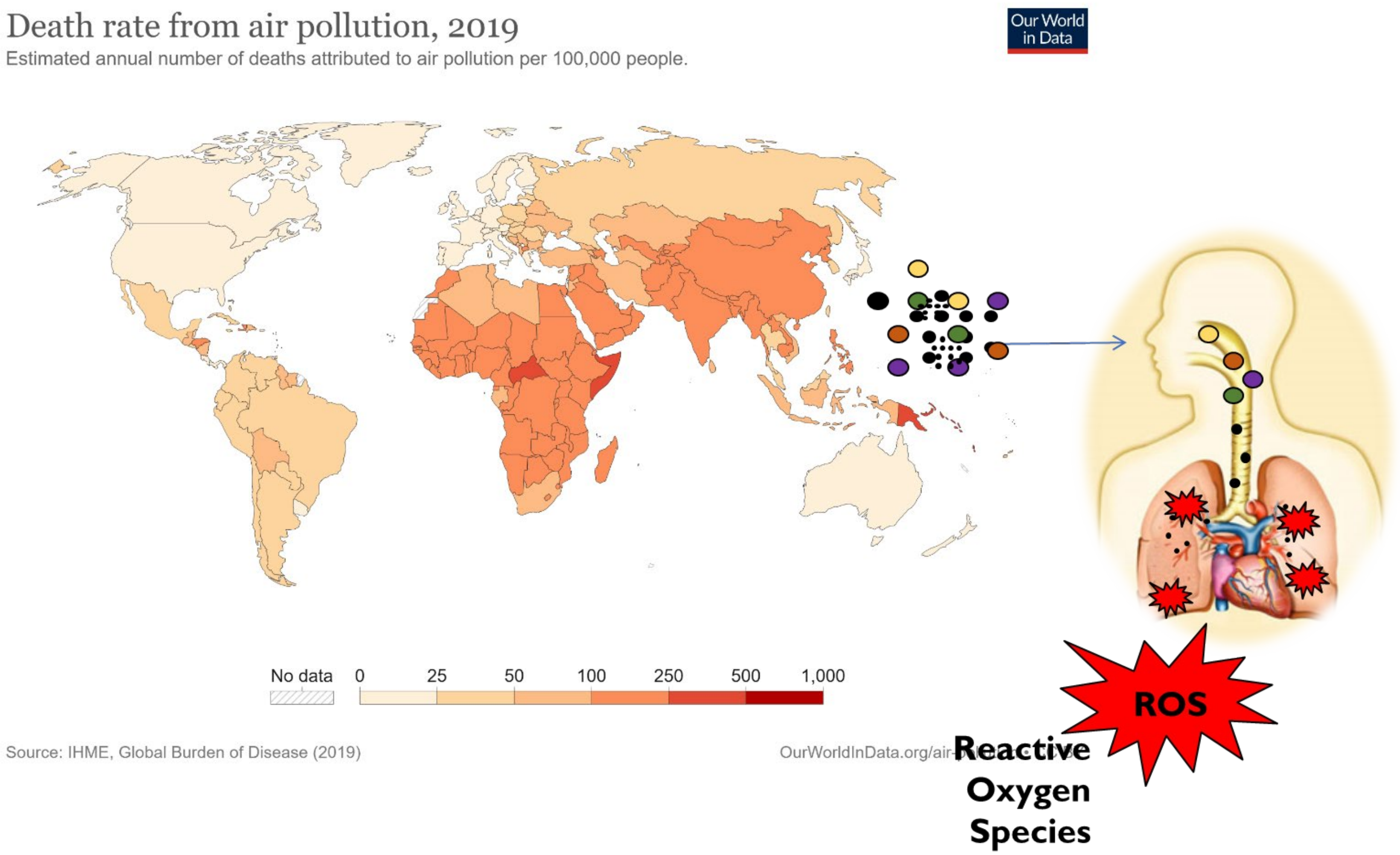
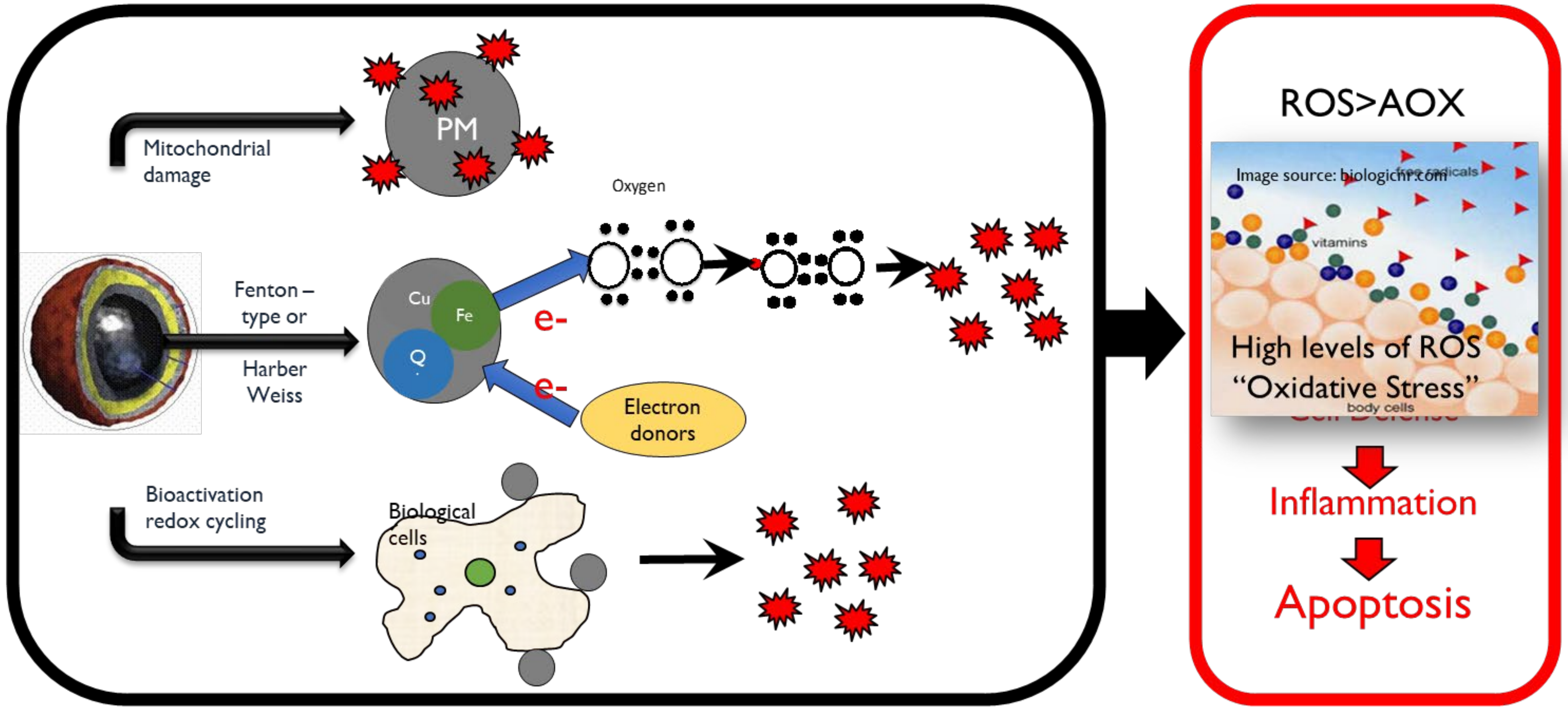
Oxidative potential of particulate matter

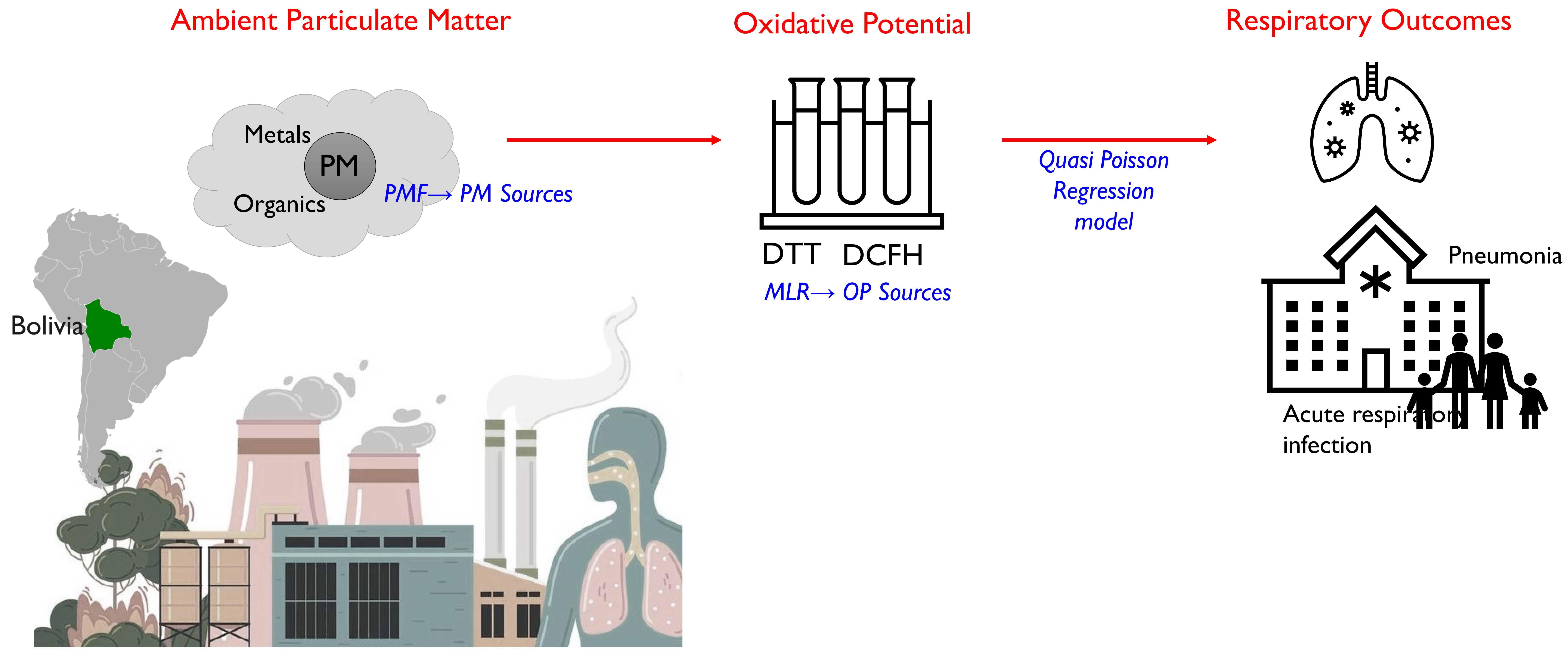
Oxidative potential (OP), defined as the capability of PM to generate ROS .





Can we use OP in air quality monitoring? Is it a viable health-based metric of PM?

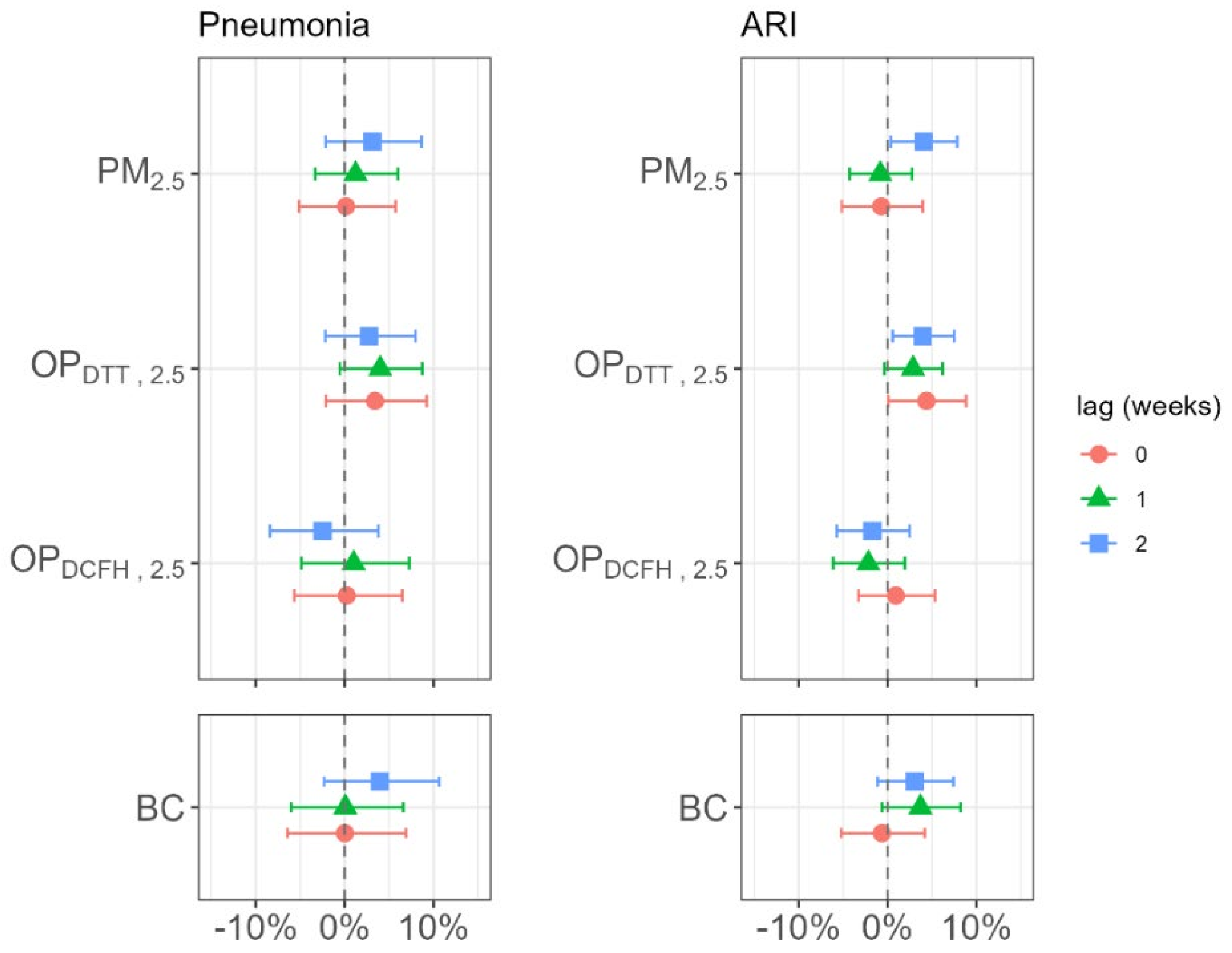
Workflow



Ambient Particulate Matter
Metals
PM
Organics
PMF→ PM Sources
Bolivia
Oxidative Potential
DTT DCFH
MLR→ OP Sources
Quasi Poisson Regression model
Respiratory Outcomes
Pneumonia
Acute respiratory infection

Highlights

- ✓ OP_{DTT} positive associations with respiratory outcomes
- ✓ OP from traffic-related sources



Estimating global trends of air pollution, air pollution-attributable disease burdens, and CO_2 emissions in 13,000 cities using large geospatial datasets

Soo-Yeon Kim, Gaige H. Kerr, & Susan C. Anenberg

George Washington University, Department of Environmental and Occupational Health

* CONTACT: sooyeonkim@gwu.edu

Research Overview

01

Update global datasets of city-level air pollution and CO_2 emissions using global geospatial datasets

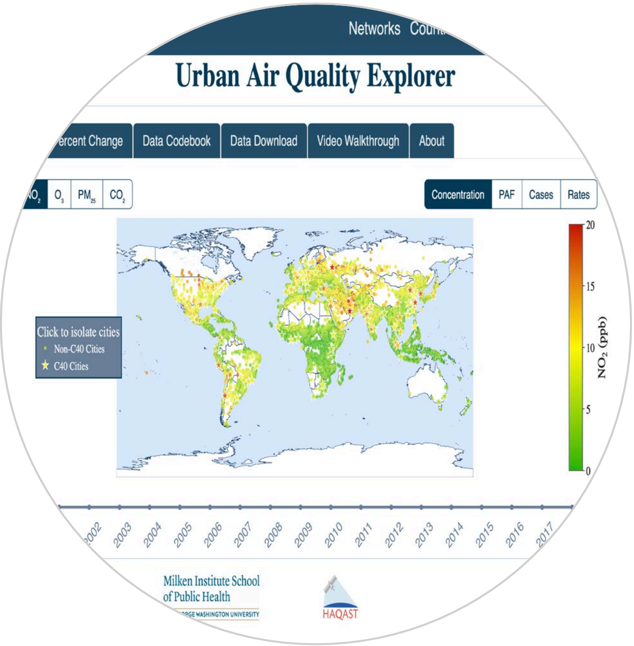
- Population-weighted annual average $PM_{2.5}$, NO_2, and O_3 concentrations in 13,189 cities for 2000-2020
- Mortality/morbidity burdens attributable to $PM_{2.5}$, NO_2, and O_3 in 13,189 cities for 2000-2020
- Fossil fuel CO_2 ($FFCO_2$) emissions per capita in 13,189 cities for 2000-2020

02

Compare temporal trends of city-level $PM_{2.5}$, NO_2, and O_3 concentrations and $FFCO_2$ per capita

- Correlation analysis between temporal trends of these pollutants

Results & Conclusions

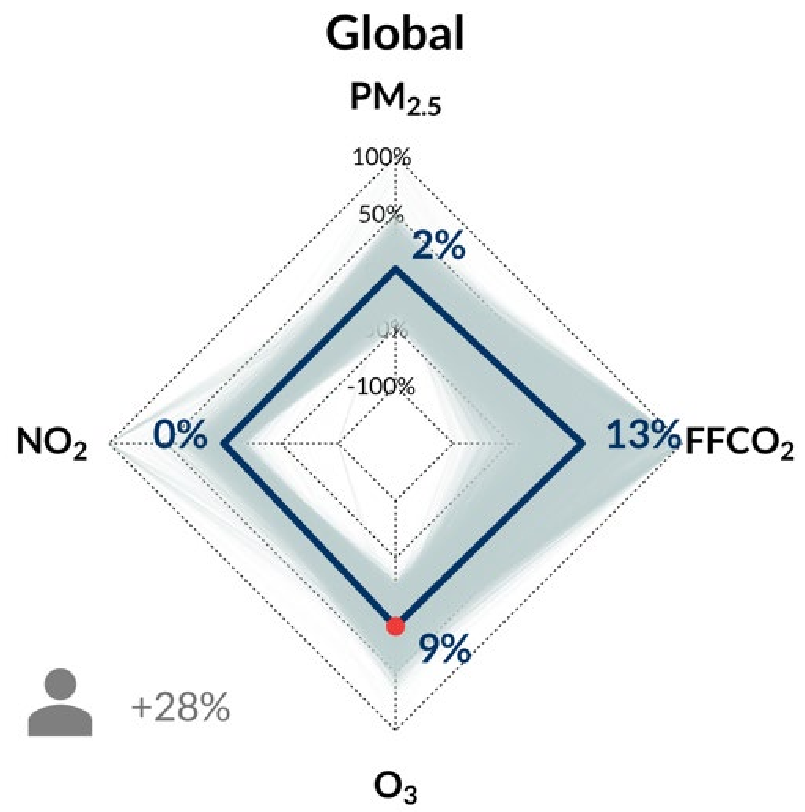


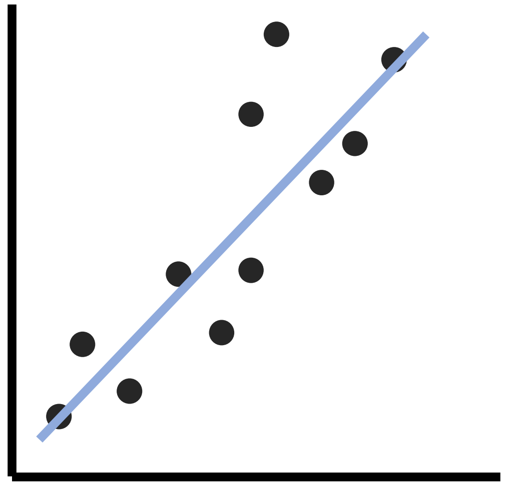
01

Global datasets of city-level air pollution and CO2 emissions (https://urbanairquality.online)

02

- **Not much progress** on reducing air pollution and CO_2 emissions globally
- Huge variations depending on regions





03

Positive correlations between temporal trends of the four pollutants across the majority of urban areas worldwide

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.

What's in the air? Engaging Native American youth in the Northern plains to reduce air pollution

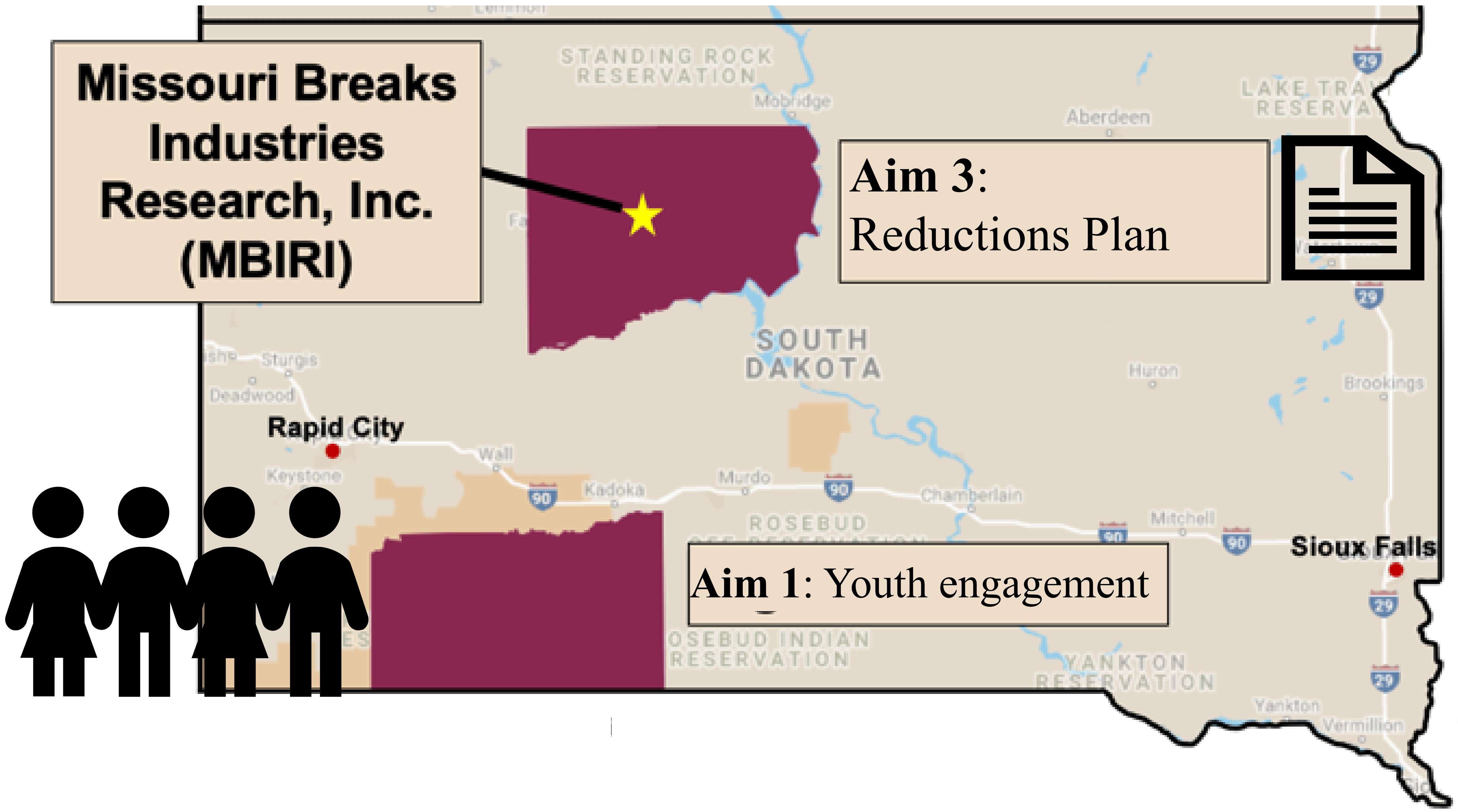
Yoshira 'Yoshi' Ornelas Van Horne, PhD

Community Partner: Missouri Breaks Industries Research

Mentors: Markus Hilpert, Ana Navas-Acien, Rima Habre

Only 15% (86/576) of all federally recognized Indigenous communities operate their own federally approved air monitoring sites.

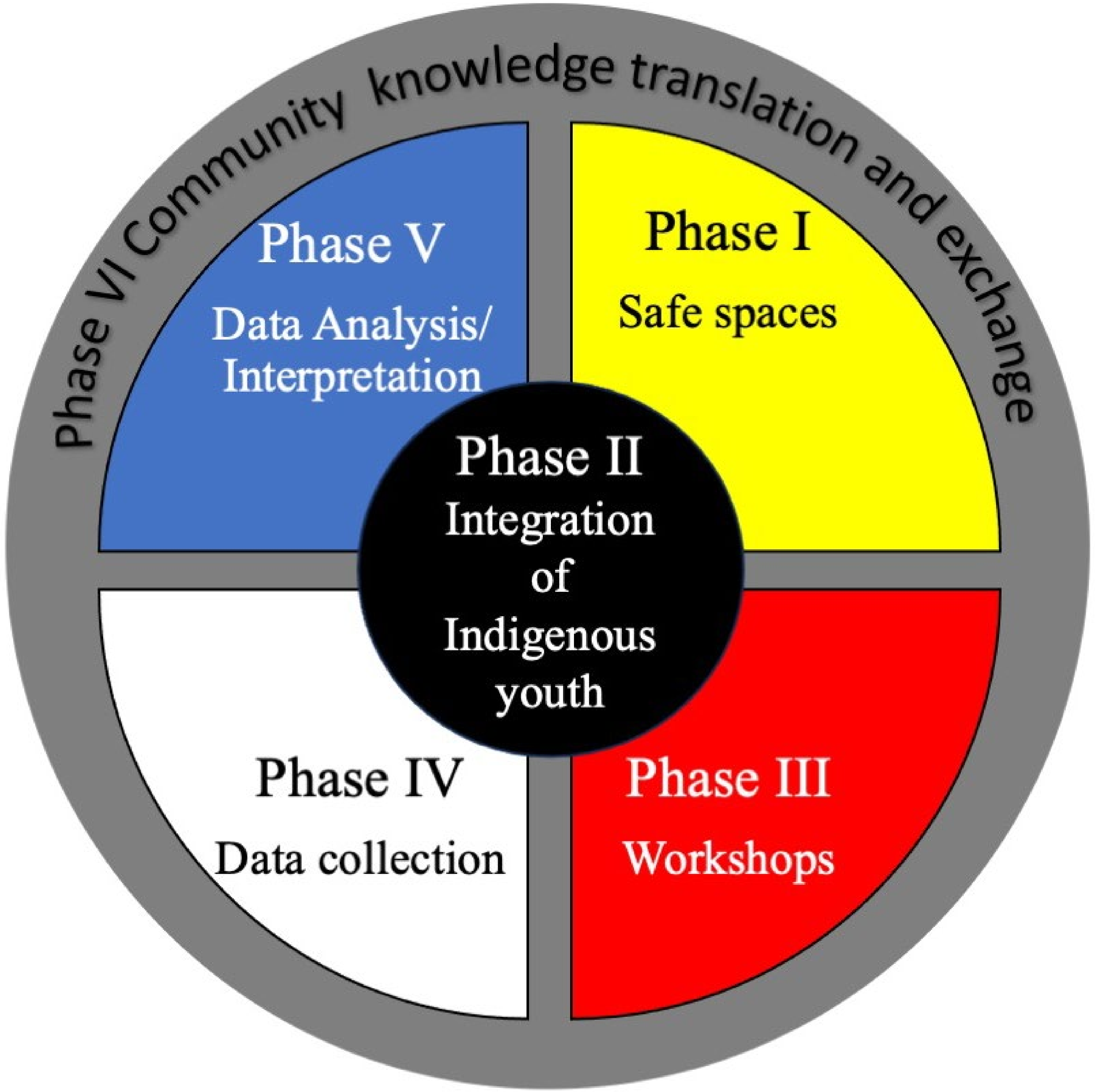
Aim 2: Air pollution exposure assessment



Among 120 Indigenous communities the top air pollution concerns were

- industrial
- wildfire
- natural resources pollution

Aim 1. Engage Native American youth in the formation of a community-based air monitoring network.



Summer 2023: Highschool students measuring VOCs

Aim 2. Determine local sources of PM2.5 exposures through ambient measurements and source-apportionment methods

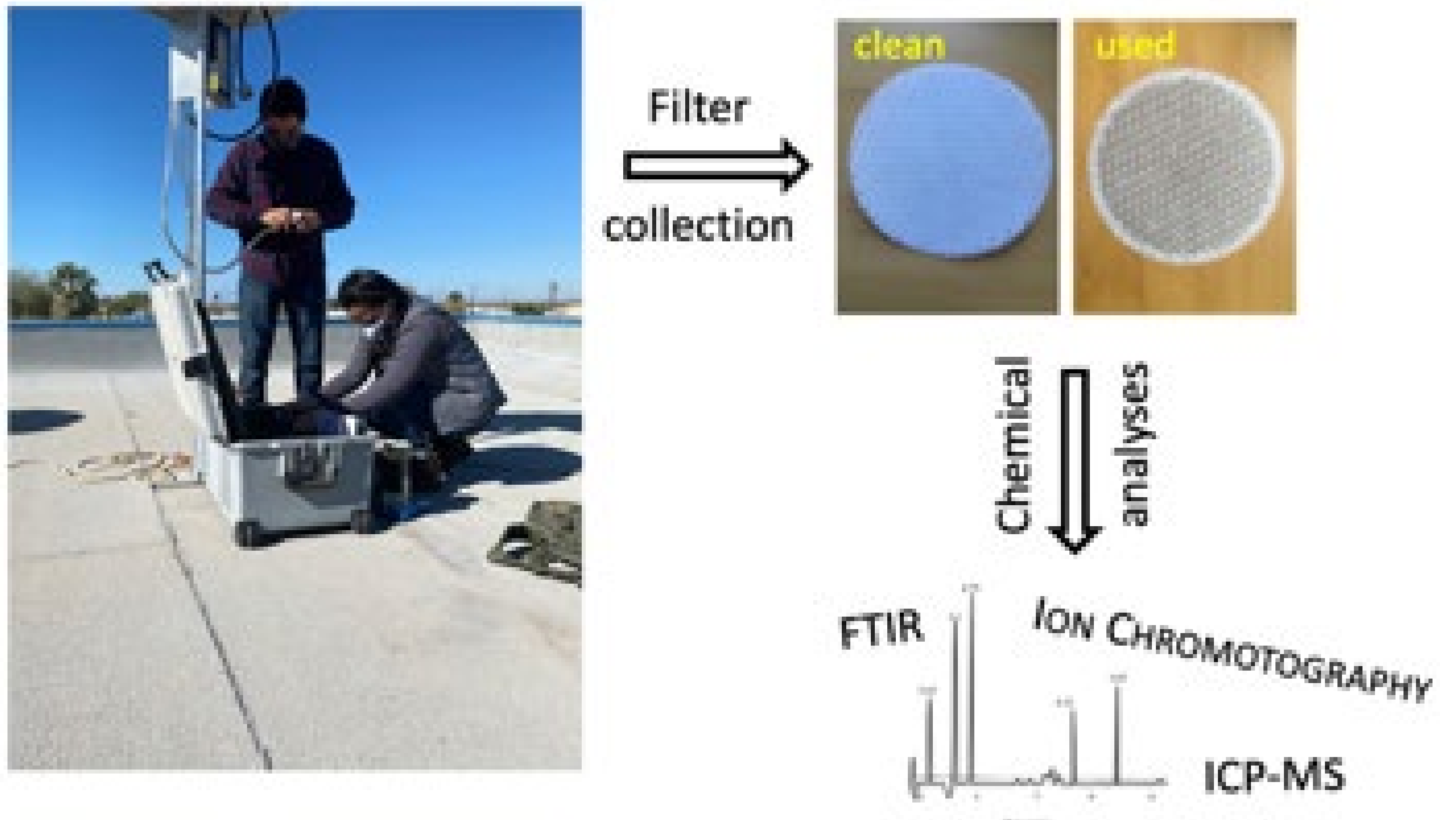
PM 2.5

Black Carbon

Metals

PM
1, 2.5, 10

CO, NO, NO2, O3



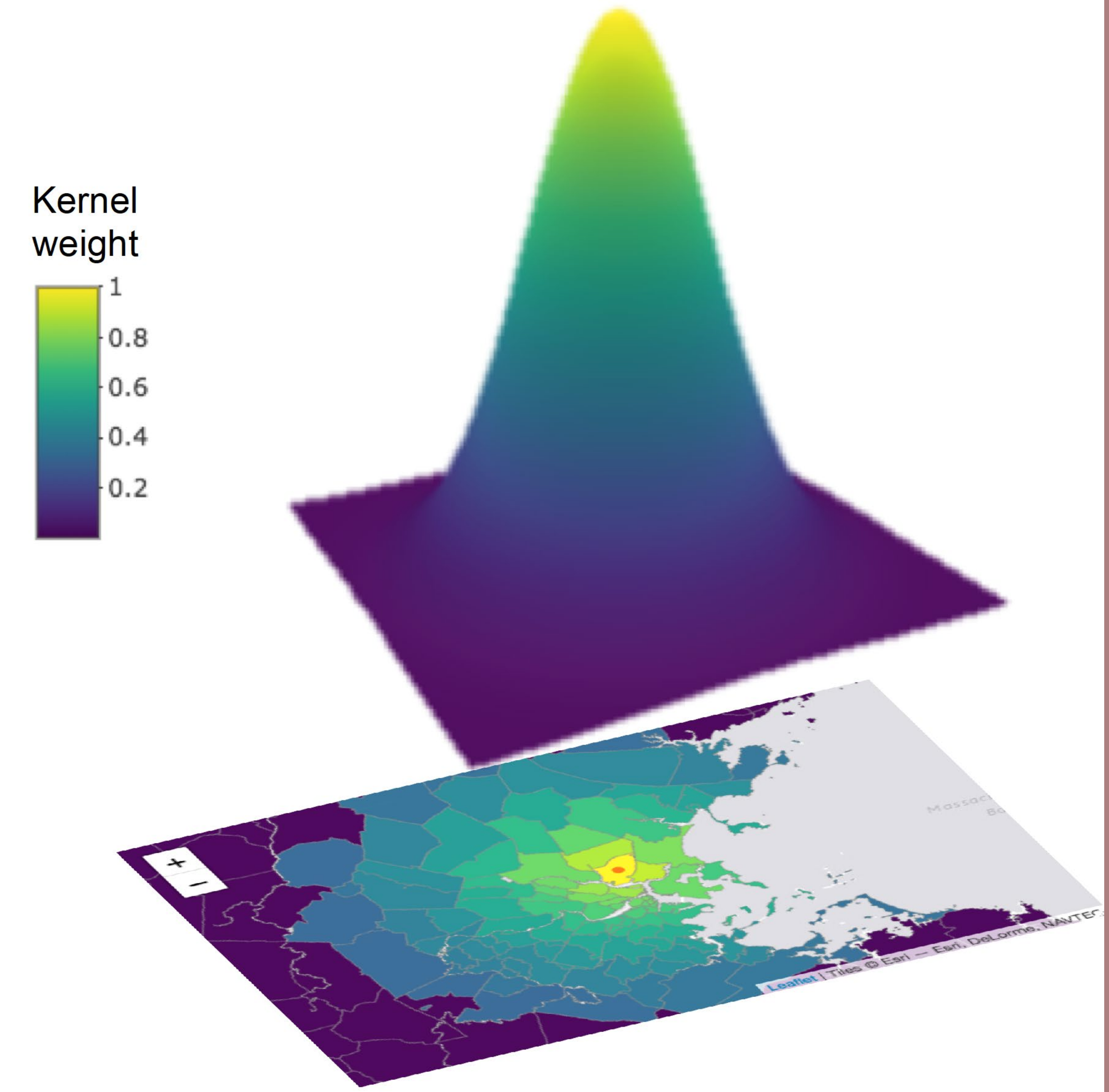
Anticipated installation July-August 2024

Project Milestones

- [x] Quality Assurance Quality Control Plan
- [x] Subcontract completed
- [x] Schools identified
- [ ] Tribal IRB: OST, LB, CRS
- [x] Monitors prepped
- [ ] Monitor installation

Summer 2023: Highschool students from EARTH program

Designing optimal policies for reducing air pollution-related health inequities



Rachel Nethery

Assistant Professor of Biostatistics

Harvard TH Chan School of Public Health

Background and Aims

- EPA committed to tailoring policies to mitigate air pollution-related health inequities
- Designing national environmental justice-centered policies requires accounting for:
  - Differential exposures, sources, and susceptibility
  - Cost constraints
- Existing statistical methods cannot tackle these challenges simultaneously

Aim 1: Develop methods to estimate spatially-varying subgroup-specific causal exposure-response curves for $PM_{2.5}$ and health in Medicare

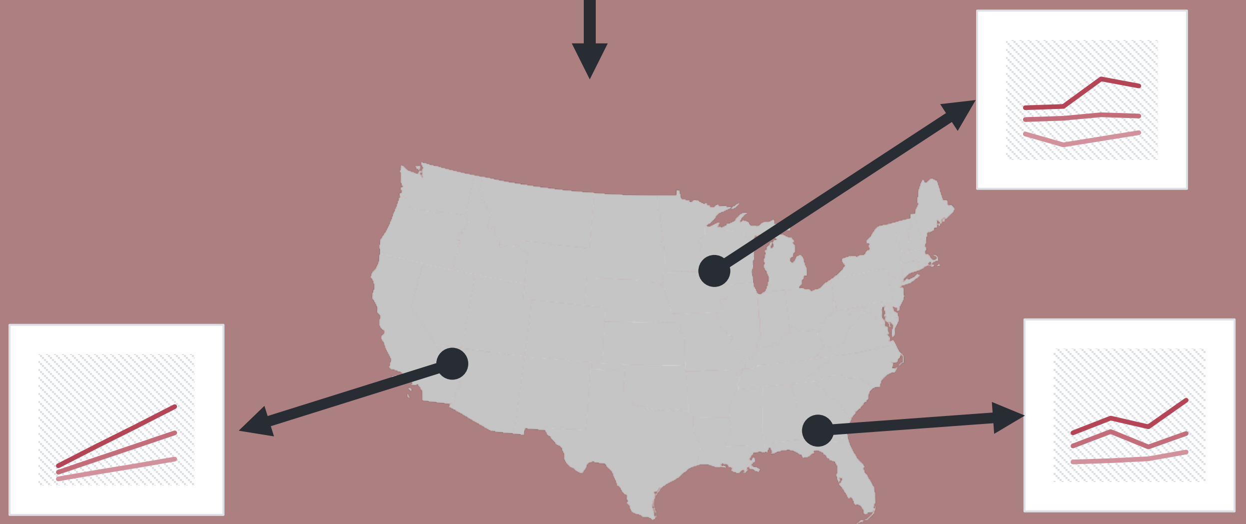
Aim 2: Conduct a Monte Carlo simulation study to identify hypothetical $PM_{2.5}$ reduction policies that minimize racial/ethnic group-specific $PM_{2.5}$-attributable health risks

Aim 3: Develop optimal policy learning algorithms to identify hypothetical $PM_{2.5}$ reduction policies that minimize group-specific $PM_{2.5}$-attributable health risks

Approaches

Aim 1

- Bayesian causal inference
- Gaussian process + spatially-varying coefficient model
- Apply to nationwide Medicare + $PM_{2.5}$

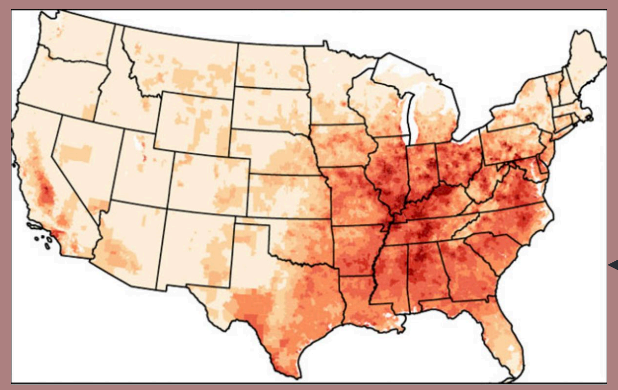


Aim 2

- Search over a space of realistic hypothetical policies
- Estimate race/ethnicity-specific health risks and identify policies that minimize them

Aim 3

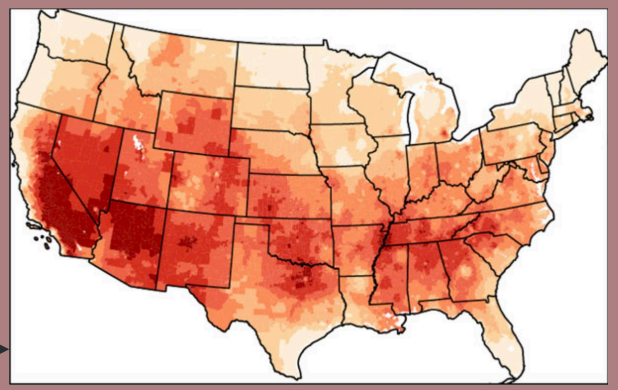
- Construct constrained optimization algorithms that can efficiently and accurately identify optimal $PM_{2.5}$ reduction policies for each racial/ethnic group



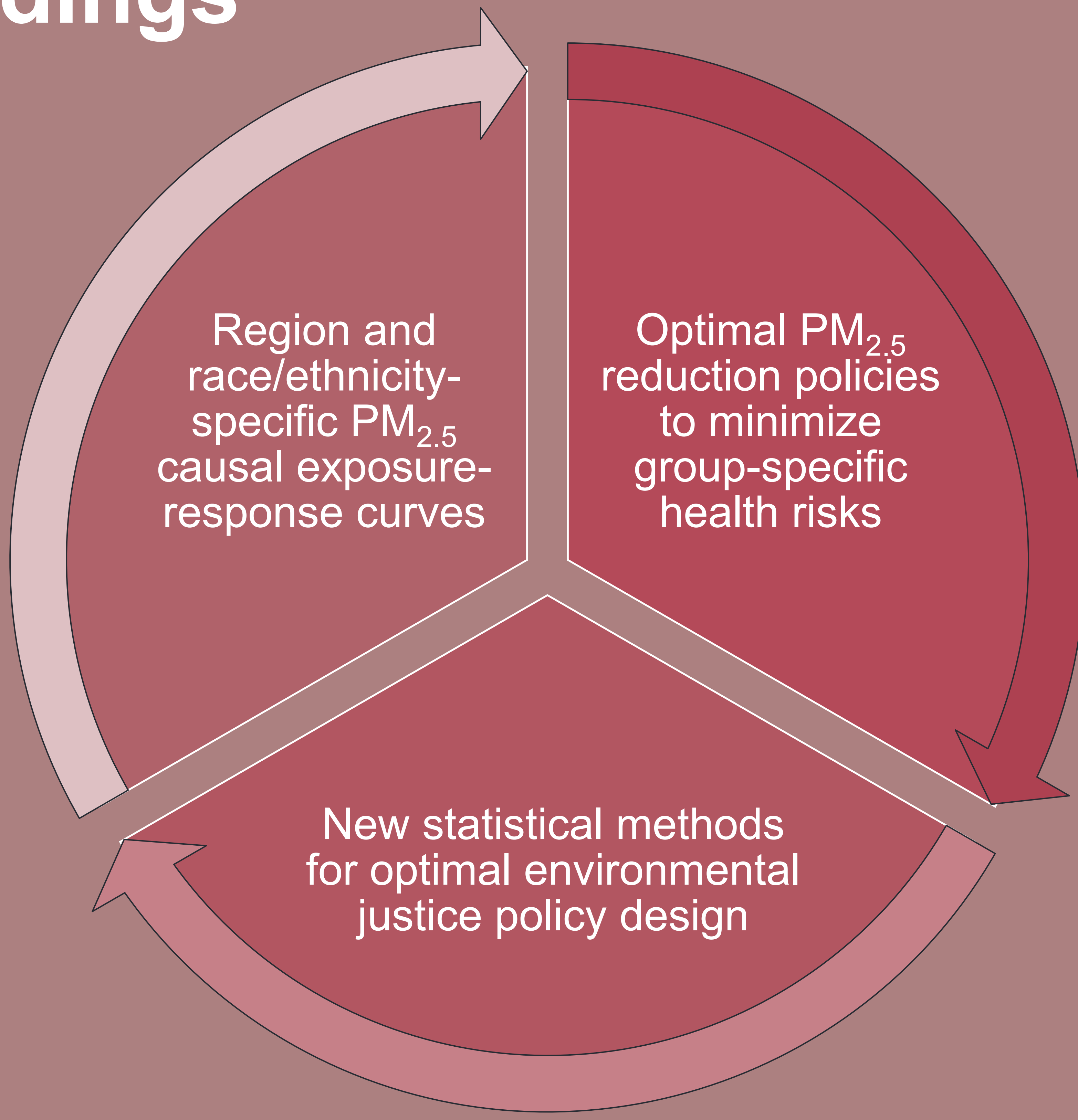
$PM_{2.5}$ reduction policy to minimize health burdens among

← Black Americans

Hispanic Americans →



Expected Findings



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