Air Quality Proving Ground 3rd Users Workshop

Raymond Hoff, UMBC

Shobha Kondragunta, NESDIS STAR

Amy Huff, Penn State University

3rd Workshop Goals

- Provide the AQPG user group with a test case of aerosol satellite products, created from July 4, 2012 data – "Day in the Life Experiment"
- Provide the group with an update on the current GOES-R status and news on the new VIIRS sensor on Suomi-NPP
- Get feedback on changes made to aerosol products since second workshop in 2012

Workshop Participants

Name	Affiliation
Pubu Ciren	IMSG at NOAA NESDIS/STAR
Ruben Delgado	UMBC
Russell Dickerson	University of Maryland, College Park
Kevin Durkee	South Coast Air Quality Management District
Cary Gentry	Forsyth County (NC) Office of Environmental Assistance and Protection
Mitch Goldberg	NOAA NESDIS
Steve Goodman	NOAA NESDIS
Winston Hao	New York State Department of Environmental Conservation
Ray Hoff	UMBC
Amy Huff	Pennsylvania State University
Hyun Kim	NOAA ARL
Richard Kleidman	SSAI/NASA
Shobha Kondragunta	NOAA NESDIS/STAR
Nickolay Krotkov	NASA GSFC
Istvan Laszlo	NOAA NESDIS/STAR
Pius Lee	NOAA ARL
Kathryn Mozer	ASRC Federal Space and Defense Services

Name	Affiliation
Leigh Munchak	NASA-GSFC/SSAI
Bill Murphey	Georgia Department of Natural Resources
Fantine Ngan	NOAA ARL
Sean Nolan	Pennsylvania Department of Environmental Protection
Li Pan	NOAA OAR/ARL
Brad Pierce	NOAA NESDIS/STAR
Lorraine Remer	UMBC
Dan Riley	Vermont Air Pollution Division
Mark Ruminski	NOAA NESDIS
Daniel Salkovitz	Virginia Department of Environmental Quality
Patricia Sawamura	UMBC Physics Department
Howard Schmidt	U.S. EPA Region 3
Ivanka Stajner	NOAA NWS
Jeff Stehr	University of Maryland, College Park
Jim Szykman	U.S. EPA ORD/NERL
Laura Warren	Maryland Department of the Environment
Chuanyu Xu	I.M. Systems Group, Inc.
Hai Zhang	UMBC

Agenda

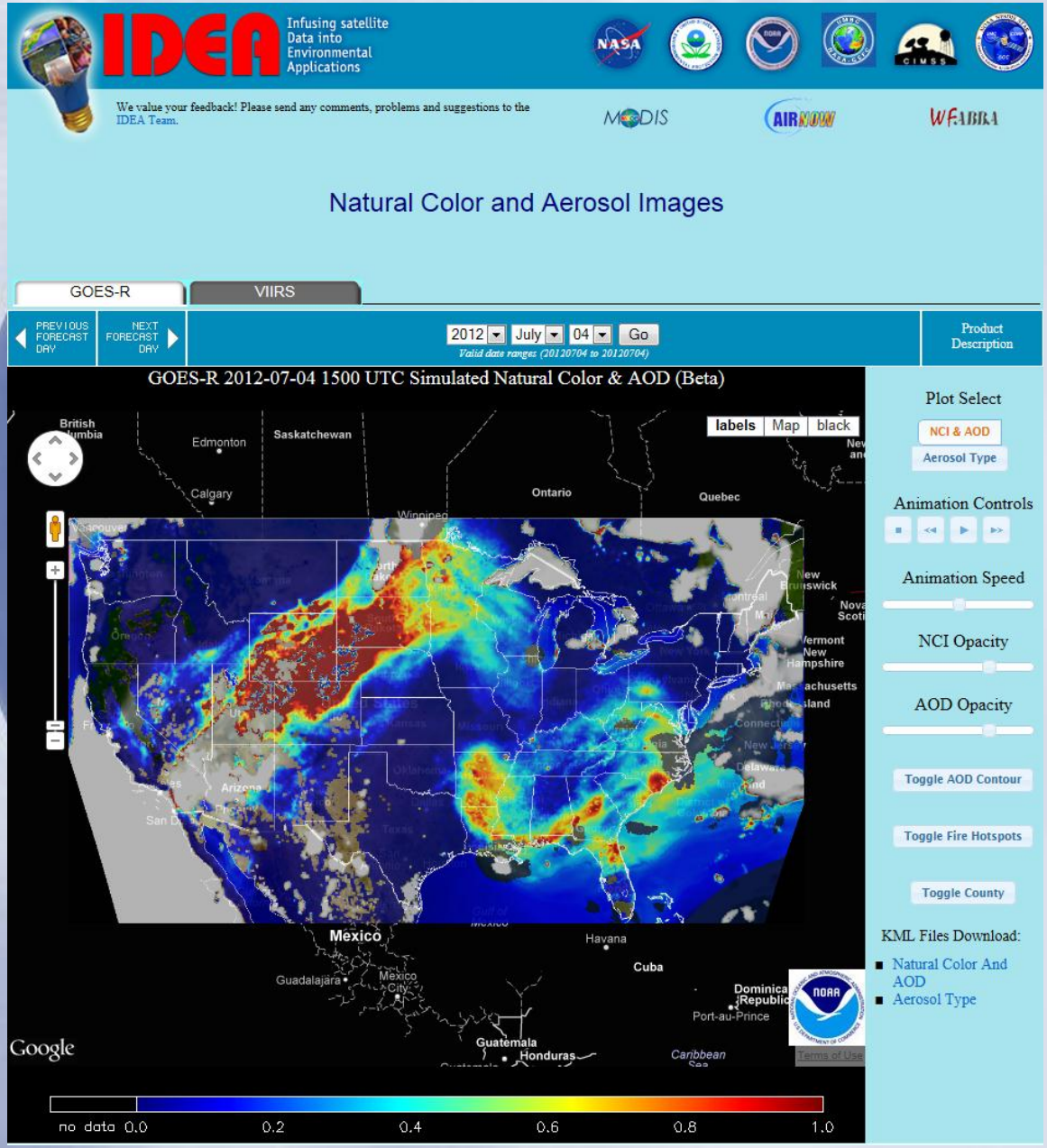
(see http://alg.umbc.edu/aqpg/)

- 8:30 - 8:45 Welcome and Overview of the Workshop (Amy Huff, PSU)
- 8:45 - 9:00 NOAA's Satellite Air Quality Proving Ground (Mitch Goldberg, NOAA)
- 9:00 - 9:30 Validation of GOES and GOES-R Aerosol Products (Lorraine Remer, UMBC)
- 9:30 – 10:00 Applications of VIIRS Aerosol Products within U. S. EPA (Jim Szykman, EPA)
- 10:30 - 11:00 AOD Retrieval from Geostationary Platforms (Ray Hoff, UMBC)
- 11:00 - 11:30 NOAA's Hazard Mapping System (Mark Ruminski, NOAA NESDIS)
- 11:30 - 12:00 Applications of GOES and MODIS Aerosol Products in NOAA's Operational Air Quality Predictions (Ivanka Stajner, NOAA NWS)
- 1:00 – 1:20 Validation of Suspended Matter Derived from Simulated GOES-R ABI AOD using Surface PM2.5 and Aircraft Data (Shobha Kondragunta, NESDIS)
- 1:20 - 1:30 Validation of MODIS based GOES-R ABI AOD retrievals using Ground Based LIDAR Data (Brad Pierce, NESDIS)
- 1:30 - 2:00 Overview of Simulated GOES-R ABI and Observed Suomi-NPP VIIRS Aerosol Products: Case Study from July 4, 2012 (Amy Huff)
- 2:00 - 3:00 Breakout Session: Review of Simulated GOES-R ABI and Observed Suomi-NPP VIIRS Aerosol Products for July 4, 2012
- 3:30 - 4:30 Group Discussion: Feedback on GOES-R ABI and Suomi-NPP VIIRS Aerosol Products (Amy Huff)
- 4:30 - 4:45 Upcoming AQPG Activities

Case Study Breakout Session

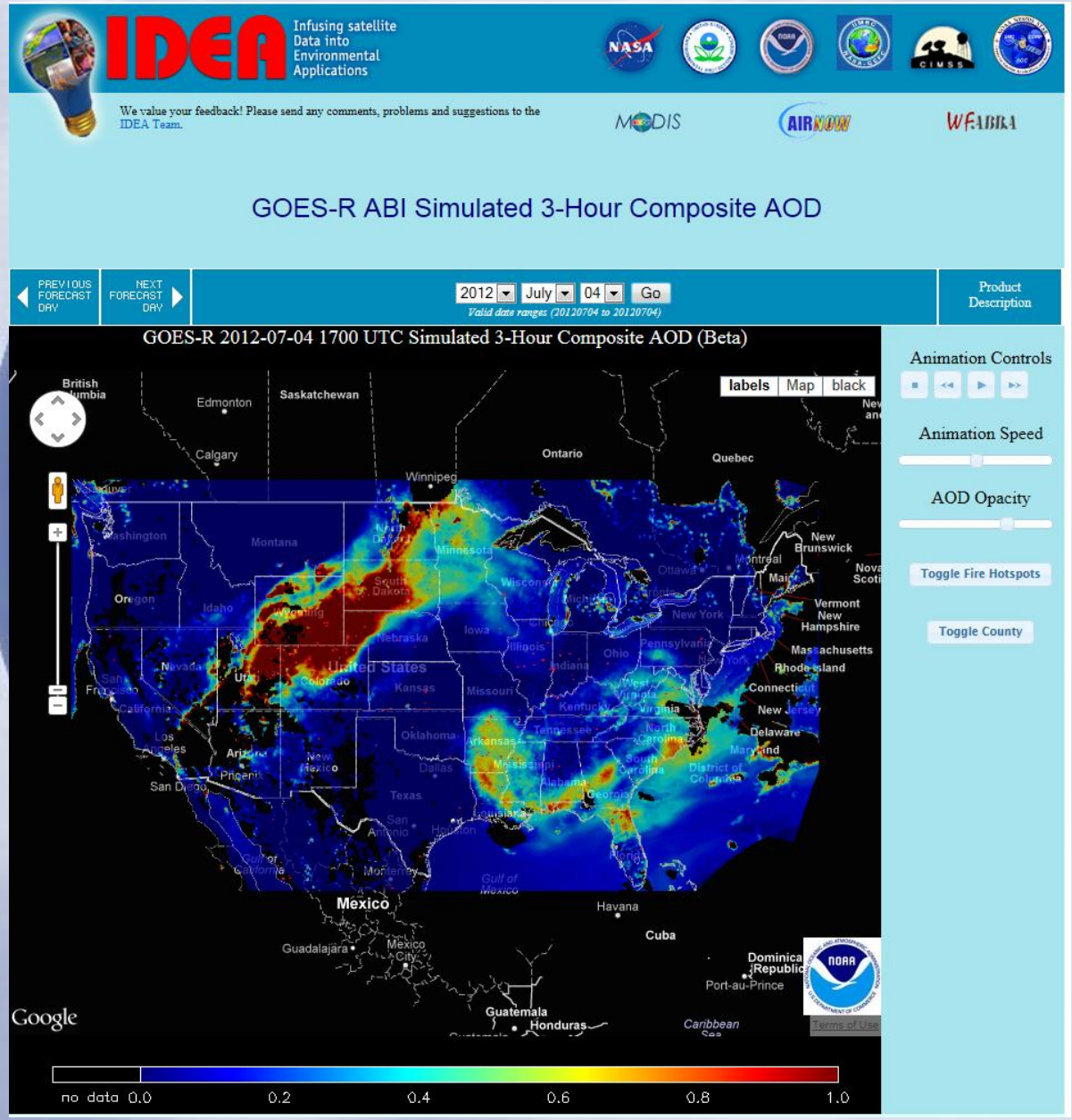
- In the afternoon, participants broke into groups of 2-3 and reviewed simulated GOES-R/ABI and observed NPP/VIIRS aerosol products for an air quality event that occurred on July 4, 2012.
- The GOES-R/ABI aerosol products were based on hourly model simulations (WRF-CMAQ).
- Participants answered questions on a worksheet about the satellite aerosol products, visualizations, and data display. We also had a spirited group discussion regarding the satellite aerosol products.
- This workshop represented the fifth time we have received organized feedback on the GOES-R/ABI aerosol products since the inception of the AQPG, so we are closing in on optimal products, data formats, and visualizations for our user community!

Simulated GOES-R ABI Natural Color and AOD



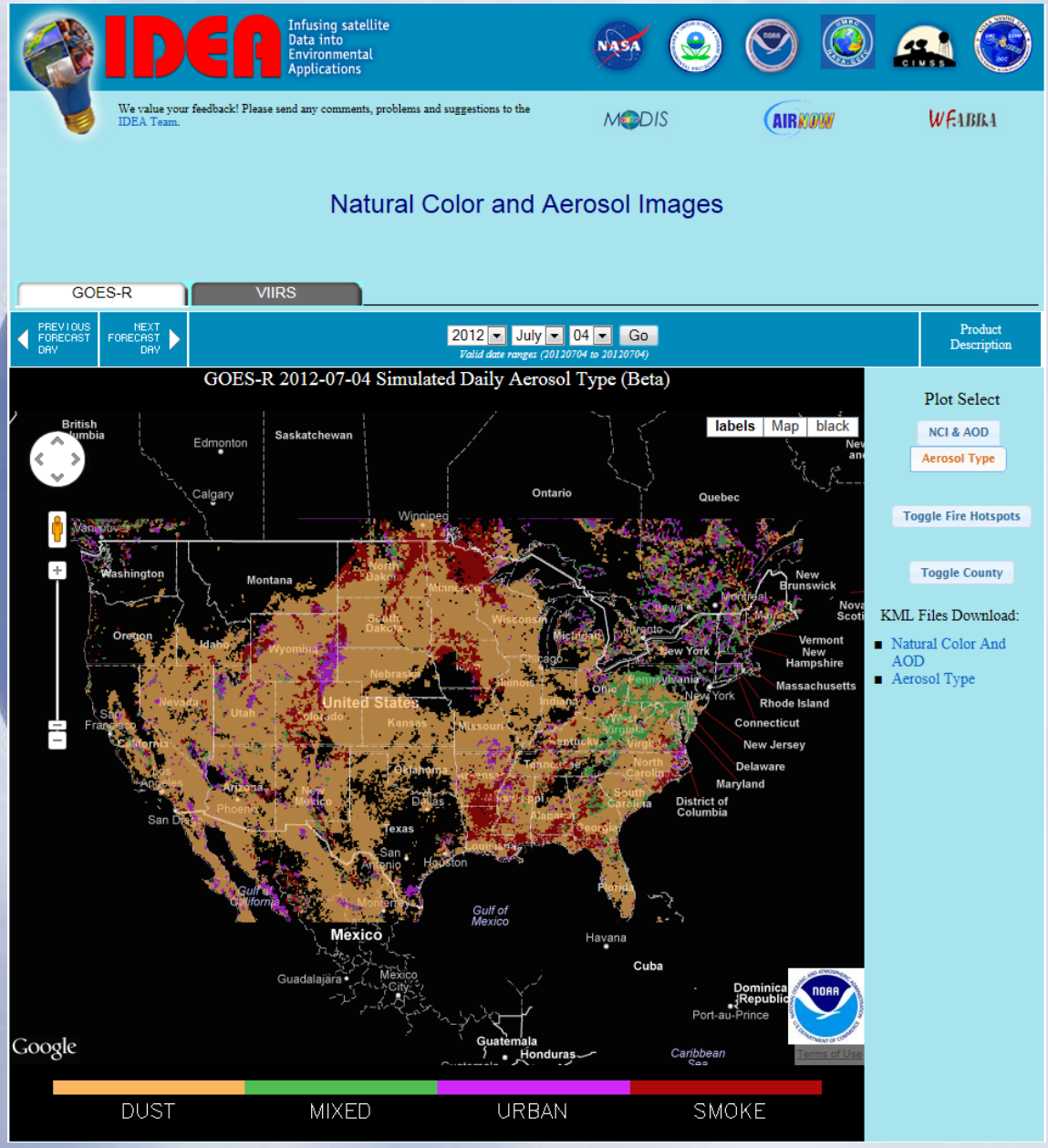
- AOD indicates areas of high particulate concentrations in atmosphere
- AOD is unitless; high AOD values (yellow, orange, red) indicate high particulate concentrations
- Clouds block AOD retrievals

Simulated GOES-R 3-Hour Composite AOD



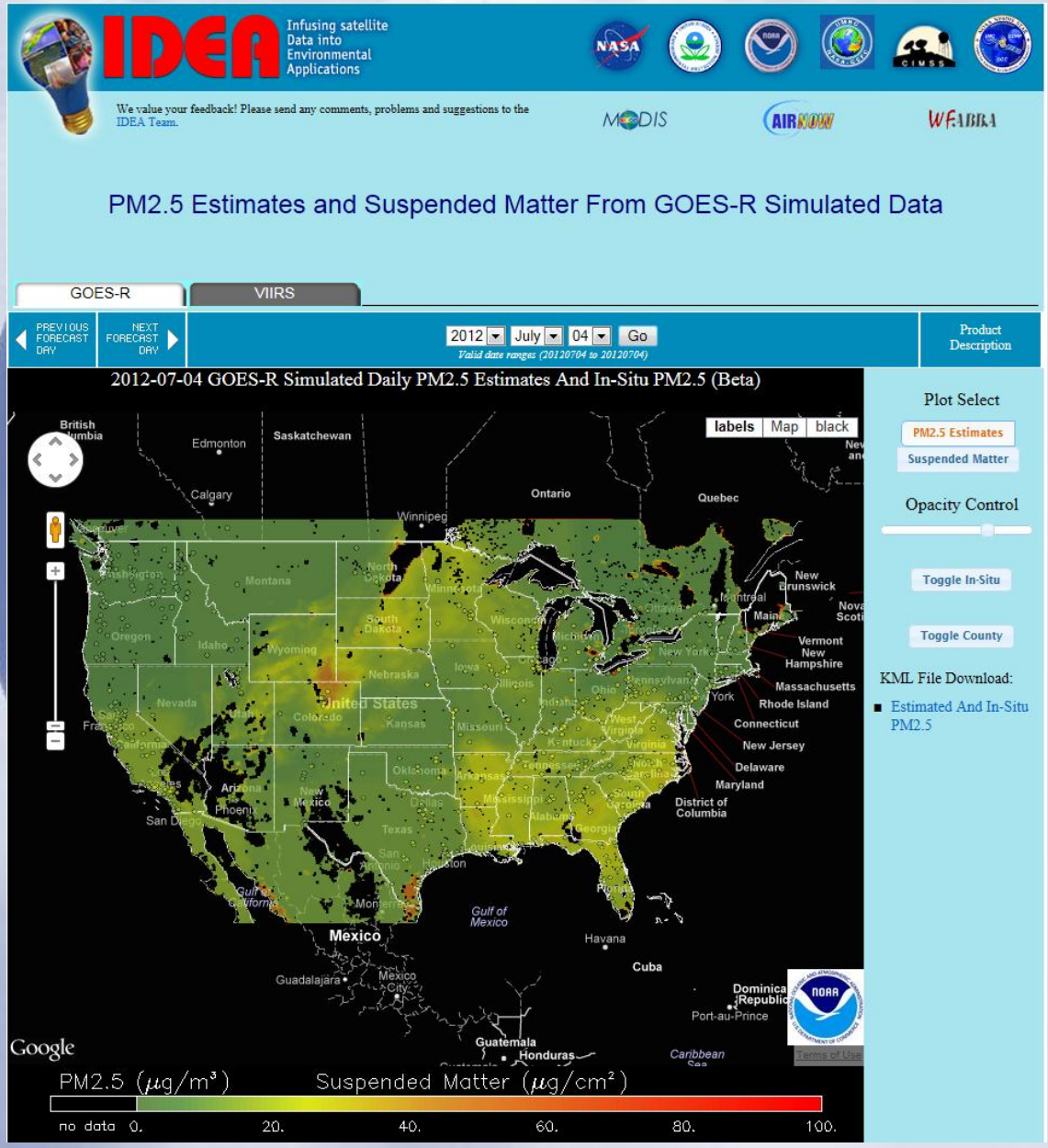
- Composites are useful in cases when AOD may be periodically missing due to clouds or bright surfaces
- AOD composites for 14:00, 17:00, 20:00, and 23:00 UTC

Simulated GOES-R ABI Aerosol Type



- New product – not available with current GOES imager
- Potentially useful for distinguishing between smoke and dust
- Can be noisy, especially at low AOD values
- New color scheme

Simulated GOES-R $PM_{2.5}$ Estimates/ Suspended Matter



- Surface $PM_{2.5}$ is estimated from average daily simulated AOD using linear relationships for MODIS AOD and surface $PM_{2.5}$ developed by Zhang et al., 2009
- Suspended matter is a simulated column measurement of aerosols in atmosphere

Key Product Updates Since the Last Workshop (Jan 2012)

- "Slider bars" to adjust opacity of AOD and NCI imagery
- Zoom in/out option
- Map display with different background options
- Overlay of contours of AOD = 0.4 and 0.7
- Overlay of fire hotspots
- Overlay of county boundaries
- Overlay of observed $PM_{2.5}$ ground-level concentrations

Group Discussion: User Feedback

- GOES-R/ABI:
  - AOD products look great!
  - Add overlay of AERONET AOD
  - Add ability to toggle on/off various Aerosol Types
  - Add ability to toggle on/off 850 mb wind vectors, precipitation, and initial trajectory heights to 48-hr aerosol trajectory forecast
- NPP/VIIRS:
  - Add descriptive labels (e.g., “best,” “good,” “satisfactory”) to AOD quality flags

You (too) need to play with it

- http://www.star.nesdis.noaa.gov/smcd/spb/aq/aqpg_v3/
- Give us feedback on suggestions and comments of this product.
- This Proving Ground did EXACTLY what we wanted it to do. We now have a user community that knows what GOES-R data will look like and they have ownership of the design of the products.

Next Steps for the AQPG

- Name change to NOAA Satellite AQPG – incorporating other satellite sensors (e.g., VIIRS)
- We will have demo/training on VIIRS at upcoming meetings (e.g., AMS, AGU, NAQC)
- 4th annual AQPG workshop will be a 2-day VIIRS Science and Application workshop
- Next near real-time ABI testbed demonstration of streaming NRT GOES-R/ABI aerosol products planned for Fall 2013
- Preparing journal article focusing on method for generating simulated GOES-R/ABI aerosol products
- Presentation on AQPG at EPA's National Air Quality Conference in Fall 2013