



***Overview of Satellite and Above-Boundary Layer
Observations for Air Quality Management
Workshop Series and other activities relevant to
GOES-R AQPG:***

Jim Szykman (ORD/NERL) and Terry Keating (OAR), U.S. EPA

**NOAA GOES-R Proving Ground
Executive Board Teleconference
09 January 2012**

Outline

Objectives/Purpose of Workshops

–1st workshop

–2nd workshop

- Focused on Exceptional Events Analysis and Use of Satellite Data to Support Regulatory Air Quality Decisions

Additional EPA efforts relevant to GOES-R PG

–AIRNow Satellite Data Processor (ASDP)

Summary

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 use of future satellite data (GOES-R ABI, VIIRS, GEO-CAPE, etc.) and other satellite missions within the NRC Decadal Survey

EPA-GEO Committee (original convener)

Terry Keating (OAR/OPAR), Venkatesh Rao and Rich Scheffe (OAR/OAQPS)

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

Vance Fong (Region 9), Scott Jackson (Region 8), Mark Sather (Region 6)



Office of Air and Radiation



Office of Research and Development



Regional Offices

- Emerging Application using POES and GOES Operational Measurements

- Fire Detection

- Air Quality Monitoring

- Factors limiting advancement of Earth Science research to applications

- Inexperience in identifying requirements of applied users of the data and information.

- Limited knowledge of how managers, policy and decision makers, and the public obtain and use data and information.

- Capacity of institutions and organizations to apply new types of data and information to traditional and ongoing processes and ways of doing business.

2007 Decadal Survey



EARTH SCIENCE AND APPLICATIONS FROM SPACE

NATIONAL IMPERATIVES FOR THE NEXT DECADE AND BEYOND

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

Workshop Series on Satellite and Above-Boundary Layer Observations for Air Quality Management

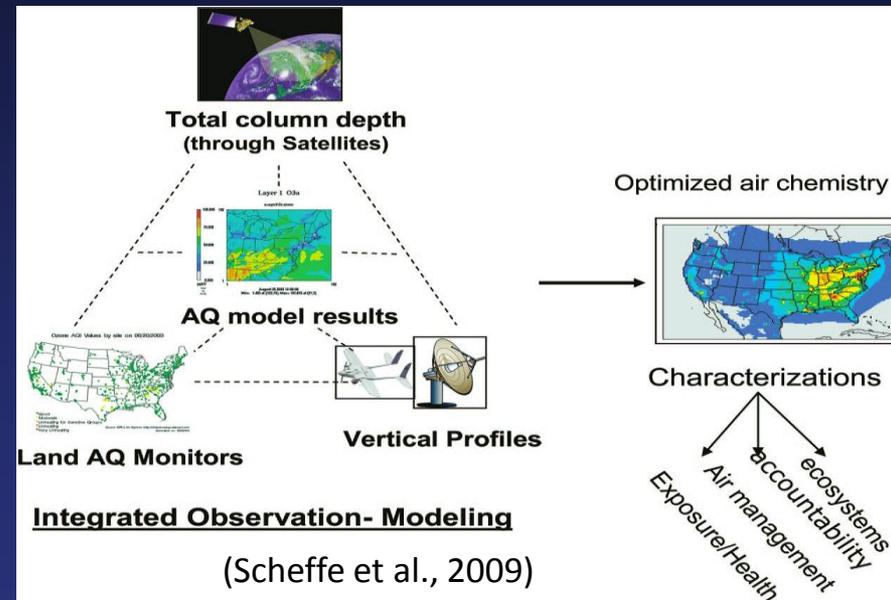
A series of 3 community workshops to:

- Engage a broader air quality management community: States, Academics, Private Sector Stakeholders
- Create an opportunity for two-way communication between Air Quality and Satellite Communities
- Create an process to link applications with satellite data, traceability to current and future stream of satellite observations.
- Begin a longer-term process that we hope will continue as new operational satellites begin to launch such as GOES-R ABI and VIIRS and other like GEO-CAPE develop and come to fruition.

1st Workshop - May 9-10, 2011, 2nd - Jan 2012, 3rd TBD (2012)

1st Workshop Discussions

- Help identify and frame key science and application areas for community discussion and input in the next two workshops.
- Begin to identify and discuss an easily understood way to identify maturity of data products and how science data maps to applications – traceability matrix.
- Assisting in defining key observational and data requirements for future air quality relevant environmental observations from space and other platforms.



Air Quality Management for “Criteria Pollutants”

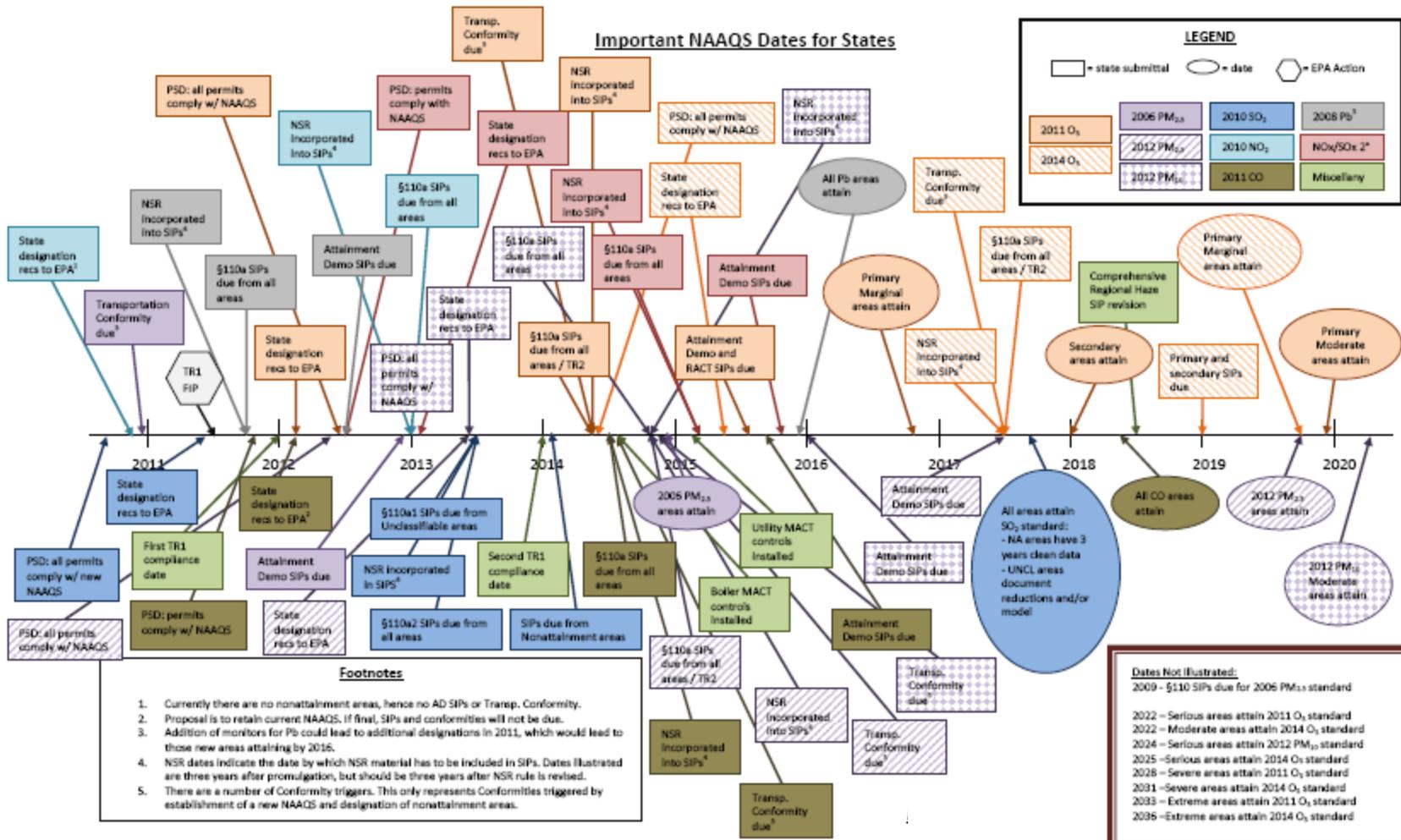
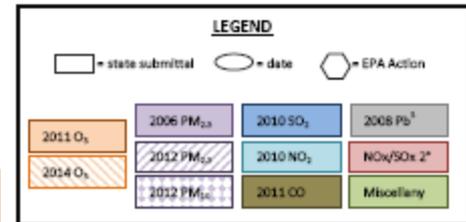
- Standard Setting
 - Science Assessment
 - Exposure & Risk Assessment
- Attainment Designation
 - Exceptional Events Analysis
- Control Strategy Development
 - SIP Development
 - Design Condition Analysis
 - Model Evaluation
 - Source Apportionment
 - Cost Effectiveness Analysis
 - Attainment Demonstration & Weight of Evidence Determination
 - Benefits Assessment
- Implementation
 - Source Permitting (NSR/PSD)
 - Emissions Reporting
 - Rule Enforcement
- Monitoring
 - Air Quality Forecasting & Public Information (AQI)

Focus of Jan 11th Workshop

- National Rule Development
 - Fuels and Vehicle Standards
 - New Source Performance Standards
 - Inter-State Transport

NAAQS Milestones

Important NAAQS Dates for States



Footnotes

1. Currently there are no nonattainment areas, hence no AD SIPs or Transp. Conformity.
2. Proposal is to retain current NAAQS. If final, SIPs and conformities will not be due.
3. Addition of monitors for Pb could lead to additional designations in 2011, which would lead to those new areas attaining by 2015.
4. NSR dates indicate the date by which NSR material has to be included in SIPs. Dates illustrated are three years after promulgation, but should be three years after NSR rule is revised.
5. There are a number of Conformity triggers. This only represents Conformities triggered by establishment of a new NAAQS and designation of nonattainment areas.

Dates Not Illustrated:

2009 - §110 SIPs due for 2006 PM_{2.5} standard

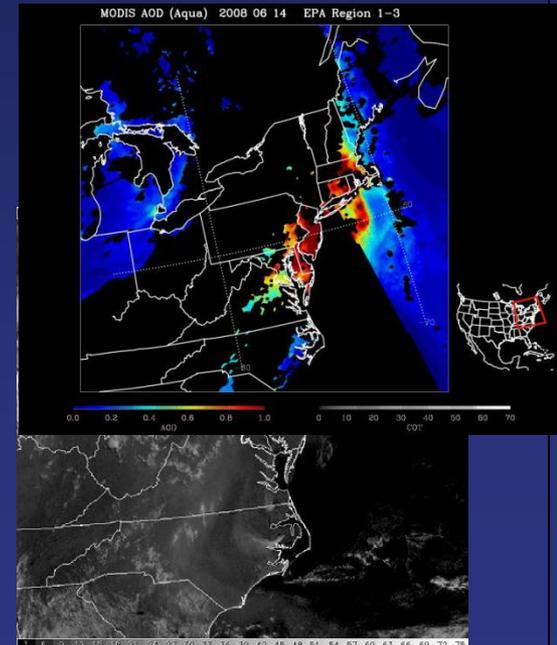
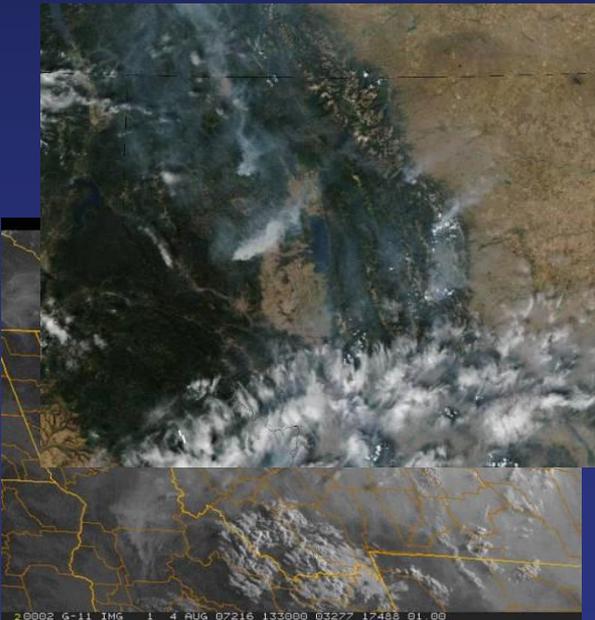
- 2022 - Serious areas attain 2011 O₃ standard
- 2022 - Moderate areas attain 2014 O₃ standard
- 2024 - Serious areas attain 2012 PM_{2.5} standard
- 2025 - Serious areas attain 2014 O₃ standard
- 2028 - Severe areas attain 2011 O₃ standard
- 2031 - Severe areas attain 2014 O₃ standard
- 2032 - Extreme areas attain 2011 O₃ standard
- 2036 - Extreme areas attain 2014 O₃ standard

Exceptional Events

- Exceptional events are air pollution events not readily controlled through traditional State Implementation Plan Processes
- Exceptional events are defined by Section 319 of the Clean Air Act
 - affects air quality;
 - is not reasonably controllable or preventable;
 - is an event caused by human activity that is unlikely to recur at a particular location or a natural event; and
 - is determined by the Administrator through the process established in the regulations . . . to be an exceptional event
- Exceptional Event Types - Where Satellite Data has been Useful
 - Wildfires Plumes
 - Dust Storms
 - Stratospheric Ozone Intrusions

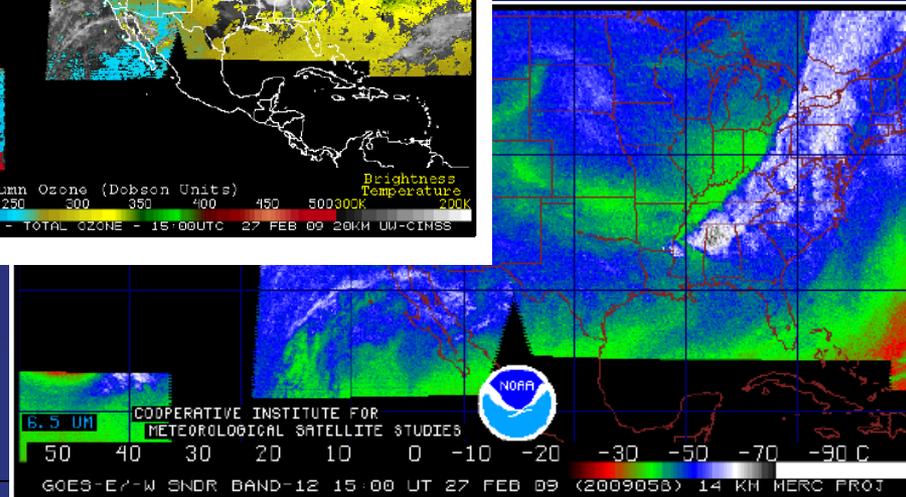
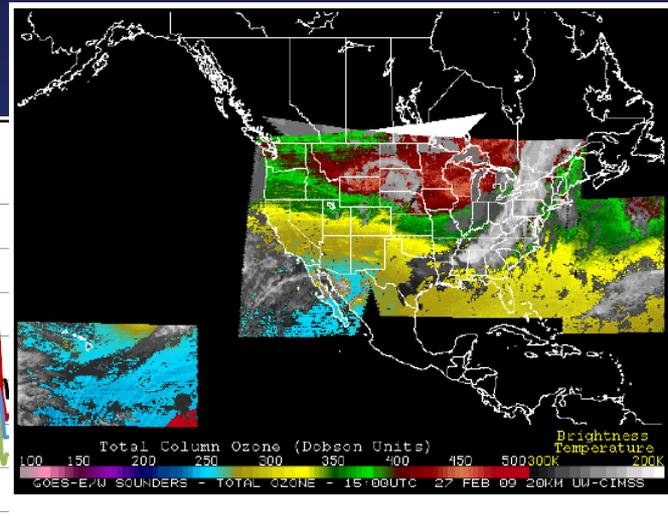
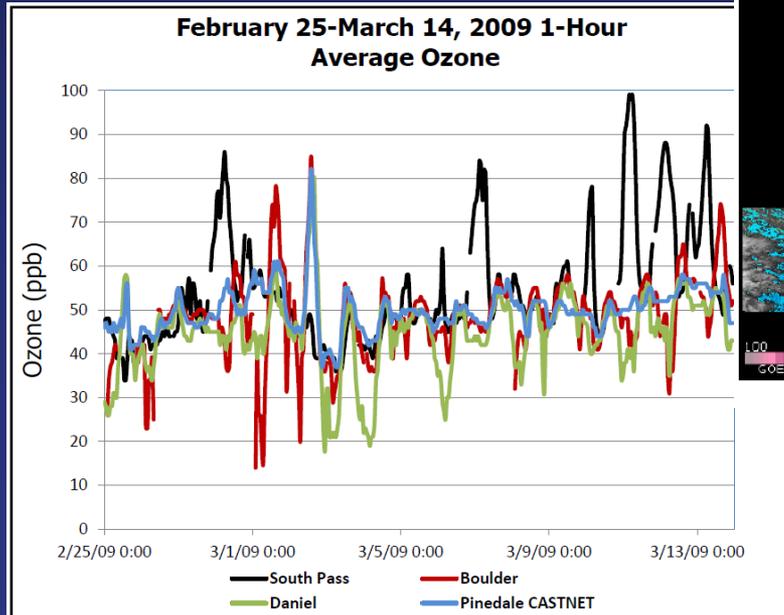
Examples of NOAA/NESDIS data sets used in EE analysis

For aerosol ($PM_{2.5}$ and PM_{10}) events (fires and dust) state and local agencies rely heavily on GOES and MODIS AOD and visible imagery and analyst products produced by the NESDIS Hazard Mapping System (HMS).

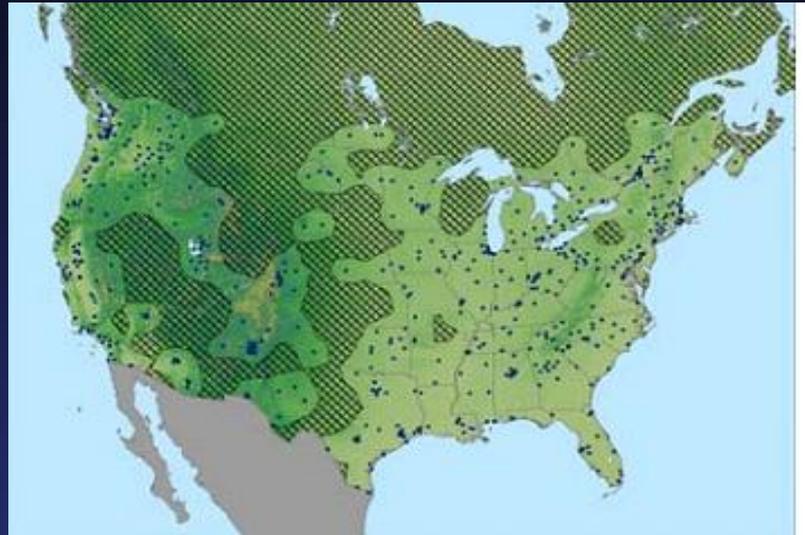


Examples of NOAA/NESDIS data sets used in EE analysis

For ozone events related to stratospheric intrusion, (primarily in the Western US) state and local agencies rely heavily on GOES, GOME-2 and OMI total column ozone and water vapor bands along with modeled parameters from NWS models.



AIRNow Satellite Data Processor (ASDP) - Project Objectives



Without satellite data, contouring would not be possible in the hatched areas.

- Improve operational air quality maps currently in AIRNow and make them available 24 hrs a day every day
- Provide satellite data products in AIRNow-Tech
- Improve tools for air quality forecasting

AIRNow Satellite Data Processor (ASDP) - Improving EPA's AQI Maps with Satellite

- **The AIRNow Satellite Data Processor (ASDP)**

is a system under development that enables blending (or fusing) of surface $PM_{2.5}$ measurements and satellite-estimated $PM_{2.5}$ concentrations to provide additional air quality information to AIRNow in regions without existing surface air quality monitoring networks.

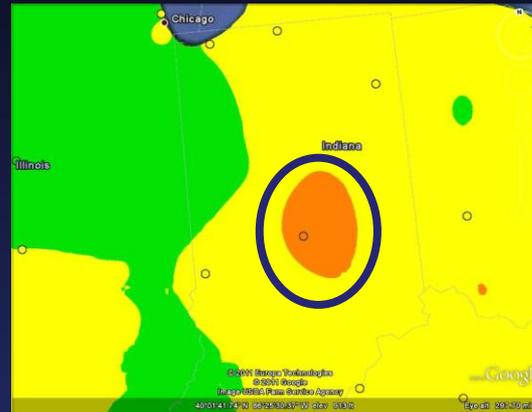
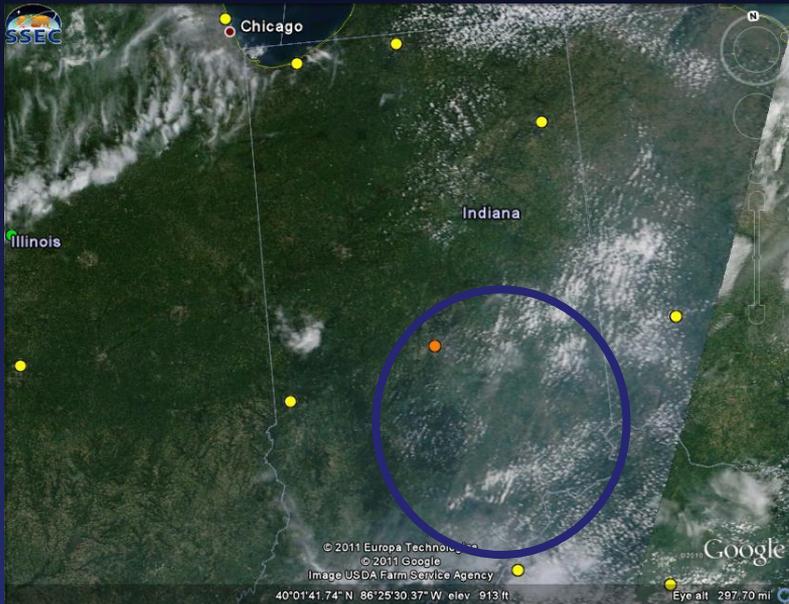
- NESDIS is providing satellite-estimates of $PM_{2.5}$ from IDEA (MODIS AOD and GASP) to the ASDP, with VIIRS and GOES-R ABI AOD being the operational data streams in the future.

 - **GOES-R AQPG is providing prototype ABI data streams for use in ASDP development.**

- The ASDP system builds the capacity and framework necessary to implement satellite data as these data become available to the air quality community.

- Development of ASDP funded by NASA ROSES and EPA.

Preliminary Results: Isolated Unhealthy for Sensitive Groups



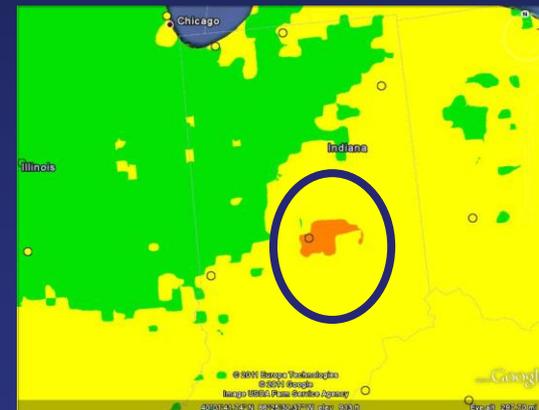
Observed Data



Satellite Data

MODIS & AIRNow Observations

- High AOD (smoke) in central Indiana
- Large USG area due to interpolation
- ASDP constrains the monitor influences
- On-going workgroup of state and local forecasters to assess results (scientific and socio-economic POV)



Fused Data

Summary

- EPA sponsored Workshop Series provides direct access to a users for useful dialogues on current and future satellite data products.
- The 2nd workshop focused on Exceptional Events will be a continued need within the air quality community and is directly relevant to the GOES-R AQPG activities.
- Through the ASDP system EPA is building the capacity and framework for continued and expanded use of GOES-R and JPSS data products within the air quality community.

Questions?