The GOES-R Air Quality Proving Ground: Building An Air Quality User Community for the Next Generation of Products

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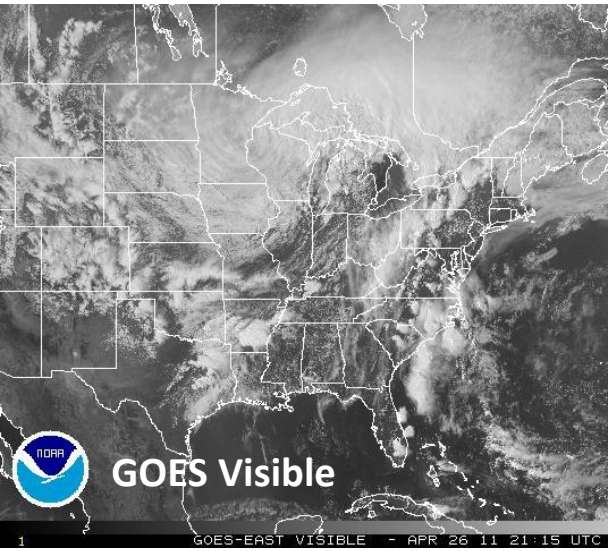
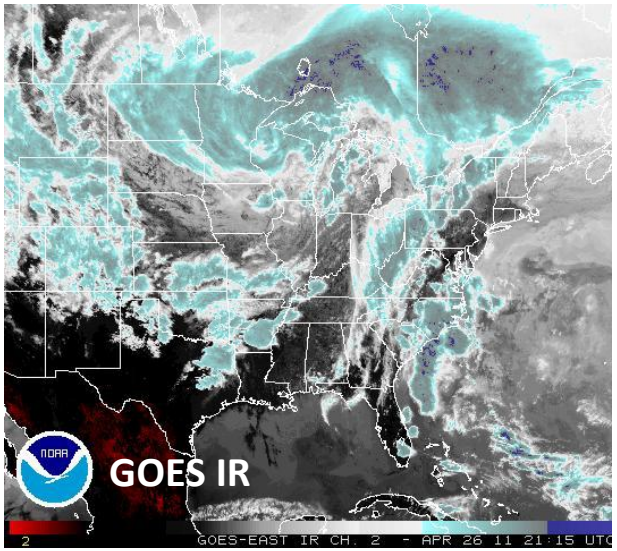
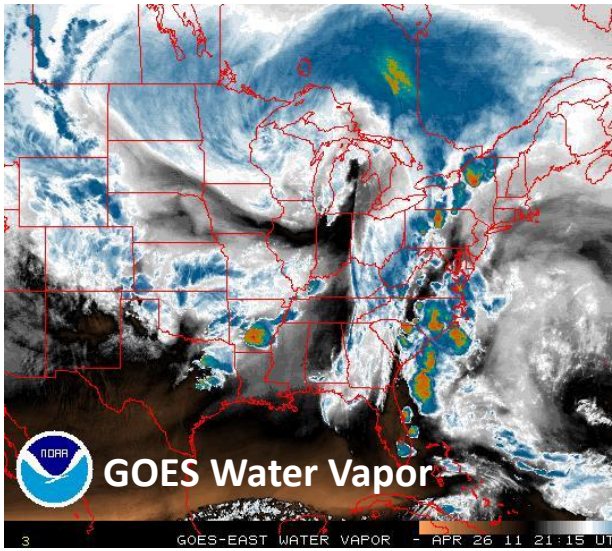
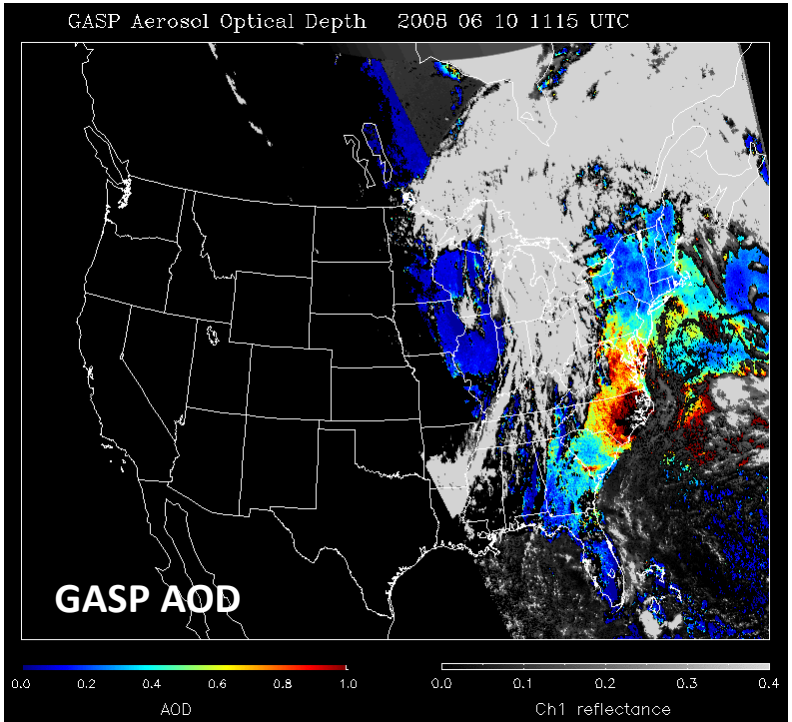
Paper 8.6 2012 AMS Annual Meeting

Current NOAA Satellite Products for AQ Community









Uses of Satellite Products by AQ Community

- Routine AQ forecasting and event analyses:
  - Identify meteorological features that affect air pollutant build-up and transport (e.g., cloud cover, convection, frontal boundaries)
  - Identify and evaluate significant air pollution events (e.g., wildfire smoke, windblown dust, haze)
  - Advanced warning of upwind significant events (especially wildfires)
- Retrospective and Exceptional Event analyses:
  - Document the overall meteorological setting of events
  - Document the location, severity, timing, transport, and extent of events
  - Utilize this evidence in regulatory exemptions under the Exceptional Event Rule

http://www.star.nesdis.noaa.gov/smcd/spb/aq/

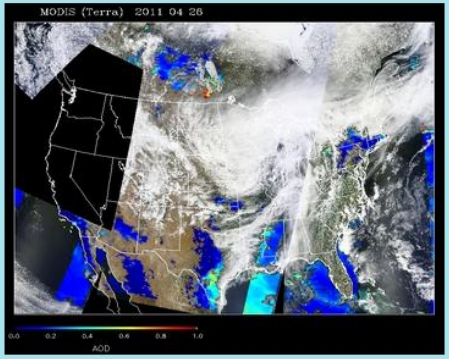
NOAA's IDEA Site (dynamic flat webpages)

IDEA Infusing satellite Data into Environmental Applications

We value your feedback! Please send any comments, problems and suggestions to the IDEA Team.

MODIS (Terra) | MODIS (Aqua) | GASP | GASP WEST

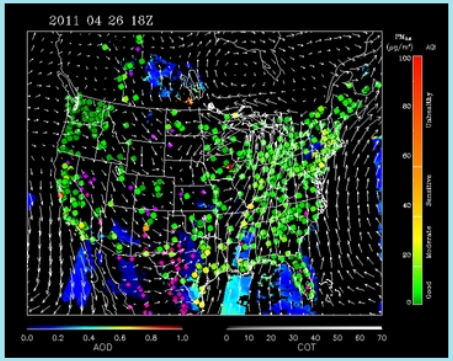
Regional plots of MODIS Terra aerosol optical depth (AOD)



Select Region

Product description

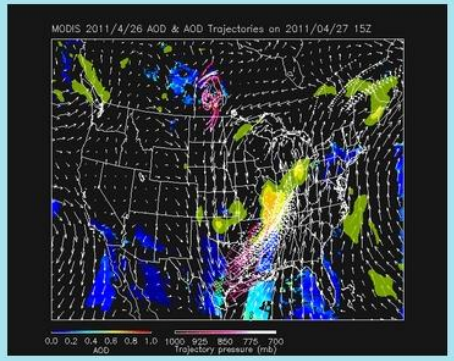
3-day composite history*



View latest

Product description

48-hour aerosol trajectory forecast, with model winds and precipitation



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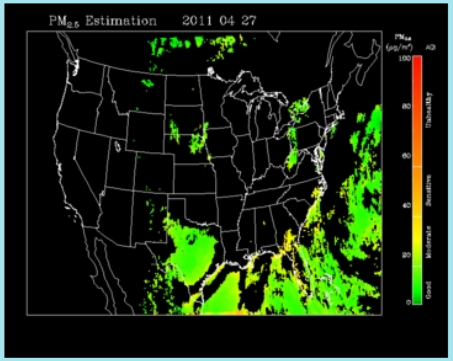
Product description

PM2.5 Estimation from AOD



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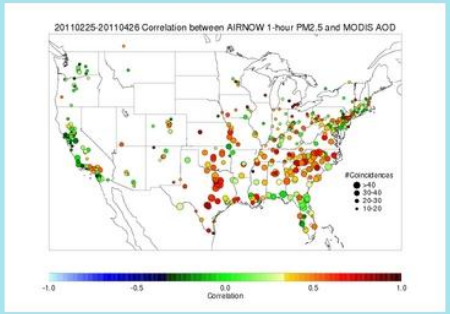
Product description

National correlation map between surface PM2.5 and MODIS aerosol optical depth



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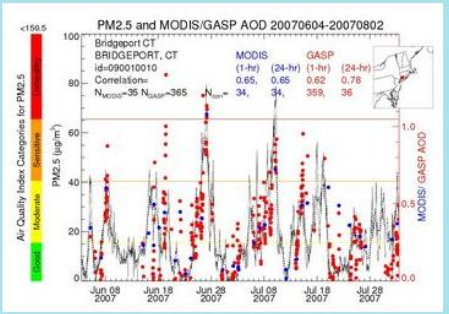
Product description

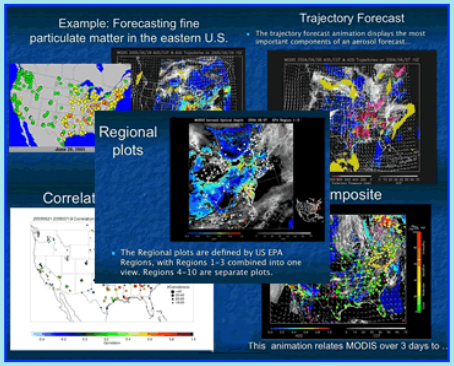
Time-series and correlations of MODIS/GASP aerosol optical depth and surface PM2.5



Select Site

Product description

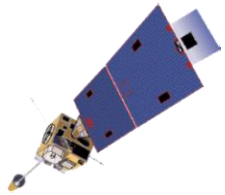
Tutorials for interpreting the IDEA products



Tutorials

Air Quality Proving Ground (AQPG)

http://alg.umbc.edu/aqpg/



- NOAA has created the AQPG – a subset of the GOES-R Proving Ground – focusing on the aerosol products that will be available from the ABI.
- Goal: build a user community that is ready to use GOES-R air quality products as soon as they become available.
- This distinction is important because the air quality community has very different needs than the majority of NOAA users (NWS meteorologists).
- AQPG is using *simulated GOES-R ABI data* for training and interaction with the user community.

AQPG Activities

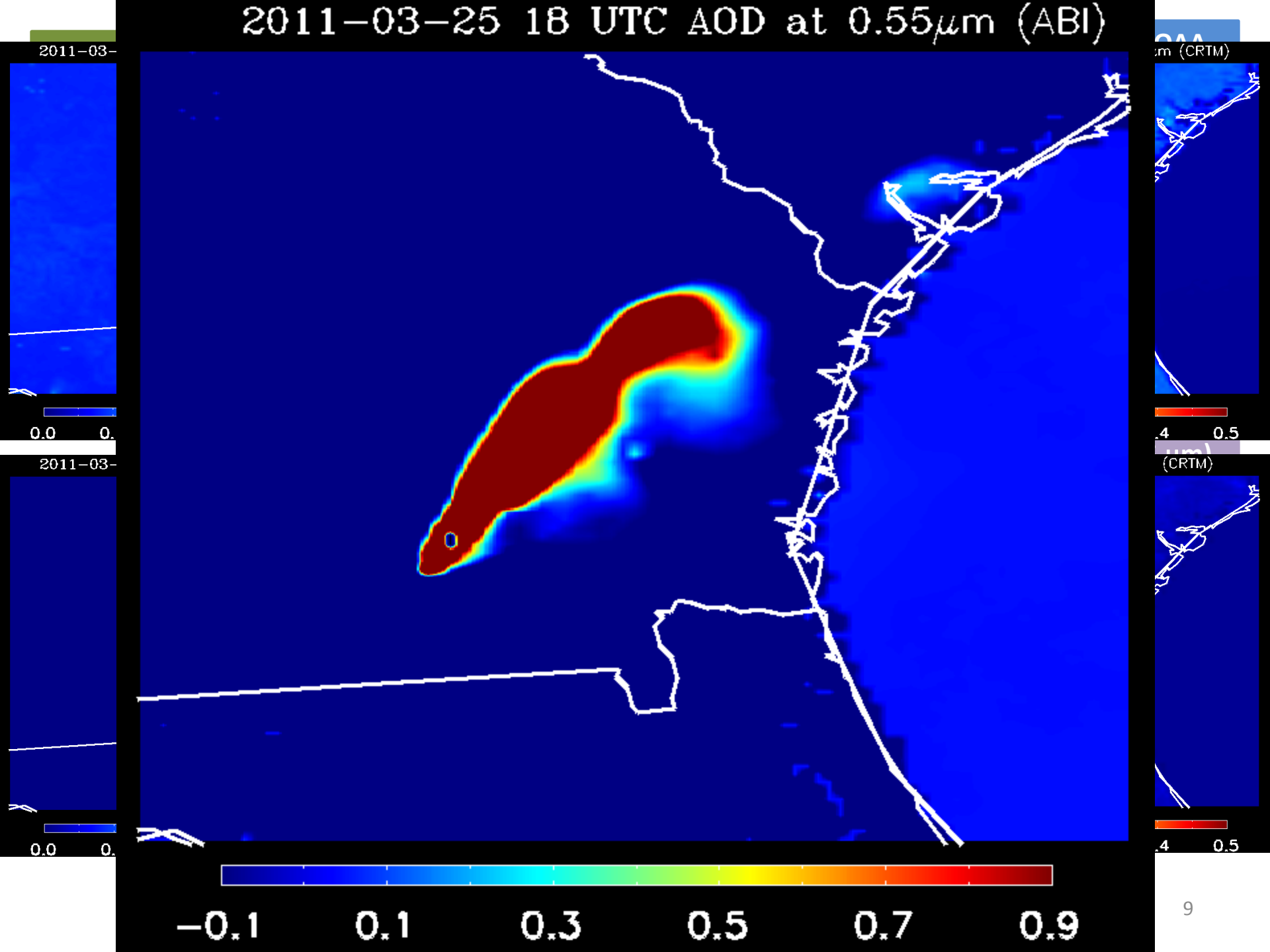
- Created an Advisory Group of forecasters and analysts who are providing feedback on products.
  - User community feedback is critical for improving product quality, usage, and distribution, and for the development of new applications (including specific data formats)
- Working with NOAA to prototype the delivery system for GOES-R air quality products.
- Creating simulated GOES-R ABI products for at least 10 case studies of past air quality events.
- Providing training on GOES-R and ABI products to Advisory Group and general AQ community at workshops and conferences.

User Group (eye chart …)

Name	Affiliation	Name	Affiliation
Bill Adamski	Wisconsin Department of Natural Resources	Brian Lambeth	Texas Commission on Environmental Quality
George Allen	Northeast States for Coordinated Air Use Management (NESCAUM)	Laura Landry	Maryland Department of the Environment
Nelson Chafetz	Texas Commission on Environmental Quality	Sang-Mi Lee	South Coast Air Quality Management District
Weslee Copeland	Texas Commission on Environmental Quality	Scott Jackson	U.S. EPA Region 8
Ruben Delgado	UMBC	Anne McWilliams	U.S. EPA Region 1
Prakash Doraiswamy	New York State Department of Environmental Conservation	Bill Murphey	Georgia Deparment of Natural Resources
Nyasha Dunkley	Georgia Deparment of Natural Resources	Duc Nguyen	Maryland Department of the Environment
Kevin Durkee	South Coast Air Quality Management District	Sean Nolan	Pennsylvania Department of Environmental Protection
Michael Geigert	Connecticut Department of Environmental Protection	Curt Reutner	Texas Commission on Environmental Quality
Cary Gentry	Forsyth County (NC) Enviromental Affairs Department	Mark Ruminski	NOAA NESDIS SAB/HMS
Lenny Giuliano	Rhode Island Department of Environmental Management	Bill Ryan	Pennsylvania State University
Mike Goldstein	Memphis and Shelby County Health Department	Howard Schmidt	U.S. EPA Region 3
Jennifer Hains	Maryland Department of the Environment	Dan Salkovitz	Virginia Department of Environmental Quality
Geoffrey Healan	Alabama Department of Environmental Management	Emmanuel Sanchez	APC Environmental Coordinator, Imperial County (CA)
Grant Hetherington	Wisconsin Department of Natural Resources	Matt Seybold	NOAA NESDIS
Joe Hoch	Wisconsin Department of Natural Resources	Jim Szykman	U.S. EPA National Exposure Research Laboratory
Jamie Kibler	NOAA NESDIS SAB/HMS	Rama Tangirala	District of Columbia Department of the Environment
Matthew Lacke	Jefferson County Department of Health (AL)	Greg Walters	Environment Canada
		Nick Witcraft	North Carolina Department of Environment and Natural Resources

AQPG Trainings

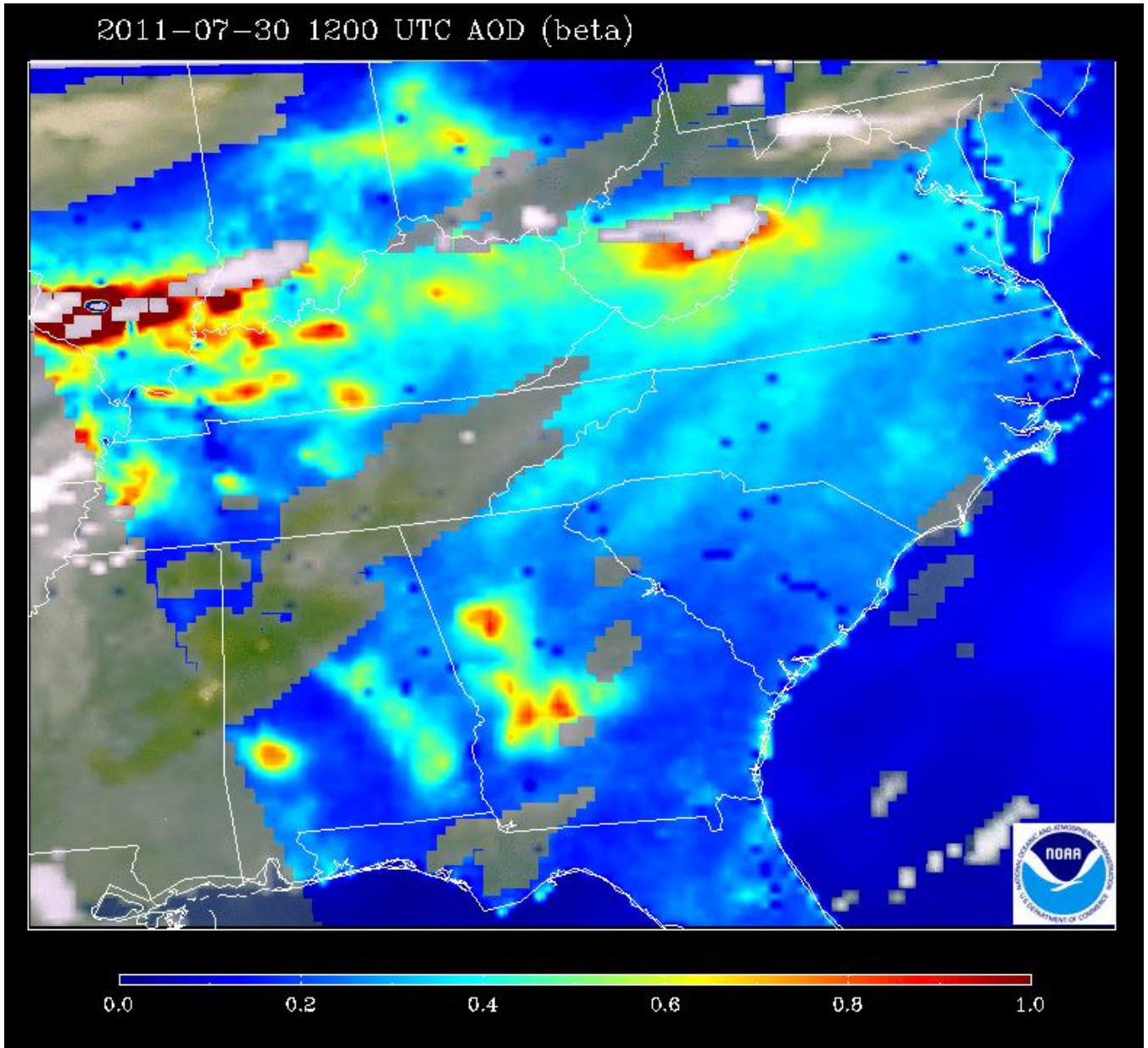
- Held three full workshops with the User Group (September 2010), the National Air Quality Conference attendees (60 people, March 2011) and January 12, 2012 at UMBC
- Workshops are tutorial in nature, presenting GOES-R 101 basics and then working with Case Studies.
- Users provide immediate and follow up feedback on the products and questions about utility of the AQ products in their daily forecasting.
- Since most of the AQ forecasters in the country work for state and local agencies, data and imagery access continues to be their primary concern.


2011-03-25 18 UTC AOD at 0.55μm (ABI)
−0.1
0.1
0.3
0.5
0.7
0.9

Case Studies of Simulated ABI Aerosol Data

- Case studies are designed to help users envision what actual GOES-R ABI data will look like, particularly GOES-R's high temporal resolution, and anticipate how to use the data.
- Simulated ABI data are prepared for past air quality events and are used for training and to obtain feedback from the air quality community.
- Simulated ABI data are based on model data processed through the ABI algorithm, so they are not completely faithful representations of past conditions.

Proxy ABI Aerosol Optical Depth (AOD)

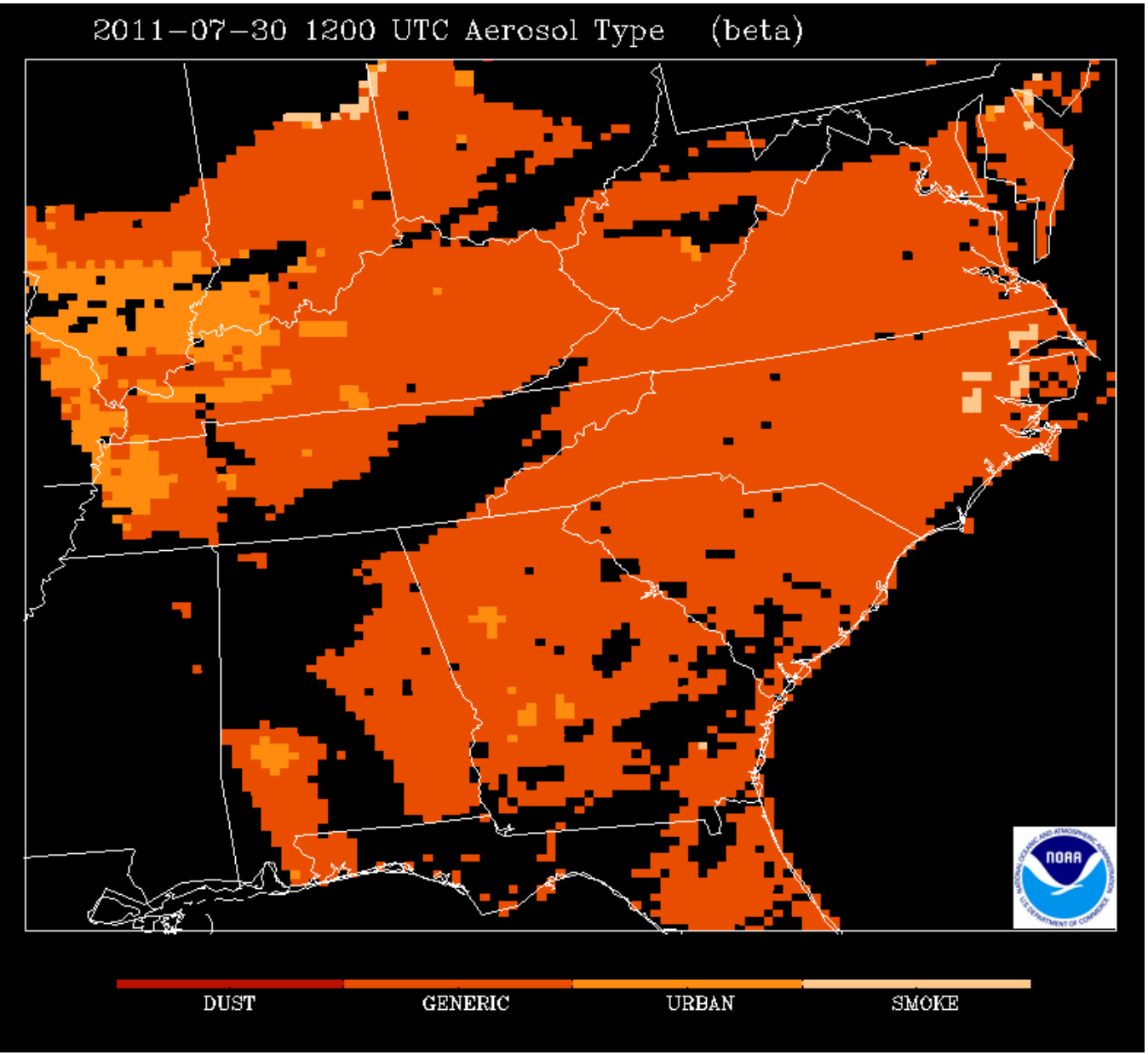


AOD indicates areas of high particulate concentrations in atmosphere

AOD is unitless; high AOD values (yellow, orange, red) indicate high particulate concentrations

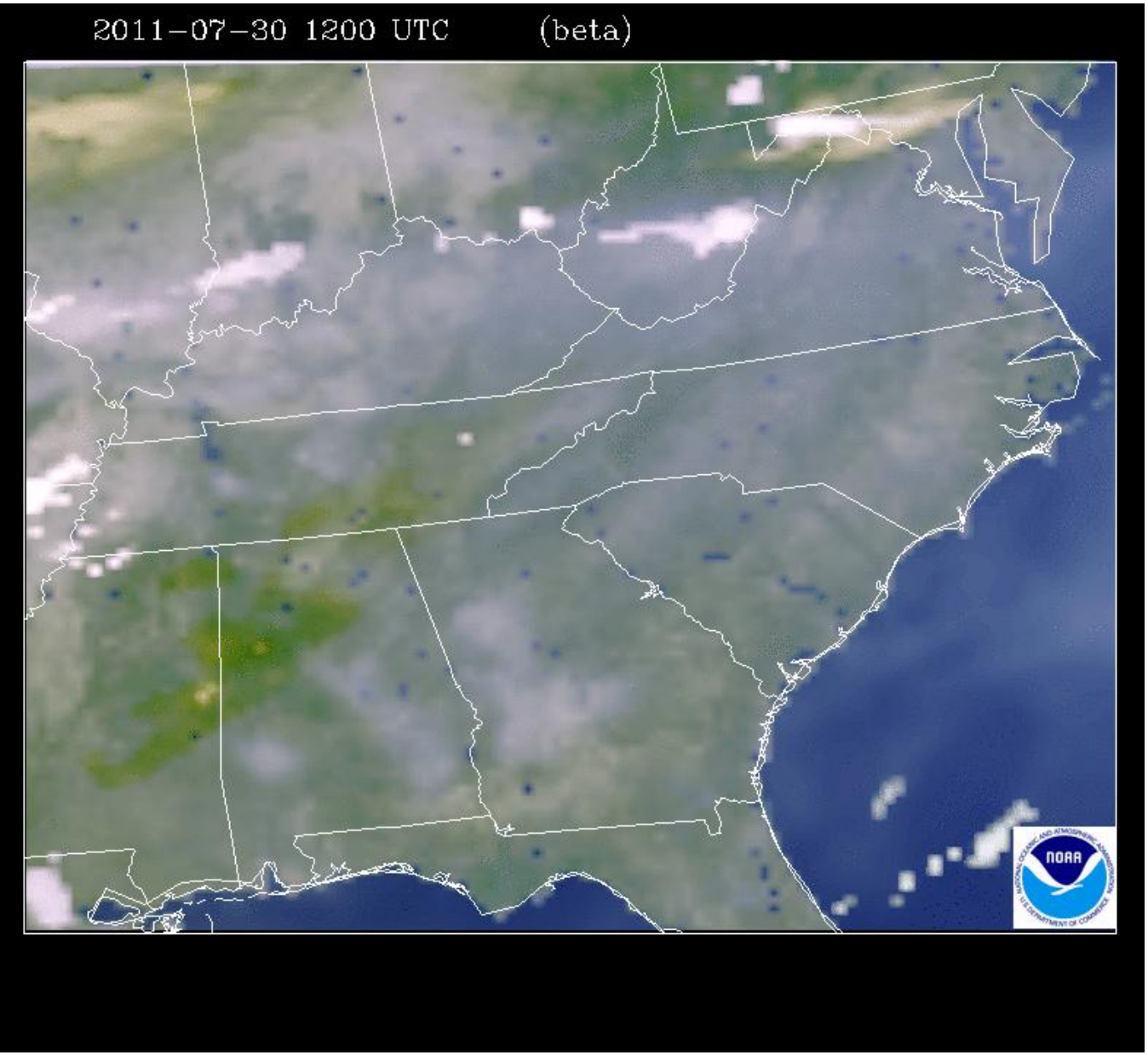
Clouds block AOD retrievals

Proxy ABI Aerosol Type



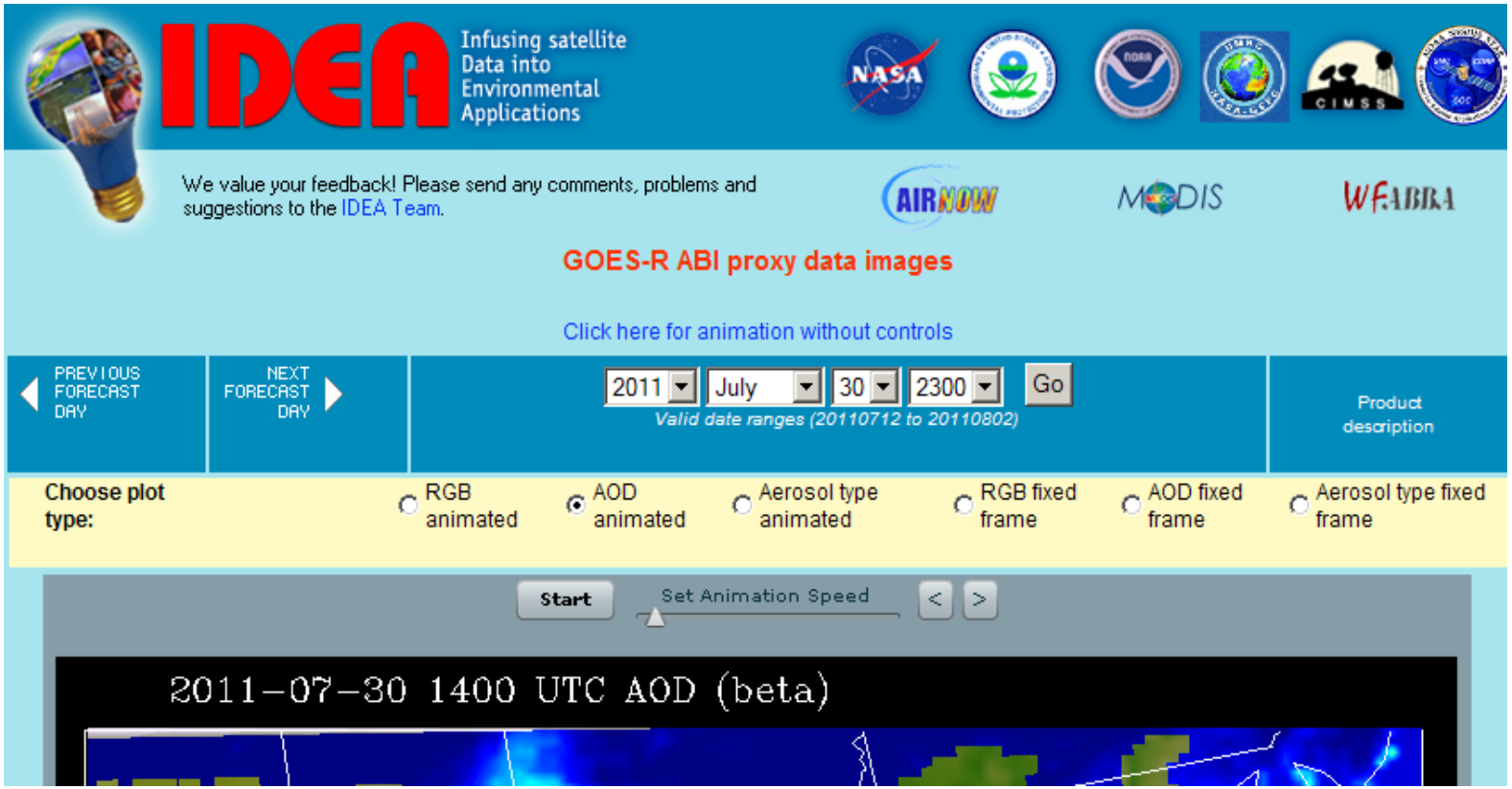
- New product - not available with current GOES imager
- Qualitative and untested
- Useful for distinguishing between smoke and dust but can be noisy, especially at low AOD values

Proxy ABI Synthetic Natural Color (RGB)



- No green band on ABI
- 2 methods to generate RGBs:
  - CIRA/SPoRT
  - UMBC/STAR
- UMBC/STAR method used for Summer 2011 experiment
- Algorithm development underway to improve RGB product

Interactive Web Display for Proxy ABI Products



- Proxy ABI aerosol products were streamed to users through the NESDIS IDEA website (http://www.star.nesdis.noaa.gov/smcd/spb/aq/aqpg/)
- Users selected the day/time of interest using a pull-down menu and flipped between the three ABI proxy products using radial buttons

Planning for the Next NRT Experiment

- AQPG team has incorporated user feedback from the Summer 2011 NRT experiment and is planning another NRT experiment for September, 2012.
- Volunteers are welcome
- To generate additional proxy ABI products, the AQPG needs real-time model aerosol output with a CONUS domain
  - Hope to use NCEP/NWS forecast products as basis for the next AQPG NRT experiment in 2012

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- Mike Johnson (NOAA NWS)
- Jaime Daniels (NOAA NESDIS)

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