GOES-R, Glory, and NPP: the Next Generation of Satellite Products for Air Quality Forecasters

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

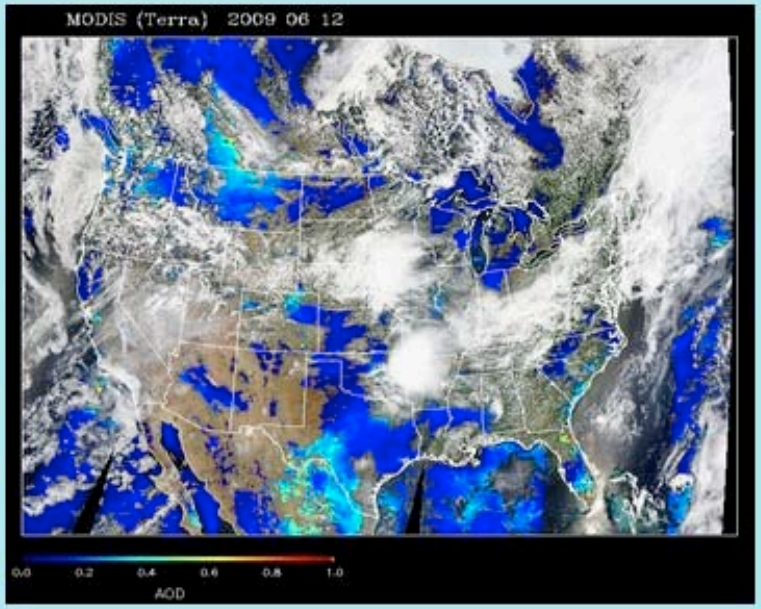
IDEA

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

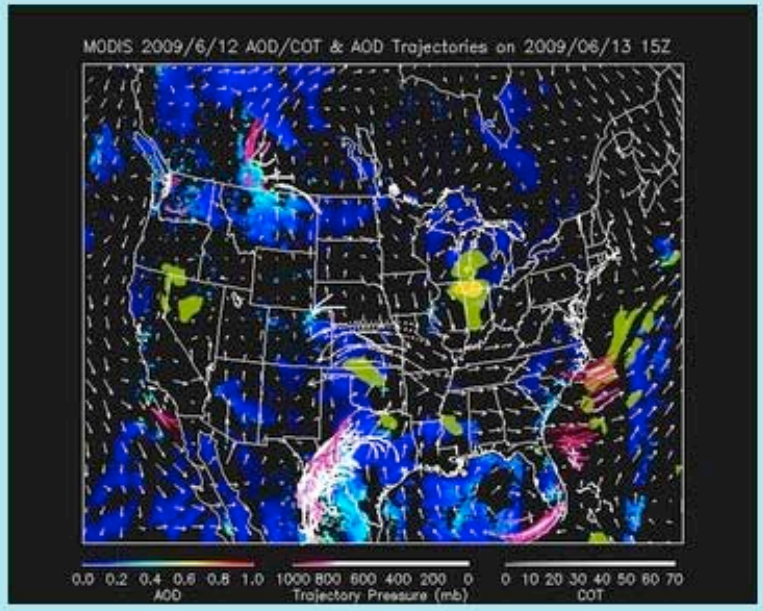
Regional plots of MODIS Terra aerosol optical depth (AOD)



Select Region

Product description

48-hour aerosol, model winds and precipitation



View latest

Product description

Transition to the Next Generation of EOS

- Current polar-orbiting Earth-observing satellites are near or at the end of their expected 6-year lifetimes:
  - Terra launched 1999 (2005)
  - Aqua launched 2002 (2007)
  - Aura launched 2004 (2010)

- NASA and NOAA plan to launch their next generation of satellites in the 2010-2015 time period:
  - Glory (NASA)
  - NPP/JPSS (NOAA/NASA)
  - GOES-R (NOAA)

Glory

- NASA polar-orbiting satellite with ~ 1:30 PM overpass time (part of A-train, ~ 4 minutes ahead of Aura)
- Launch planned for late 2010
- Science goals: measure optical properties of aerosols and long-term changes in solar irradiance to determine effects on Earth's climate and energy balance
- Key air quality instrument is Aerosol Polarimetry Sensor (APS):
  - 9 spectral bands ranging from 0.4 to 2.4 μm
  - 1 day temporal resolution; global coverage
  - Similar to current POLDER instrument on PARASOL satellite
  - AOD with higher accuracy than MODIS but less spatial coverage due to multi-angle measurements

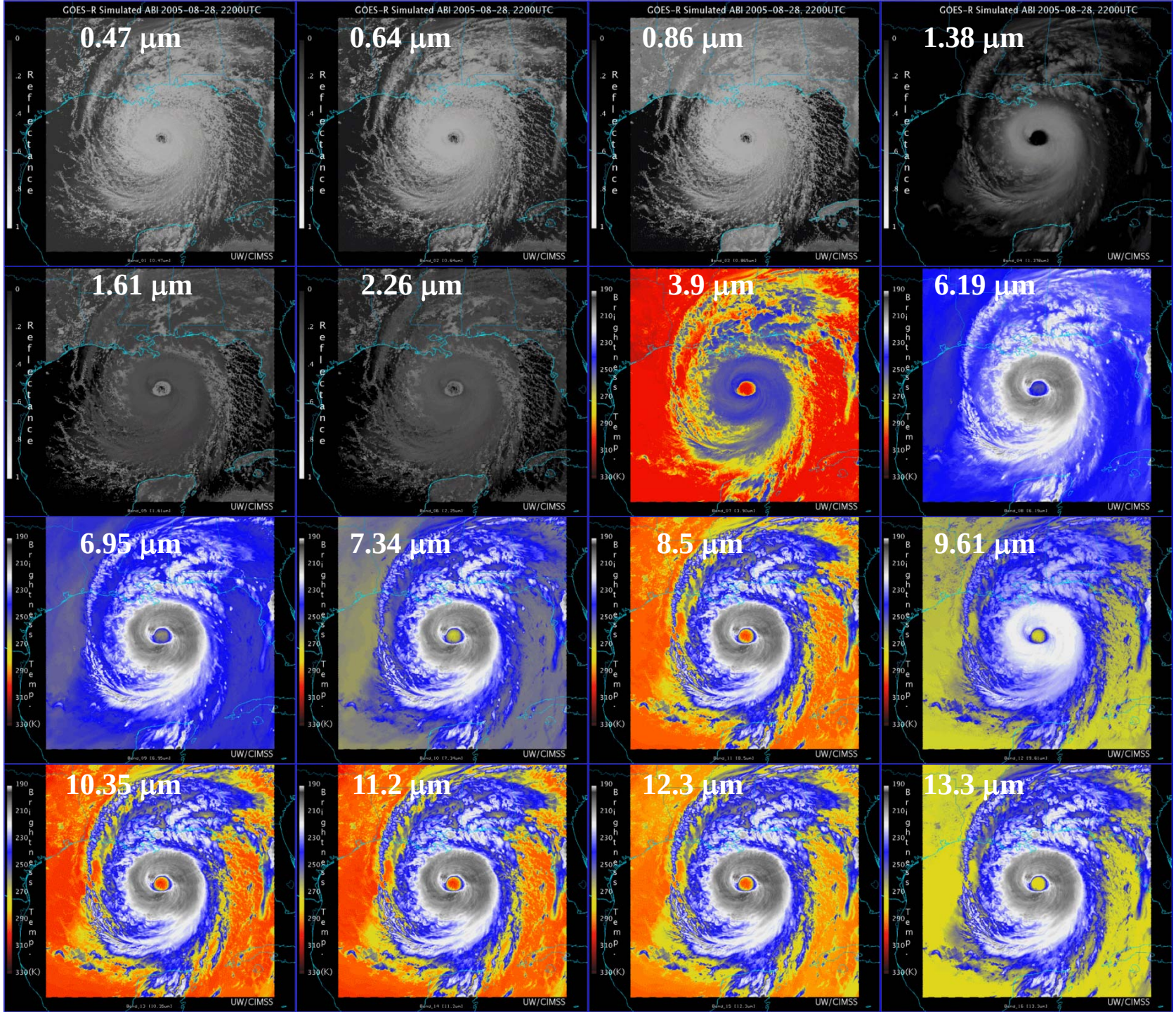
NPP/JPSS

- NPOESS Preparatory Project/Joint Polar Satellite System
- Joint NASA/NOAA polar-orbiting satellite with ~10:30 AM overpass time (similar to Terra)
- Launch planned for late 2011
- Science goal: transition from Terra/Aqua/Aura to JPSS
- Visible Infrared Imaging spectroRadiometer Suite (VIIRS):
  - 21 spectral bands ranging from 0.3 to 14 μm
  - 1 day temporal resolution; global coverage
  - AOD with spatial resolution similar to MODIS (400 m at nadir), but wider swath
  - Simulated true color images (no green band)
- Ozone Mapping and Profiler Suite (OMPS):
  - Primarily designed to measure total column O_3
  - Aerosol index, similar to OMI (smoke and dust vs. haze)

GOES-R

- Next generation of NOAA geostationary weather satellites, designed to replace current series of GOES
- Launch planned for 2015
- Key air quality instrument is Advanced Baseline Imager (ABI):
  - 16 spectral bands ranging from 0.47 to 13.3 μm
  - 5 minute temporal resolution
  - AOD with accuracy similar to MODIS
  - Aerosol type information (smoke vs. dust)
  - Fire/hot spot characterization
  - Visible, IR, water vapor imagery

AWG Proxy ABI Simulations of Hurricane Katrina



NOAA/NESDIS STAR and GOES-R Imagery Team

Tim Schmit (NOAA/NESDIS/STAR) and Jason Otkin (UW-Madison/CIMSS)

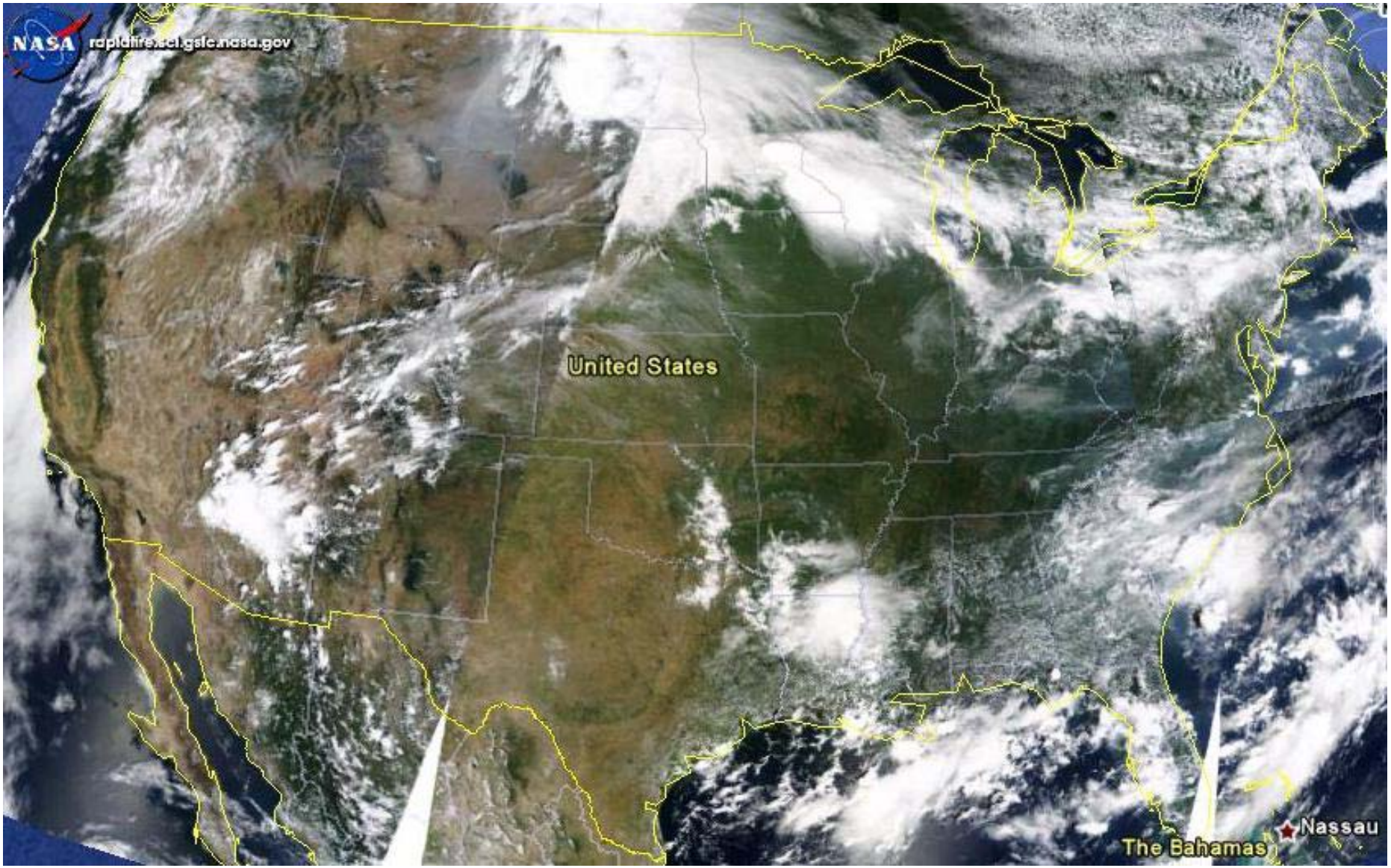
Air Quality Proving Ground (AQPG)

- NOAA has established a *GOES-R Proving Ground* – an experimental testbed to prepare the user community for the new satellite products using simulated GOES-R data.
- First major technological changes to GOES since 1994, and NOAA is concerned that users won't be prepared for huge volume of new and improved data.
- The AQPG is a subset that is focusing on the aerosol products that will be available from the ABI.
- This distinction is important because the air quality community has very different needs than the majority of NOAA users, the NWS meteorologists.

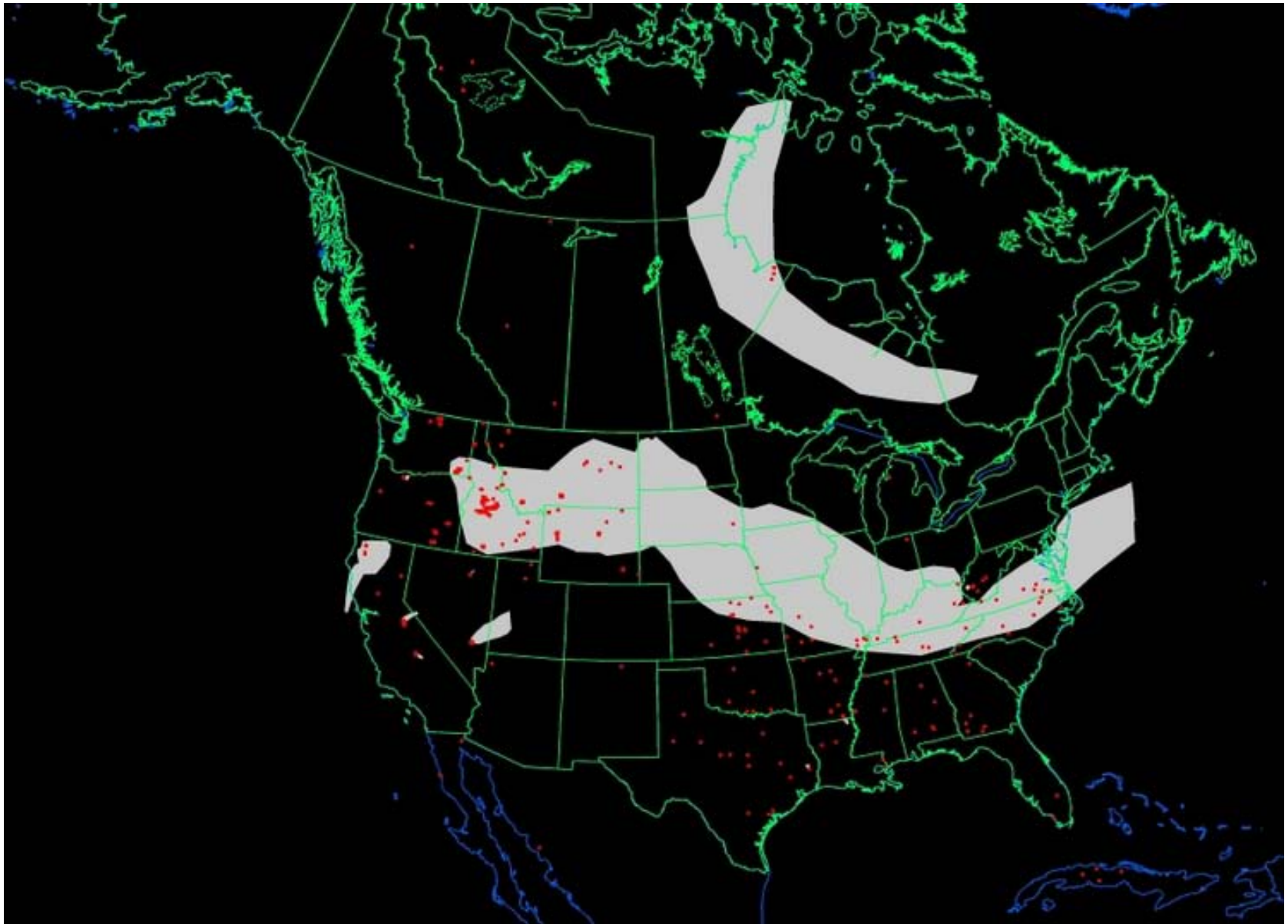
AQPG Activities

- Goal: build a user community that is ready to use GOES-R air quality products as soon as they become available.
- Developing an internet delivery system for GOES-R air quality products.
- Will likely include NPP VIIRS/OMPS and Glory APS data when they become available.
- Creating simulated GOES-R ABI products for at least 10 case studies:
  - Past air quality events featuring haze, smoke, and/or dust
  - Range of locations in CONUS

AQPG Case Study 1 – August 24, 2006
Terra MODIS True Color Image

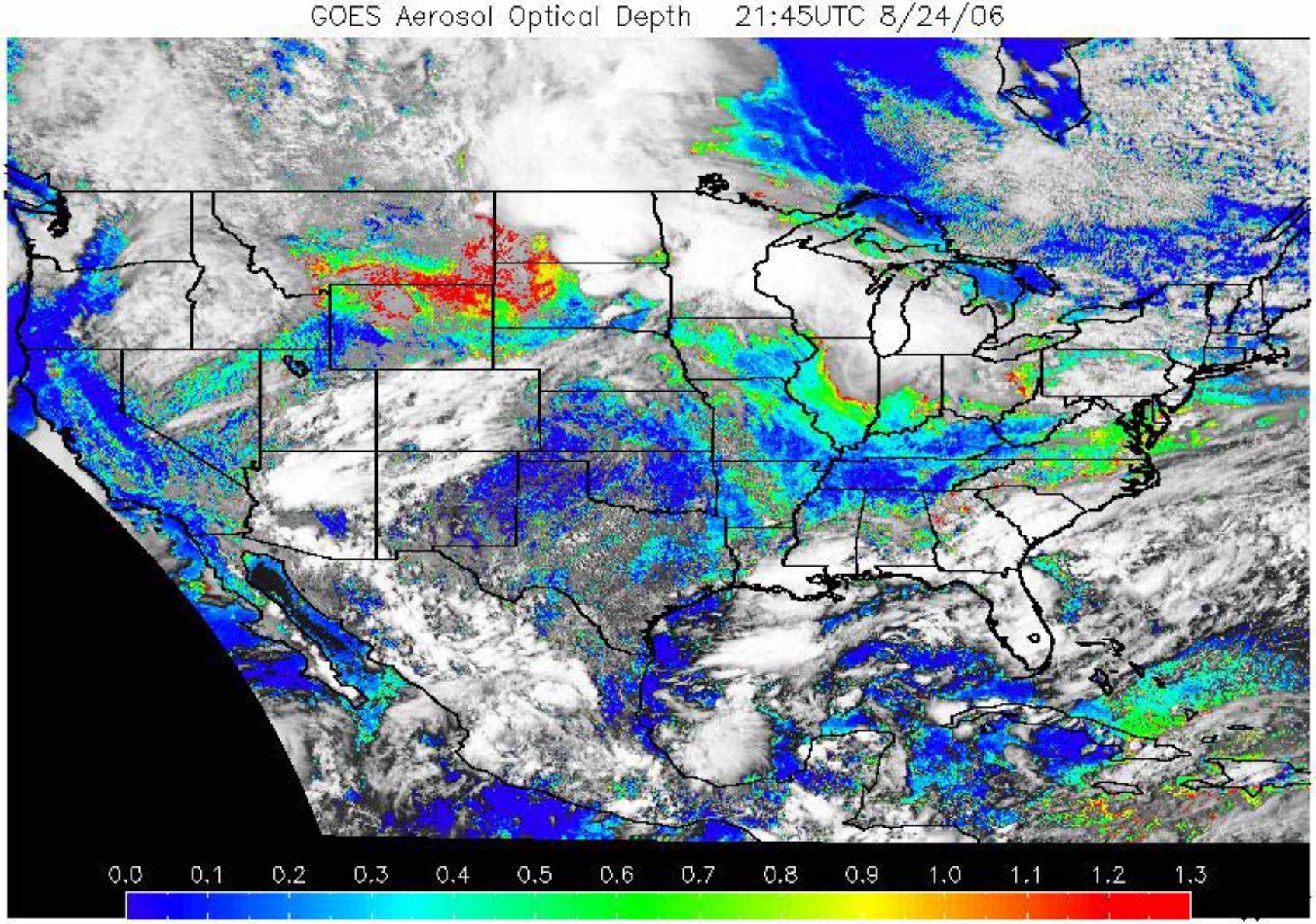


AQPG Case Study 1 – August 24, 2006
NOAA Hazard Mapping System



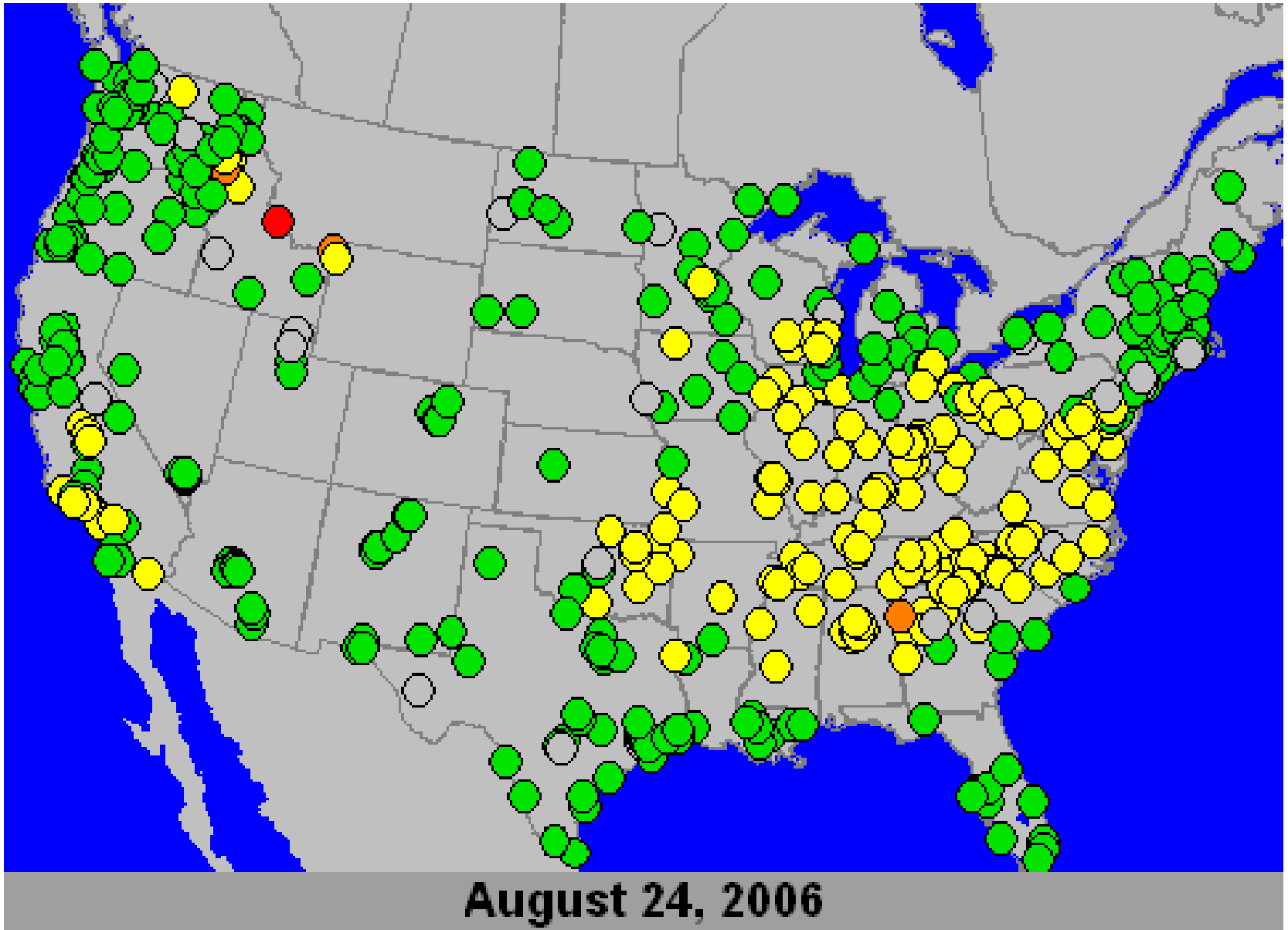
AQPG Case Study 1 – August 24, 2006

NOAA GASP AOD

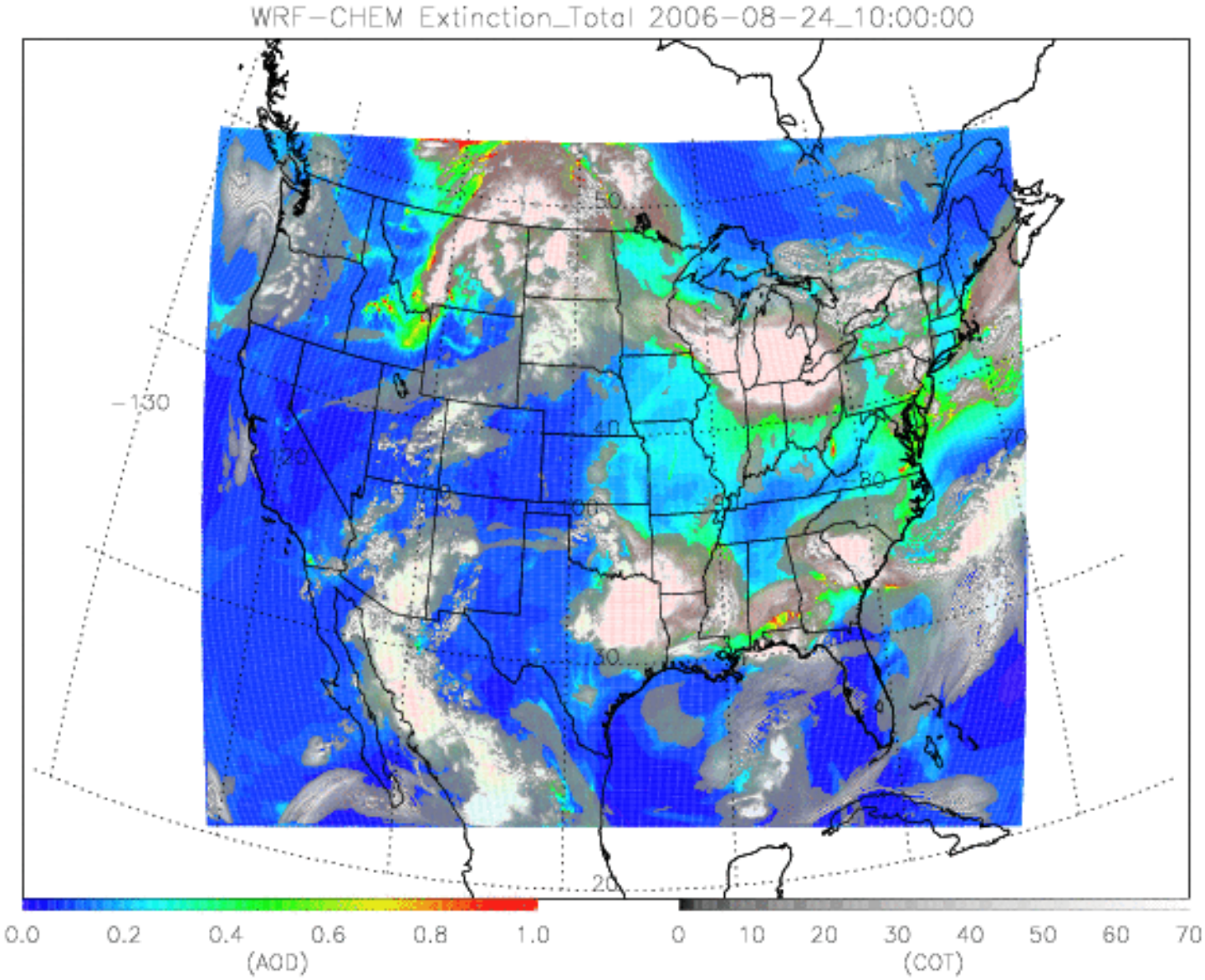


AQPG Case Study 1 – August 24, 2006

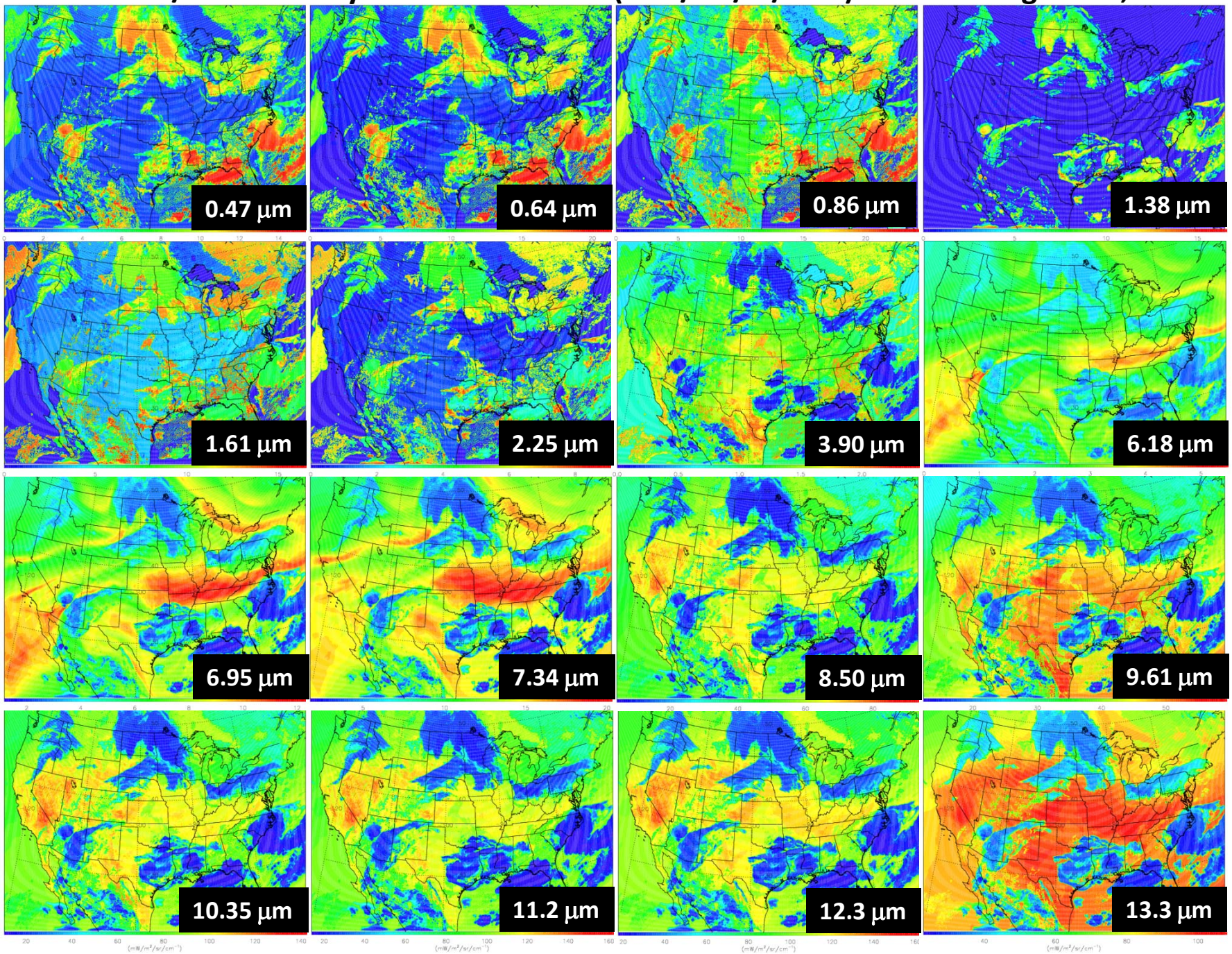
$PM_{2.5}$ 24-hour Average AQI



AQPG Case Study 1 – August 24, 2006
Synthetic GOES-R ABI AOD Loop from WRF-Chem Model



WRF-CHEM/CRTM ABI Synthetic Radiances ($mW/m^2/sr/cm^{-1}$) - 18 UTC August 24, 2006



AQPG End User Group

- We are creating an *End User Group* of forecasters and analysts who will advise us on satellite product features and data delivery, with a focus on GOES-R.
- The End User Group will continue through the launch of GOES-R in 2015.
- Important questions for the User Group:
  - What satellite products do you want to use? *Many new products and improved versions of existing products, such as AOD, aerosol type, true color imagery, visible/IR/water vapor imagery*
  - How do you want the products to be displayed? *Each product independent of the others? Overlays? Trajectories?*
  - How do you want to access the products? *Via a website like IDEA? Do you need image files (jpeg), data files (hdf or netCDF), and/or visualization files (geoTIFF or kml)?*

AQPG Next Steps

- Currently forming the AQPG User Group – if you want to influence the next generation of air quality satellite products, please contact me!
- AQPG End User Group kick-off teleconference in late April or early May.
- 2-day AQPG End User Group workshop and training at UMBC in September (NOAA will provide travel support).
- For updates and more information on the Proving Ground, visit the official website hosted by CIMSS:

http://cimss.ssec.wisc.edu/goes_r/proving-ground.html

Acknowledgements

- Shobha Kondragunta, Steve Goodman, Brad Pierce (NOAA NESDIS)
- Ray Hoff, Hai Zhang (UMBC)
- Mark Green (DRI)
- Sundar Christopher (UAH)
- Fred Moshary (CCNY)