Building an Air Quality Program in Central America

Dr. Amy K. Huff

Battelle Memorial Institute

huffa@battelle.org

Origin of Air Quality Program in Central America

- Poor air quality is an issue in Central America and the Caribbean, especially PM_{10} and $PM_{2.5}$ from wildfires and urban transportation sources.
- Regional transport of pollution impacts U.S.!
- Interagency cooperation and funding from USEPA and NASA to develop an air quality program in the region.

Interagency Cooperation and Funding

- USEPA Office of International Affairs (OIA):
  - Expand ground-based monitor network
  - Enhance outreach and communication
  - Recommendations for clean fuels and vehicles
- NASA Applied Sciences Program:
  - Develop satellite air quality analysis capabilities
  - Create near real-time satellite products
  - Establish numerical air quality model
- Central American partners/implementers:
  - SERVIR program/CATHALAC
  - University of Panama
  - Central American Commission for Environment and Development (CCAD)

Geographic Focus of Air Quality Program

Expansion of Ground-Based Monitor Network

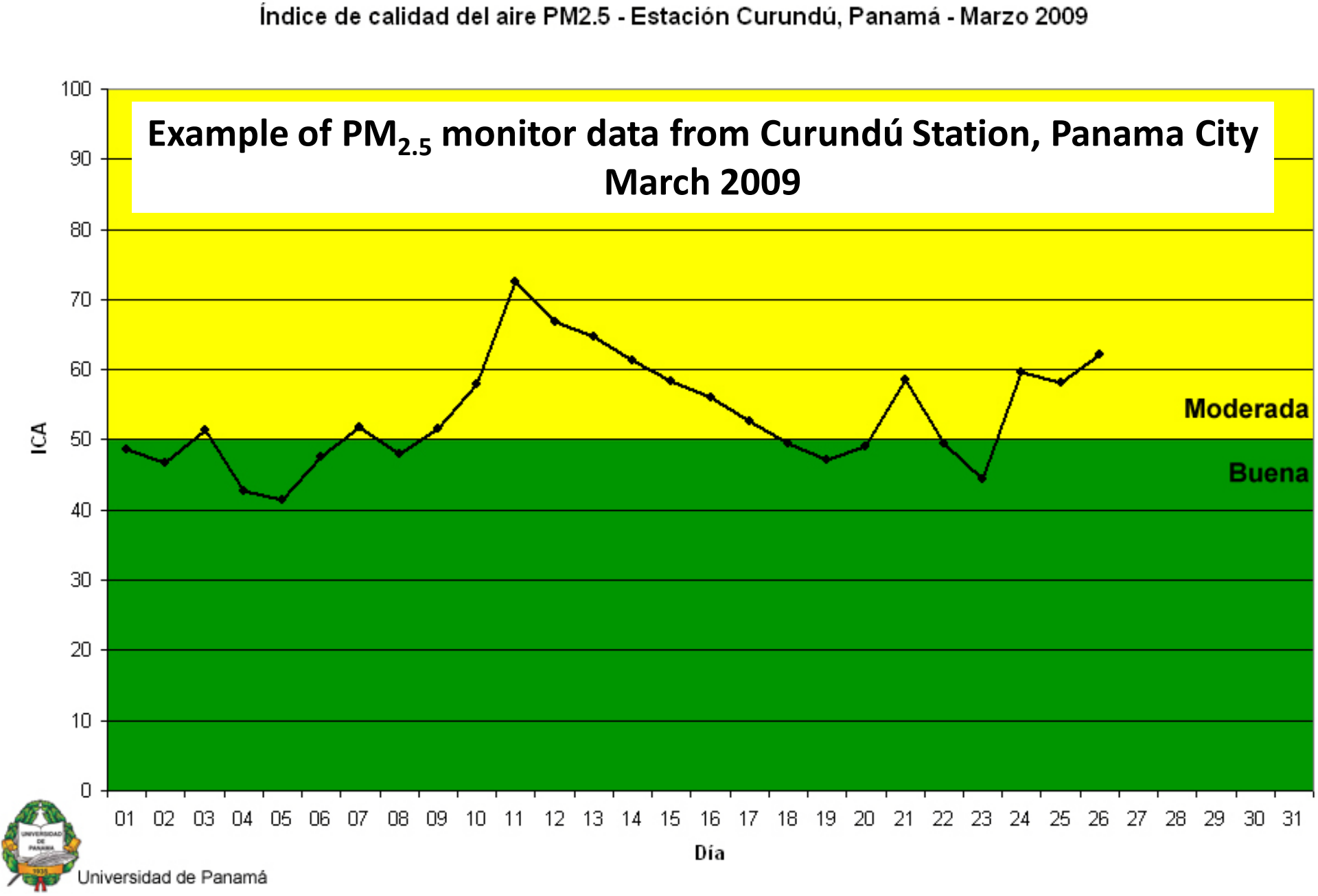
- Limited monitor network in region, mostly capital cities
- Conducted inventory of available equipment:
  - filter-based monitoring of TSP, PM_{10}, $PM_{2.5}$, O_3
  - passive diffusion monitoring of O_3, NO_x, SO_2, CO
- Purchased 3 refurbished PM_{10} monitors (DR and Belize)
- Trainings on air quality management and data QA/QC

Nicaragua Inventory

- PM_{10} mini-vol sampler
- Gas filter correlation CO analyzer (inoperable)
- CO and SO_2 gas monitors
- Spectrophotometer
- Balance
- Gravity convection oven
- pH meter (inoperable)
- Rotameter (inoperable)

University of Panama's Air Monitoring Program

- Based in Panama City, Panama
- 10 years of PM_{10} data at 10 locations
- β-attenuation $PM_{2.5}$ monitor at Curundú station
  - Continuous $PM_{2.5}$ measurements, 8/08 – present
  - Data available through SERVIR portal at http://www.servir.net/datos_observados



Universidad de Panamá

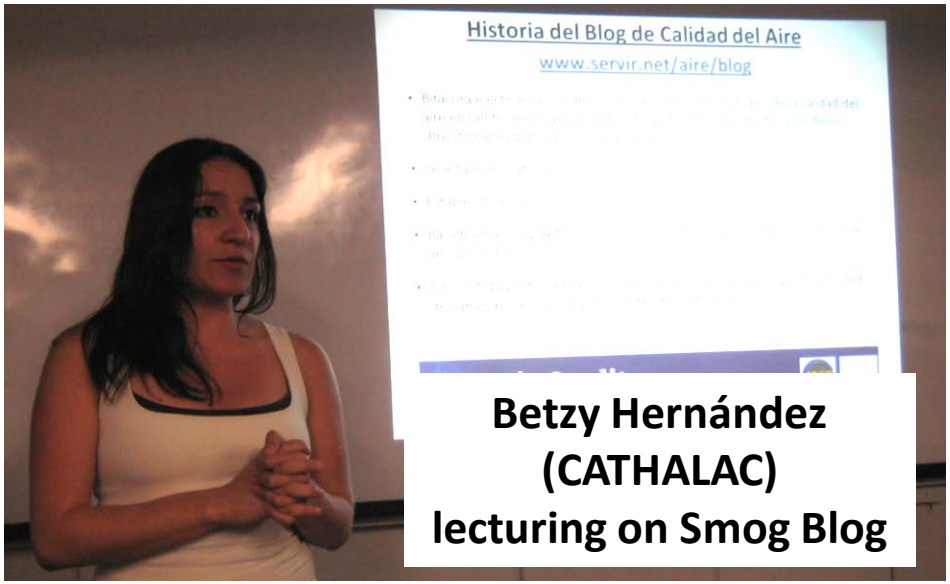
Developing Satellite Air Quality Analysis Capabilities

Initial Weblog Training
CATHALAC
September 11-12, 2008

CAFTA-DR Satellite and Weblog Training
CATHALAC, December 4-5, 2008

Satellite and Weblog Training
National University, Costa Rica
July 20-22, 2009

Trainings: Lectures and "Hands-On" Activities

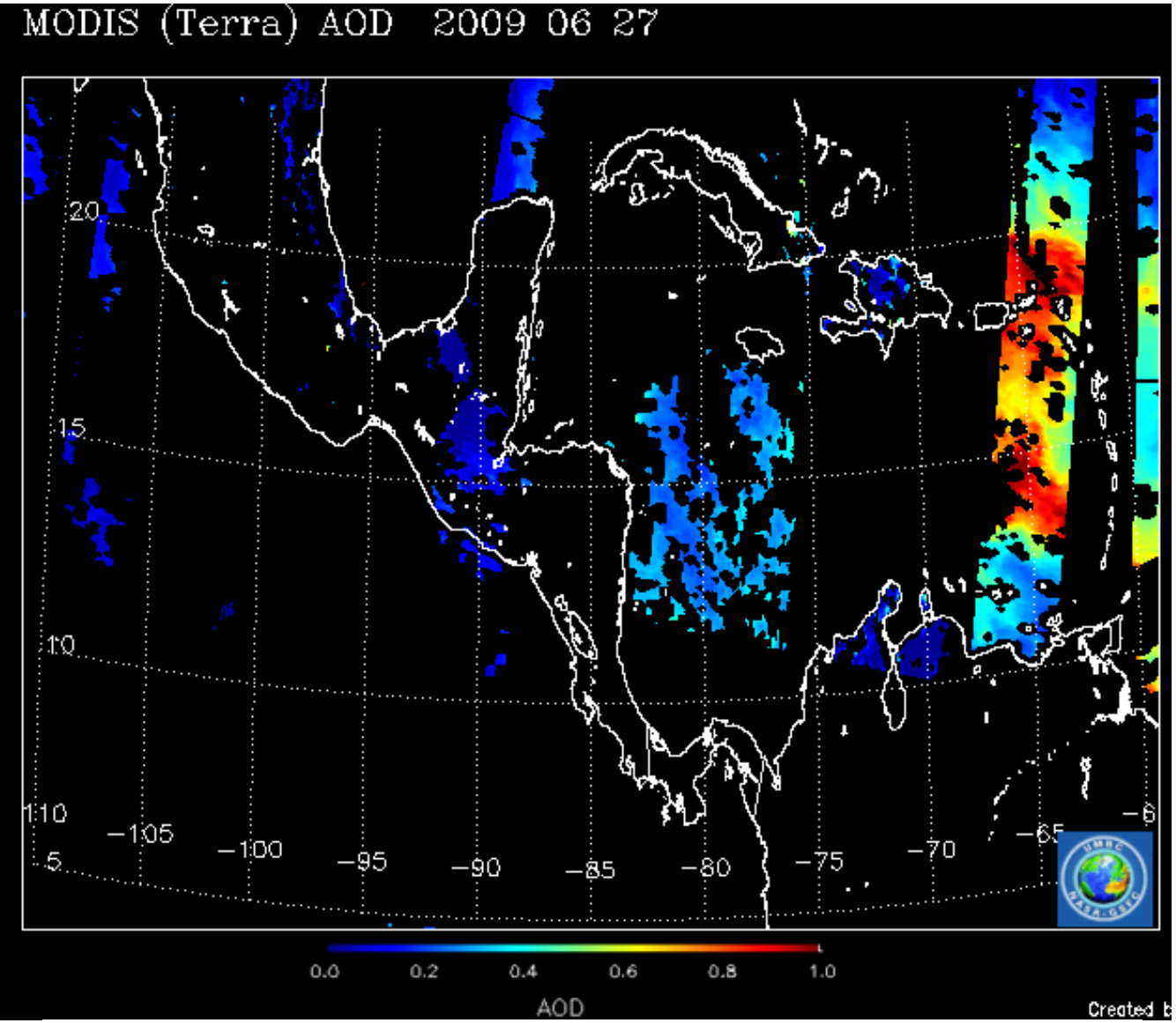


Betzy Hernández (CATHALAC) lecturing on Smog Blog

Santiago Restrepo (National University of Costa Rica) presenting his air quality analysis

Erica Zell (Battelle) helping Alberto Fabian (El Salvador)

Creating Near Real-Time Satellite Products



- Experimental NRT AOD:
  - Terra and Aqua MODIS AOD
  - GASP full disk (3 images per day)
- Next step: operational products via NASA's LANCE system

Created by Dr. Hai Zhang (UMBC), courtesy of NOAA NESDIS

BAMS-SERVIR Air Quality Model

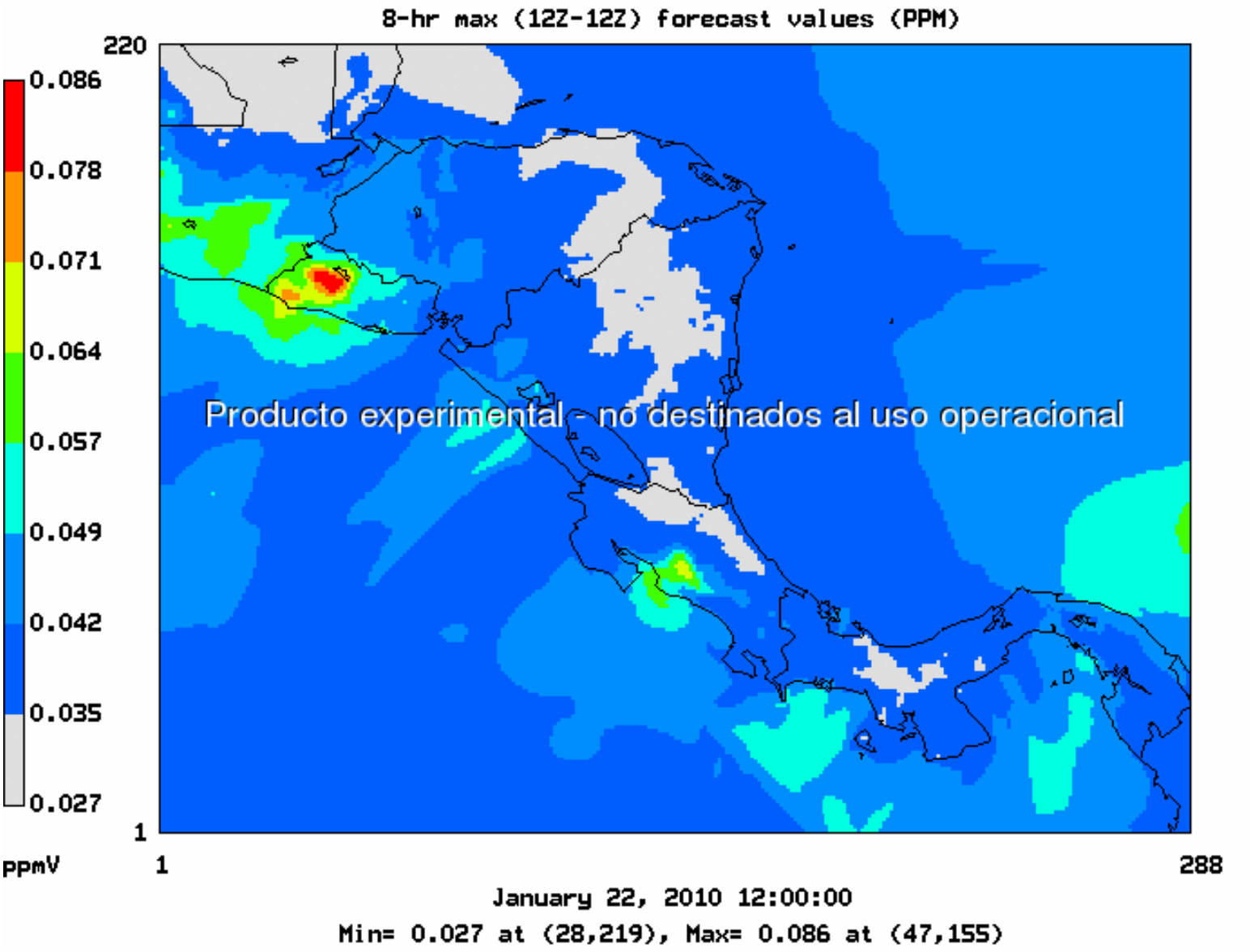
http://www.servir.net/images/imageviewer/cmaq/

- BAMS has implemented a numerical air quality model for the Central American and Caribbean region at CATHALAC:
  - Combined meteorological-air quality model (MM5 and CMAQ)
  - Forecasts generated once per day at 12 UTC
  - 27 km and 9 km spatial resolution
  - Ground-level O_3 and $PM_{2.5}$
  - Model not yet verified; experimental use only
  - Output available on SERVIR portal in several formats, including kml files for visualization in Google Earth

BAMS
BARON ADVANCED METEOROLOGICAL SYSTEMS

SERVIR

Example of BAMS-SERVIR model forecast for O_3 January 22, 2010



Mesoamerican and Caribbean Smog Blog ("Blog de Calidad del Aire")

www.servir.net/aire/blog

- Founded in September 2008 at CATHALAC
- Analysis of air quality events in Central America and the Caribbean using satellite data, model output, and available ground-based monitor data.
- Communication tool and information source (data links, help files on satellite products)
- Posts made regularly by trained staff from:
  - CATHALAC
  - University of Panama
  - National University of Costa Rica (beginning soon)
  - El Salvador Environmental Ministry (beginning soon)

Calidad del Aire

- Blog de Calidad del Aire
- Acerca del Blog
- Fuentes de datos
- Material de entrenamiento
- Material de Difusión
- Datos Observados
- Pronóstico
- Artículos de Ayuda
- Crear un Nuevo Blog
- Mis Blogs

ULTIMAS ENTRADAS

- Nube de polvo sobre el Caribe
- Incendios Forestales Atípicos en Costa Rica
- Puntos de Calor dentro de Área Protegida Biotopo Laguna del Tigre-Río Escondido, Peten, Guatemala
- Disfrutó de una buena calidad de aire en América Central este fin de semana pasado.

Blog de Calidad del Aire

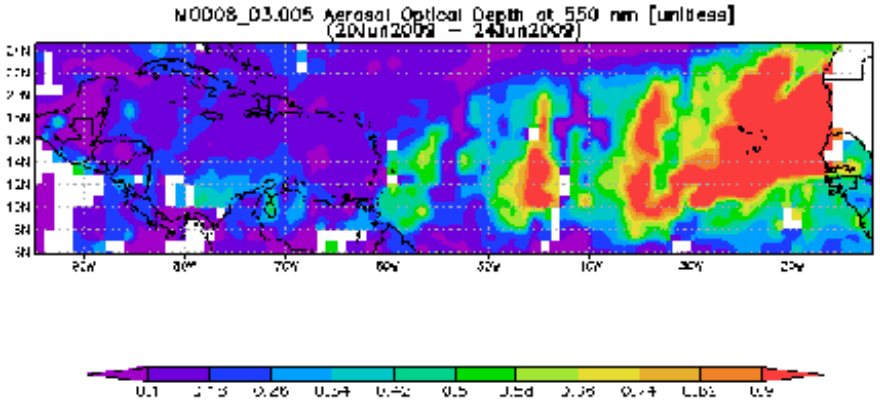
Nube de polvo sobre el Caribe

Satélite

ESCRITO POR WILFREDO URRIOLA G.

MARTES, 30 DE JUNIO DE 2009

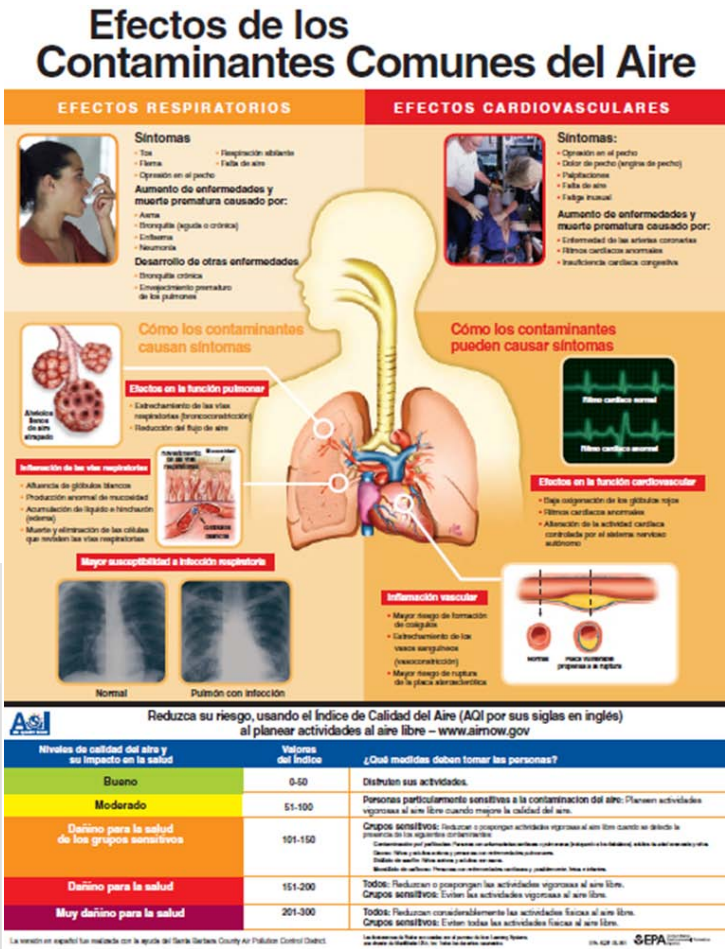
La imagen satelital de AOD proporcionada por TERRA, nos muestra una nube de polvo proveniente de África entre el 20 y el 24 de junio, que posiblemente llegará a las islas del Caribe, disminuyen la calidad del aire en esa región.



Air Quality Outreach and Communication

"Communicating Air Quality Information in Central America" Workshop
Panama City, September 11-12, 2009

Outreach Materials



Press Releases

NASA, Partners Celebrate First Anniversary of Vital Air Quality Communications Resource in Mesoamerica, Caribbean 09.15.09

NASA, the U.S. Agency for International Development (USAID), the U.S. Environmental Protection Agency (USEPA) and their partners today celebrate the first anniversary of the air quality initiative within SERVIR that delivers in-situ, satellite-based, and modeled air quality data to forecasters, researchers, broadcasters, and communities throughout Mesoamerica and the Caribbean.

A key component of SERVIR is now the Mesoamerica and Caribbean 'Smog Blog,' which provides timely information about air pollution and its sources in the region. This Smog Blog helps the public, governments and health officials monitor air quality and mitigate health impacts. In the past year of the Smog Blog's implementation, daily reports on air quality have been provided by faculty and students at the University of Panama in Panama City, and staff from the Water Center for the Humid Tropics of Latin America and the Caribbean, known

SERVIR's 'Smog Blog' provides timely information about air pollution and its sources throughout Mesoamerica and the Caribbean. Image credit: SERVIR

Goal: "AIRNow-like System" of AQI for Region

- SERVIR, EPA working together to make region ready for possible involvement in AIRNow-International program.

1 – 50 Buena
51 – 100 Normal
101-150 Mala
151 – 200 Muy Mala
201 – 250 Extremadamente Mala

Lessons Learned and Next Steps in Central America

- We have accomplished a lot in a short time – interagency cooperation between NASA and EPA is invaluable!
- Coordinated development of satellite data capabilities, ground-based monitor network, numerical air quality model is essential.
- Best approach: build regional capabilities by working with advanced groups in region (i.e., UP, CATHALAC), then they can train others – a good way to develop sustainability.
- Next steps in the region include:
  - Training/technical exchanges on monitor calibration and data validation
  - Making continuous $PM_{2.5}$ monitor data available on-line in near real-time
  - Emissions inventories for Panama and/or Guatemala

Acknowledgements

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- **STI:** Alan Chan, Jessica Johnson, Tim Dye
- **BAMS:** John McHenry, Bob Imhoff

Battelle
The Business of Innovation

UMBC
AN HONORS UNIVERSITY IN MARYLAND

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STI
Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions