NASA Air Quality Program Outreach Initiatives

NASA Applied Sciences Program, Air Quality Team Meeting
Potomac, Maryland, June 14-16, 2007

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NASA Air Quality Program Outreach Initiatives: Overview

- Satellites for Air Quality 101: Seminars for the air quality community
- Air Quality Training: Curriculum for multi-day workshops
- “Smog Stories” / Air Quality News Pegs: Image interpretation for the general public
- SERVIR-Air: The 3D-AQS project goes south
- A few thoughts on outreach initiatives

Satellites for Air Quality 101

- Developed as seminar for Air & Waste Management Association conferences
- Revised to be full training materials with slides and speaker notes
- Presented as train-the-trainer to NASA GSFC

Satellites for Air Quality 101

Satellites for Air Quality: How NASA Sensors Can Help You Monitor Air Pollution

Prepared by Jill Engel-Cox, Battelle Memorial Institute, for NASA Earth-Sun System Applied Sciences Program, under Subaward Agreement #CG0616 to the Joint Center for Earth Systems Technology, March 20, 2007.

[Notes to Trainer: This presentation is a 30 minute seminar on satellite remote sensing for monitoring air pollution, suitable for presentation at a NASA booth at environmental conferences or other gatherings of environmental professionals. It was designed for an audience who knows about air quality and other environmental issues but is not knowledgeable about remote sensing. Templates of an announcement flyer and sign-up sheet have been provided as companion materials with this presentation.]

…

Background: In the last 10 years, the number of satellite sensors and the websites to obtain satellite images and data have increased significantly. Over that time, there has been considerable research documenting how satellite data are useful to monitoring air quality. Several tools to provide information to the air quality community are now available and more are being developed. …

Satellites for Air Quality 101

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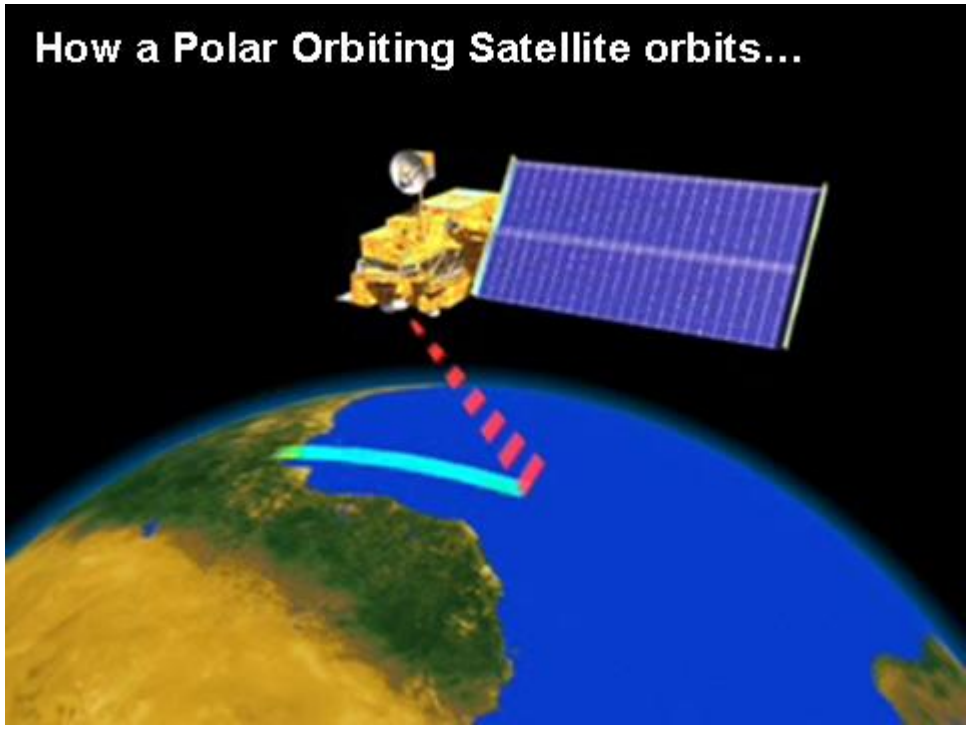

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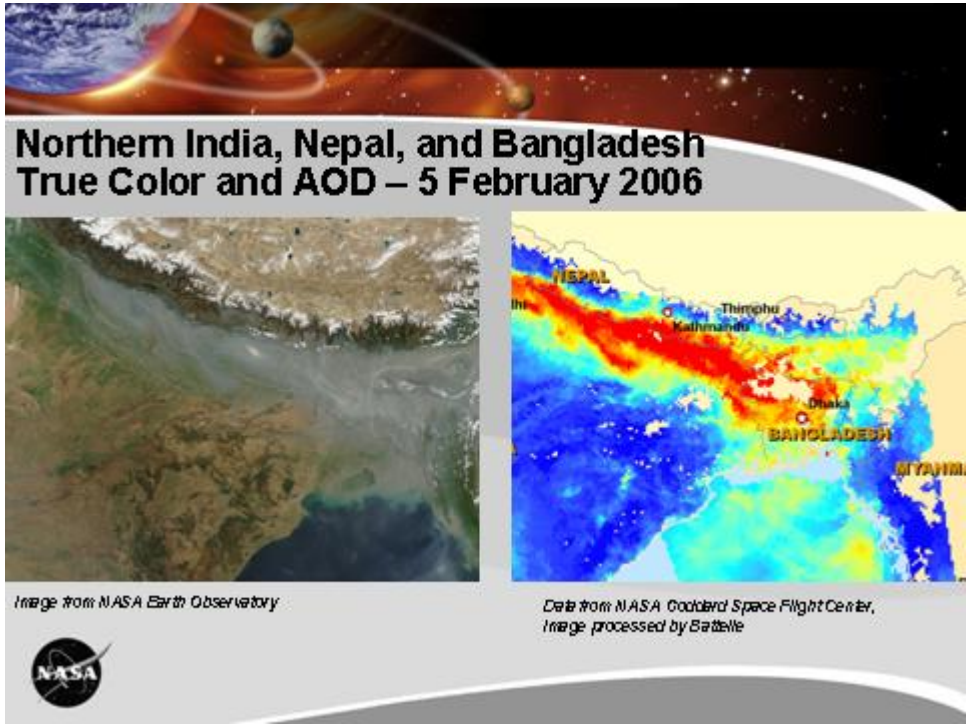

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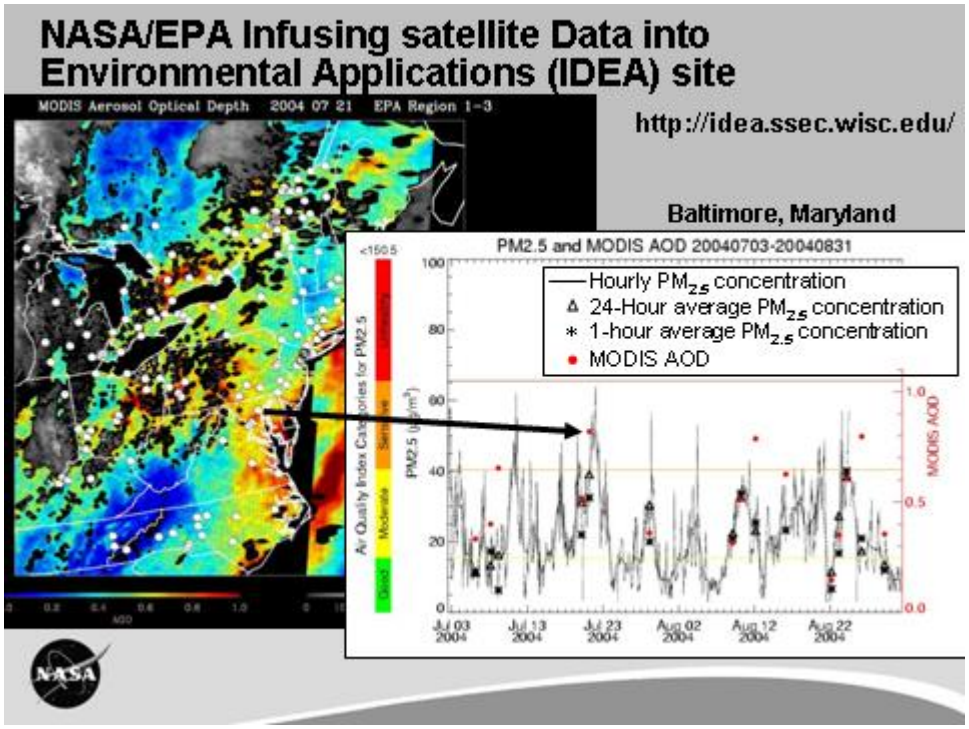

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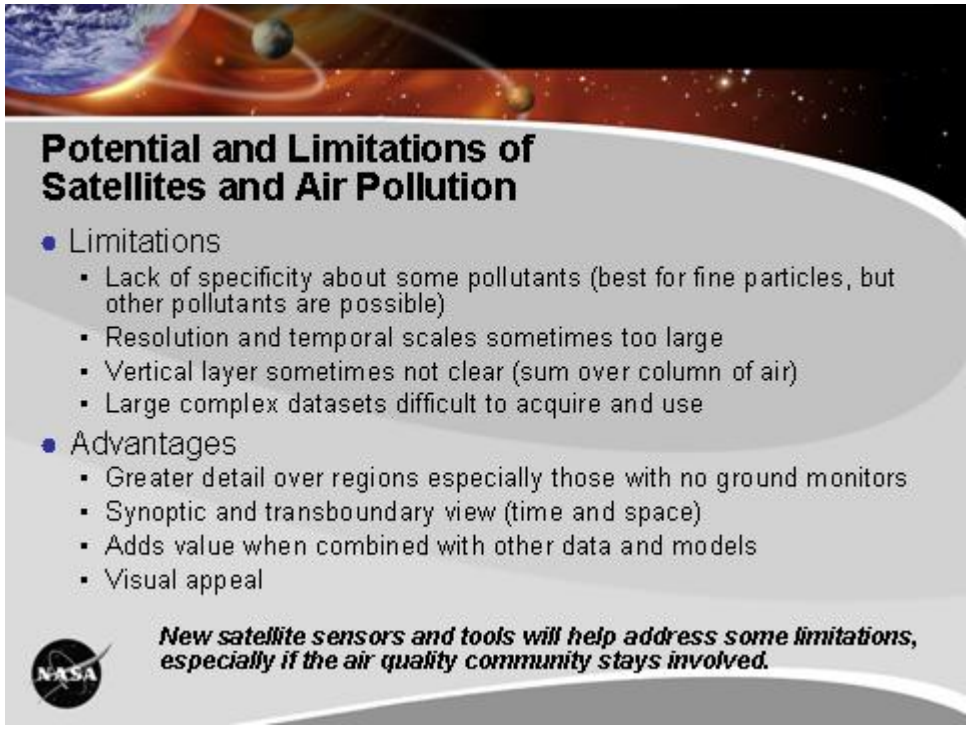
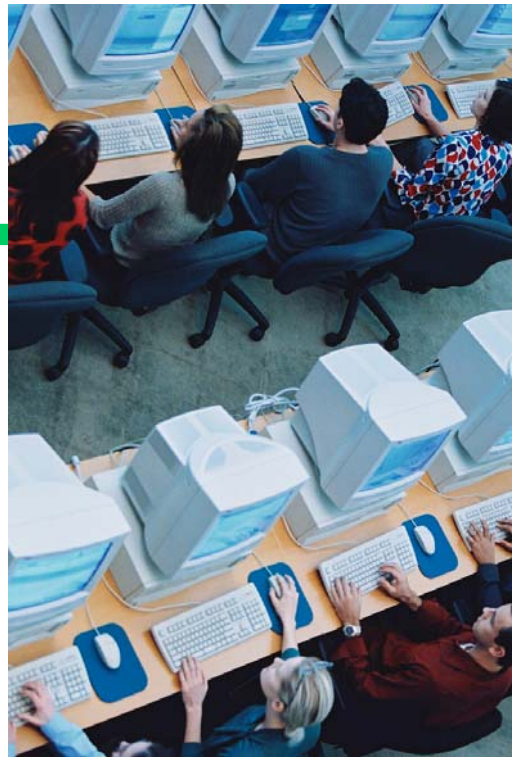


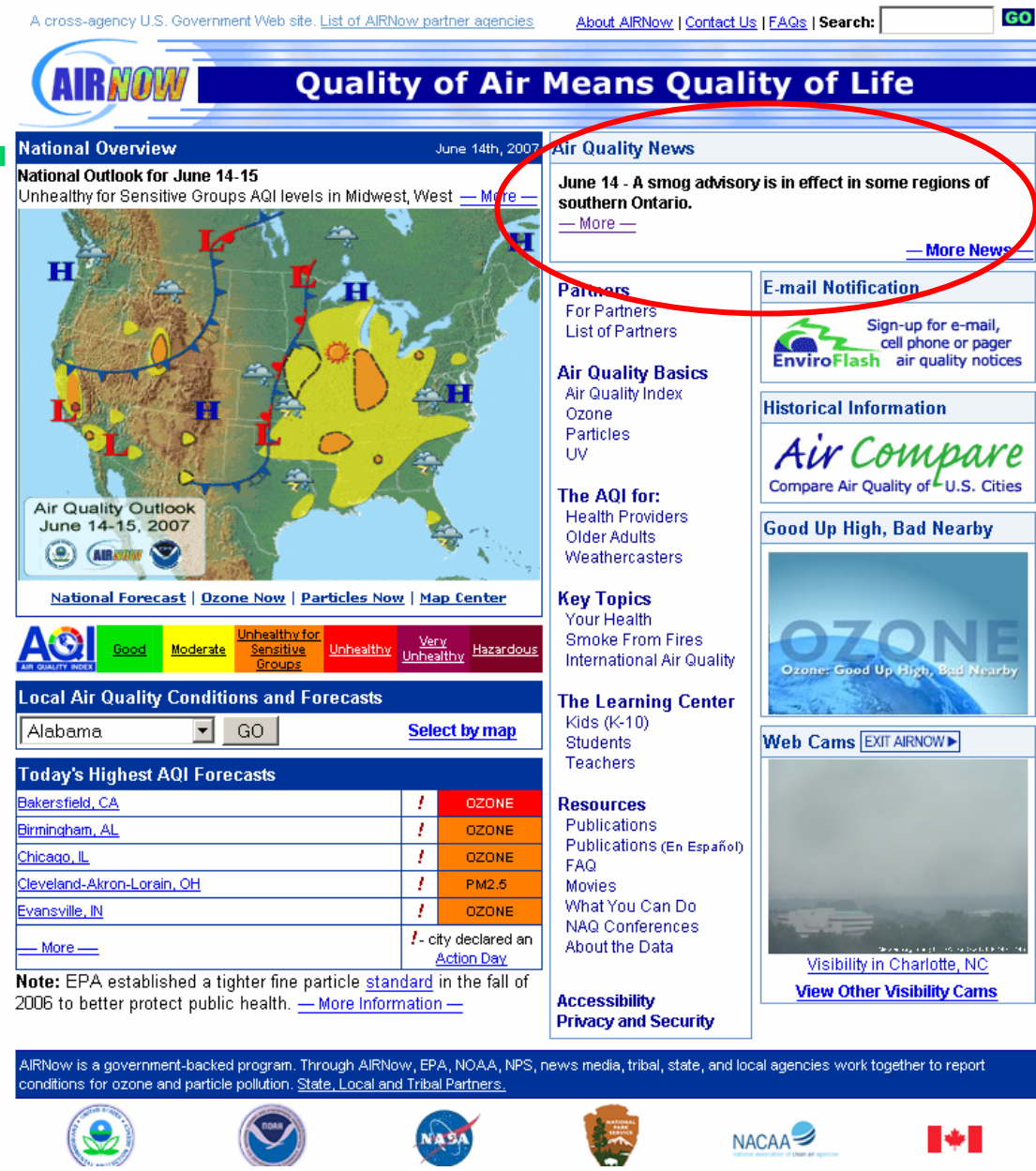
Air Quality Training



- Curriculum for multi-day workshops
  - → Designed for environmental audience new to satellite remote sensing
  - → Satellite remote sensing basics
  - → Image interpretation and data acquisition
  - → Hands-on project tailored to audience
- Potential training sessions at
  - → UN Symposium on “Space Tools and Solutions for Monitoring the Atmosphere in Support of Sustainable Development” in Graz, Austria, September 2007
  - → SERVIR headquarters at the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) in the Republic of Panama, Fall 2007
  - → Tentative 3-4 day class in Asia, Spring 2008

“Smog Stories” / Air Quality News

- Incorporate NASA images into AIRNow Air Quality News
  - → www.airnow.gov
- Building on daily monitoring of U.S. Air Quality (Smog Blog)
  - → alg.umbc.edu/usaq
- Pilot project this summer/fall
  - → Develop procedure
  - → Produce and distribute ~10 news ‘pegs’



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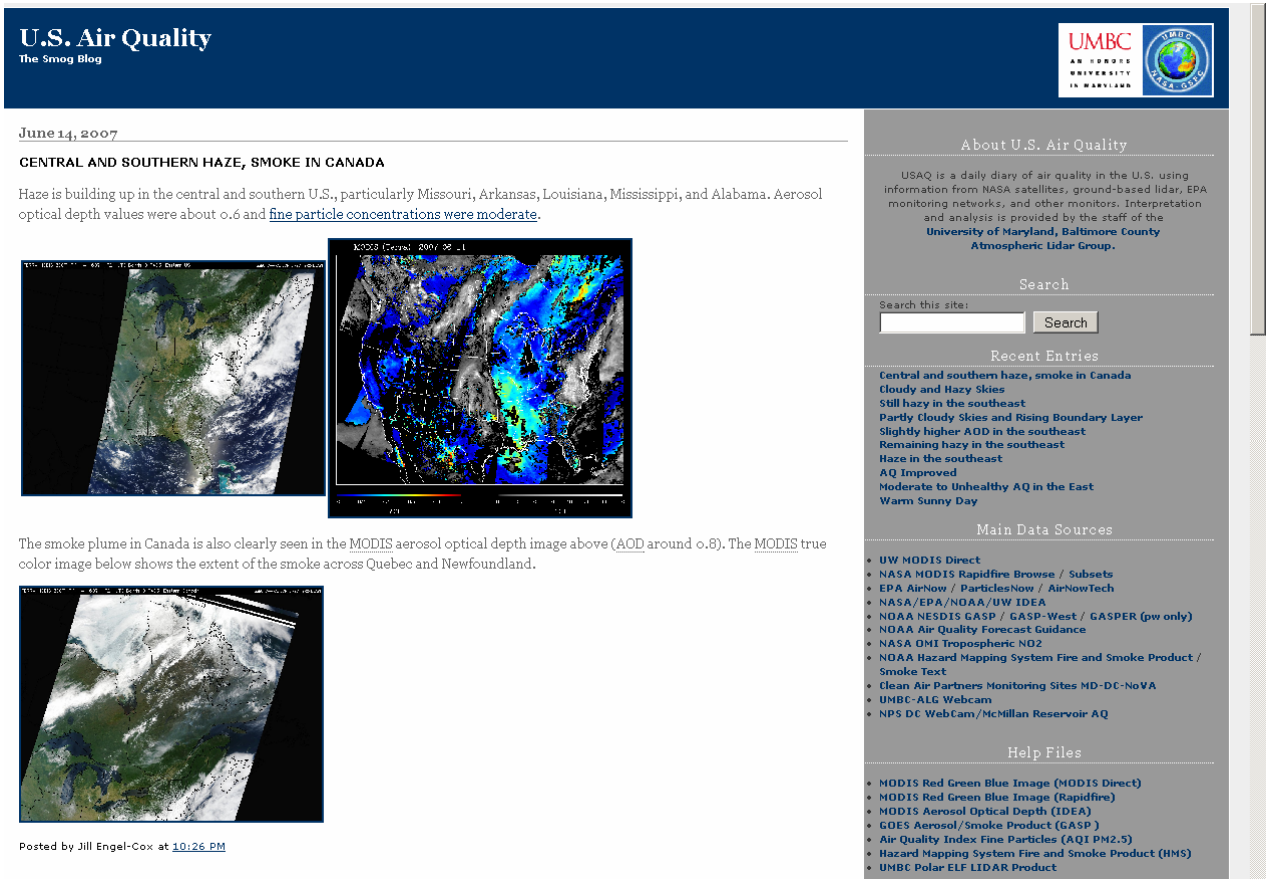

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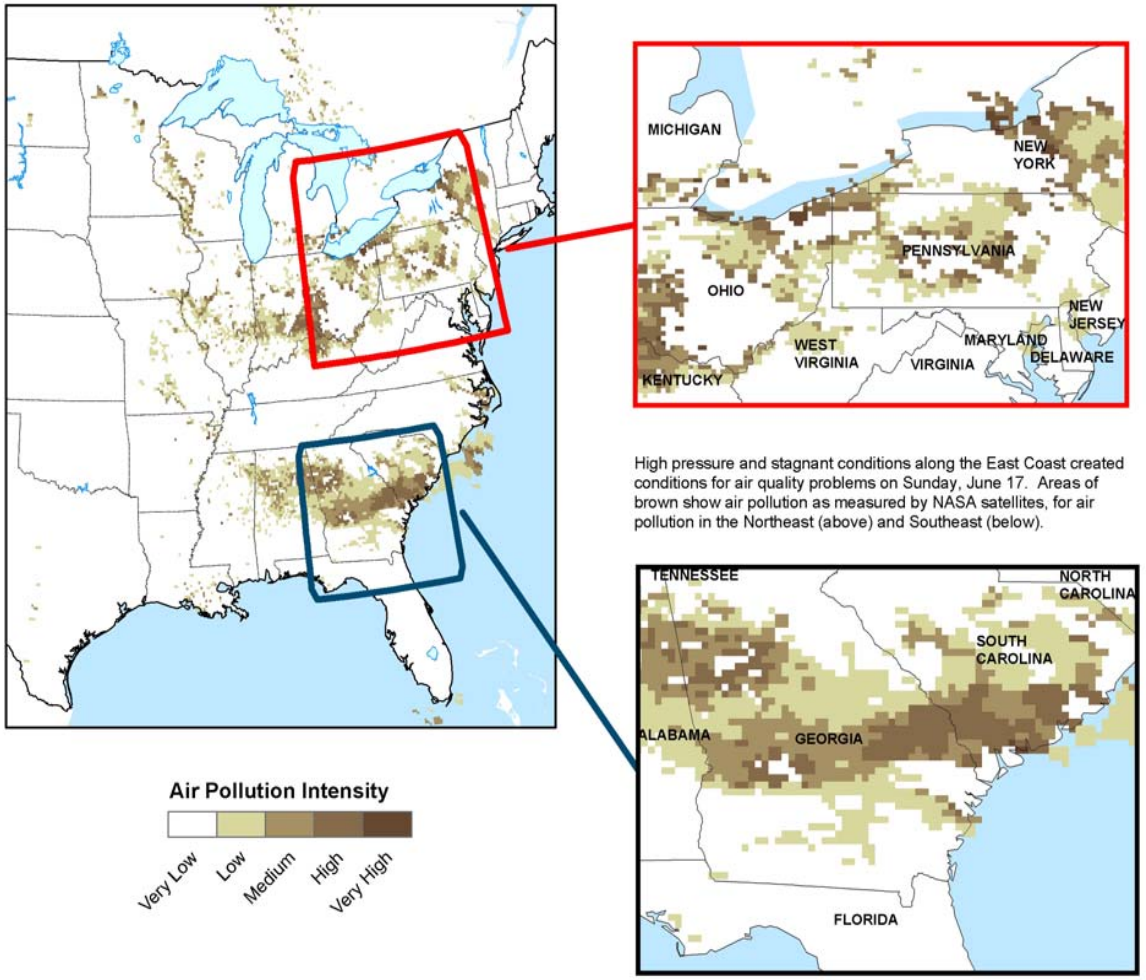
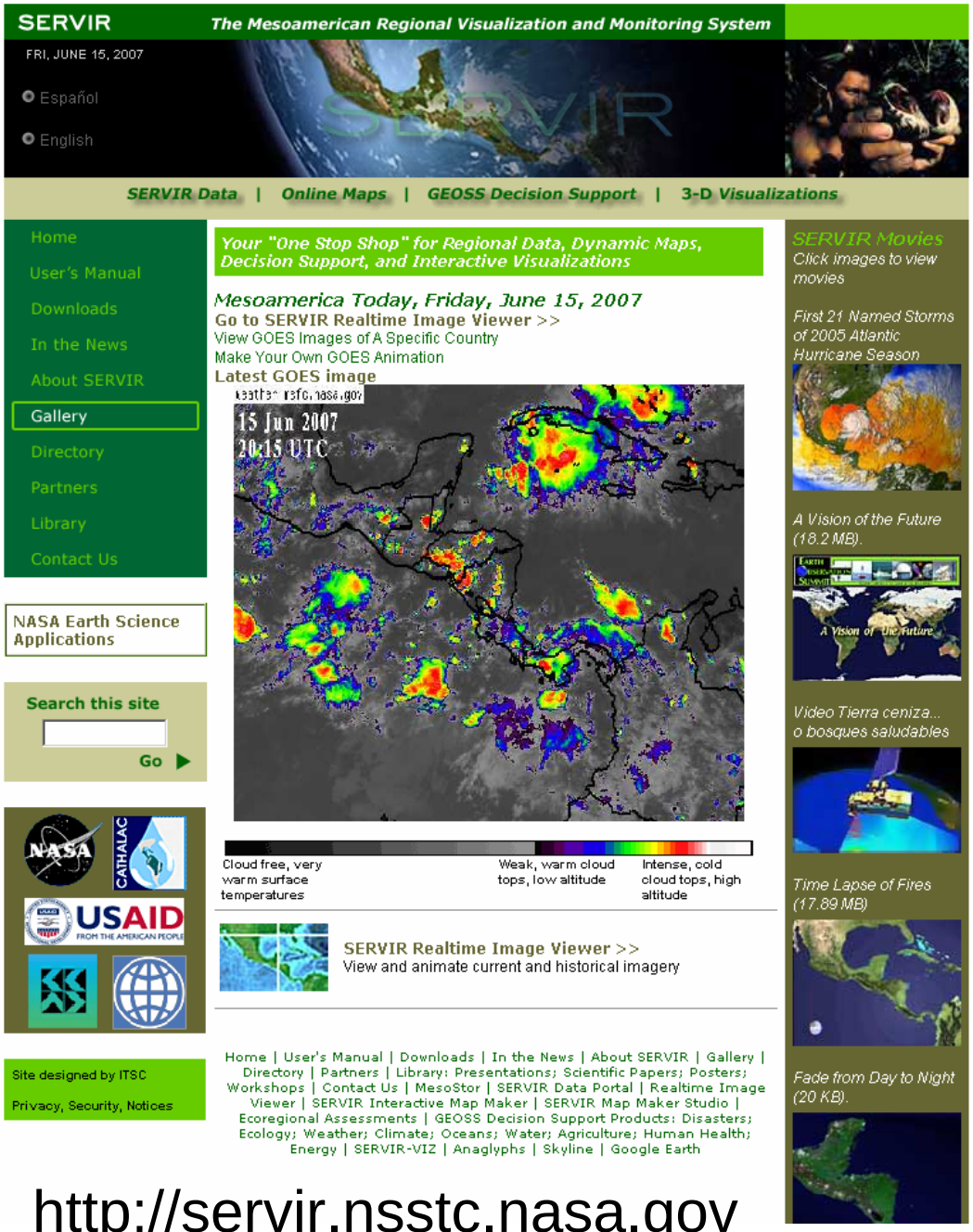


High pressure and stagnant conditions along the East Coast created conditions for air quality problems on Sunday, June 17. Areas of brown show air pollution as measured by NASA satellites, for air pollution in the Northeast (above) and Southeast (below).

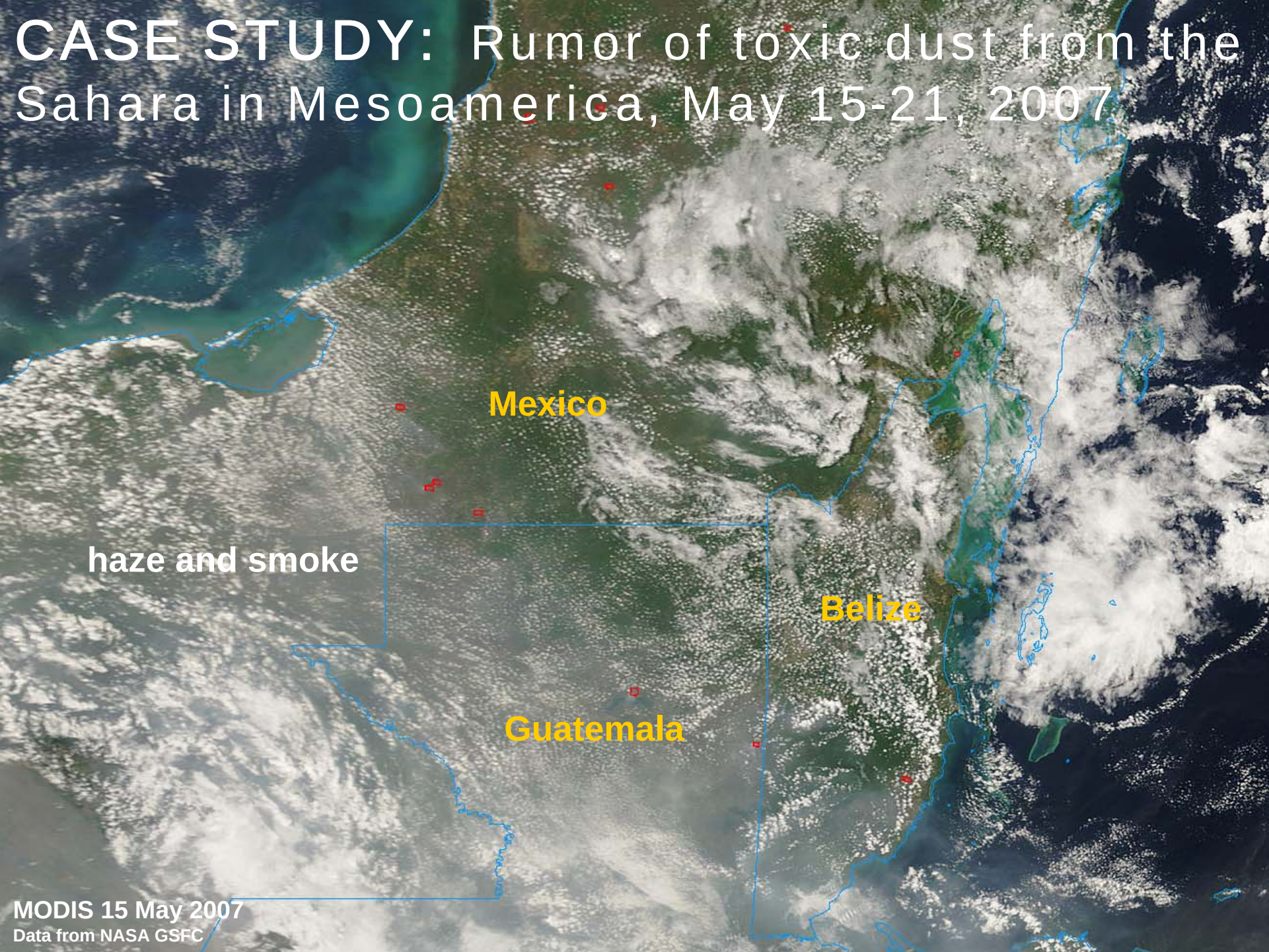
SERVIR *Air*

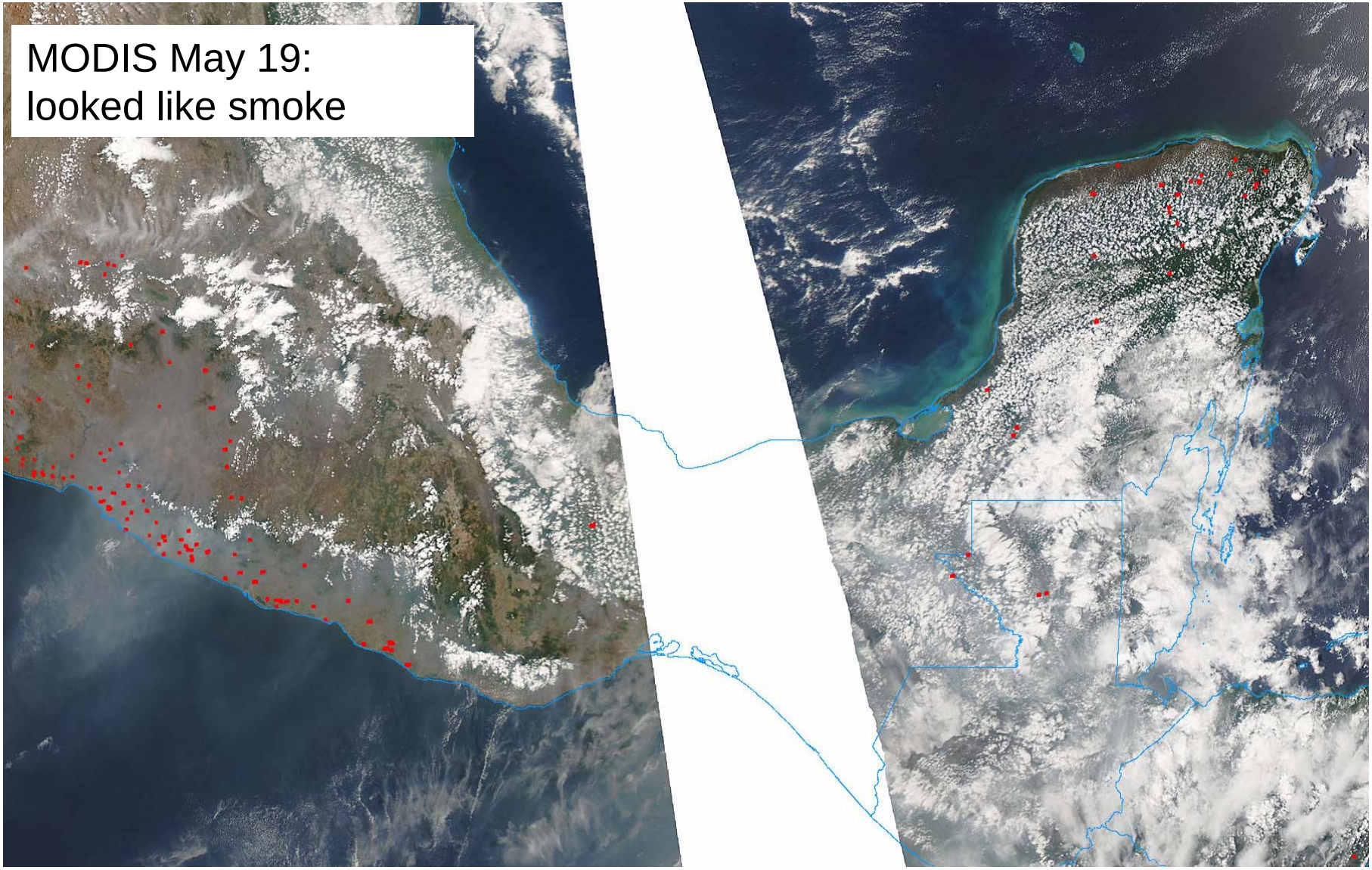
- SERVIR is satellite visualization and monitoring system for Mesoamerica
- Focus on disasters, ecosystems, biodiversity, weather… *not air quality*
- Partner with 3D-AQS to bring air quality info into SERVIR
  - → Case study
  - → Mesoamerica air quality blog
  - → Training & student exchange
  - → Transfer of real-time systems
  - → Improved ground monitors (EPA)
  - → Communication & outreach



http://servir.nsstc.nasa.gov

CASE STUDY: Rumor of toxic dust from the Sahara in Mesoamerica, May 15-21, 2007




MODIS May 19:
looked like smoke

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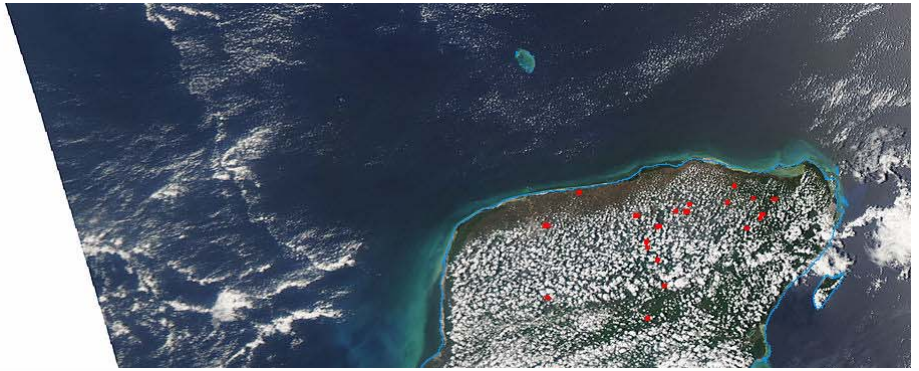
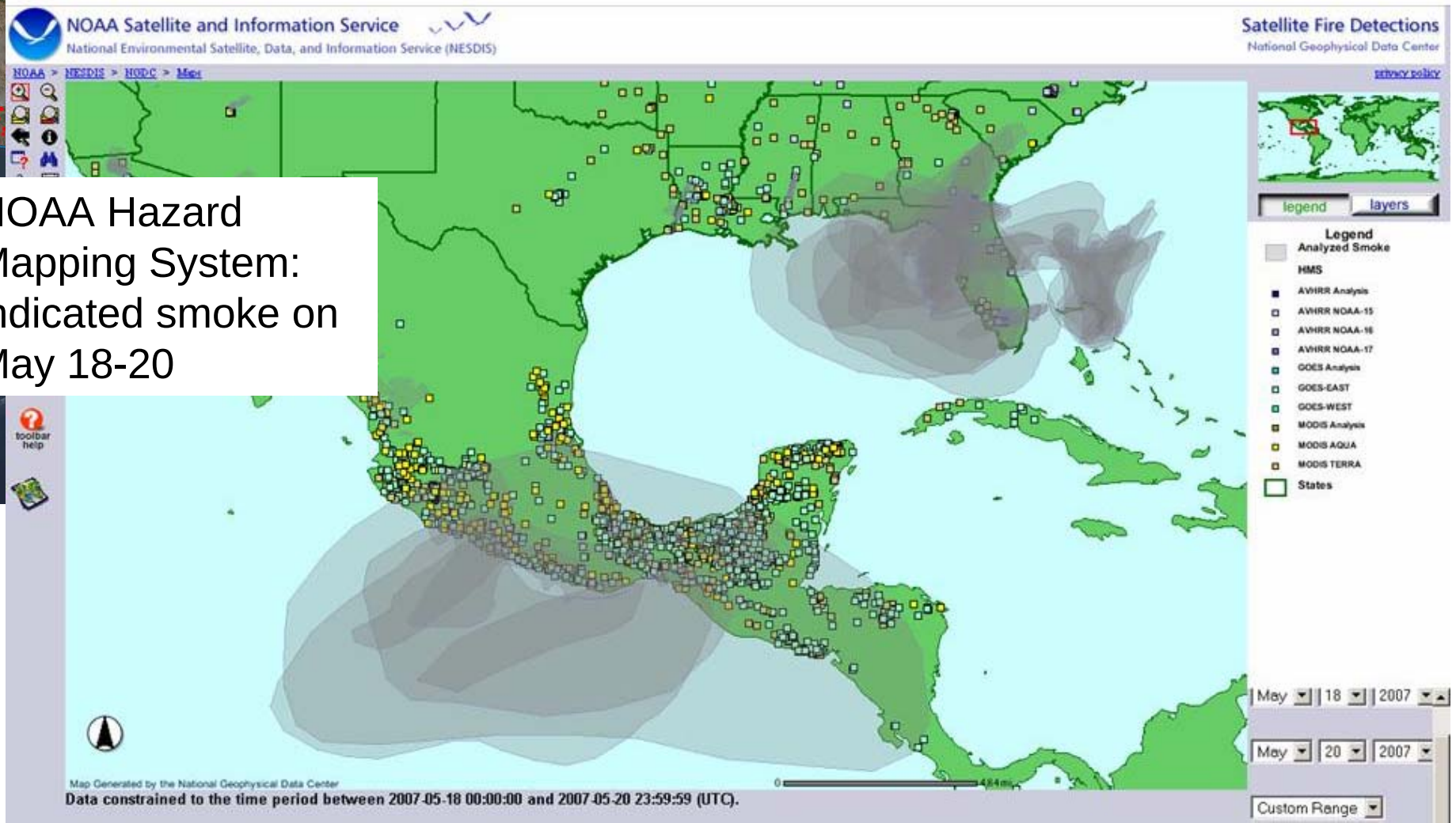


NOAA Hazard Mapping System: indicated smoke on May 18-20



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NOAA Satellite and Information Service
National Environmental Satellite, Data, and Information Service (NESDIS)

Satellite Fire Detections
National Geophysical Data Center

NOAA > NESDIS > NGDC > Maps

privacy policy

legend | layers

Legend
Analyzed Smoke
HMS
AVHRR Analysis
AVHRR NOAA-15
AVHRR NOAA-16
AVHRR NOAA-17
GOES Analysis
GOES-EAST
GOES-WEST
MODIS Analysis
MODIS AQUA
MODIS TERRA
States

toolbar help

NOAA HYSPLIT MODEL
Backward trajectory ending at 00 UTC 20 May 07
GDAS Meteorological Data

Source ★ at 15.77 N 91.06 W

Meters AGL

Job ID: 392632 Job Start: Fri Jun 1 20:56:56 GMT 2007
Source 1 lat.: 15.77 lon.: -91.06 height: 500 m AGL

Trajectory Direction: Backward Duration: 72 hrs Meteo Data: GDAS1
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

May | 18 | 2007

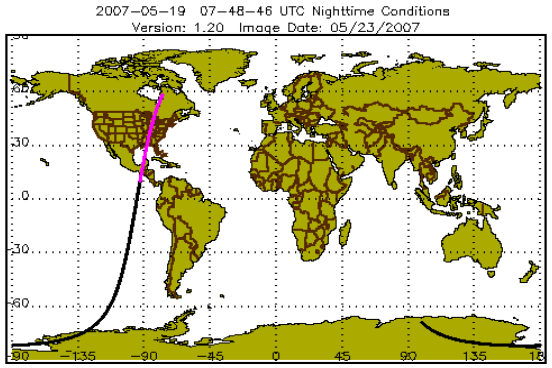
May | 20 | 2007

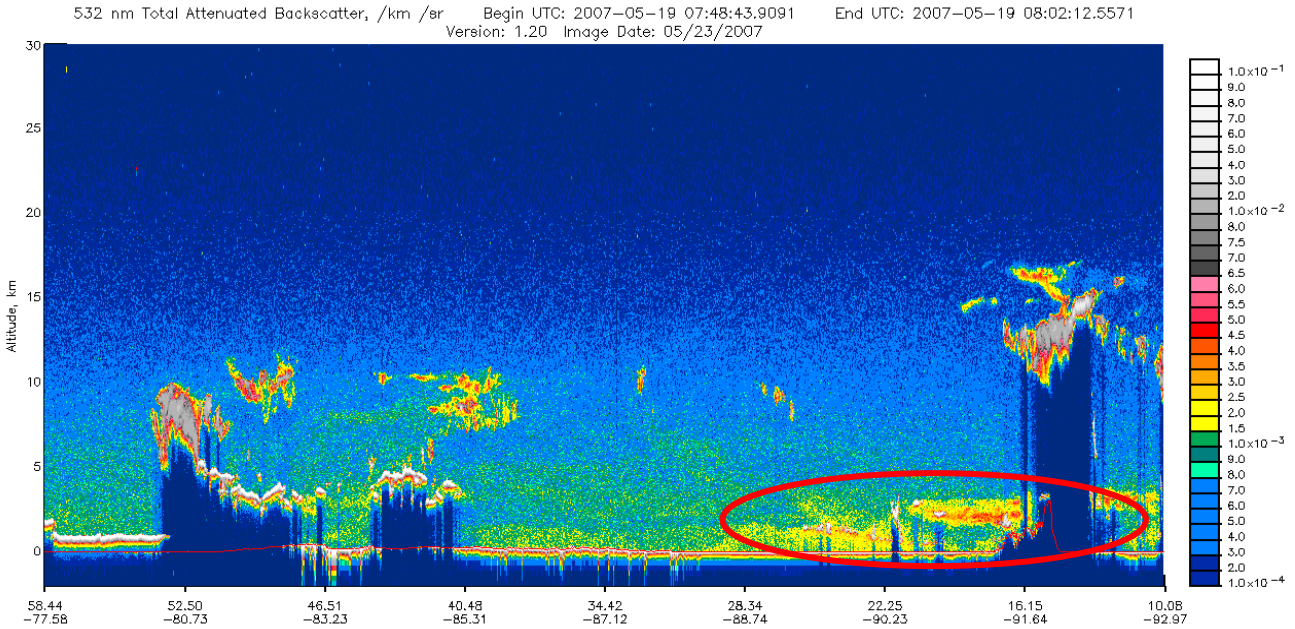
Custom Range

NOAA HYSPLIT: pointed to local sources

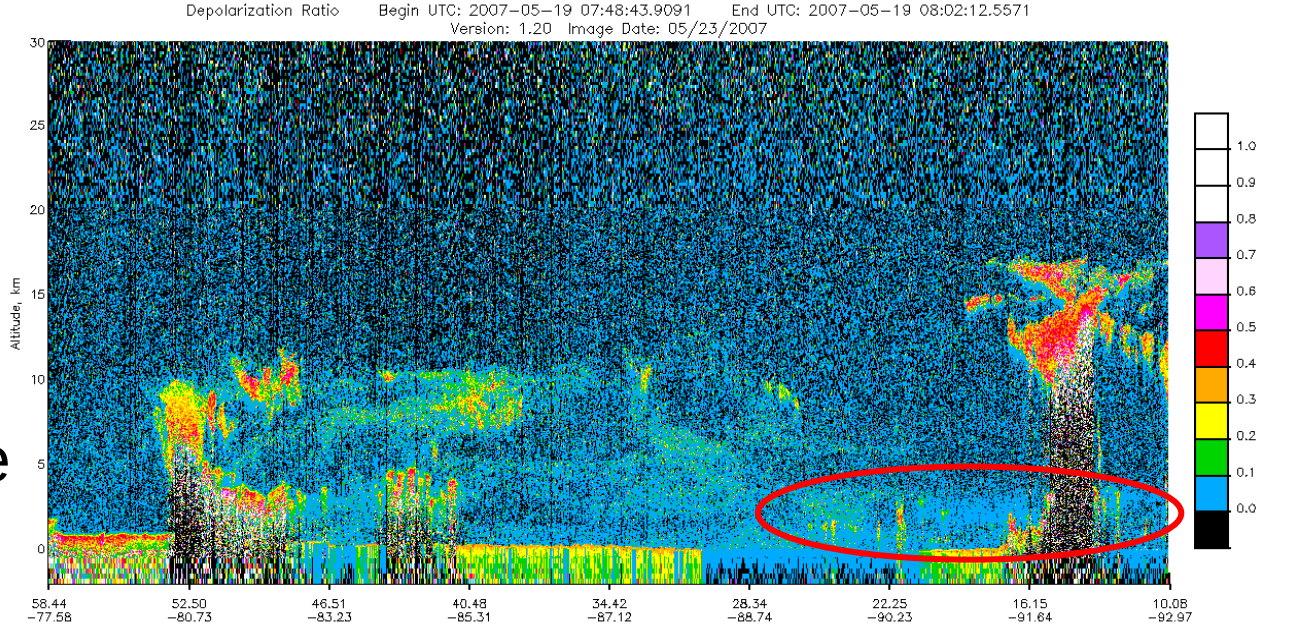
And in the 3D view…

- CALIPSO images from May 18 over Costa Rica and Nicaragua

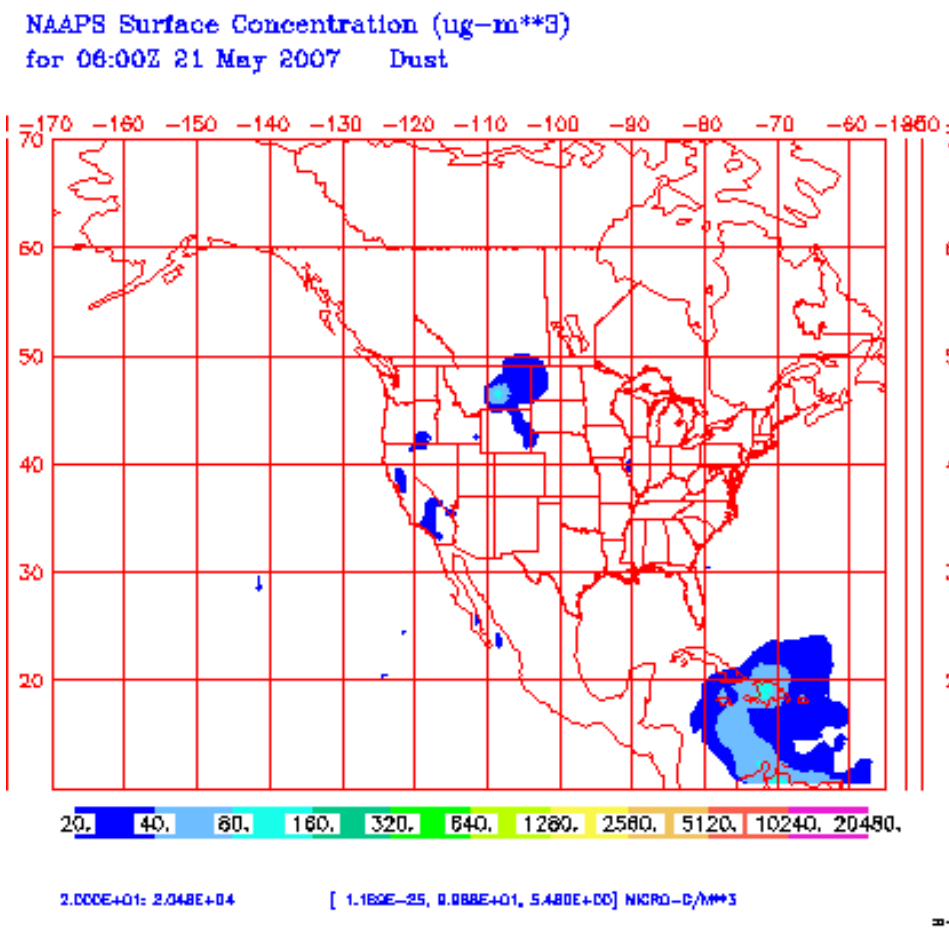


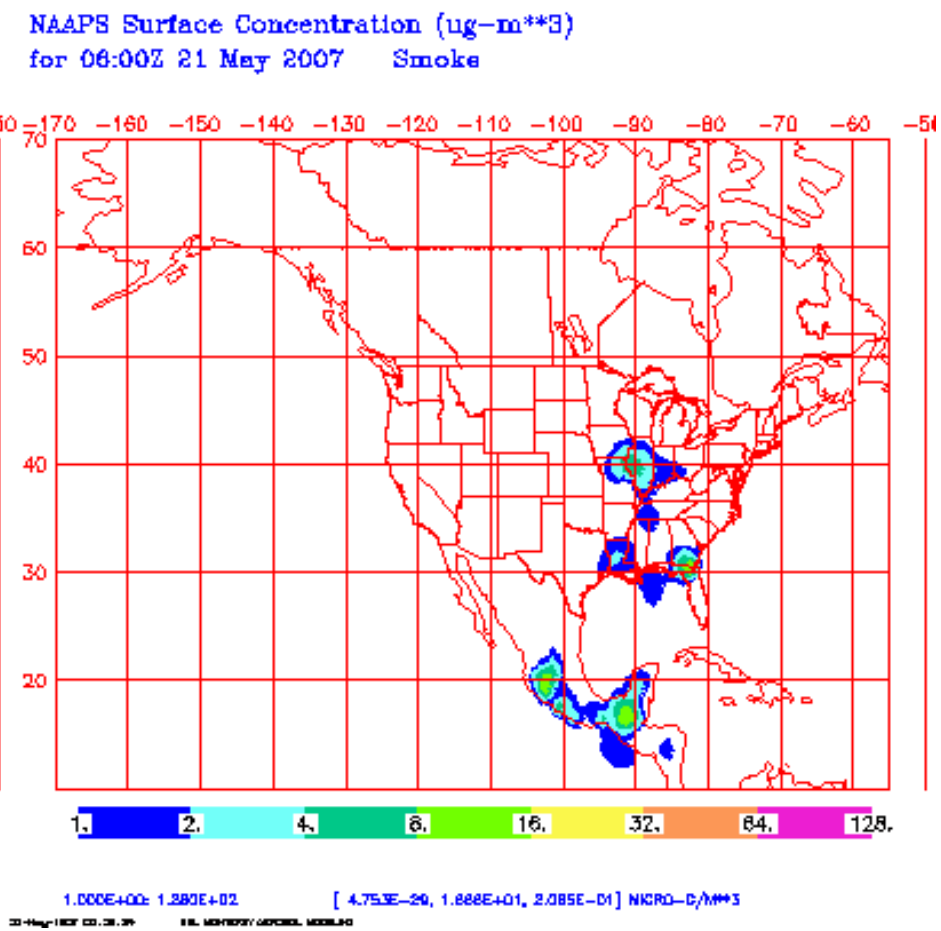


- Depolarization ratio supports case for smoke



What about the rumors of Saharan dust?





NRL model says there's smoke, and maybe dust to the east..

U.S. Air Quality (The Smog Blog), http://alg.umbc.edu/usaq

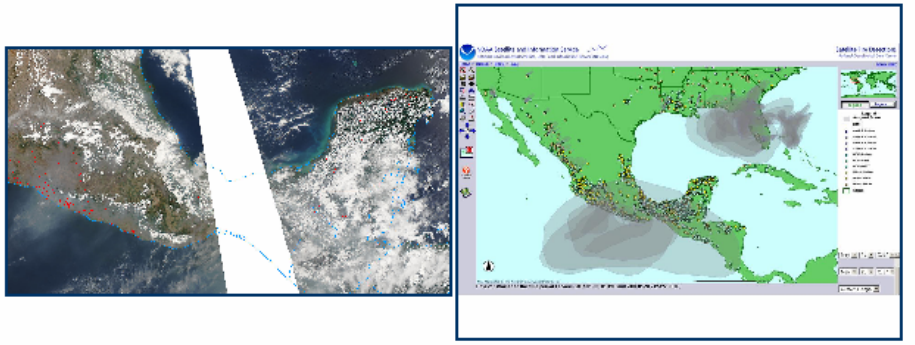
« Still Smokey in the southeast and possible African dust | Main | Still hazy in the southeast »

May 21, 2007

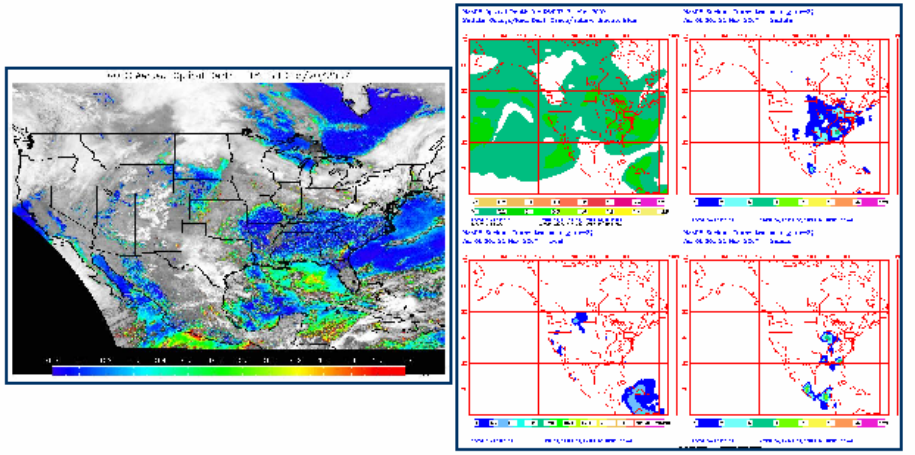
SPECIAL FEATURE: FIRES AND SMOKE IN MESOAMERICA

On May 21, we received an email from colleagues with questions about air pollution that parts of MesoAmerica (specifically, Honduras, Costa Rica and Nicaragua) were experiencing, starting on Friday May 18. There was concern about toxics and about the possibility of Saharan dust crossing the Atlantic. We'd been watching the northern Gulf of Mexico pretty closely, since it had been very smoky from the fires in Florida. So, we looked a little further south to see if we could figure out what was happening.

MODIS true color images told us there were many fires in Central America that entire week; for example, on May 15 and May 16. The MODIS image from May 19 showed significant smoke and clouds in the entire northern part of the region (left image below). This is confirmed by the NOAA NESDIS smoke and fire detection Hazard Mapping System (right).



The GOES aerosol optical depth images from May 20 showed quite a bit of smoke and haze across the Gulf of Mexico, Caribbean Sea, and off Pacific coast (left image). The NRL model indicated smoke on May 21 (right image, bottom right panel). The back trajectories varied depending on start time and location, but 72 hours runs pointed to mostly local sources (e.g., see HYSPLIT for May 19 and May 20). NASA's Earth Observatory did a story on these fires in Mexico and Central America, including an image of the fires on May 21.

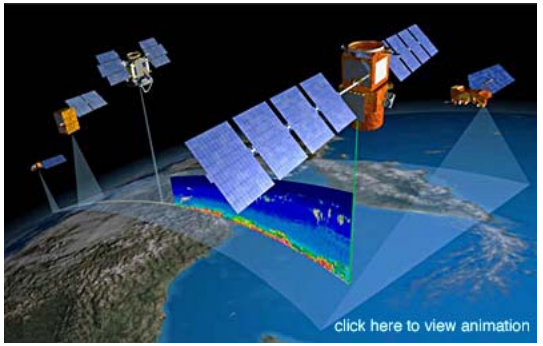


Conclusion:

Air pollution in Mesoamerica May 18-21 was dominated by locally generated smoke

A few thoughts on Satellite Remote Sensing and Outreach

- Pay attention at least a little every day
- Apply basic rules:
  - → Occam's razor (or *lex parsimoniae*): All things being equal, the simplest solution tends to be the best one
  - → Chatton's anti-razor (paraphrased): If three (satellites) are not enough to verify an affirmative proposition about things, a fourth must be added, and so on
- A picture is worth 1000 words
  - → But a few words can really help explain what the heck you're looking at
- Tell a story: be timely and relevant
- Share data, techniques, images, information
  - → More people using and demanding environmental information = greater understanding of air quality




Questions?