An Overview of the Air Climate and Energy (ACE) Research Program

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Presentation Overview

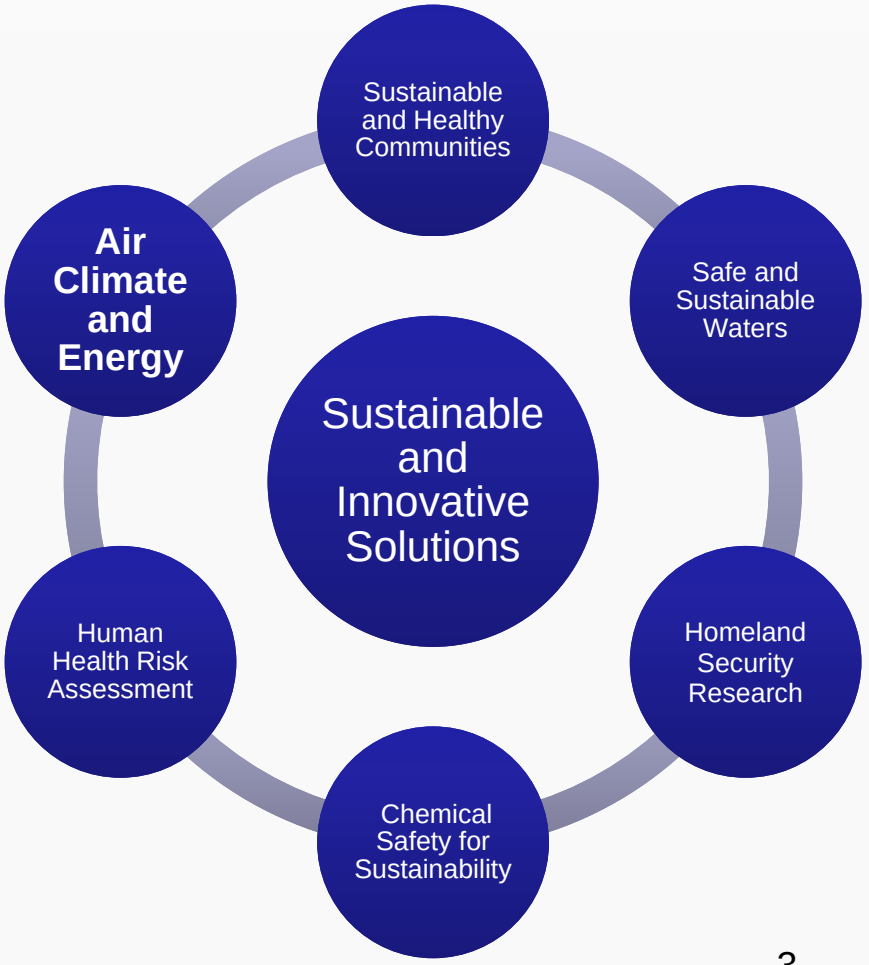
- New Research Programs in the EPA's Office of Research and Development (ORD)
- ORD's Air Climate and Energy (ACE) Research Program
- Ambient Air Monitoring Research within ACE

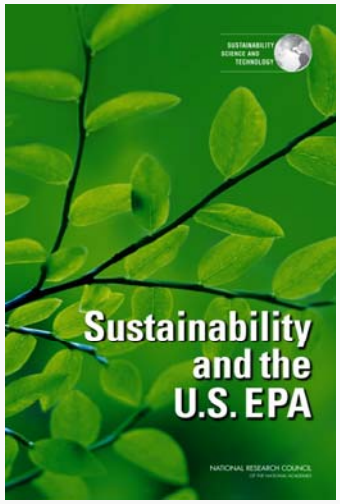
Building Sustainability and Systems Thinking into EPA Research

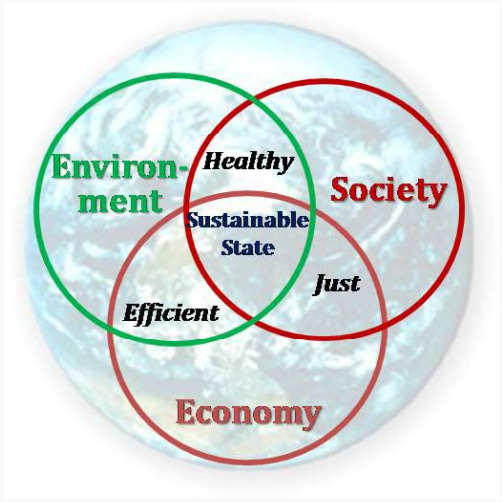
Previous ORD Research Programs

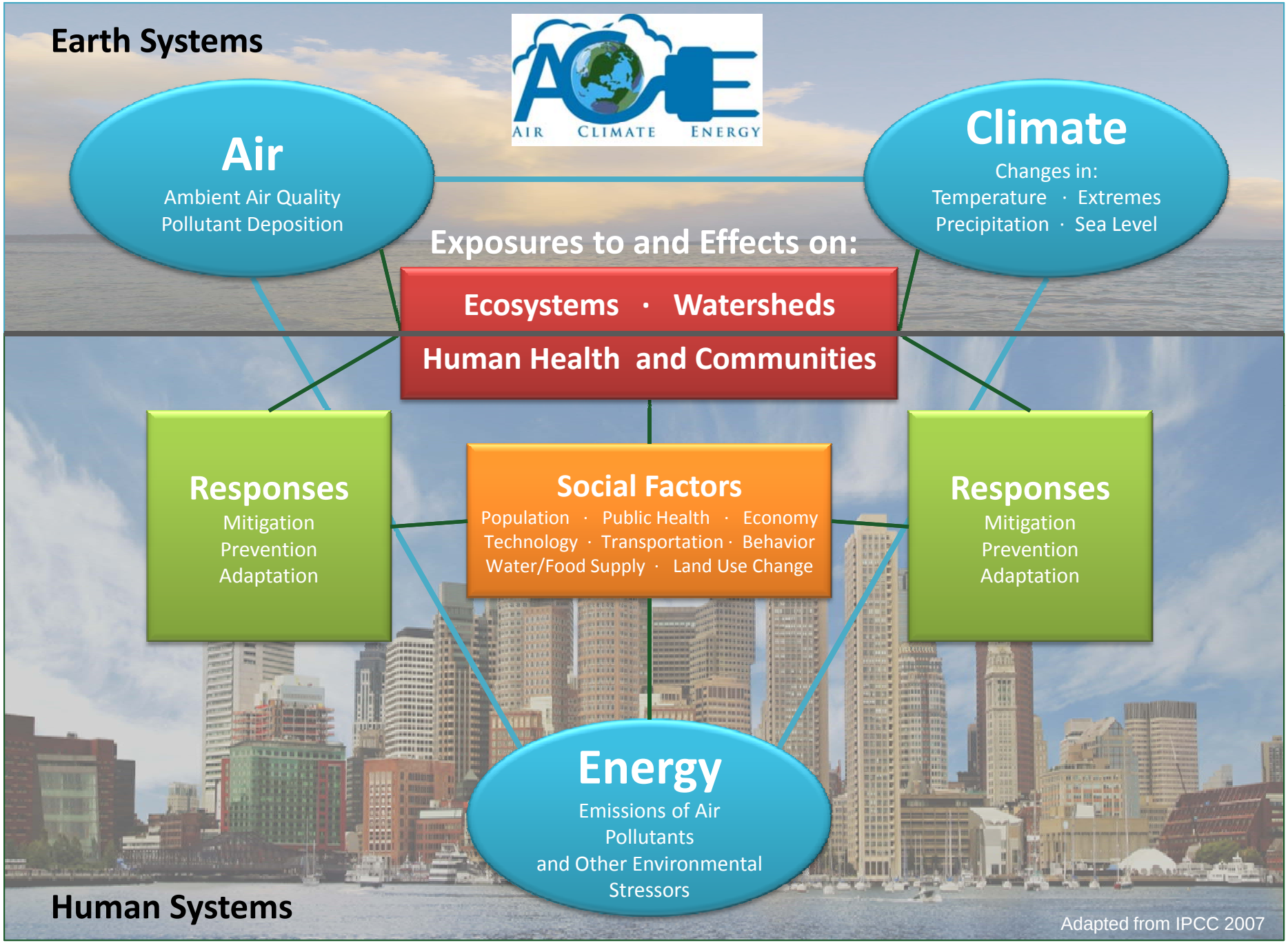
Air
Drinking Water
Human Health
Mercury
Homeland Security
Endocrine Disruptors
Sustainability
Global
Water Quality
Ecosystems
Land
Human Health Risk Assmt
Safe Pesticides/Products
Computational Toxicology

New ORD Research Programs





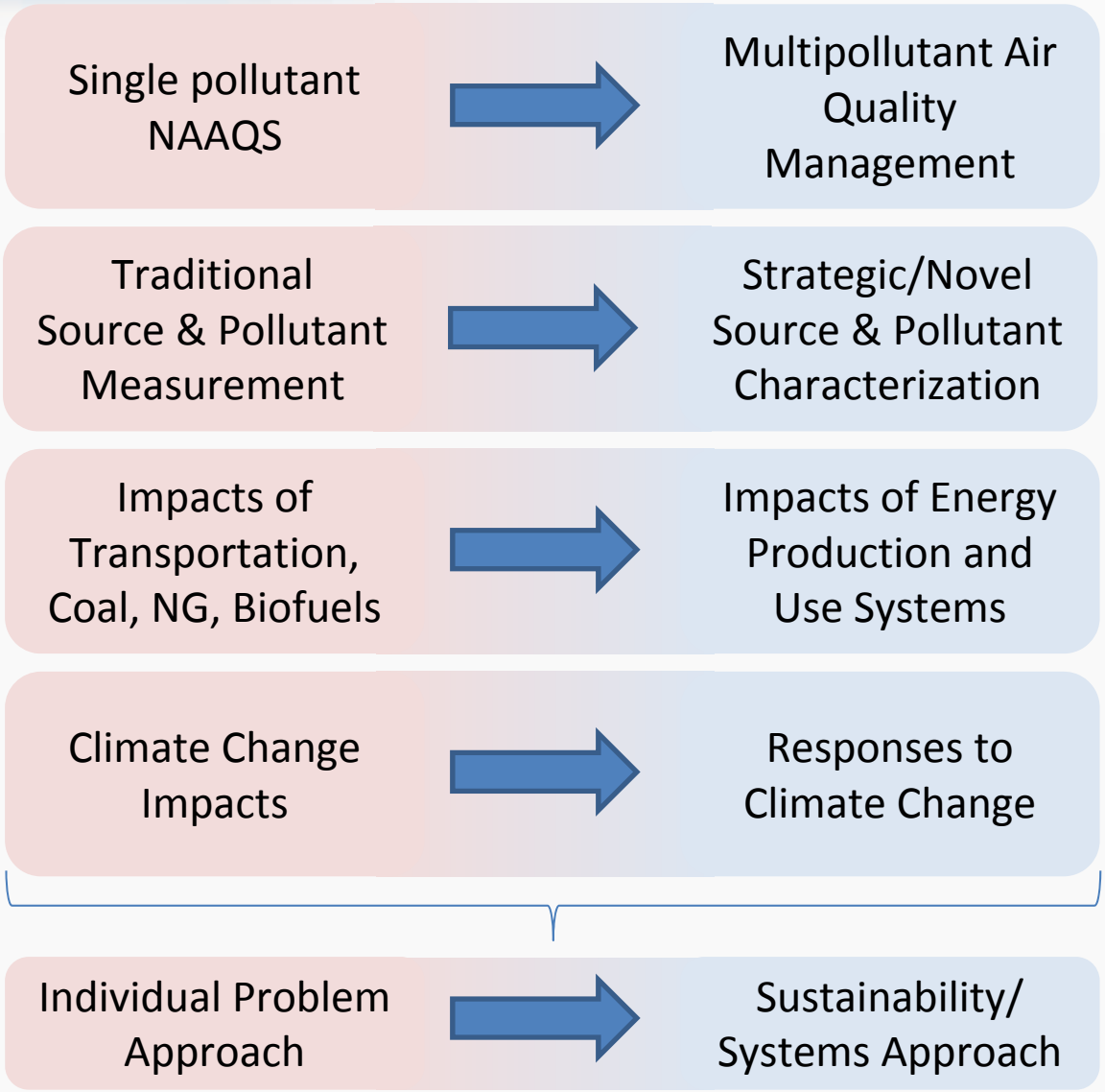



Earth Systems
AIR CLIMATE ENERGY
Air
Ambient Air Quality
Pollutant Deposition
Climate
Changes in:
Temperature · Extremes
Precipitation · Sea Level
Exposures to and Effects on:
Ecosystems · Watersheds
Human Health and Communities
Responses
Mitigation
Prevention
Adaptation
Social Factors
Population · Public Health · Economy
Technology · Transportation · Behavior
Water/Food Supply · Land Use Change
Responses
Mitigation
Prevention
Adaptation
Energy
Emissions of Air Pollutants
and Other Environmental Stressors
Human Systems
Adapted from IPCC 2007

Key Issues for ACE

- The multipollutant nature of air pollution
- The impacts of climate change and the development and evaluation of sustainable adaptation and mitigation options
- The human health and environmental impacts of current and future energy alternatives
- The expanding and contracting scales of environmental problems that range from global to local
- The social, behavioral, and economic factors that influence the effectiveness of air quality and climate policies

Evolution of ACE Research



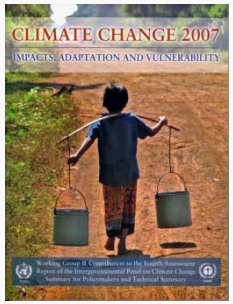
ACE Research Themes

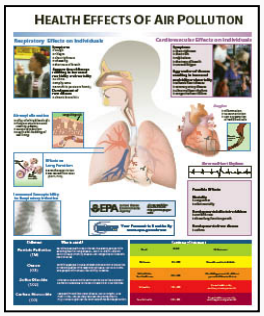
Theme 1: Assess Impacts

Assess human and ecosystem exposures and effects associated with air pollutants and climate change at individual, community, regional, and global scales

Theme 2: Prevent and Reduce Emissions

Provide data & tools to develop and evaluate approaches to prevent and reduce emissions of pollutants to the atmosphere, particularly environmentally sustainable, cost effective, and innovative multipollutant and sector-based approaches





Theme 3: Respond to Changes in Climate & Air Quality

Provide human exposure and environmental modeling, monitoring, metrics and information needed by individuals, communities, and governmental agencies to adapt to the impacts of climate change and make informed public health decisions regarding air quality

AQI AIR QUALITY INDEX

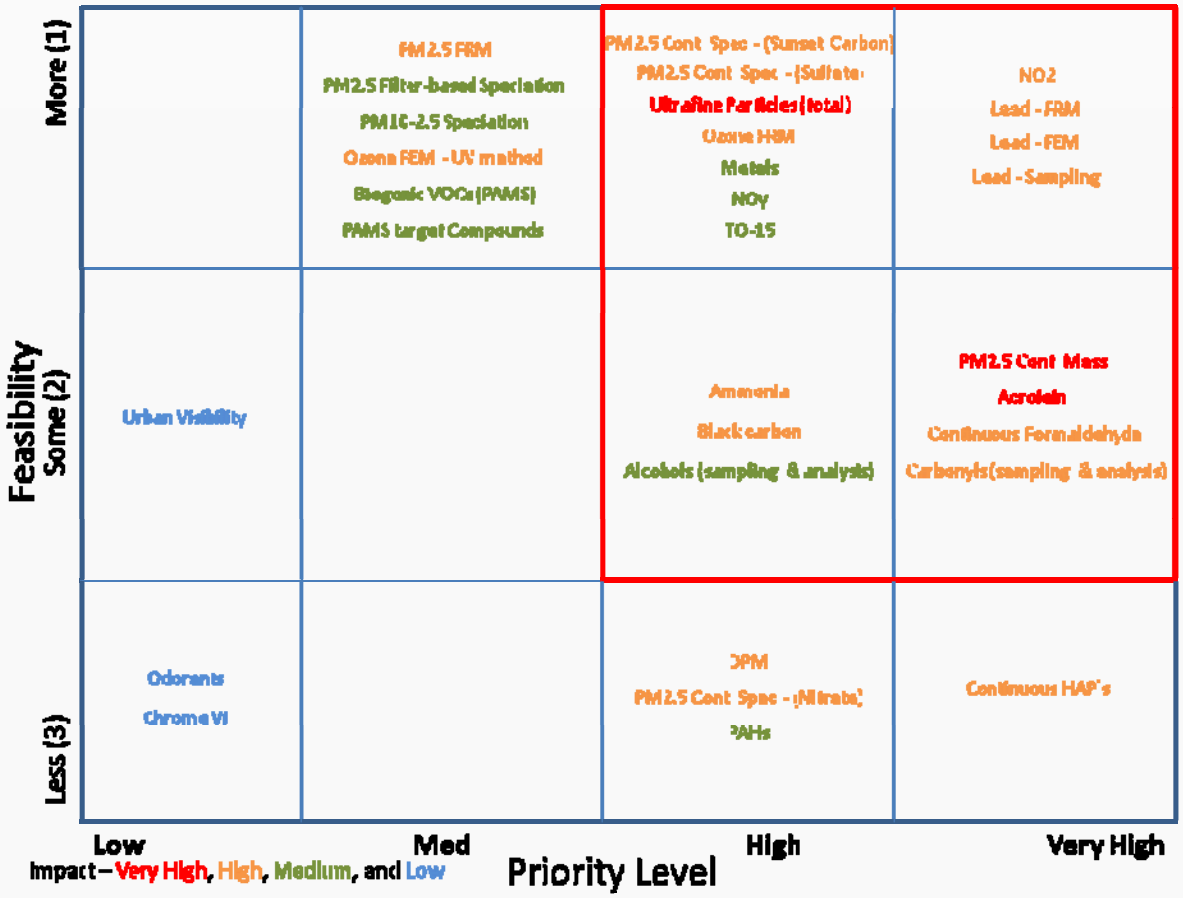
Ambient Air Monitoring in ACE

- Methods Development and Evaluation
  - Methods for Measurements to Inform Policy Development and Implementation
  - Changing the Paradigm of Air Pollution Monitoring

- Methods Application
  - Ambient Air Characterization
  - Source Apportionment
  - Human Exposure/Health

Methods for Measurements to Inform Policy

- Criteria Pollutants
  - NAAQS Compliance
    - Federal Reference Methods (FRM)
    - Federal Equivalency Methods (FEM)
  - NAAQS Review
- Hazardous Air Pollutants
  - Acrolein
  - Benzene (Small Business Innovative Research solicitation)



(Source: Summary of June 2011 ORD Ambient Methods Workshop)

Changing the Paradigm for Air Pollution Monitoring: The Problem

ACE Objective: Develop, evaluate and apply source and ambient air monitoring methods to support multiple objectives

Expanding Area

Regulatory	Research	Public Information
• Compliance • Enforcement • Permitting	• Human Exposure • Human Health Impacts • Model Evaluation • Emissions Characterization	• Community Decisions • Individual Decisions

The Problem:

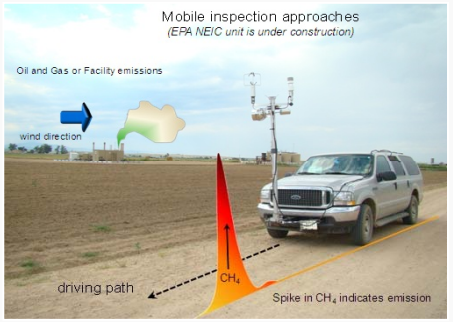
The complexity of the issues we are trying to address requires more monitoring and improved methods, but our ability to address these issues solely through traditional monitoring approaches is constrained by available resources.

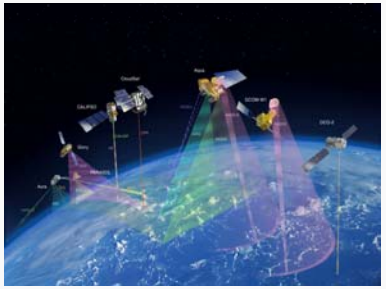
Changing the Paradigm for Air Pollution Monitoring

Changing the Paradigm: From Sensors to Satellites

- Sensors
  - Present both Opportunities and Challenges
  - Evaluating a range of technologies (e.g., hand held, mobile)
    - Performance evaluations
    - Fence line applications
    - Community-based applications
  - Workshops
    - Apps and Sensors for Air Pollution (ASAP) (March 2012)
    - Next Generation Air Monitoring (NGAM) – Fence Line (Nov 2012)
  - Open Source Challenges
    - Benzene (with EPA Region 5)
    - Joint challenge with Department of Health and Human Services
- Satellites
  - Evaluating and enhancing air quality applications
  - Leveraging investments from NASA and NOAA
    - NASA Air Quality Applied Science Team (AQAST) http://acmg.seas.harvard.edu/aqast/index.html
    - NASA DISCOVER-AQ http://www.nasa.gov/mission_pages/discover-aq/
- Data Fusion
  - Integrating modeling data with monitoring data to fill spatial and temporal gaps.

(communitysensing.org)





Methods Application: Recent and Ongoing Field Studies

- Near Road
  - Near-road EXposures and effects from Urban air pollutants Study (NEXUS) (Detroit): 2010-11
  - EPA/FHWA Near Road Collaboration Project (Detroit): 2010-11
  - Near Road Collaboration w/ Michigan Department of Environmental Quality: Ongoing
  - Near Road Collaboration w/ NC DENR: Ongoing (developing Raleigh site)
  - RTP Area Mobile Source Emission Study (RAMSES) Summer Pilot: 2012

- Other Near Source
  - Cicero rail yard study (CIRYS) with EPA Region 5: completed in fall 2011
  - Atlanta rail yard study (ARYS): ongoing
  - EPA Region 2 Port Study: planned to start sampling in June 2012

- Cleveland Multiple Air Pollutant (CMAPS): completed 2010

- Desert Southwest Coarse PM Study (Pinal County, AZ): completed 2010

- NASA DISCOVER-AQ Campaigns
  - Baltimore MD: 2011
  - California: 2013
  - Houston TX : 2013

For More Information

- EPA Air and Climate Research Websites
  - http://www.epa.gov/airscience/
  - http://www.epa.gov/research/climatescience/
- Tim Watkins
  - watkins.tim@epa.gov
  - 919-541-5114
- ACE program welcomes ideas for collaborative opportunities