GOES-R Air Quality Proving Ground (AQPG)

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2011 GOES-R Proving Ground Meeting, Boulder

May 18, 2011

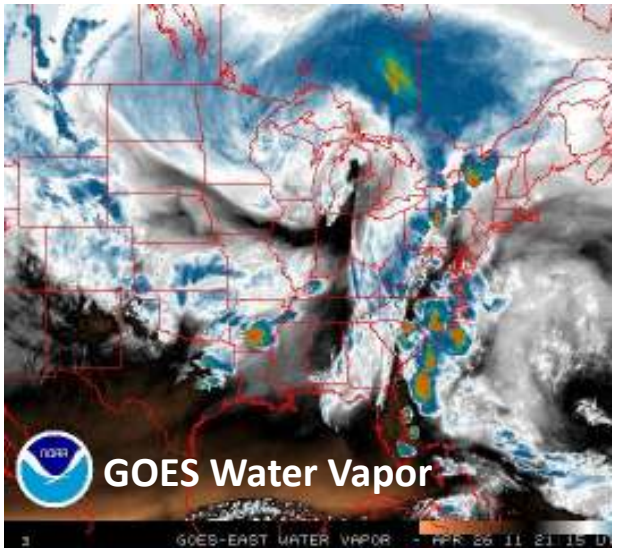
UMBC
AN HONORS UNIVERSITY IN MARYLAND

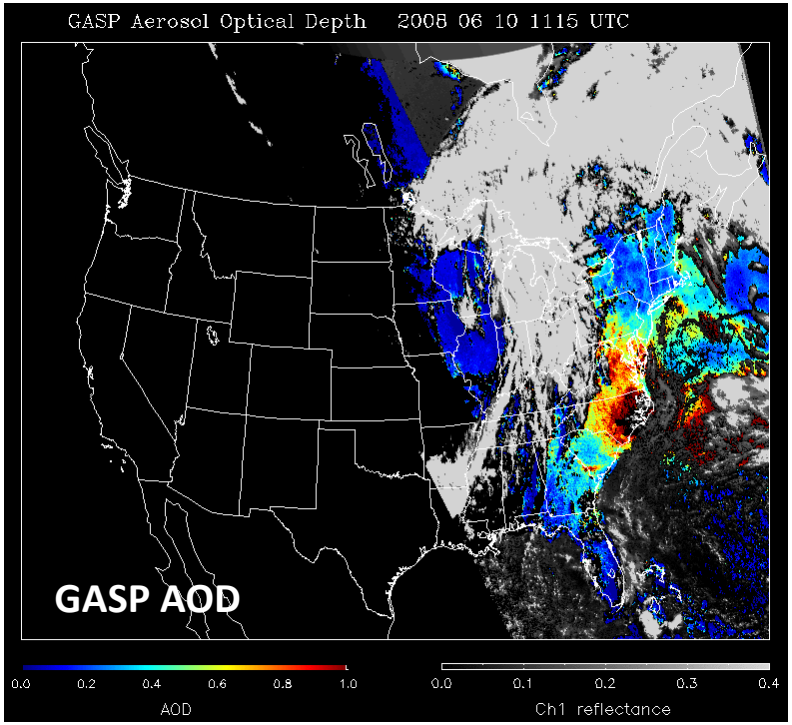
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

Battelle
The Business of Innovation

UAH

Current NOAA Satellite Products for AQ Community



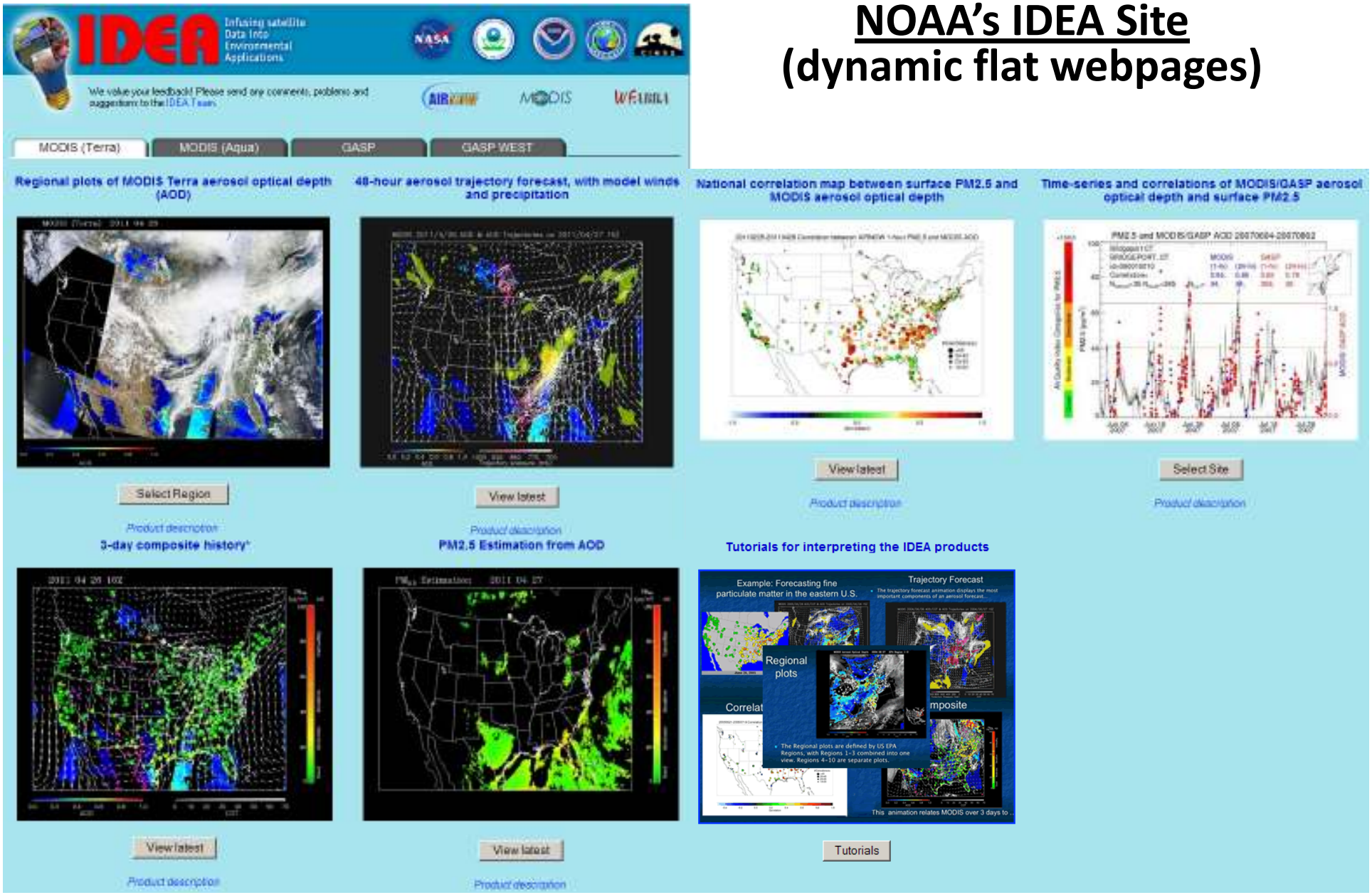


Uses of Satellite Products by AQ Community

- 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

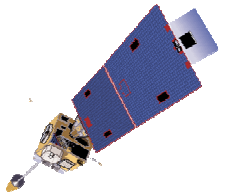
http://www.star.nesdis.noaa.gov/smcd/spb/aq/

NOAA's IDEA Site
(dynamic flat webpages)



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

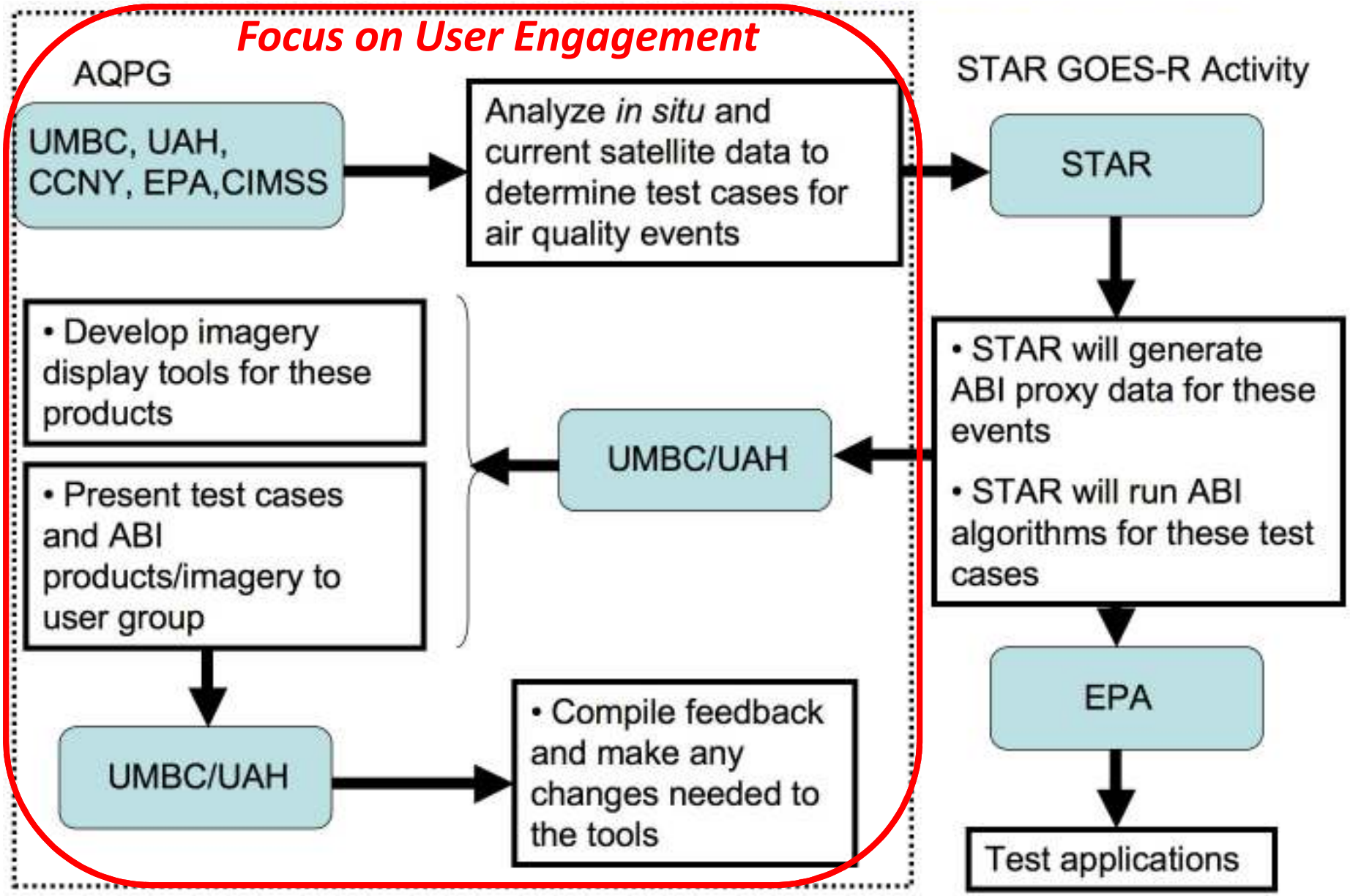
AQPG Trainings

- Held two full afternoon workshops with the User Group (September 2010) and the National Air Quality Conference attendees (60 people, March 2011)
- 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.

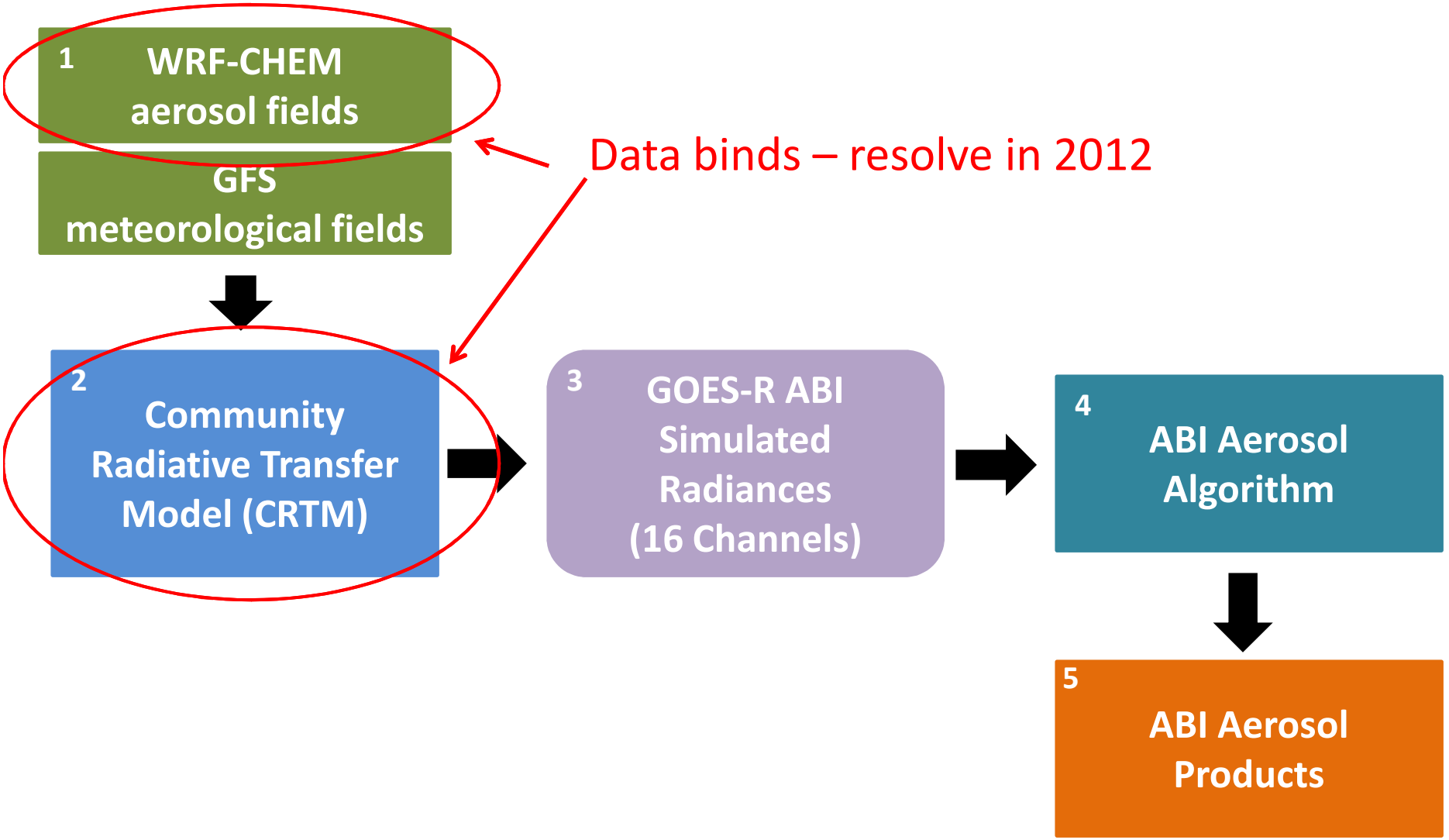
AQPG Team Members

- Sundar Christopher (UAH)
- Barry Gross (CCNY)
- Ray Hoff (UMBC)
- Amy Huff (Battelle)
- Shobha Kondragunta (NOAA NESDIS)
- Brad Pierce (NOAA NESDIS)
- Bonnie Reed (NOAA NWS)
- Ivanka Stajner (NOAA NWS)
- Jim Szykman (USEPA)

AQPG Overview



Simulated ABI Data Creation Process



NOAA GOES-R
Air Quality Proving Ground
Case Study 3
July 5, 2010

Haze in Northeast, Mid-Atlantic,
Southeast, and Great Lakes Regions

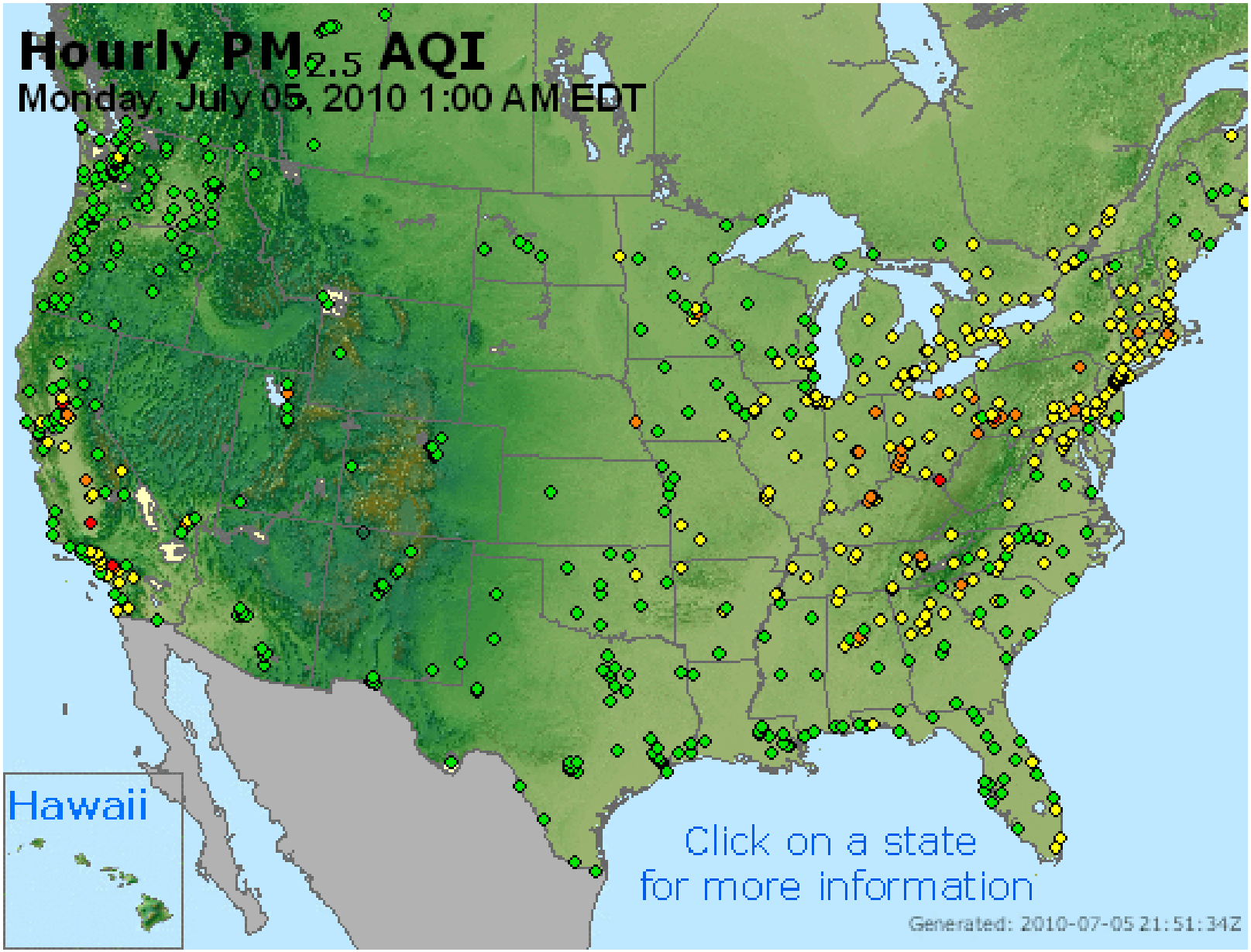
Case Studies of Simulated ABI Aerosol Data

- 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.

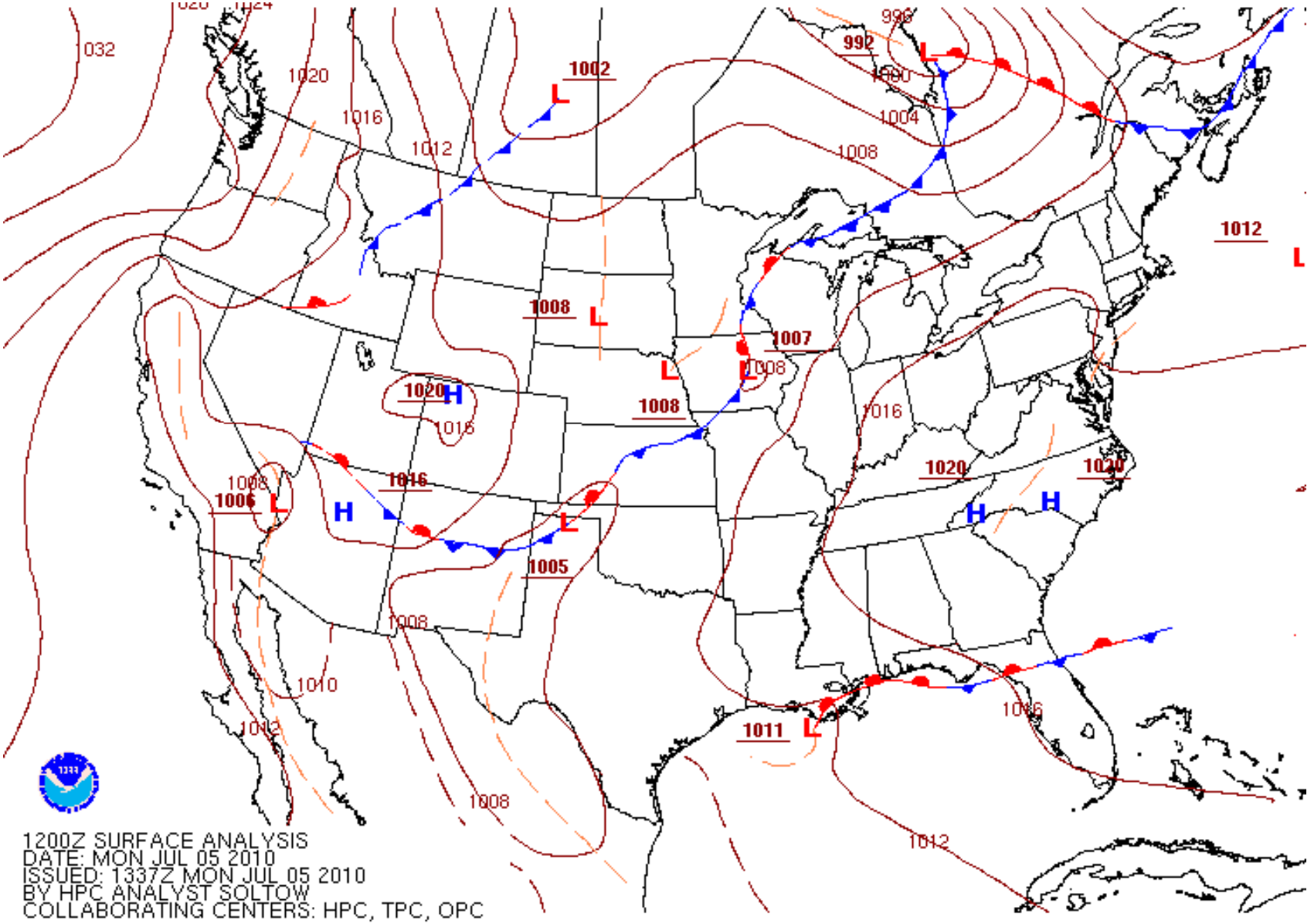
Simulated ABI Data Development

- AQPG is using numerical model output to develop simulated ABI aerosol data for the CONUS:
  - WRF-Chem, CMAQ, GOCART (aerosol fields)
  - WRF, GFS (meteorological fields)
- The Joint Center for Satellite Data Assimilation's (JCSDA) Community Radiative Transfer Model (CRTM) is used to generate simulated ABI radiances (16 bands).
- The simulated ABI radiances are used as input into the GOES-R ABI aerosol algorithm, which generates the ABI aerosol products.

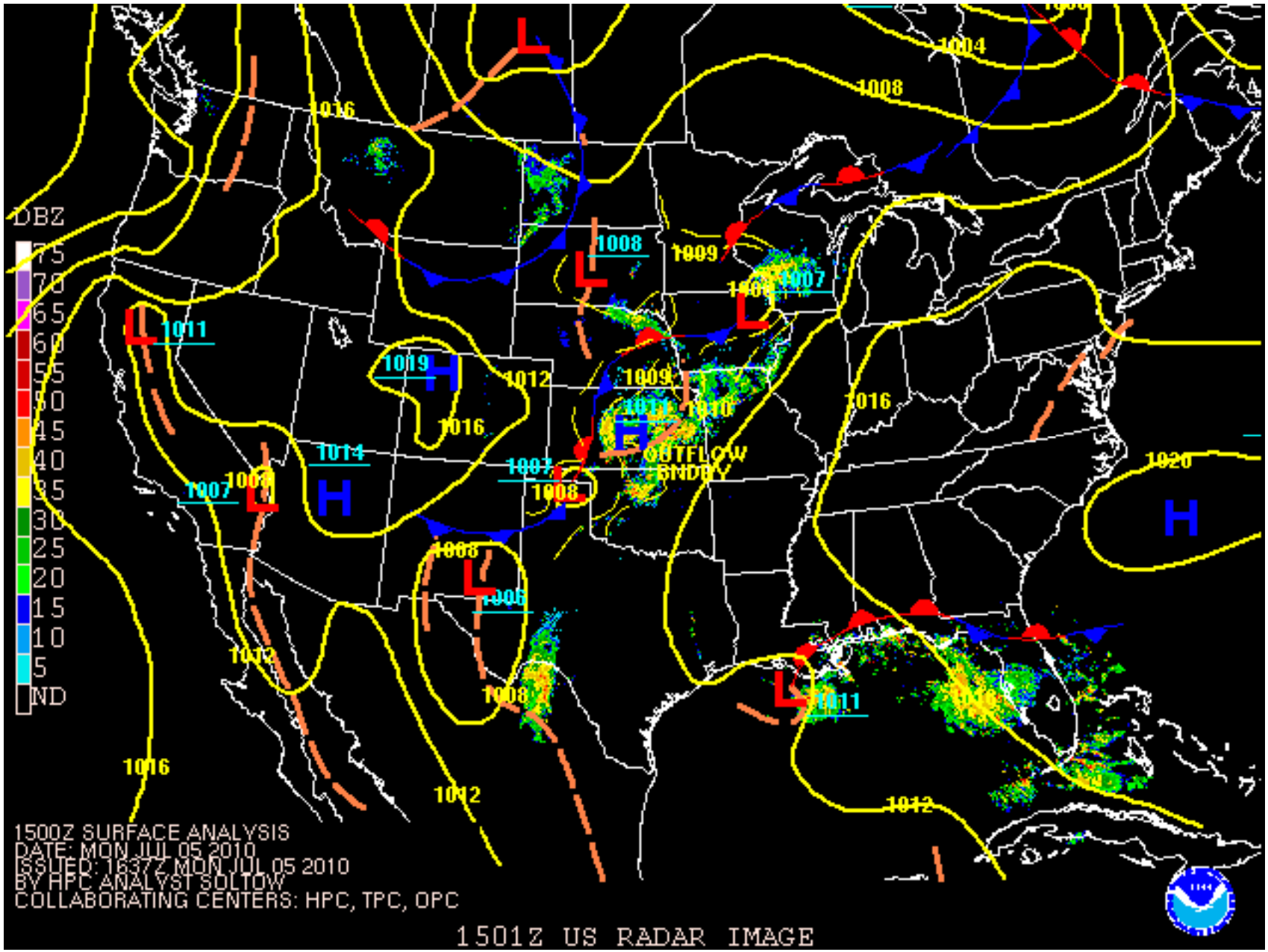
$PM_{2.5}$ AQI Loop for July 5, 2010



12 UTC Surface Analysis for July 5, 2010

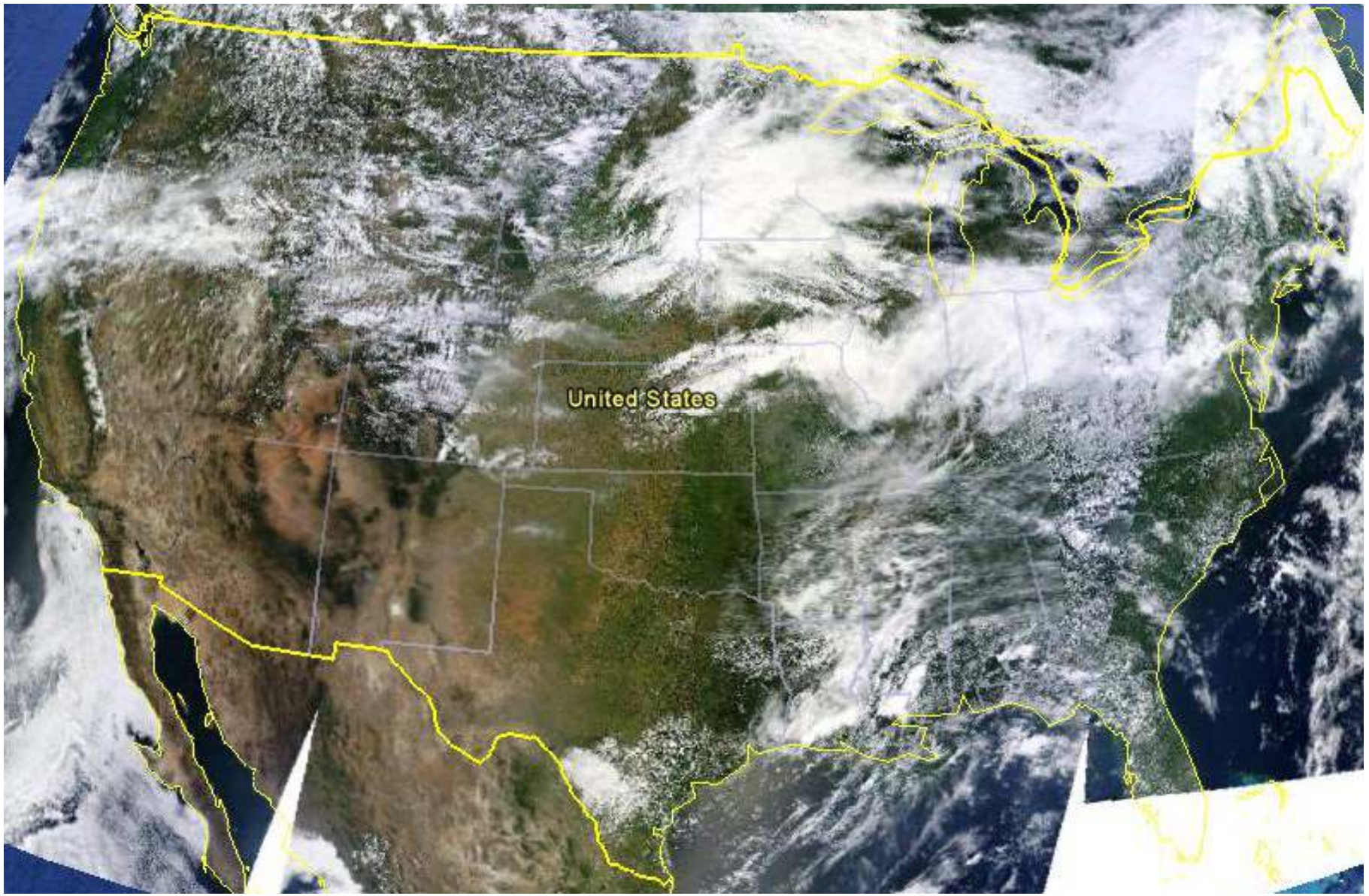


15 UTC Surface Analysis with Radar for July 5, 2010

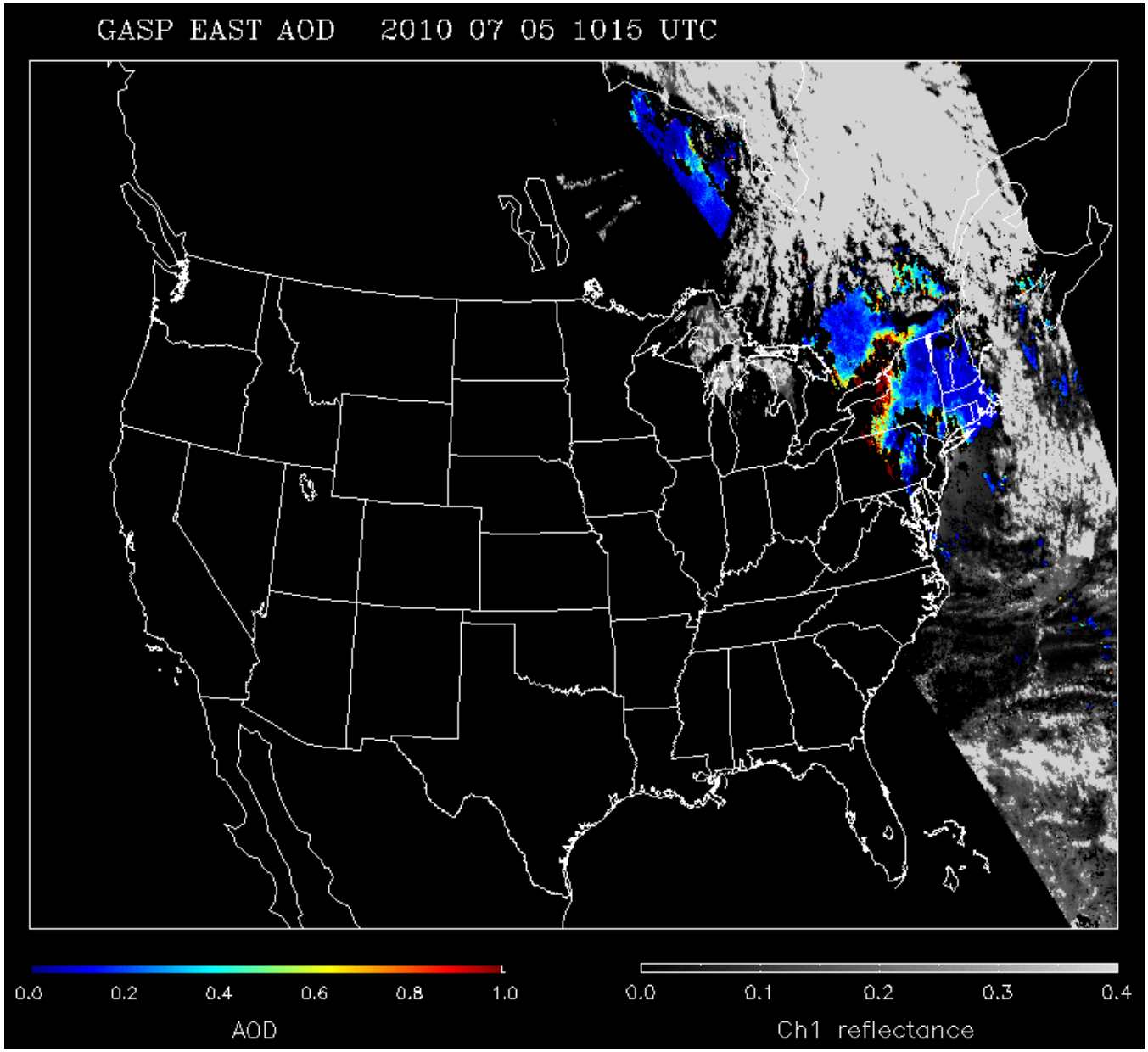


NOAA Hazard Mapping System
Fire and Smoke Analysis for July 5, 2010

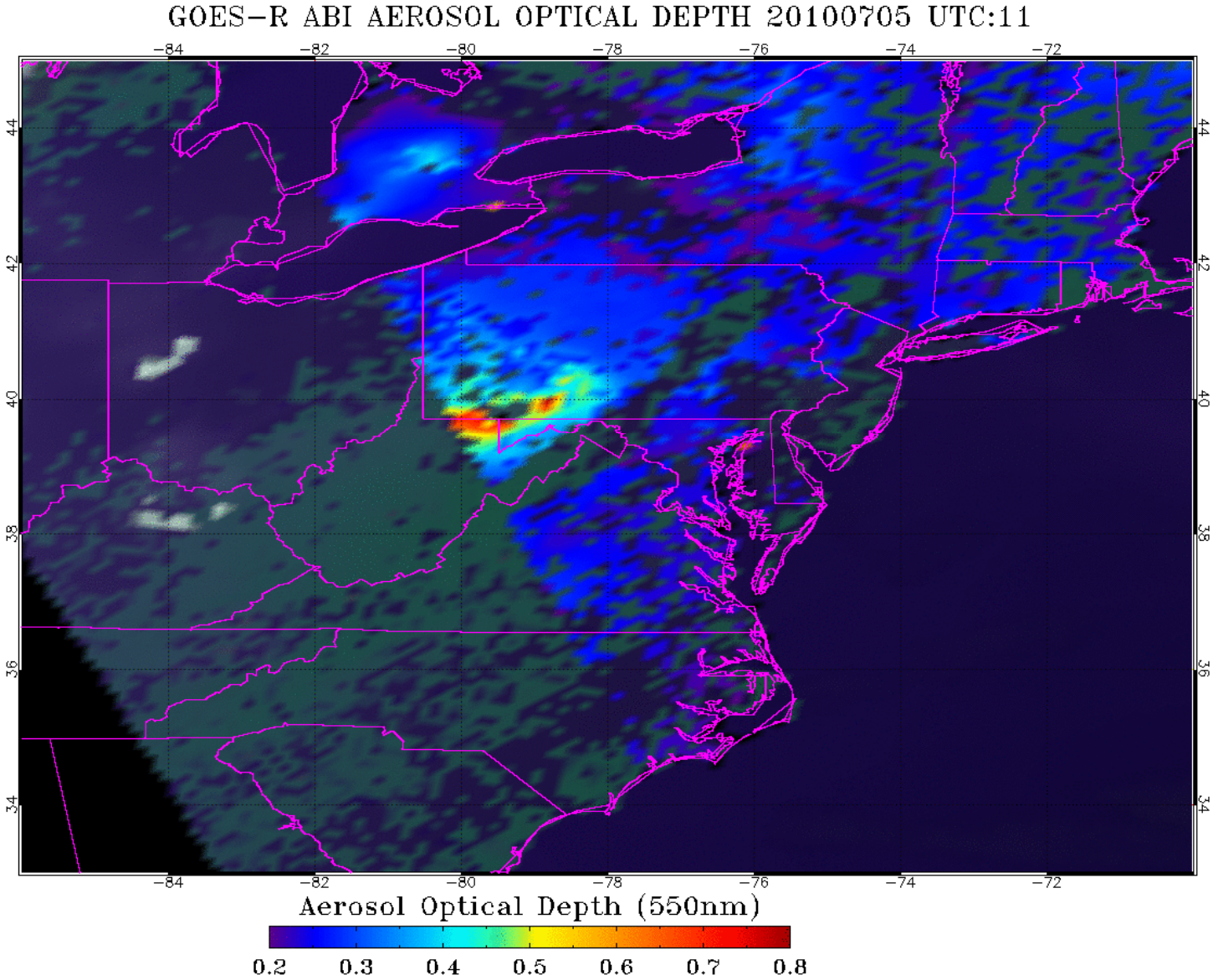
Terra MODIS True Color Image for July 5, 2010



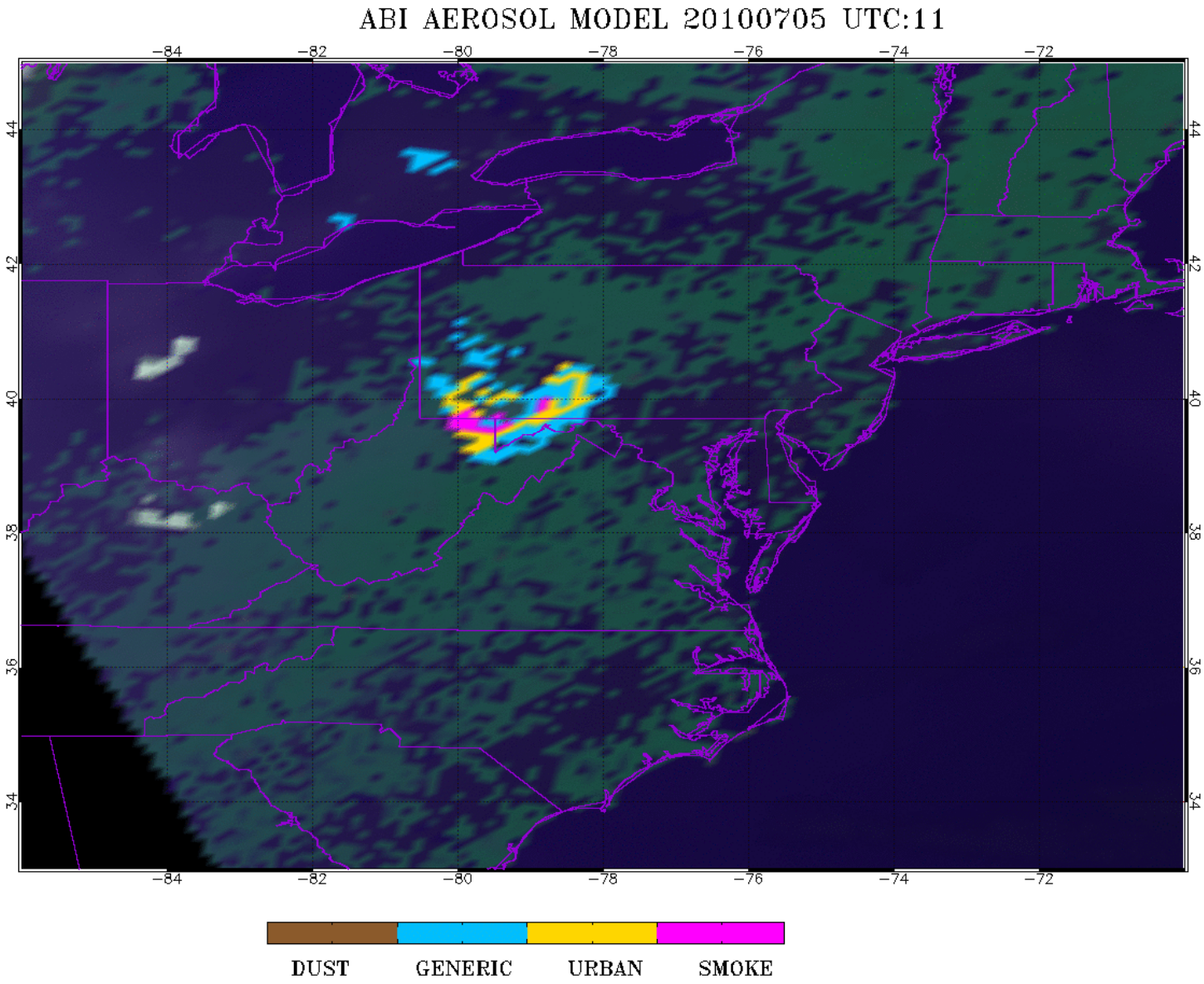
GOES Aerosol Optical Depth (GASP) for July 5, 2010



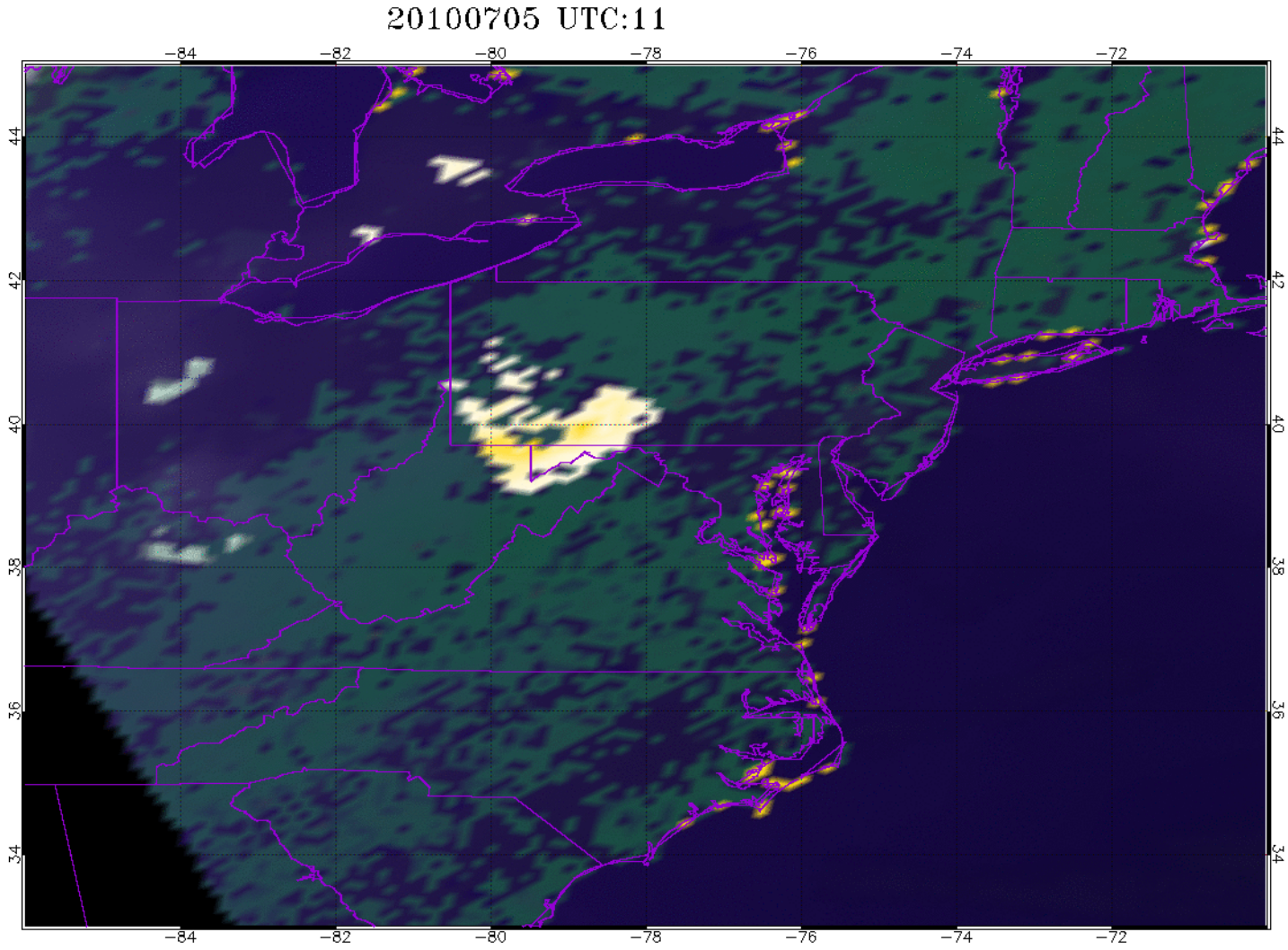
Simulated GOES-R ABI AOD Loop for 11-18 UTC July 5, 2010



Simulated GOES-R ABI Aerosol Type Loop for 11-18 UTC July 5, 2010



Simulated GOES-R ABI False Color Imagery Loop for 11-18 UTC July 5, 2010



Next Steps for the AQPG

- Preparing additional case studies for training/feedback.
- Running near real-time testbed of simulated ABI AOD during DISCOVER-AQ mission (July 1-31, 2011):
  - PHL-BAL-DC corridor (DISCOVER-AQ region) and Mid-Atlantic/Southeast region
  - Next-day ABI AOD available ~2-3 PM for 2 weeks
  - AQ forecasters will review ABI AOD and provide feedback
- 2nd annual AQPG workshop at UMBC in Oct/Nov:
  - 1-day workshop in Baltimore for Advisory Group members
  - Discuss recent progress in AQPG, review simulated ABI data, get feedback from air quality community
- Reviewing AWIPS-II and evaluating options for ABI aerosol data delivery to AQ community.

Acknowledgements

- Steve Goodman (NOAA NESDIS)
- Shobha Kondragunta (NOAA NESDIS)
- Ray Hoff (UMBC)
- Sundar Christopher (UAH)
- Bonnie Reed (NOAA NWS)
- Mike Johnson (NOAA NWS)
- Pubu Cirenand Chuanyu Xu (NOAA NESDIS)