



Air, Climate, and Energy Research

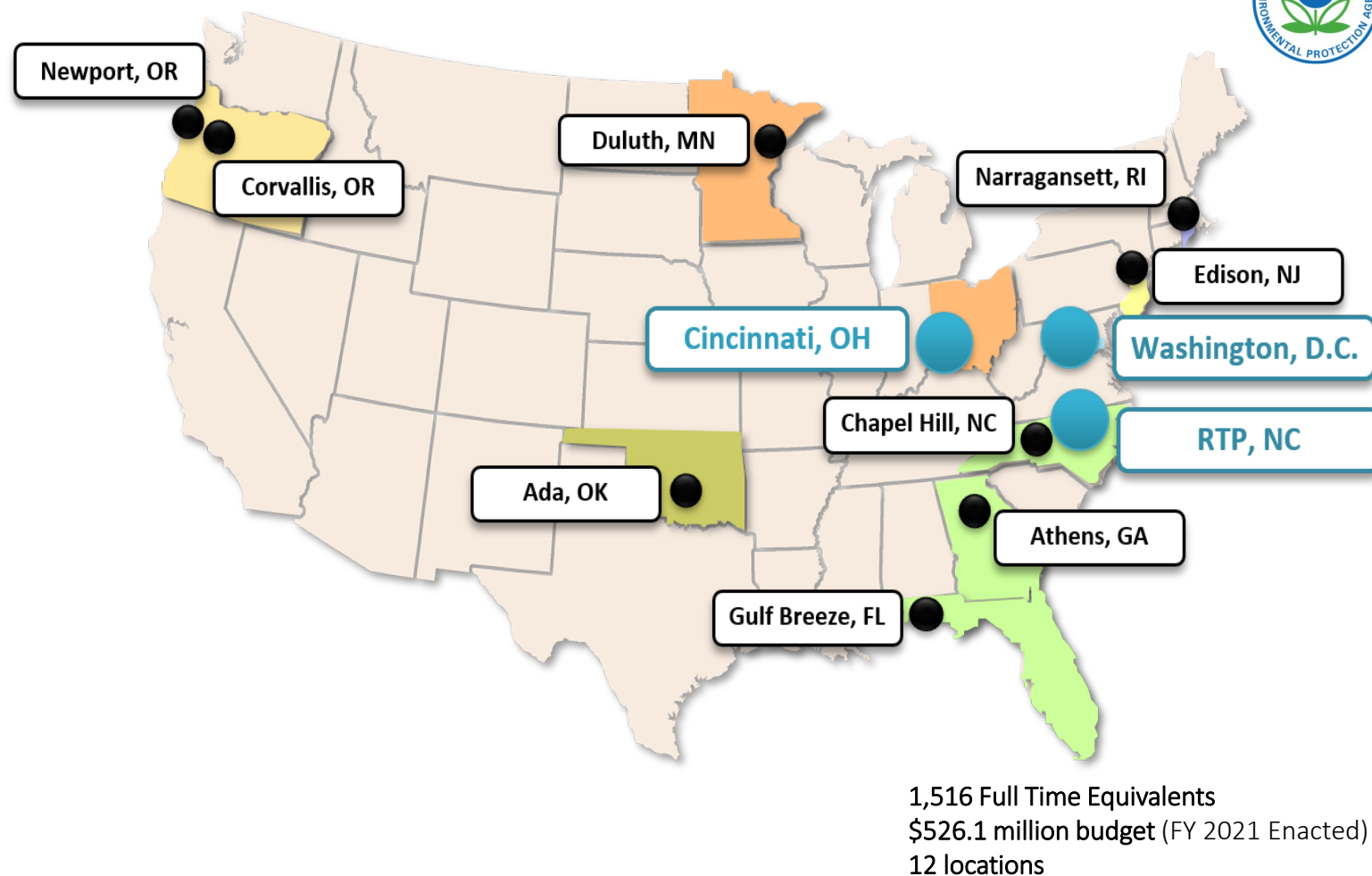
Angie Shatas

Air, Climate, and Energy National Research Program, US EPA

AAPCA Fall Business Meeting, September 29, 2022

Office of Research and Development

Mission: Provide the science, technical support, technology and tools to inform EPA's mission to protect public health and the environment.



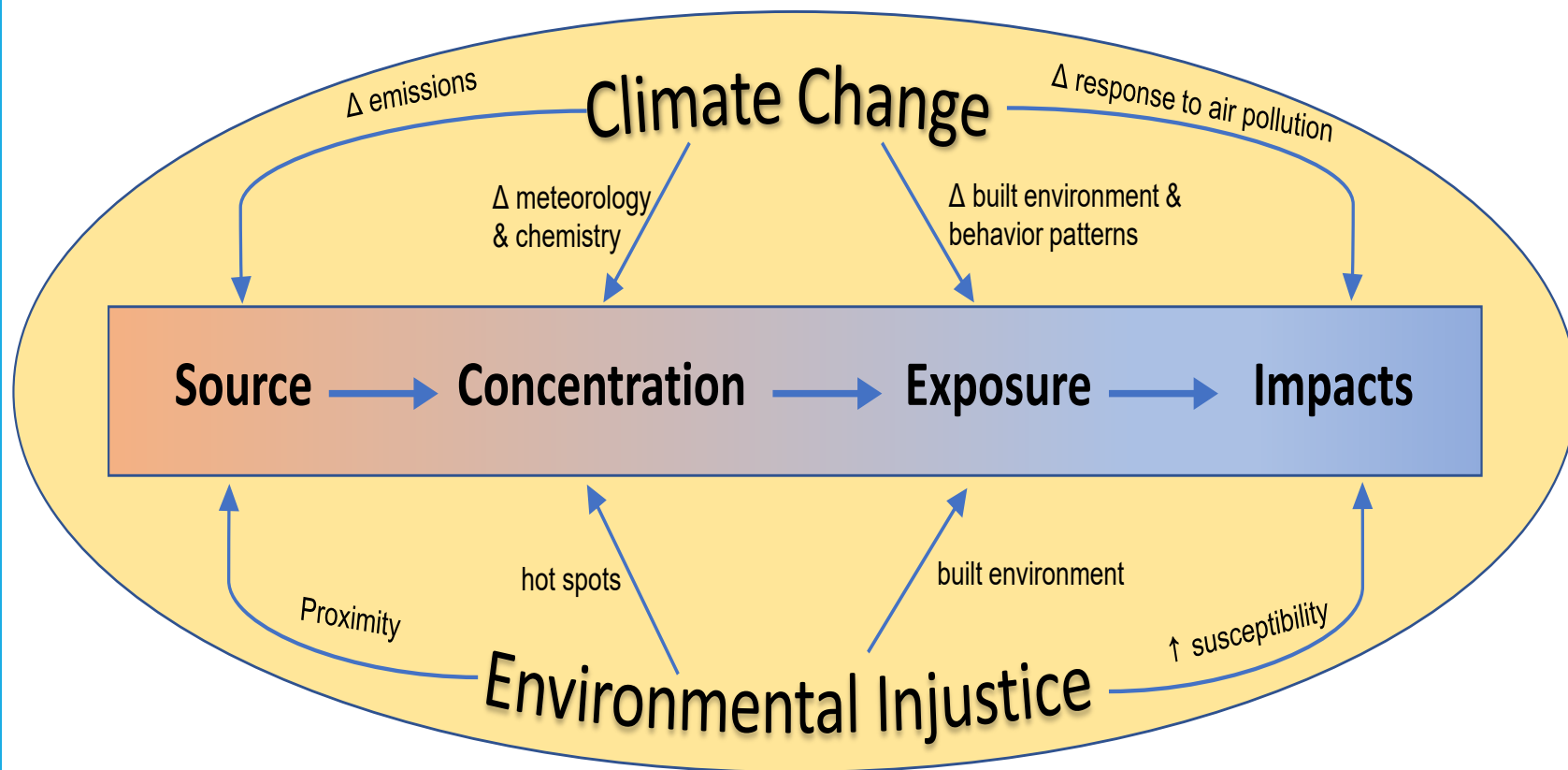
Integration of science and assessments are crucial to inform EPA's voluntary and regulatory actions.



Air, Climate, and Energy (ACE)

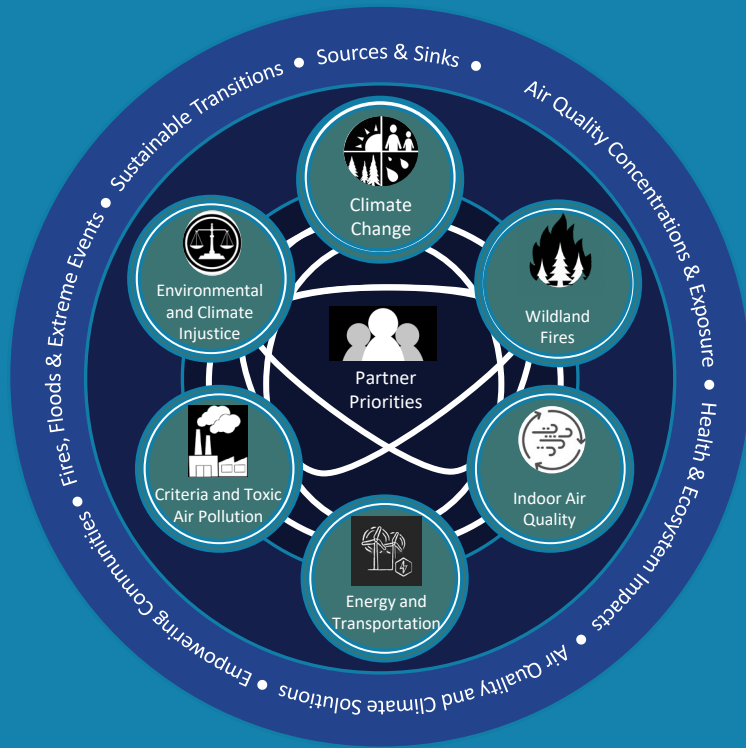
Reducing environmental and health inequities AND responding to the impacts of climate change is part of the holistic vision for the ACE Program.

Source-to-Impacts Continuum



ACE Strategic Research Action Plan FY23-26

ACE is focused on addressing six key interrelated challenges.



ACE StRAP FY23-26 Research Areas

Topic 1: UNDERSTANDING Air Pollution and Climate Change and Their Impacts on Human Health and Ecosystems

Research Area 1:
Sources and Sinks of
Air Pollution and
Climate Forcers

Research Area 2:
Air Quality
Concentrations and
Exposure
Characterization:
Measurements

Research Area 3:
Air Quality
Concentrations and
Exposure
Characterization:
Modeling

Research Area 4:
Health Impacts of
Air Pollution and
Climate Change

Research Area 5:
Ecosystem Impacts
of Air Pollution and
Climate Change

Topic 2: RESPONDING to Risks and Impacts and Preparing for the Future

Research Area 6:
Scientific Support for
Climate Change and Air
Quality Policy Solutions

Research Area 7:
Empowering communities
and individuals to improve
public health

Research Area 8:
Responding to Risks
of Fires, Floods, and
Other Extreme
Events

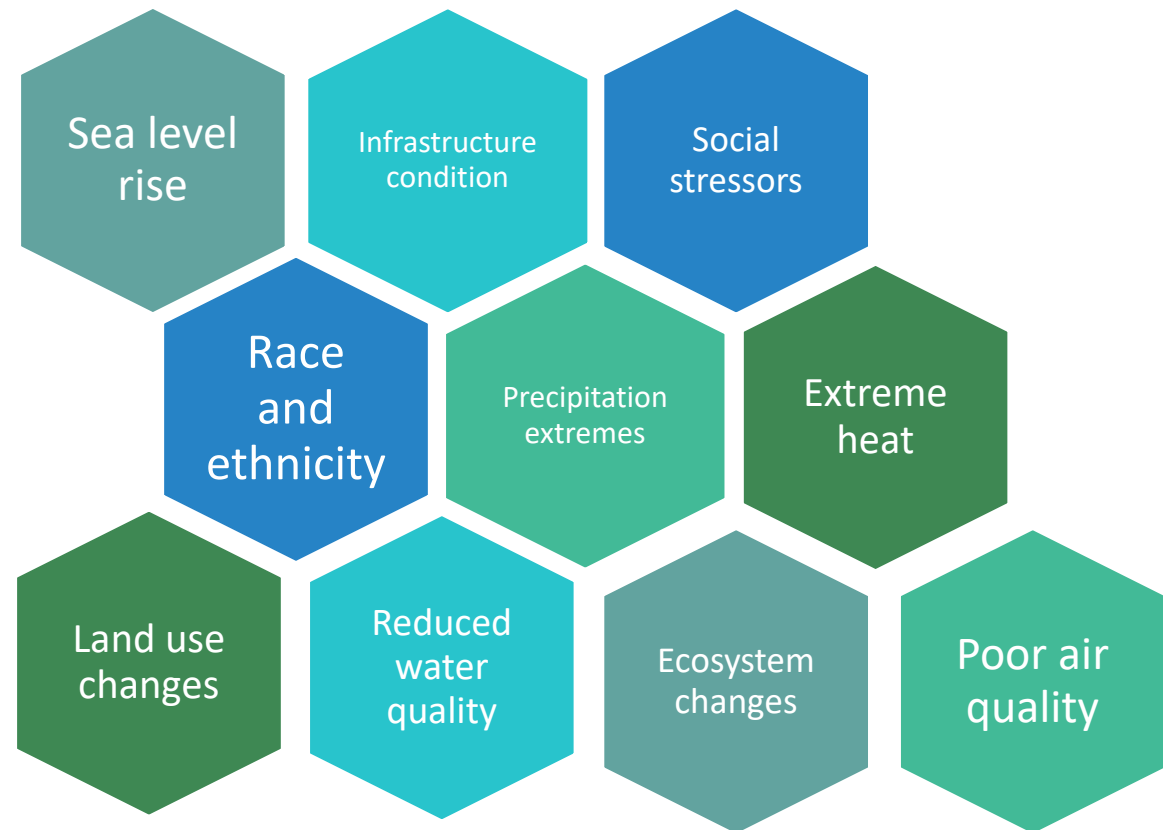
Research Area 9:
Transitions to a
Sustainable Future

Impacts of climate change

Impacts on health are complex, often indirect, and dependent on multiple societal and environmental factors.

How can we do research that supports adaptation planning and resilience building?

Integrating social science is key.

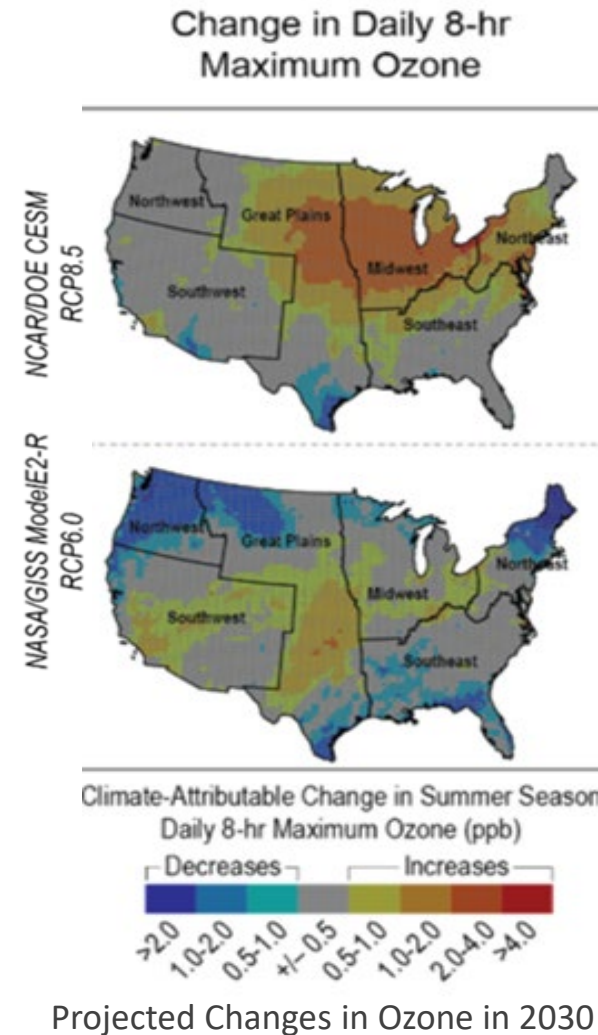


Climate, air pollution, and equity

Research examples:

- Impacts of extreme weather on acute and chronic health
- Quantify impacts of environmental and health effects (or benefits of avoiding impacts)
- Assess potential strategies for reducing air pollution and climate forcers
- Evaluate effects of historical inequalities on health disparities

Assessing the Impacts of Changing Environmental Conditions on Air Quality and Human Health



Impacts of Climate Change-related Extreme Weather Events on Health Outcomes



Effects of Historical Redlining on Climate and Health

Interventions to mitigate climate change effects

Research examples:

- Green infrastructure for climate resiliency and air quality
- Building on EPA's EJ Academy to enhance climate change and environmental justice capacity



Urban Green Infrastructure Design and Assessment



Strengthening Capacity at the Intersection of Climate Change & Environmental Justice

Next Generation Emissions Measurements (NGEM)

Research examples:

- Advance emissions measurement at Fugitive and Area Sources and for Fenceline Monitoring
- Understand air emissions from landfills
- Understand air emissions from storage tanks



Storage tanks



Landfills



Fenceline monitoring




Commercial versions of EPA ORD's open-source design SPod fenceline sensor now in use around oil and gas pads in Colorado.

Air Sensors

Research examples:

- Evaluate sensor performance
- Improve data quality from air sensor networks
- Broaden new technology use for loan to air agencies

 United States Environmental Protection Agency

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Science Inventory

You are here: [EPA Home](#) > [Science Inventory](#) > Performance Testing Protocols, Metrics, and Target Values for Fine Particulate Matter Air Sensors: Use in Ambient, Outdoor, Fixed Site, Non-Regulatory Supplemental and Informational Monitoring Applications

Performance Testing Protocols, Metrics, and Target Values for Fine Particulate Matter Air Sensors: Use in Ambient, Outdoor, Fixed Site, Non-Regulatory Supplemental and Informational Monitoring Applications

Citation:
Duvall, R., A. Clements, G. Hagler, A. Kamal, Vasu Kilari, L. Goodman, S. Frederick, K. Johnson Barkjohn, I. VonWald, D. Greene, AND T. Dye. Performance Testing Protocols, Metrics, and Target Values for Fine Particulate Matter Air Sensors: Use in Ambient, Outdoor, Fixed Site, Non-Regulatory Supplemental and Informational Monitoring Applications. U.S. EPA Office of Research and Development, Washington, DC, EPA/600/R-20/280, 2021.

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Impact/Purpose:
The use of air sensor technologies has grown exponentially for a variety of applications. However, there is still significant variability in data quality from air sensors. There are currently no standard testing protocols, metrics, or targets to evaluate the performance of air sensors uniformly. Without these standard procedures, it is difficult for consumers to understand the performance of any given device and select sensors that are appropriately suited for a desired application. The U.S. EPA developed a recent guideline

Sensor Evaluations and Performance Testing



PurpleAir PM_{2.5} sensor



ThingyAQ PM_{2.5}, CO, VOC sensor



Vehicle Add-on Mobile Monitoring System (VAMMS) PM_{2.5}



Air Sensor Loan Program

Sensor loans to state, local, and tribal air agencies through the Wildfire Smoke Air Monitoring Response Technologies ([WSMART](#)) Pilot

Energy Modeling

Research examples:

- Analyze energy system transformations through a suite of energy modeling tools
- Develop decision support tools for state, regional, and national air quality and climate change planning
- Examine energy policy on a city-scale

Explore the impacts of energy technologies and policies on the environment using [GLIMPSE](#)



Examine city-level energy policy and conduct scenario exercises to look at the impacts using [COMET](#)



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