



# ***Earth Science for Society: Applications of Environmental Remote Sensing to Air Quality and Public Health***

*Workshop: May 8-9, 2007  
Potomac, MD*

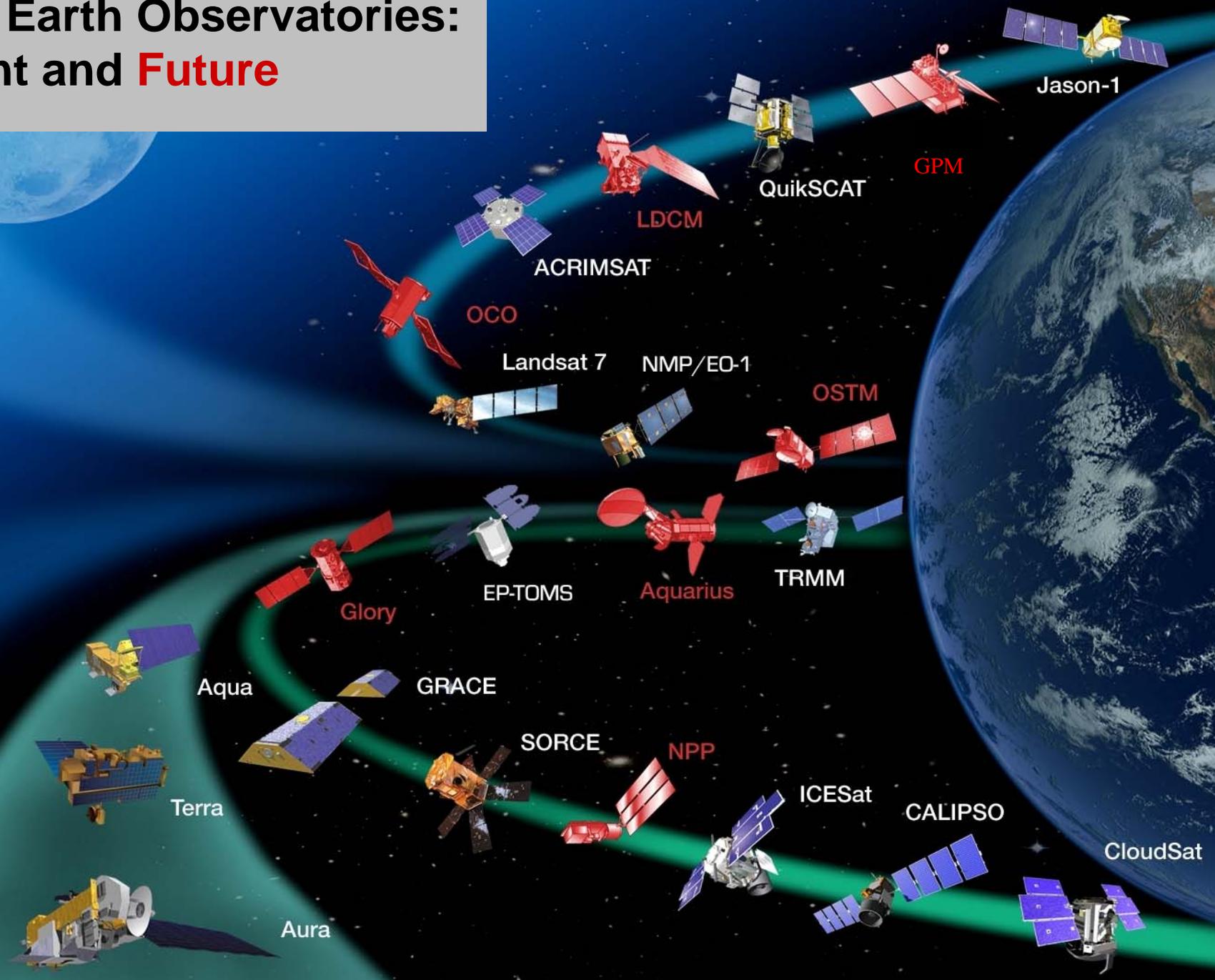
*NASA Science Mission Directorate  
Applied Sciences Program*

*CDC, EPA, NOAA &  
University Partners*

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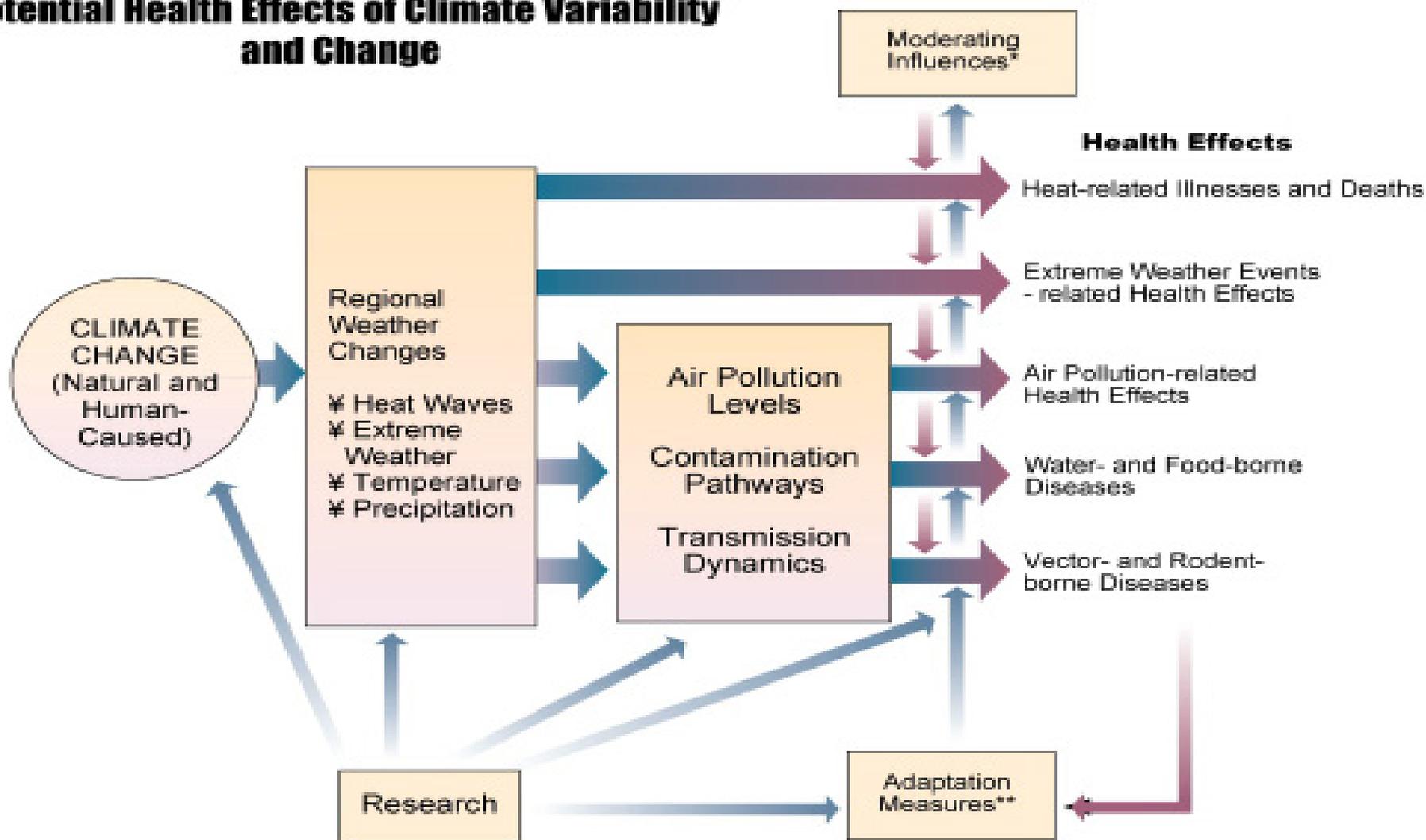
*Extending the societal and economic benefits of  
Earth science research and technology ...*

# NASA Earth Observatories: Current and **Future**

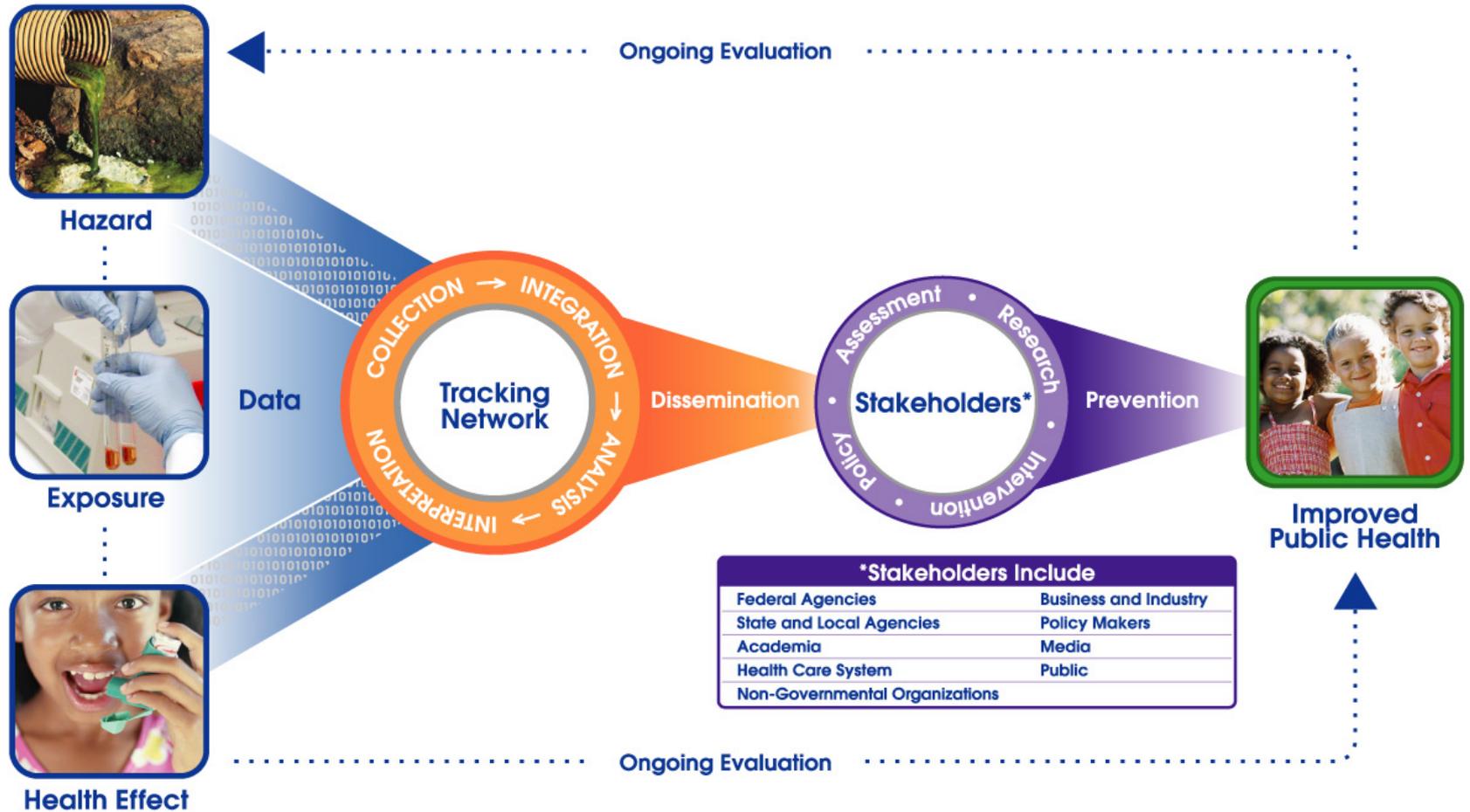


# The Public Health – Air Quality – Climate Change Connection

## Potential Health Effects of Climate Variability and Change



# ENVIRONMENTAL PUBLIC HEALTH TRACKING



**\*Stakeholders Include**

Federal Agencies	Business and Industry
State and Local Agencies	Policy Makers
Academia	Media
Health Care System	Public
Non-Governmental Organizations	



DEPARTMENT OF HEALTH AND HUMAN SERVICES  
CENTERS FOR DISEASE CONTROL AND PREVENTION  
SAFER • HEALTHIER • PEOPLE





# Applied Sciences Program: *Public Health & Air Quality*

## Public Health

### Programmatic Themes

- Environmental Health
- Infectious Disease
- Emergency Preparedness/Response
- Public Health Tracking/Information Network (crosscuts)

### Primary Federal Agency Partners

- Health & Tracking: CDC, EPA, DOE
- Disease & Emer.: CDC, USAID, DOD, USGS

### NASA Centers Involved in Program

- Marshall, Goddard, Ames, Langley

## Air Quality

### Programmatic Themes

- AQ Planning
- AQ Forecasting
- AQ Compliance
- Emissions Inventories (*crosscuts*)

### Primary Federal Agency Partners

- EPA, NOAA
- Developing: NPS, USDA

### NASA Centers Involved in Program

- Langley, Goddard, Marshall, JPL

# Group on Earth Observations

Group on Earth Observations:

Ministerial-level leadership for coordination of Earth observing systems

10-year implementation plan

Began August 2003

Integrate scientific capacity of organizations and observing systems to support nine societal benefit areas:

- Disasters
- Ecosystems
- Agriculture
- Climate
- Human Health
- Water
- Biodiversity
- Energy
- Weather

An international *political* endeavor to recognize the importance of Earth Observations



**Earth Observation Summit III**

*Feb. 2005*

**GEO involves:  
67 nations (plus EU)**

**48+ international  
Organizations**

**GEO Secretariat at WMO  
in Geneva**

# USGEO: United States Group on Earth Observations

## STRATEGIC PLAN FOR THE U.S. INTEGRATED EARTH OBSERVATION SYSTEM



### *Interagency Working Group on Earth Observations Membership*

Department of Commerce <ul style="list-style-type: none"><li>National Oceanic and Atmospheric Administration</li><li>National Institute for Standards and Technology</li></ul>	Environmental Protection Agency
Department of Defense <ul style="list-style-type: none"><li>Air Force</li><li>National Geospatial-Intelligence Agency</li><li>Navy</li><li>U.S. Army Corps of Engineers</li></ul>	National Aeronautics and Space Administration
Department of Energy	National Science Foundation
Department of Health & Human Services <ul style="list-style-type: none"><li>National Institute of Environmental Health Sciences</li></ul>	Smithsonian Institution
Department of Homeland Security <ul style="list-style-type: none"><li>Federal Emergency Management Agency</li></ul>	Tennessee Valley Authority
Department of the Interior <ul style="list-style-type: none"><li>US Geological Survey</li></ul>	U.S. Agency for International Development
Department of State	U.S. Department of Agriculture <ul style="list-style-type: none"><li>Agriculture Research Service</li><li>U.S. Forest Service</li></ul>
Department of Transportation	White House Council on Environmental Quality
	White House Office of Management and Budget
	White House Office of Science and Technology Policy

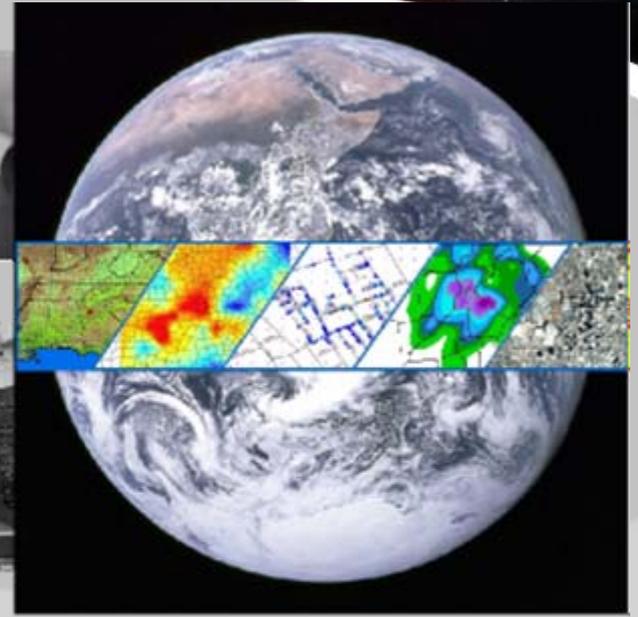
### *USGEO & IEOS Near-Term Opportunities*

*Air Quality Assessment and Forecast System*

*Improved Observations for Disaster Reduction*

*National Integrated Drought Information System*

# Data Access & Interoperability



Supply

Broker  
Collaboration  
& Technology

Demand

Technology use supports the broker position

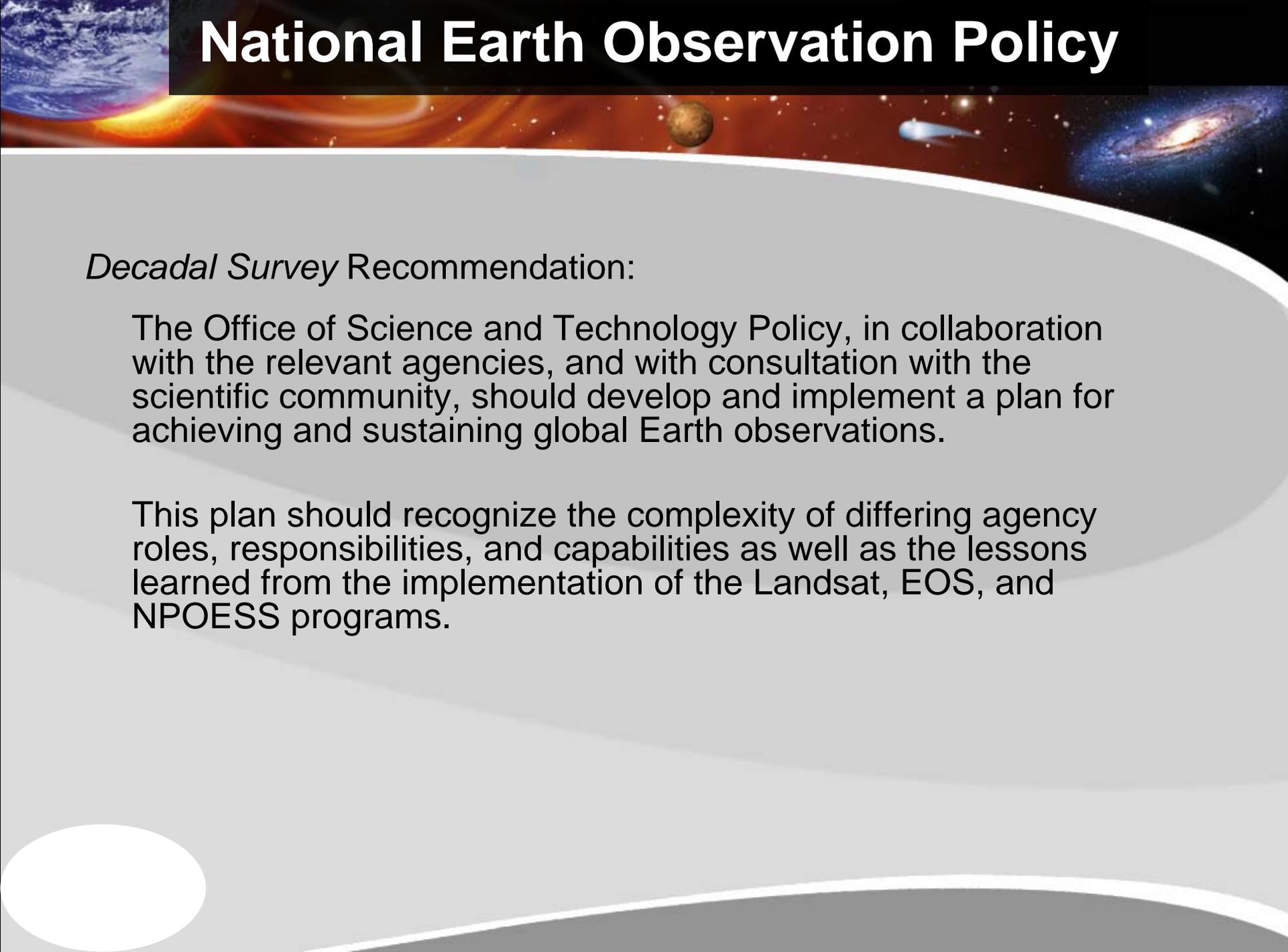
# Decadal Survey

## Earth Science Decadal Survey:

### Recommended Observation Types, by Panel

*Modification of Table 2.4*

<i>Panel</i>	<i># of Recom. Observation Types</i>
Climate	9
Ecosystem	6
Water	12
Health	29
Solid Earth	3
Weather	10
<hr/>	
<i>Total</i>	69

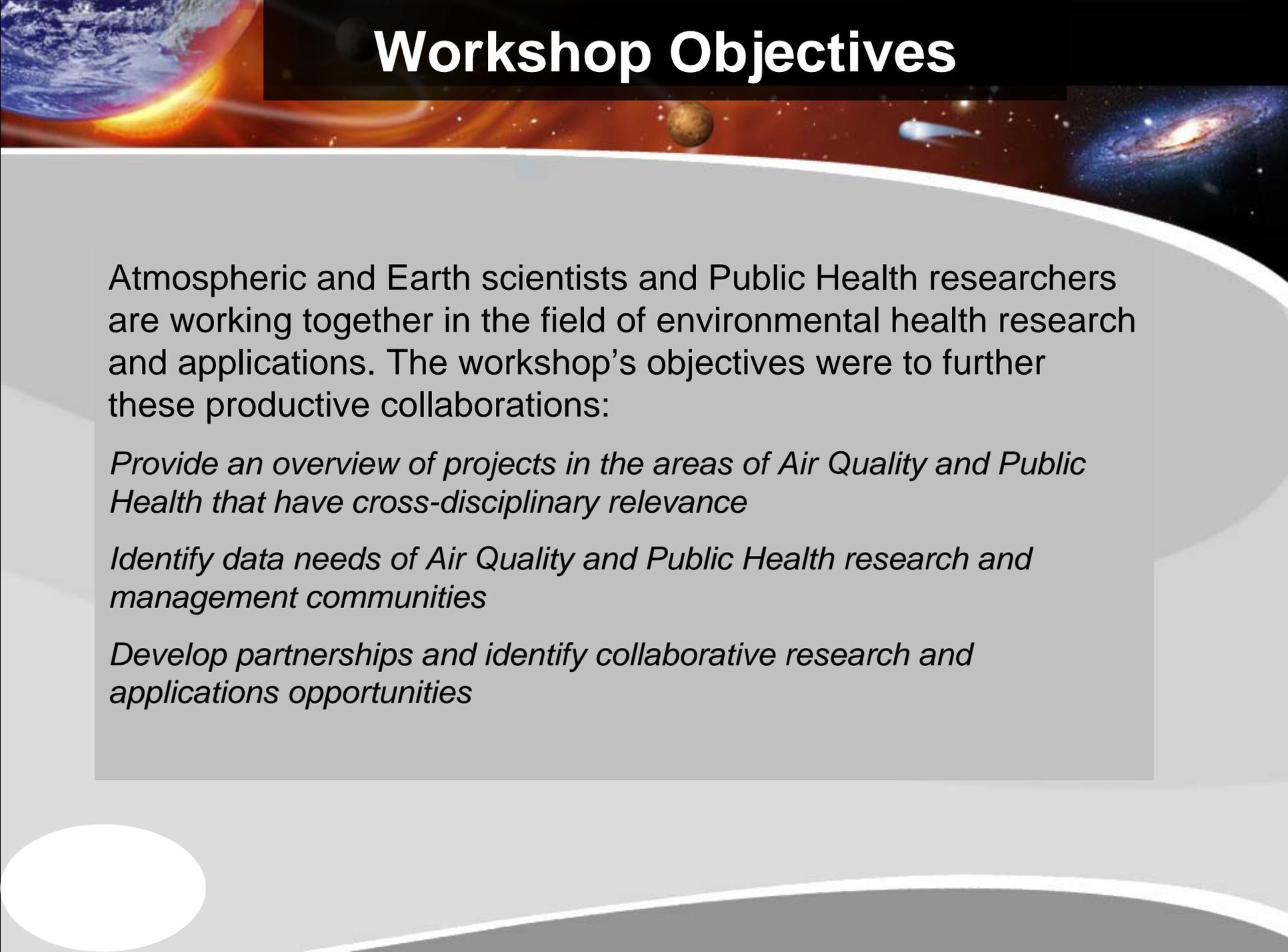


# National Earth Observation Policy

## *Decadal Survey* Recommendation:

The Office of Science and Technology Policy, in collaboration with the relevant agencies, and with consultation with the scientific community, should develop and implement a plan for achieving and sustaining global Earth observations.

This plan should recognize the complexity of differing agency roles, responsibilities, and capabilities as well as the lessons learned from the implementation of the Landsat, EOS, and NPOESS programs.



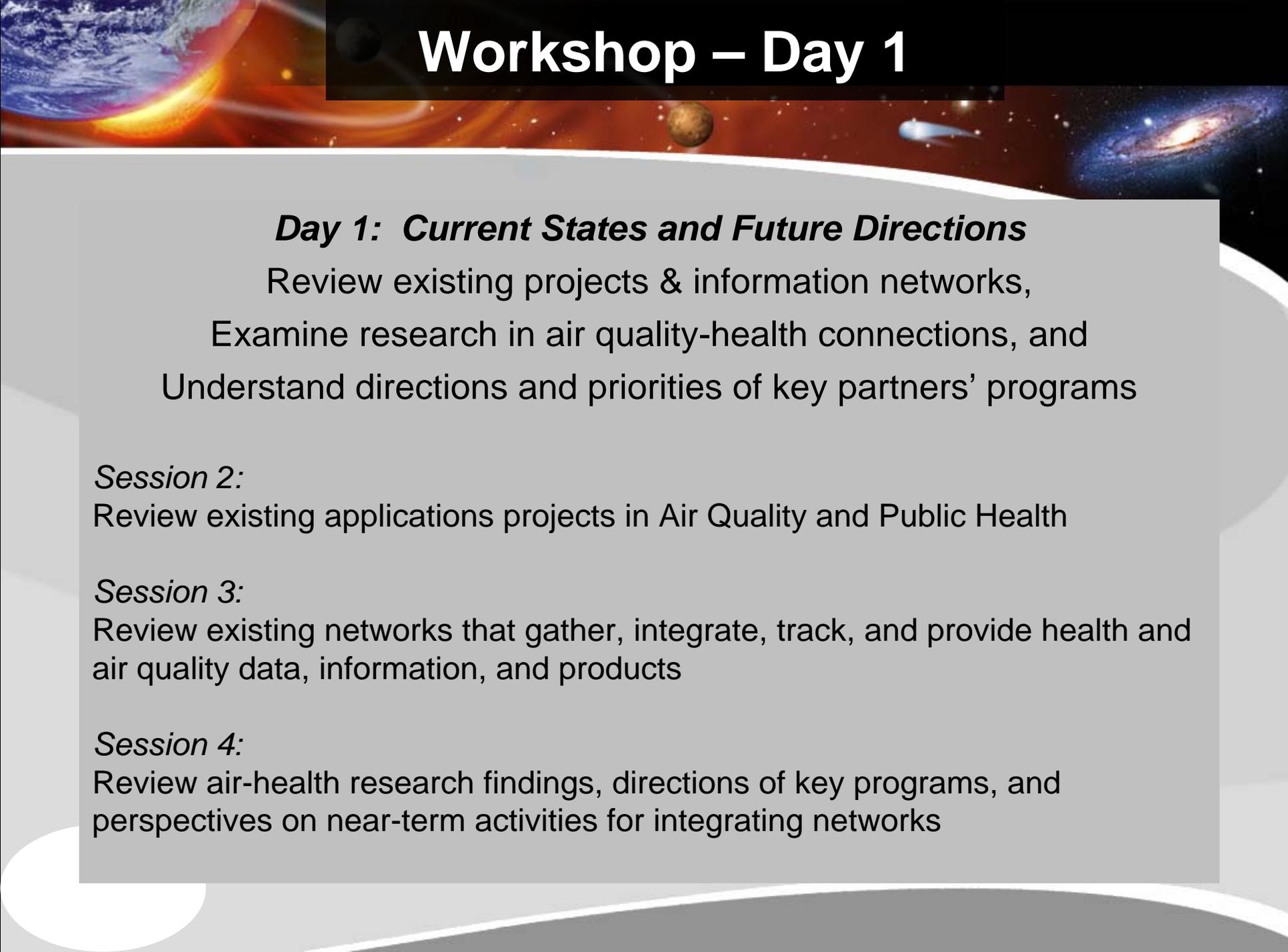
# Workshop Objectives

Atmospheric and Earth scientists and Public Health researchers are working together in the field of environmental health research and applications. The workshop's objectives were to further these productive collaborations:

*Provide an overview of projects in the areas of Air Quality and Public Health that have cross-disciplinary relevance*

*Identify data needs of Air Quality and Public Health research and management communities*

*Develop partnerships and identify collaborative research and applications opportunities*



# Workshop – Day 1

## ***Day 1: Current States and Future Directions***

Review existing projects & information networks,  
Examine research in air quality-health connections, and  
Understand directions and priorities of key partners' programs

### *Session 2:*

Review existing applications projects in Air Quality and Public Health

### *Session 3:*

Review existing networks that gather, integrate, track, and provide health and air quality data, information, and products

### *Session 4:*

Review air-health research findings, directions of key programs, and perspectives on near-term activities for integrating networks



# Workshop – Day 2

## ***Day 2: Common Needs & Synergistic Opportunities***

Discuss common needs to advance the state of practice in use of Earth science tools in assessing exposure, impacts, and health outcomes. Identify specific activities to pursue.

### *Break-outs:*

State of knowledge/practice and future needs & directions in use of Earth observations, models, error estimates, etc. relating to:

- Air quality exposure and chronic/acute health conditions
- Health-related air quality hazards and impacts
- Linkages of exposure to health outcomes

### *Sessions 5 & 6: Discuss findings*

Needs for research, products, techniques, interoperability approaches, etc. Opportunities for specific short-term collaborations and achievements, activities to contribute to USGEO/GEO, opportunities for public awareness, etc. Longer-term directions, needs, and priorities.



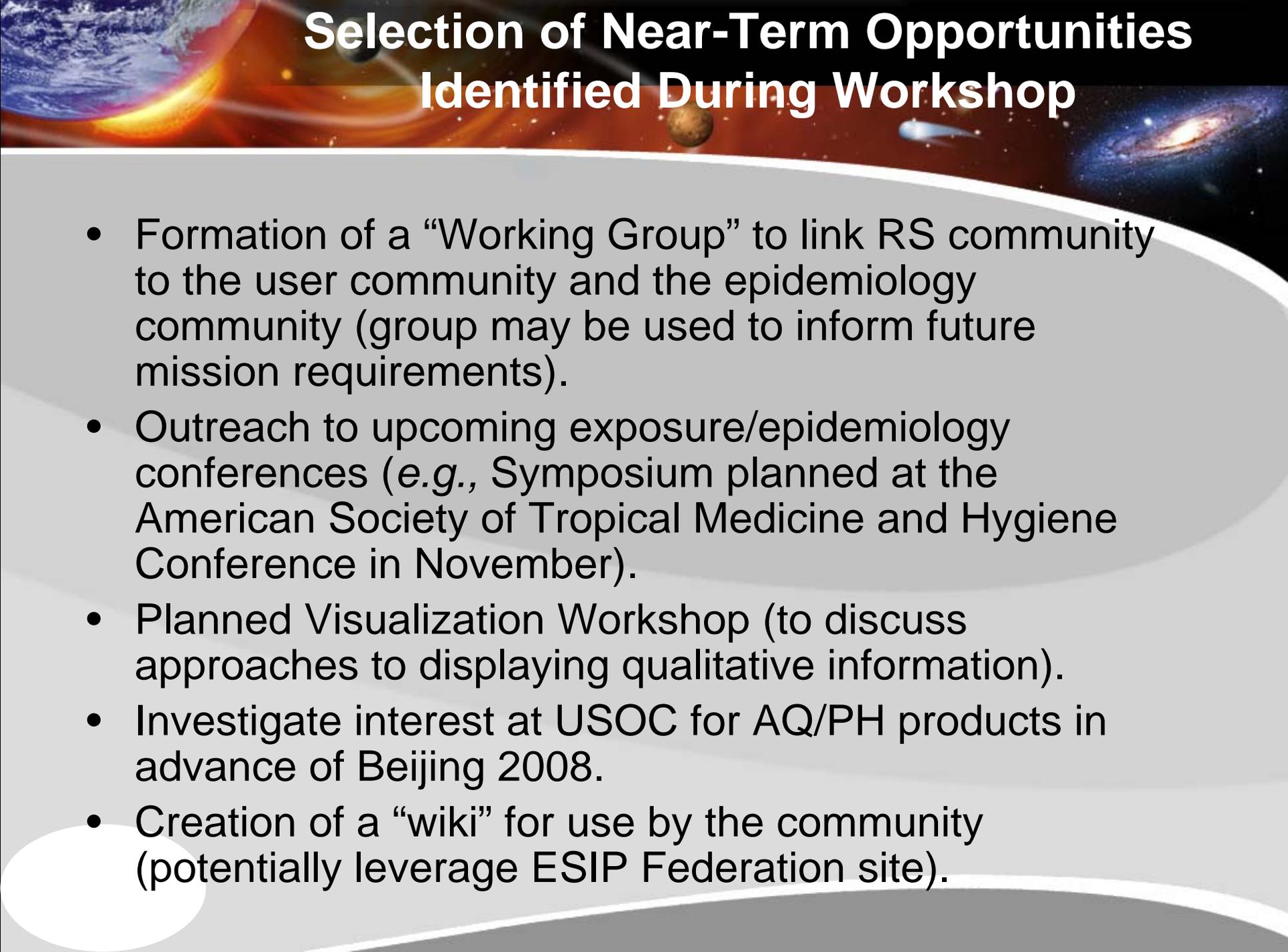
# Conference Attendees

Conference attendees spanned the sectors of government, academia, private, and other institutes/NGOs

- Total Attendance: 74
  - Government (including Fed, state, local): 44
  - Academia: 22
  - Private/NGOs: 8

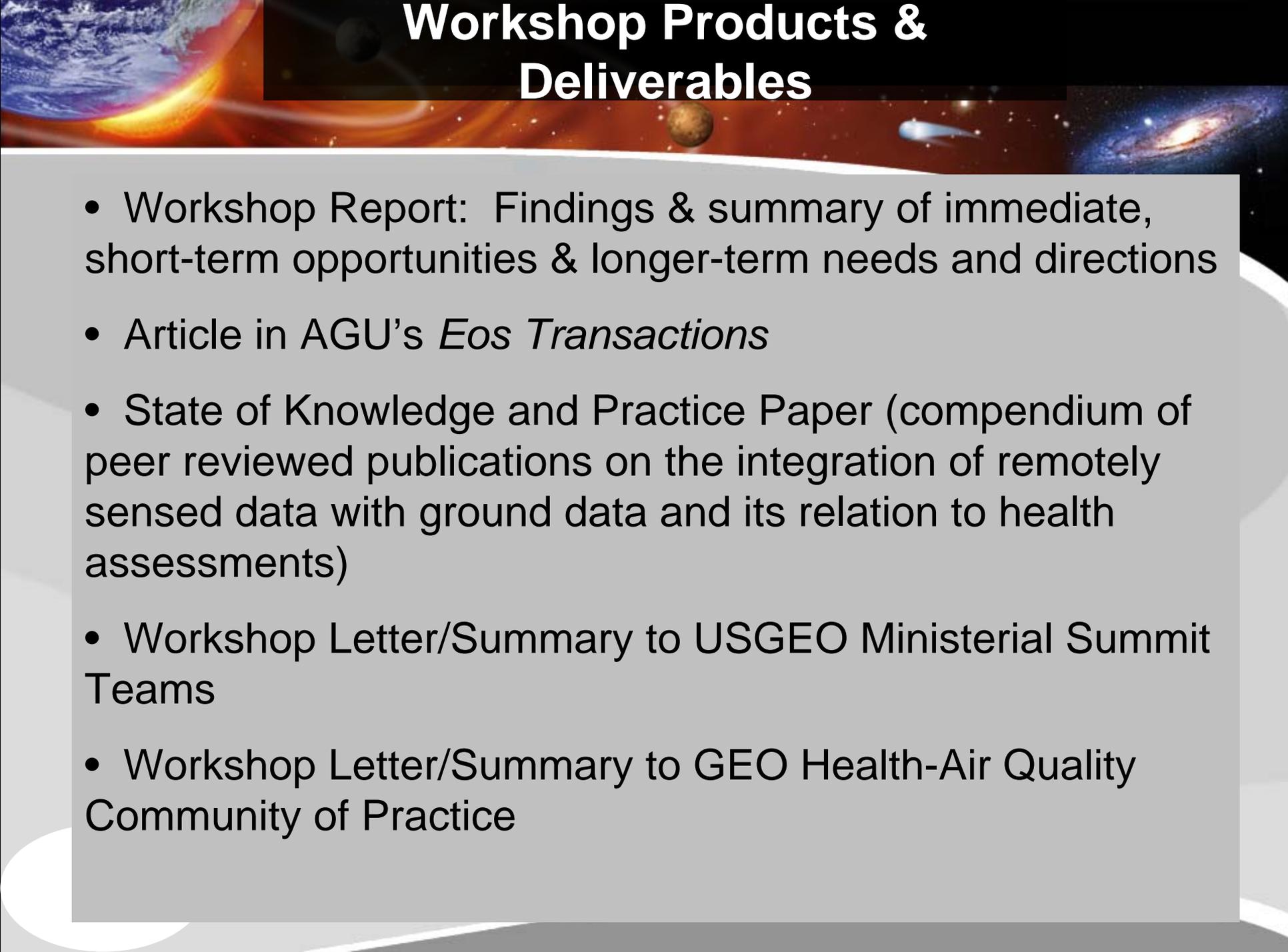
# Selected Workshop Findings

- Highest Priority Pollutants: PM and ozone
  - Ideal PM measurement would include: vertical profile, some speciation, 1-2 times/day, and 1-km or better resolution
- Need to address quantifying the accuracy of environmental conditions. For models, a factor of 2 error in PM estimates may be acceptable for climate research, but will that satisfy public health needs?
- Need to address issue of error propagation through model forecasts (uncertainty).
- Communities should think of collaboration with partners who have access to PHI -- rather than direct access to PHI
- Need for “Remote Sensing 101” and “Epi 101” training to help facilitate communication between communities.



# Selection of Near-Term Opportunities Identified During Workshop

- Formation of a “Working Group” to link RS community to the user community and the epidemiology community (group may be used to inform future mission requirements).
- Outreach to upcoming exposure/epidemiology conferences (e.g., Symposium planned at the American Society of Tropical Medicine and Hygiene Conference in November).
- Planned Visualization Workshop (to discuss approaches to displaying qualitative information).
- Investigate interest at USOC for AQ/PH products in advance of Beijing 2008.
- Creation of a “wiki” for use by the community (potentially leverage ESIP Federation site).



# Workshop Products & Deliverables

- Workshop Report: Findings & summary of immediate, short-term opportunities & longer-term needs and directions
- Article in AGU's *Eos Transactions*
- State of Knowledge and Practice Paper (compendium of peer reviewed publications on the integration of remotely sensed data with ground data and its relation to health assessments)
- Workshop Letter/Summary to USGEO Ministerial Summit Teams
- Workshop Letter/Summary to GEO Health-Air Quality Community of Practice