



An Environmental Protection Agency Perspective on the GEO-CAPE Atmospheric STM

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Air Quality Management

Science

Policy

Effects Research

Risk Assessment

“Exposure” Monitoring

Source Attribution

Control Strategy

Evaluation

Air Quality Forecasting



Air Quality Standards

Emission Standards &

Control Technology

Requirements

Emission Permits

Public Information

All of these activities depend on atmospheric observations and models to a greater or lesser extent.

EPA Working Group on Satellite Observations for Air Quality Management

Objectives:

- To improve communication across the different EPA groups interested in satellite observations related to air quality management
- To better articulate EPA's interests and commitment to using satellite observations
- To provide a focal point for communication with NASA and NOAA, with a focus on GEO-CAPE and other Decadal Survey missions

EPA-GEO Committee (convener)

John Dawson, Terry Keating, David McCabe (OAR/OPAR), Scott Jackson, Venkatesh Rao, Rich Scheffe (OAR/OAQPS)

Jeff Arnold (NCEA), Bryan Bloomer (NCER), Rob Pinder (NERL/ASMD), George Pouliot (NERL/ASMD), Jim Szykman (NERL/ESD), Tim Watkins (NERL/HEASD), Darrell Winner (NCER)

Vance Fong



Office of Air and Radiation



Office of Research and Development



Region 9

Proposed Workshop Series on Satellite Observations in Air Quality Management

- Engage a broader air quality management community: States, Academics, Private Sector Stakeholders
- Opportunity for two-way communication between Air Quality and Satellite Communities
- Not just about GEO-CAPE, but also about what can be done with the current stream of satellite observations.
- Beginning of a longer-term process that we hope will continue as the mission develops and comes to fruition



A tri-national, public-private partnership to coordinate research on tropospheric air pollution to inform air quality management

Category: Emissions

Science question

- What are the emissions of gases and aerosols important for air quality and what are the processes controlling these emissions?

GEOCAPE provides opportunities to

- Quantify emissions of natural sources (e.g. biogenic VOCs and NO_x , sea-salt, wildfires, dust)
- Evaluate the activity-based emissions estimates for anthropogenic sources (e.g. impacts of control strategies, spatial and temporal variability of meteorologically driven sources)
- Quantify emissions of non-regulated sectors (e.g. seasonal and spatial variability of CH_4 & NH_3 emissions, emissions along international borders, ...)

Emissions of long-lived GHGs are relevant, but should not come at the cost of ozone and aerosol precursors.

Category: Processes

Science question

- How do atmospheric transport, chemical evolution, and deposition determine tropospheric composition over scales ranging from urban to continental?

GEOCAPE provides opportunities to

- Better understand the **sources** of surface ozone and aerosol concentrations
- Observe processes above the surface layer
 - More powerful when integrated with other LEO observations
- Fill in our spatially and temporally sparse land-based observation network
- Characterize important synoptic-scale processes and develop synoptic-scale “chemical climatologies”
- Monitor the onset, progress, and decay of severe air quality events
- Provide measures of chemical processing, through precursor ratios
- What information can be provided about aerosol composition or characteristics?

Category: Improve Models

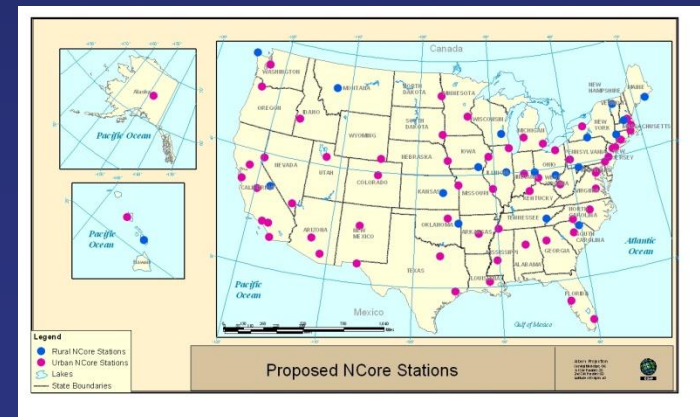
Science question

- How do we improve air quality forecast and assessment models?

GEOCAPE provides opportunities for

- Data assimilation into forecast and assessment models
- Integration with observations from surface sites and other platforms
 - To inform forecasting (w/ or w/o 3-d models)
 - To produce “analyzed” chemical fields
- Model evaluation of forecast and assessment models

How will GEOCAPE compliment and be integrated with observations from existing ground-based monitoring, including EPA’s NCore network?



Category: Climate Change

Science question

- How do changes in air quality drive climate forcing on a continental scale?

Air Quality and Climate Change are Inextricably Linked

- Physically, changes in aerosols, tropospheric ozone, methane, and other shorter-lived forcing agents are likely to drive any changes in the rate and magnitude of climate change in the next 50 years.
- Politically, policies to address either issue will have an impact on the other.

Category: Climate Change

Science question

- How do changes in air quality drive climate forcing on a continental scale?

Air Quality and Climate Change are Inextricably Linked

Without degrading information about the sources of ozone and aerosols at the surface, GEOCAPE also provides opportunities for

- Characterizing changes in the radiative forcing of aerosols, ozone, and other short-lived pollutants
 - In conjunction with other LEO observations, which can provide information about vertical distributions

Category: Intercontinental Transport

Science question

- How does intercontinental transport affect air quality?

As North American and European emissions sources continue to decrease, and other parts of the world continue to develop economically, we expect the relative and absolute contribution of intercontinental transport to air quality problems in the United States (and Europe) to increase.

This increasing “background” presents challenges for

- setting the National Ambient Air Quality Standards
- developing equitable attainment plans

And provides a motivation for collective global action.

Category: Intercontinental Transport

Science question

- How does intercontinental transport affect air quality?

GEOCAPE provides opportunities for

- Observing the continental inflow and outflow of pollutants and the synoptic patterns that drive intercontinental transport
- Characterizing the nature of “background” pollution concentrations, including magnitude, and spatial and temporal variability
- Linking to other geo-stationary missions to characterize intercontinental transport

Learning more from EOS, Applying lessons to GEOCAPE

- The Air Quality Community is just starting to embrace the use of observations from EOS instruments.
- As the AQ Community begins to build the infrastructure and capacity to use this information, it is based on the current suite of EOS instruments and datasets – what continuity will there be with GEO-CAPE?
- The AQ Community consists of a wide spectrum of users with different needs and different capabilities to access and use the data.
- What lessons can be learned from the current applications of EOS data products regarding data availability, data coverage, data formats, data accessibility, and data quality?

We look forward to exploring these issues with you.