An Overview of SERVIR: the Regional Visualization & Monitoring System

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Latin America and the Caribbean (CATHALAC)

30.09.08

Institutional context:

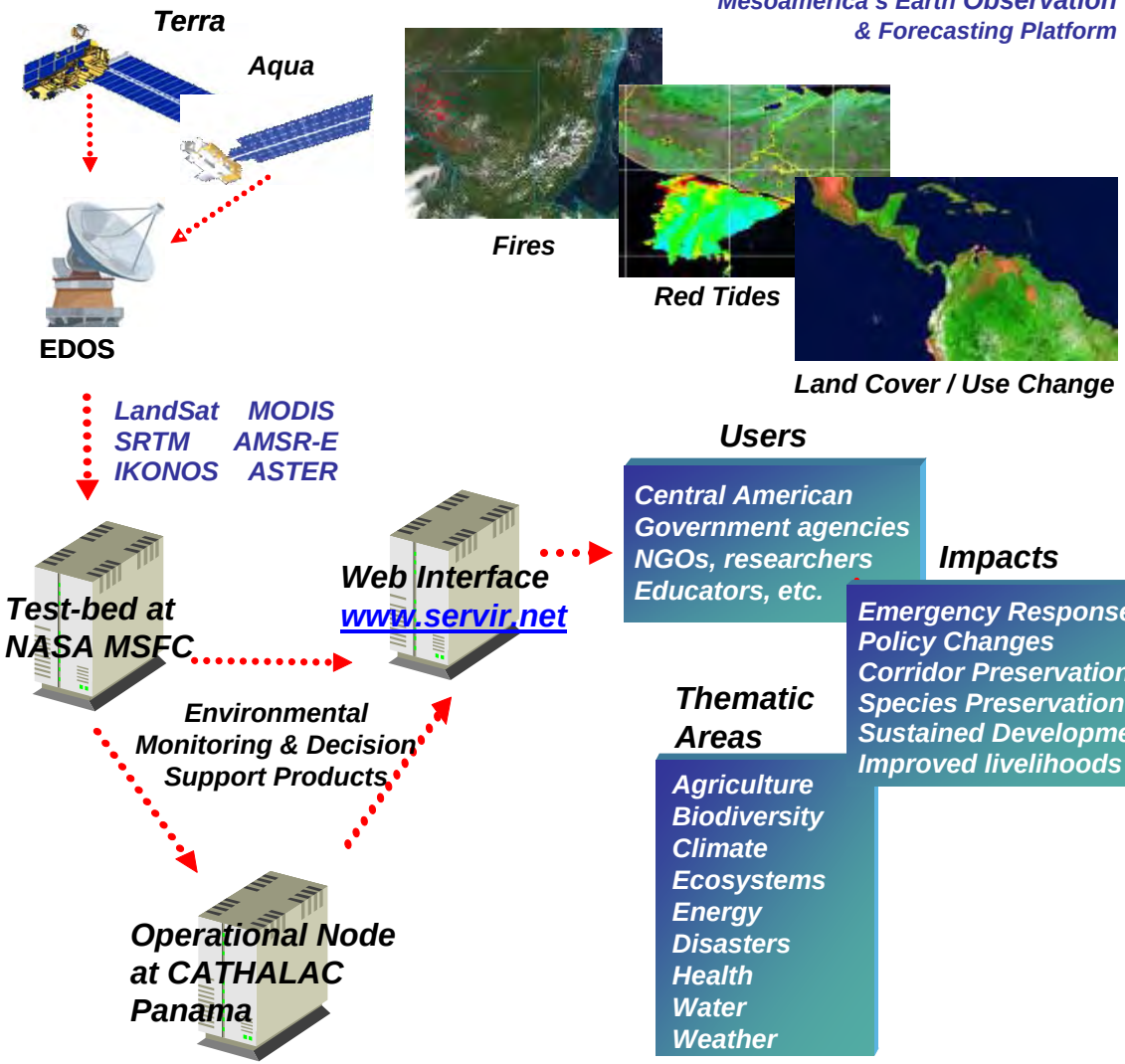
- Founded in 1992 with regional LAC mandate
- 2004 MOU with CCAD & ANAM to serve as regional node for Mesoamerican Environmental Information System (SIAM)
- 2005 inauguration of SERVIR facility / MOU with NASA
- 2005 UNEP Ministerial Decision*
- 2006 Cooperative Agreement with USAID*
- 2007 designation as GEO participating organization

Overview

- What is SERVIR?
- What are SERVIR's monitoring / forecasting capabilities?
- How is SERVIR applicable to the region?
- Questions & Answers

the Regional Visualization & Monitoring System (SERVIR)

Mesoamerica's Earth Observation & Forecasting Platform



- Global Earth Observation System of Systems (GEOSS)
- International Charter on Space and Major Disasters
- Mesoamerican Environmental Information System (SIAM)

SERVIR is a completely open-access system w/ products in range of formats

Regional Visualization & Monitoring System (SERVIR): Network of Partners

USAID FROM THE AMERICAN PEOPLE
NASA
CATHALAC
CCAD

SEMARNAT
MARN
SERNA
Ministerio de Medio Ambiente y Recursos Naturales
MARENA
MINAE
anam

The Nature Conservancy — Saving the Last Great Places
JPL
NOAA
USGS — science for a changing world
SSAI
Oak Ridge National Laboratory
UNEP

GEO
IAGT
Conservación Internacional
GISCORPS

University of Arkansas
USF
USRA
University of Maryland
UAH
UMGC

SERVIR
ESRI
FORTUNA, S.A.

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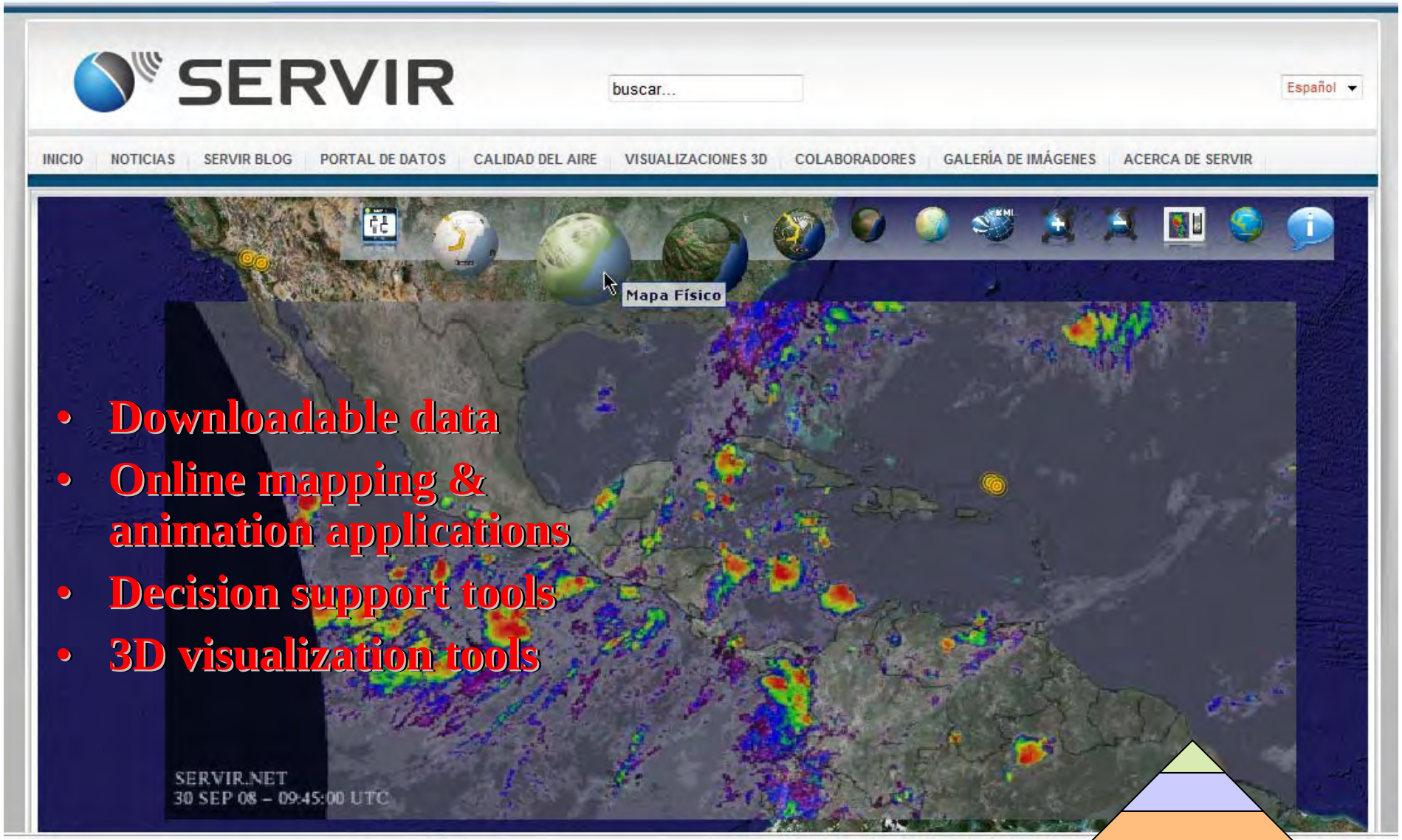
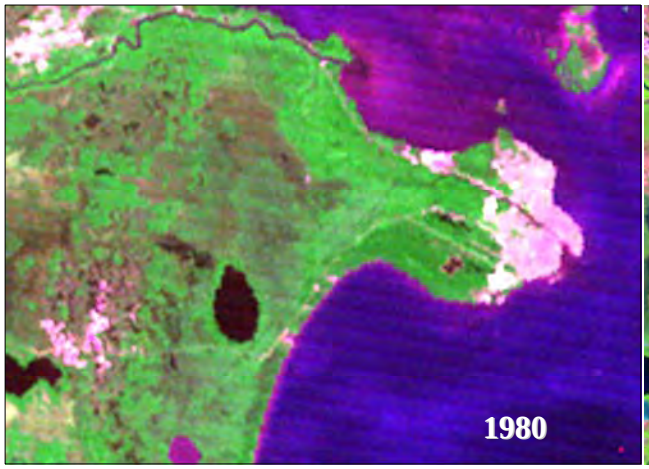
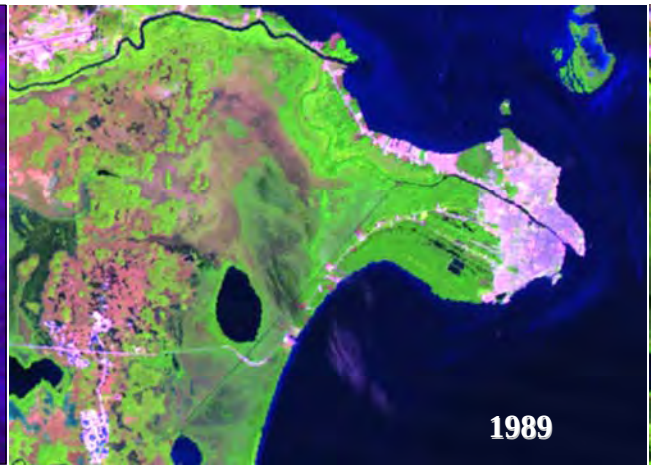
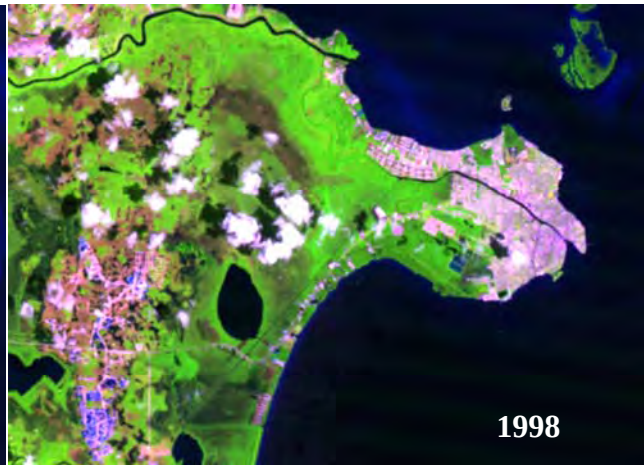


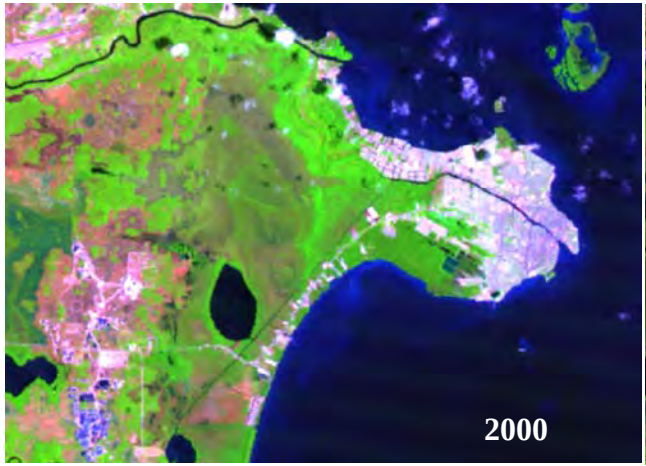
- Downloadable data
- Online mapping & animation applications
- Decision support tools
- 3D visualization tools

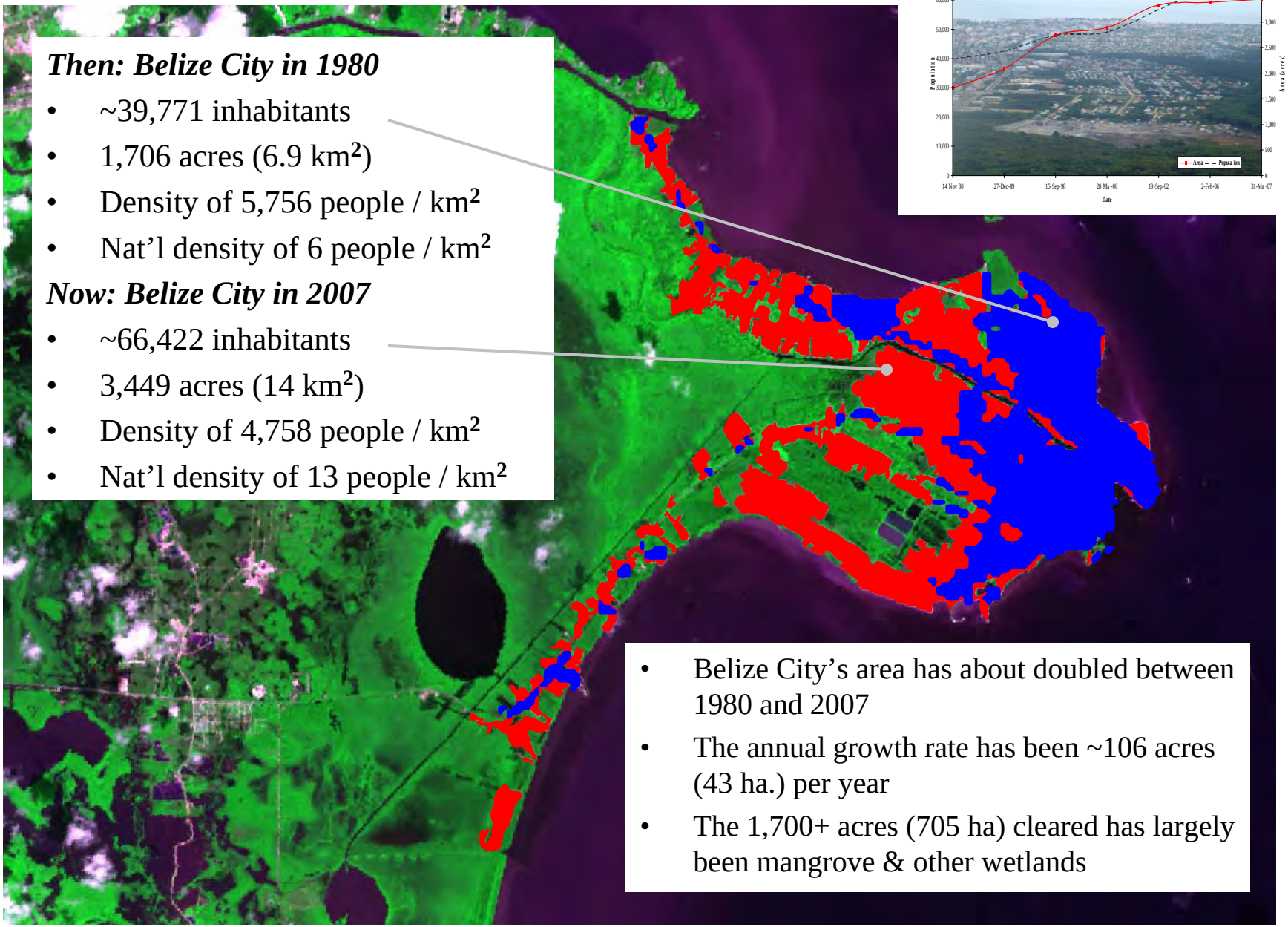






Using SERVIR's image archive to track development





Then: Belize City in 1980

- ~39,771 inhabitants
- 1,706 acres (6.9 km^2)
- Density of 5,756 people / km^2
- Nat'l density of 6 people / km^2

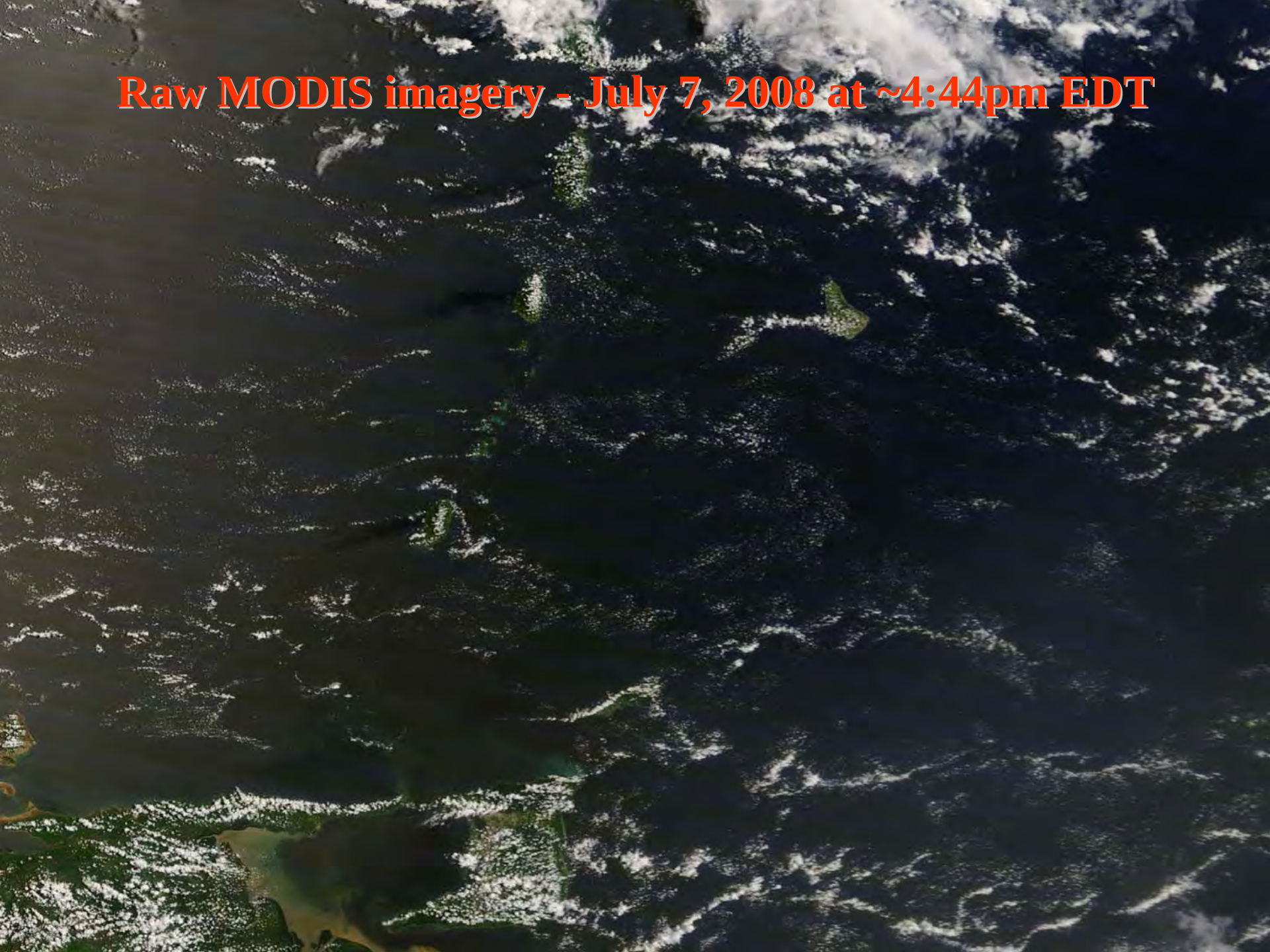
Now: Belize City in 2007

- ~66,422 inhabitants
- 3,449 acres (14 km^2)
- Density of 4,758 people / km^2
- Nat'l density of 13 people / km^2

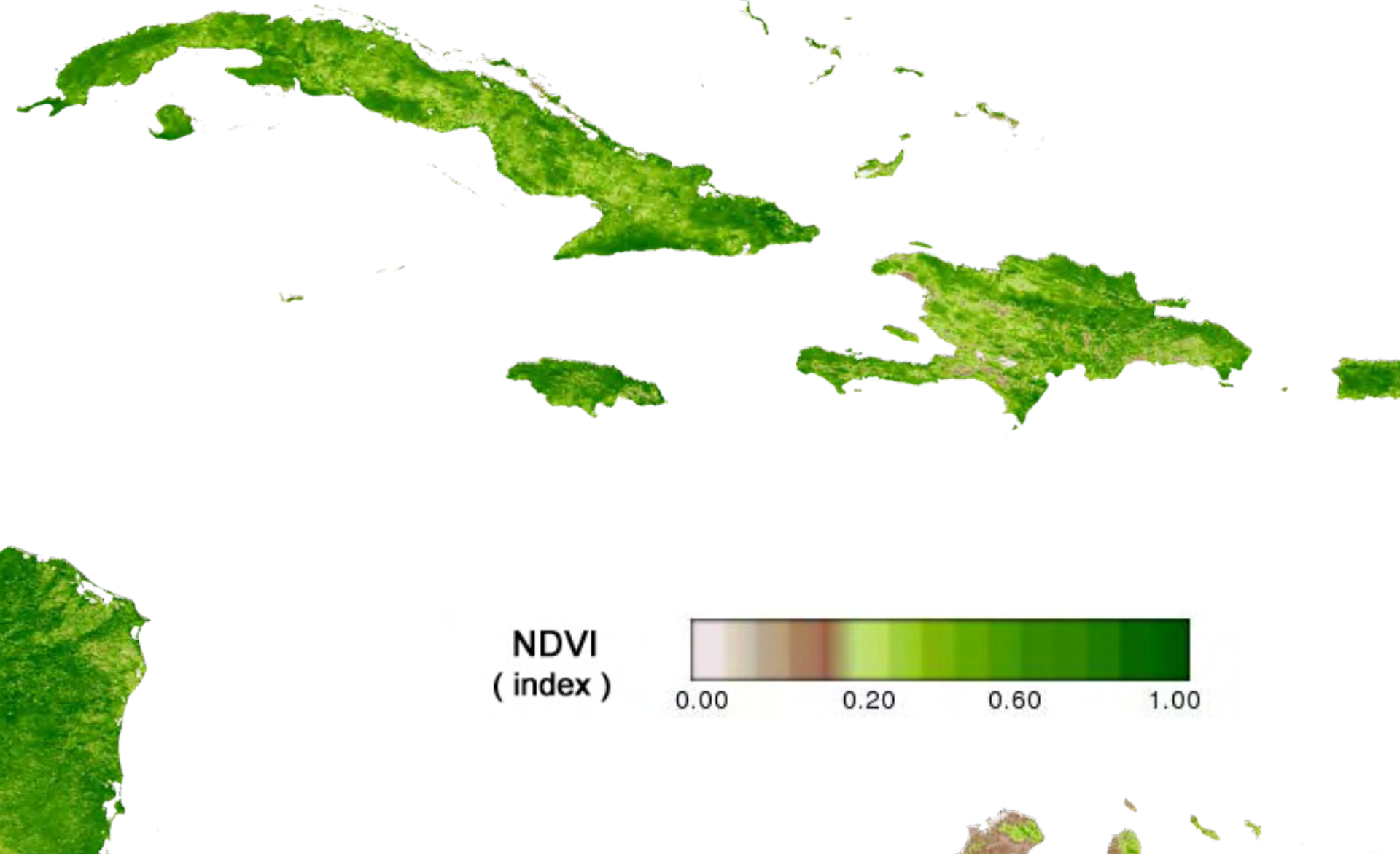
- Belize City's area has about doubled between 1980 and 2007
- The annual growth rate has been ~106 acres (43 ha.) per year
- The 1,700+ acres (705 ha) cleared has largely been mangrove & other wetlands

False color ASTER image courtesy of NASA / JAXA

Raw MODIS imagery - July 7, 2008 at ~4:44pm EDT



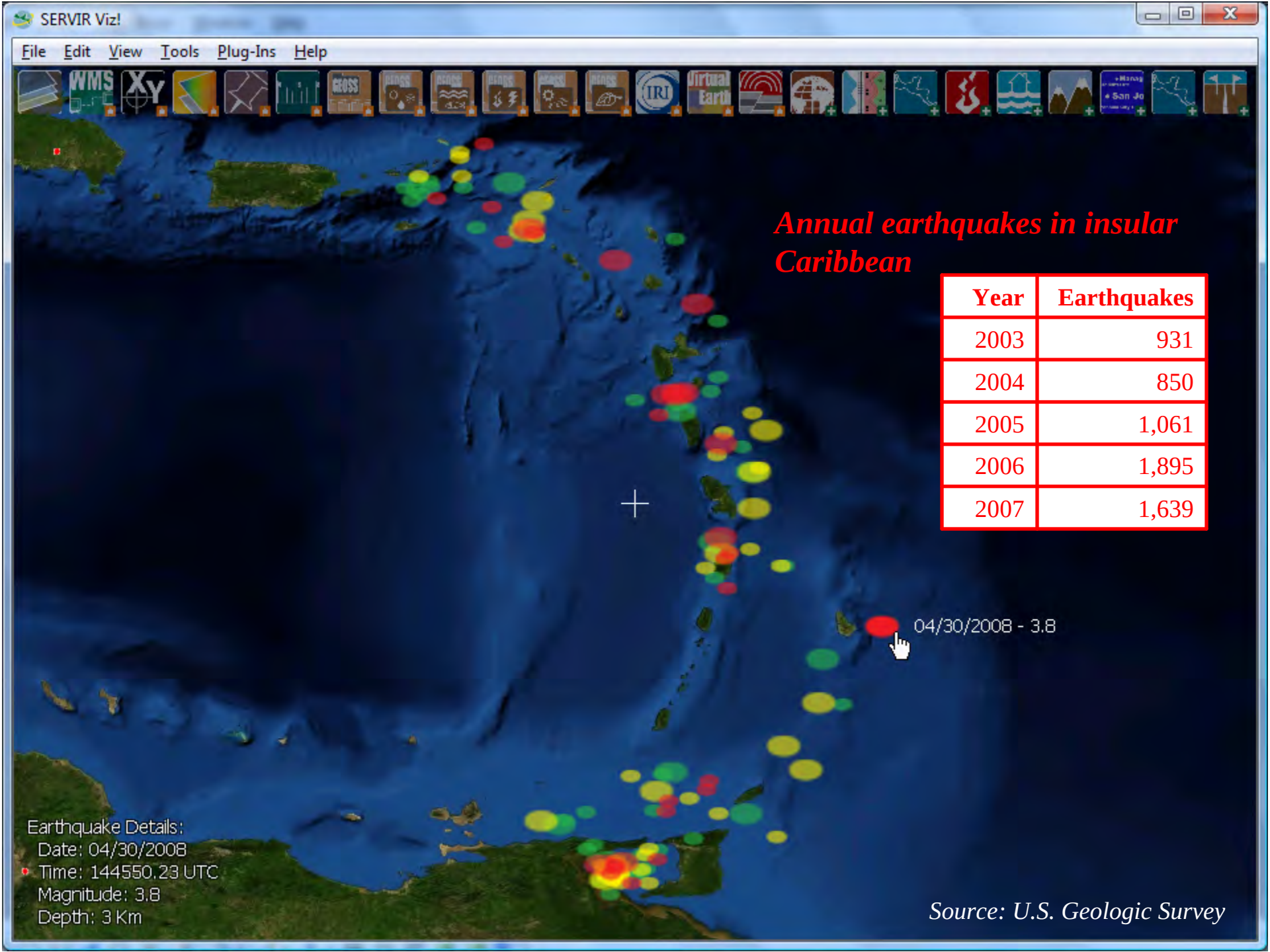
Monitoring relative biomass across Caribbean via the Normalized Difference Vegetation Index (NDVI)



Year	Fires
2003	4,482
2004	12,314
2005	10,296
2006	10,385
2007	7,773

Annual fires in insular Caribbean

Source: UMD FIRMS / NASA MODIS Rapid Response System

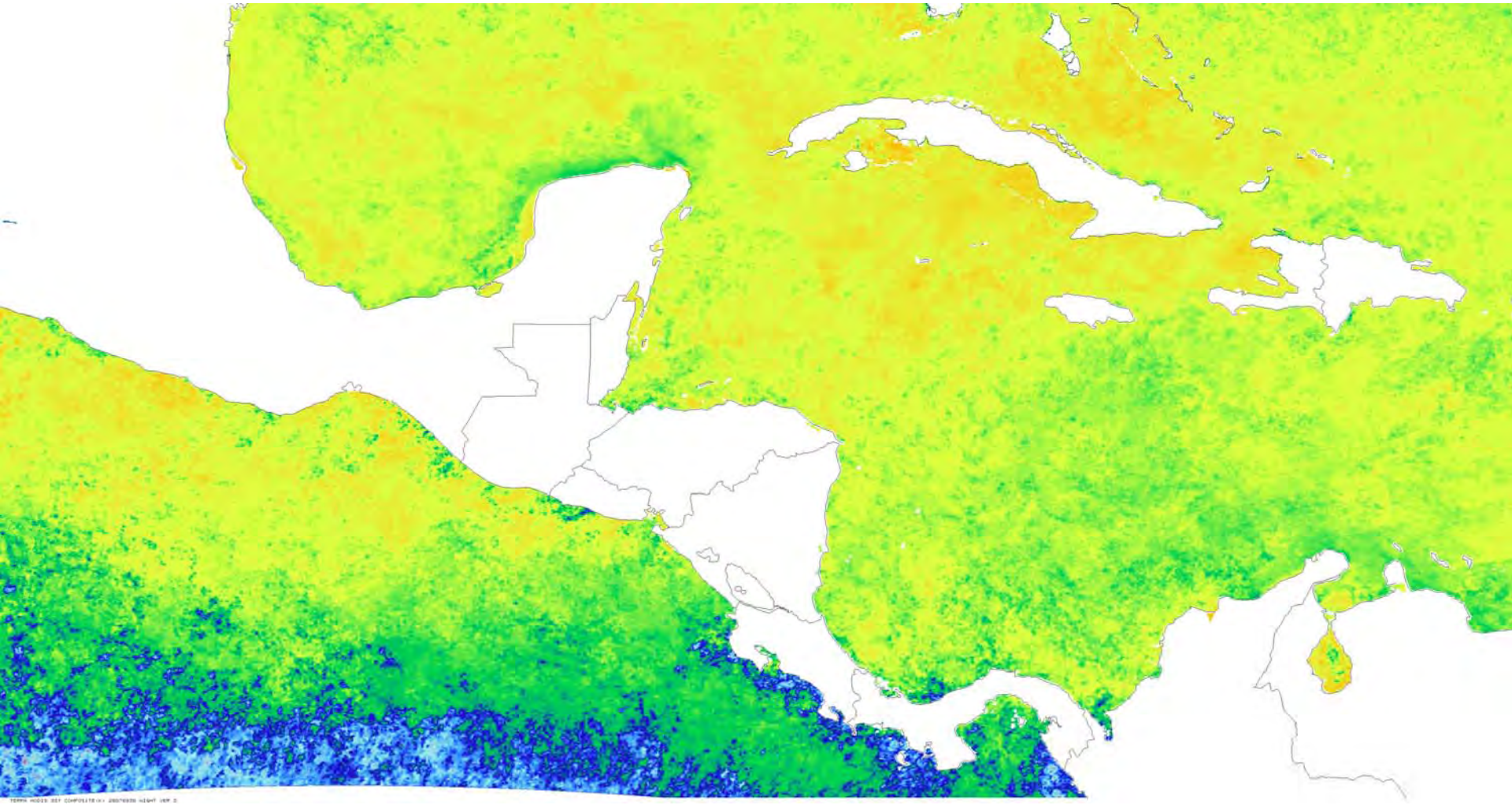


Annual earthquakes in insular Caribbean

Year	Earthquakes
2003	931
2004	850
2005	1,061
2006	1,895
2007	1,639

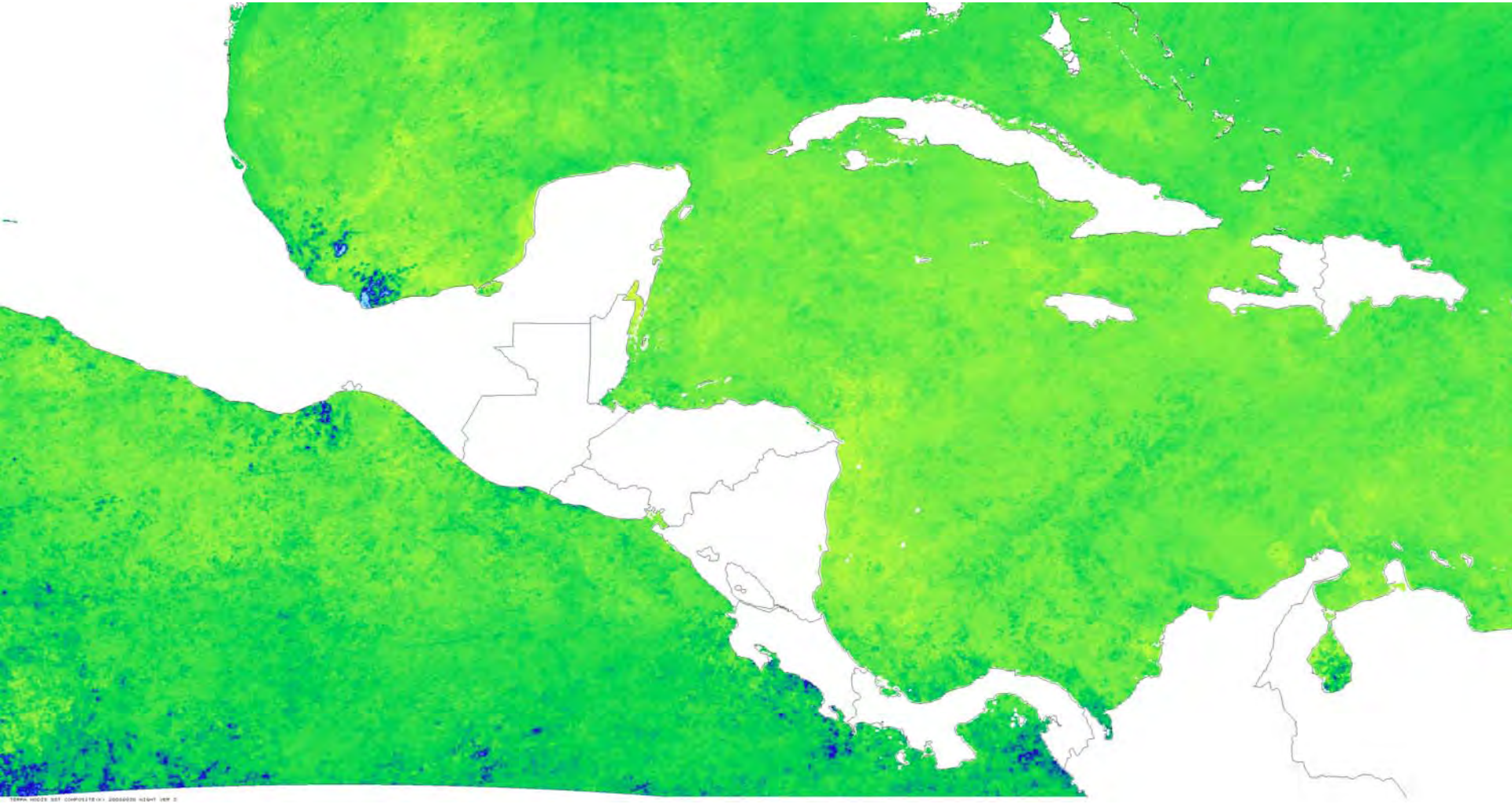
Source: U.S. Geologic Survey

Satellite-Based Sea Surface Temperature (SST): 1 year ago at 2:43am EDT (September 30, 2007)

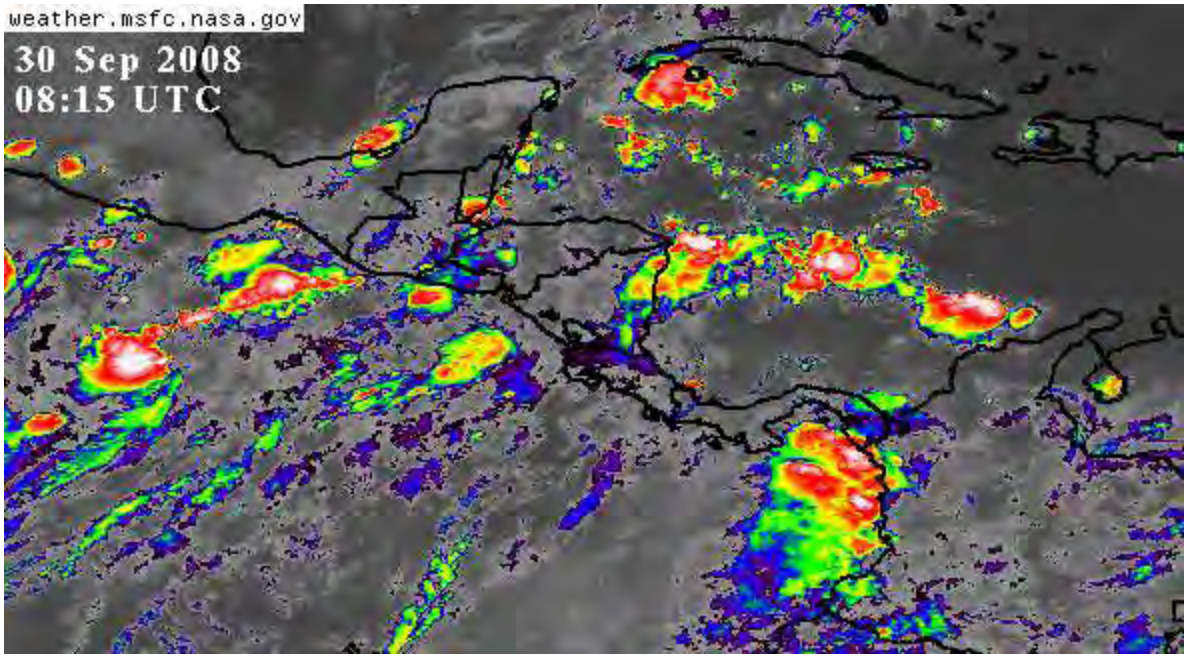


Source: MODIS Terra

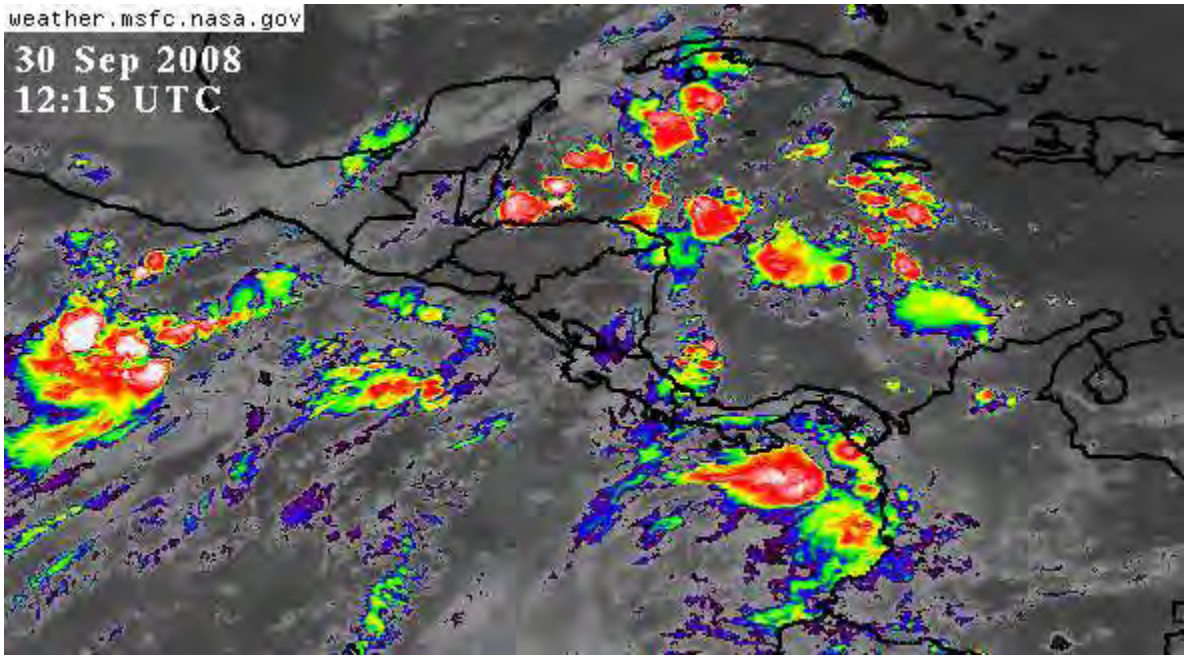
Satellite-Based Sea Surface Temperature (SST): TODAY at 2:26am (September 30, 2008)



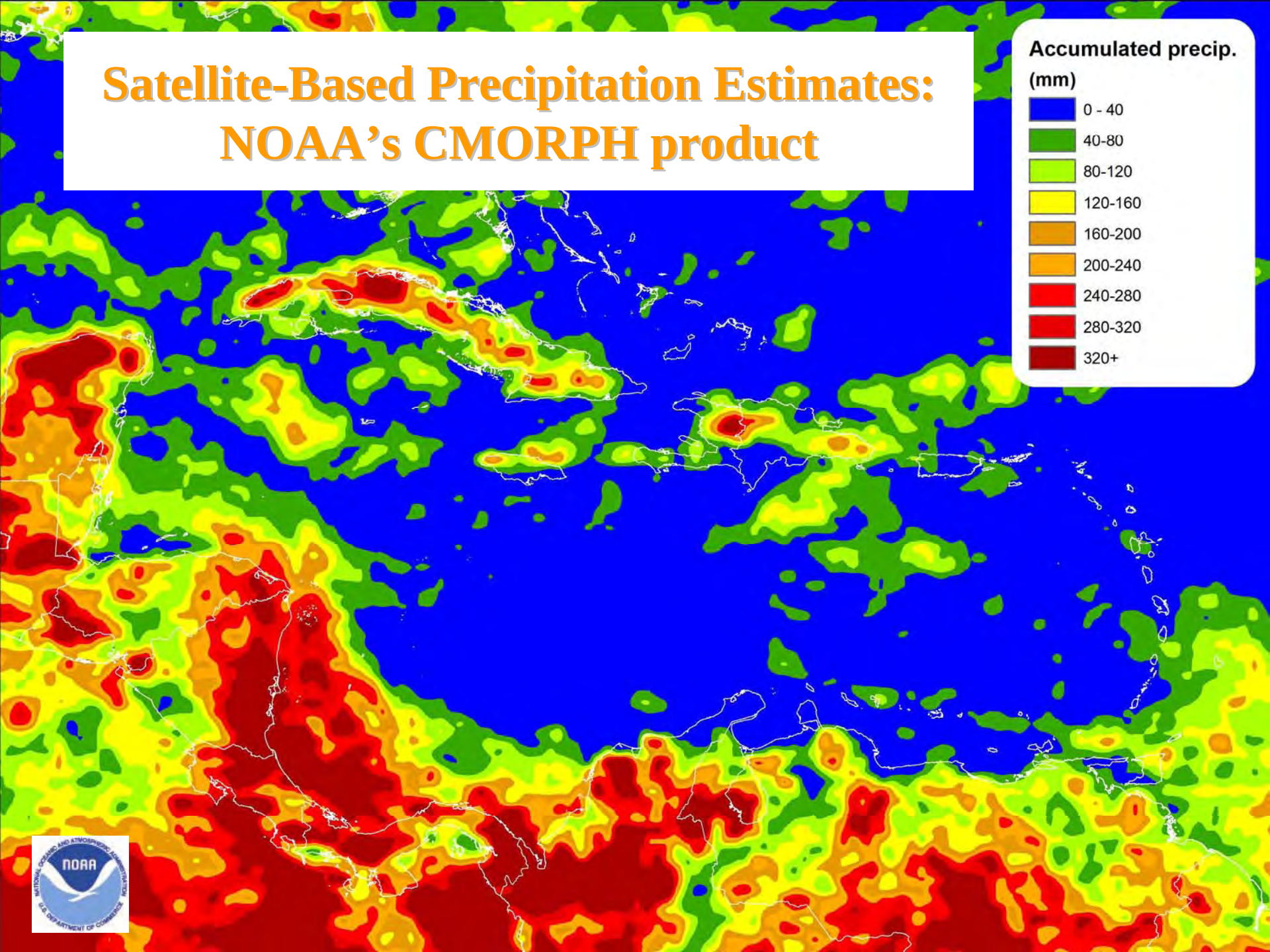
Source: MODIS Terra



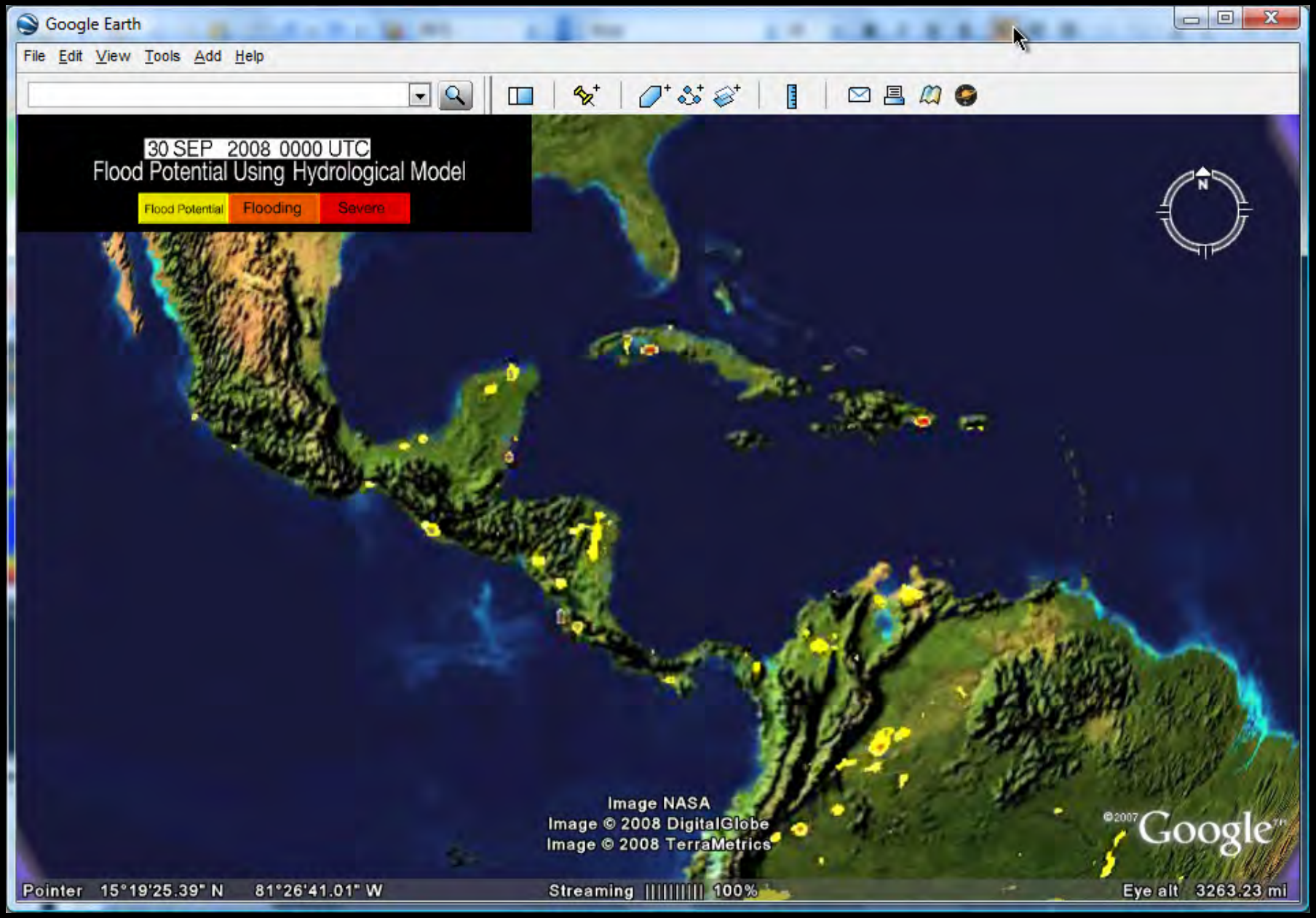
‘Raw’ Infrared Imagery from NOAA’s GOES met satellite



Satellite-Based Precipitation Estimates: NOAA's CMORPH product

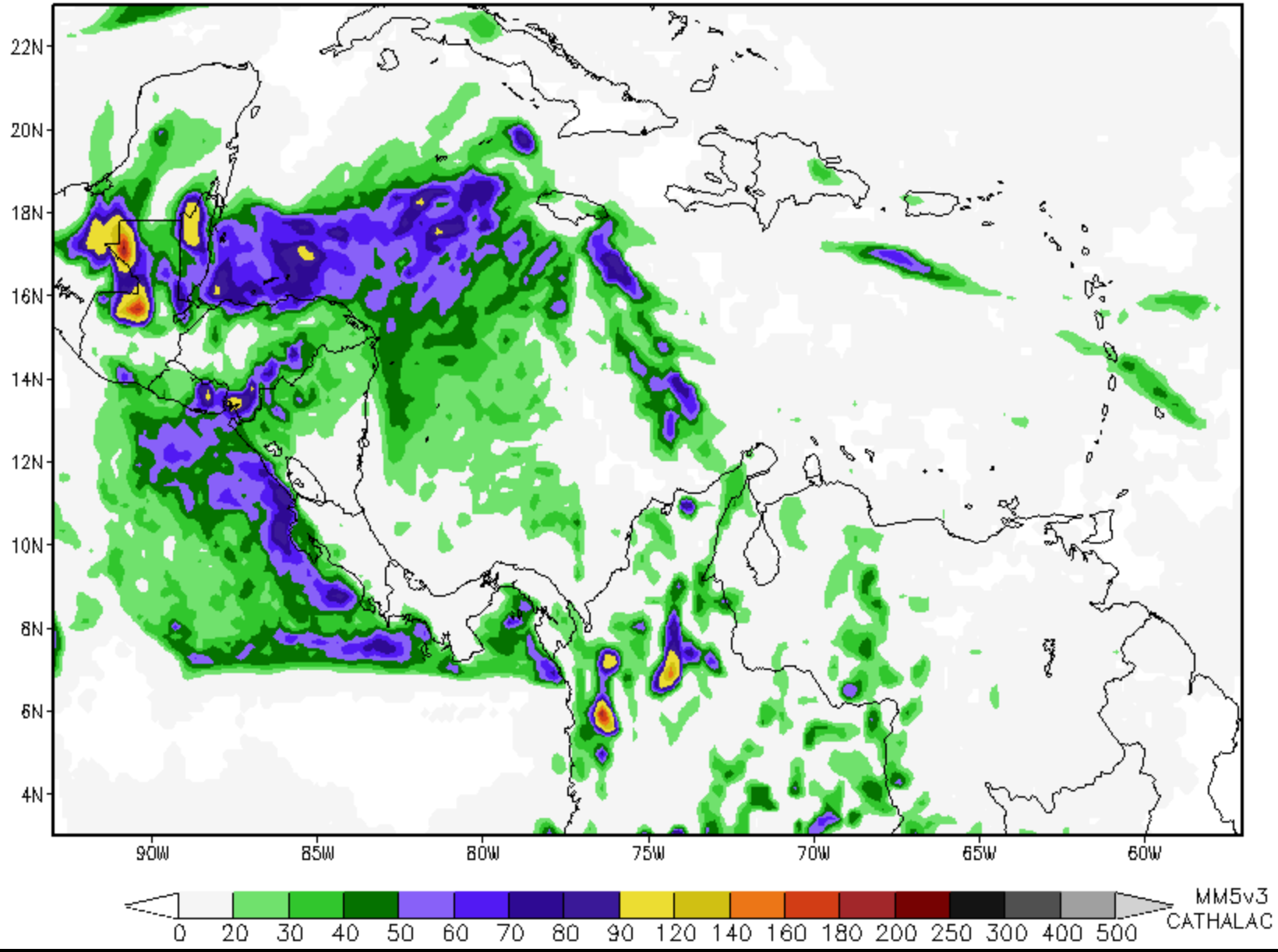


Data can be ported out into a variety of formats such as Google Earth

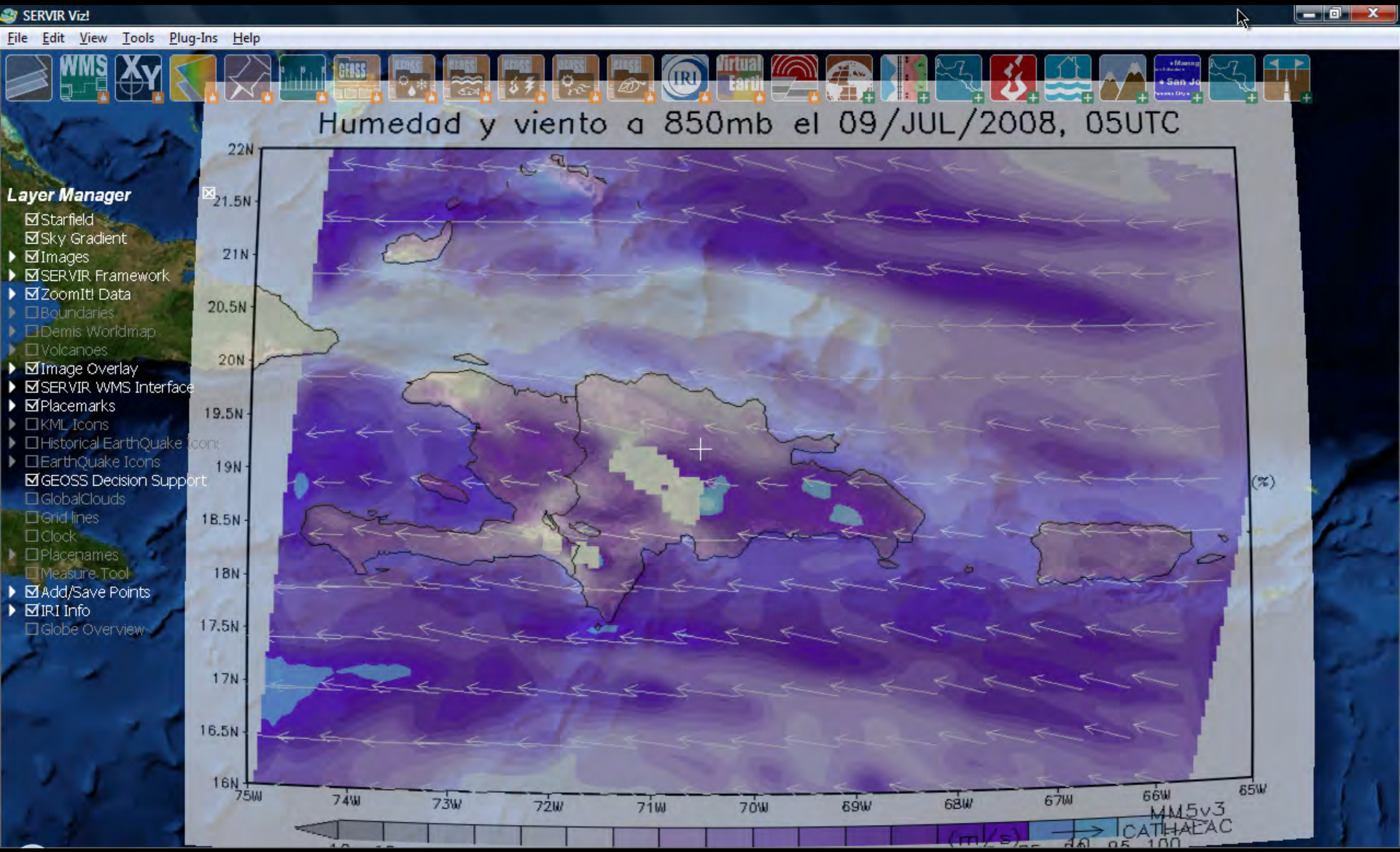


Source: NASA TRMM

lluvia total pronostico a 24hrs hasta el 01/OCT/2008, 05UTC



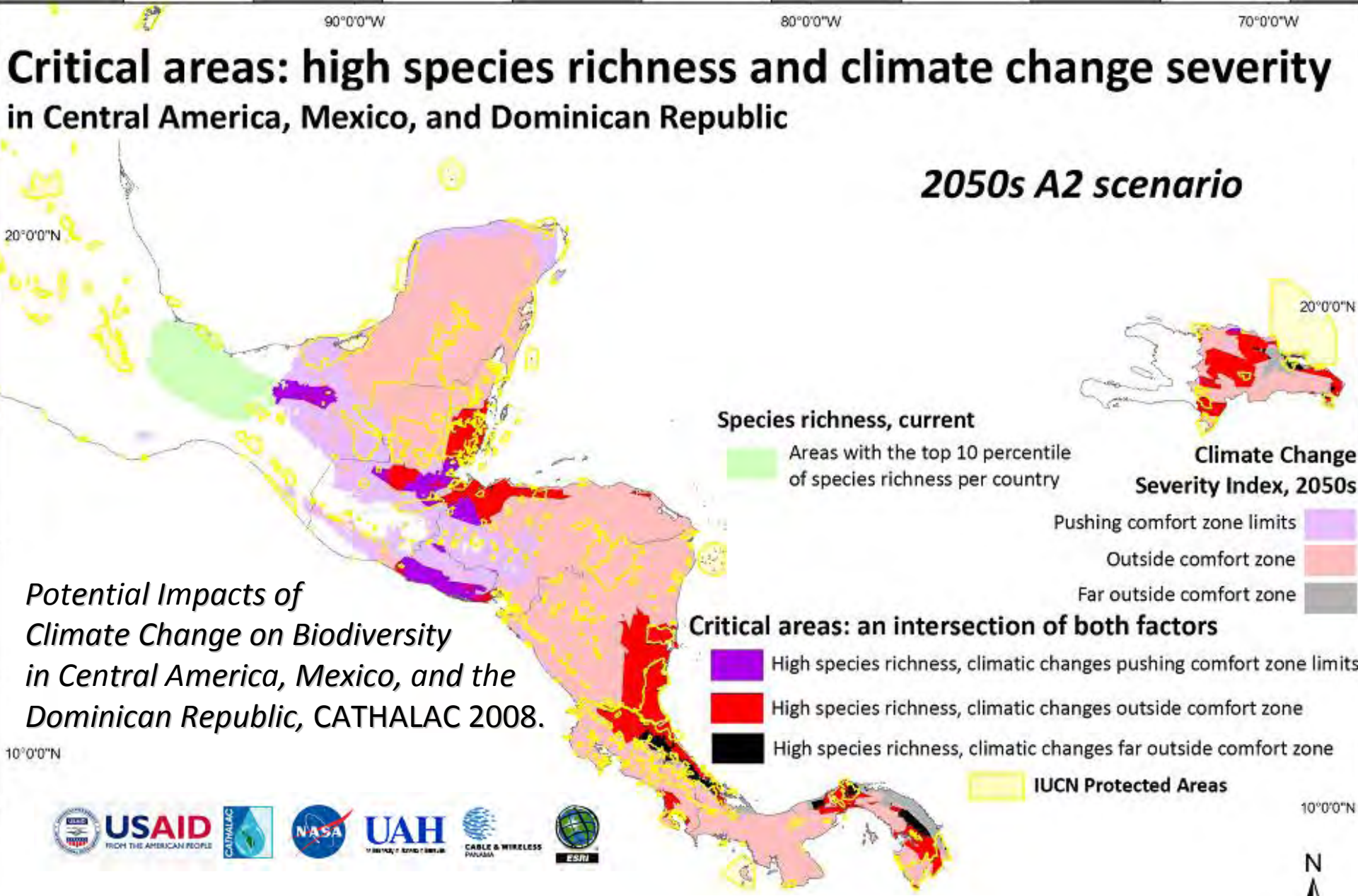
SERVIR incorporates both cutting-edge visualizations and numerical forecasting capabilities (e.g. MM5, WRF)



The SERVIR Viz software seen here can be downloaded for free

Critical areas: high species richness and climate change severity

in Central America, Mexico, and Dominican Republic



Potential Impacts of Climate Change on Biodiversity in Central America, Mexico, and the Dominican Republic, CATHALAC 2008.

Data derived from: NatureServe InfoNatura Species Distribution Grids.
WorldClim Climate Grids: Current and Future Conditions.
IUCN World Commission on Protected Areas, 2007.

Potential Impacts of Climate Change on Biodiversity

in Central America, Mexico and the Dominican Republic

Executive Summary 2008

Identifying Critical Areas for Conservation: Biodiversity and Climate Change in Central America, Mexico, and the Dominican Republic

Eric R. Anderson[a], *Emil A. Cherrington* [b], *Laura Tremblay-Boyer* [c], *Africa I. Flores* [b], *Emilio Sempris* [b]

Abstract. Given the rapidity and intensity of anthropogenic impacts on natural systems, assessing the effectiveness of current protected areas in preserving biodiversity is especially important in Mesoamerica and the Caribbean, which contain a wide array of species and ecosystems. In light of the growing need to consider climate change in policymaking, combining climate change projections with biodiversity maps allows scientists and decision makers to understand possible climate change impacts on biodiversity. In this study, we use GIS to identify spatial relationships between regional climate change models and species habitat ranges for Mesoamerica and the Caribbean. Evaluating possible effects of climate change in terms of temperature and precipitation involves three factors: historical averages, historical ranges, and future averages. Because different ecosystems and species exist at different temperature and precipitation ranges, we consider "comfort zones" of each area. We develop a quantitative, spatial measurement of climate change intensity of each area by calculating the difference between historical and future averages and dividing that difference by the area's comfort zone, at a spatial resolution of 1km2. The result is a normalized grid of projected climate change severity. According to the modeling results, should worst case scenario conditions prevail, by the 2020s, the Caribbean coasts of Costa Rica, Honduras, Nicaragua, Panama, and the Dominican Republic, will be significantly impacted by climate change. By the 2080s, all of the ecosystems and species of Central America and the Dominican Republic may be subjected to conditions well outside of their traditional comfort zone, while most of Mexico's ecosystems and species are at lower risk of severe climate change impacts. Integrating species richness data with the climate change severity analysis identifies critical areas that may require specific interventions to facilitate the adaptation of species to climate change. The information generated points not only to the utility of current protected areas, but is also useful in guiding the development of new protected areas and biological corridors, for the reduction of the potential impacts of future climate change.

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INTRODUCTION

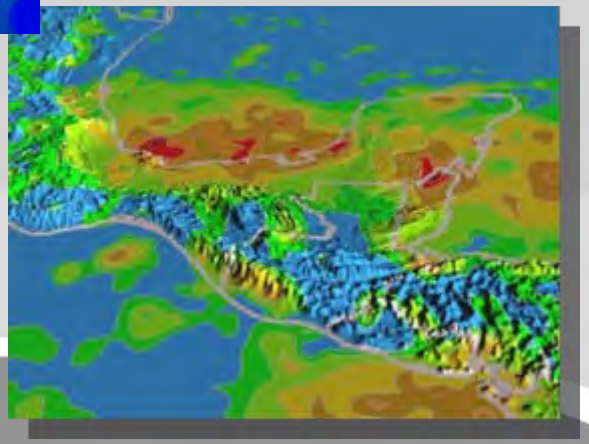
Mesoamerica and the Caribbean are two of the world's top twenty-five biodiversity hotspots, teeming with globally significant biological diversity. In Mesoamerica alone, nearly 8% of the world's terrestrial species are found on less than 1% of earth's landmass (Myers 2002). Yet, deforestation and uncontrolled human development have resulted in the loss of an estimated 70% of original habitat (Conservation International 2004). In response to this situation, the regions' governments have demonstrated their commitment to biodiversity conservation through the Mesoamerican Biological Corridor and Caribbean Biological Corridor, networks of protected areas spanning the isthmus and Caribbean islands. These corridors are home to the globe's only preserves for sensitive species such as the jaguar and white shark (respectively the largest cat in the Americas, and the world's largest fish), as well as over 250 threatened birds, mammals, and amphibians (InfoNature 2007).

The richness of species and ecosystems in Mesoamerica and the Caribbean is constantly threatened by human-induced drivers of environmental change. The conversion of natural landscapes such as forests, grasslands and wetlands, into

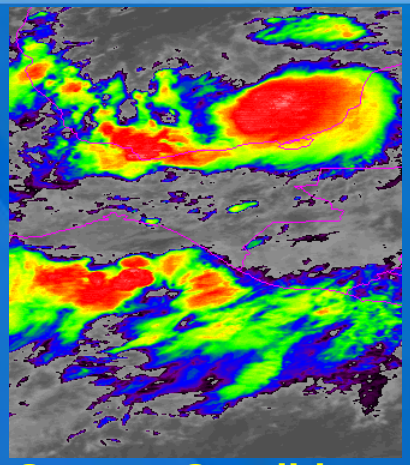
Figure 1. Mesoamerican and Caribbean Biodiversity hotspots.

SERVIR Disaster Response (2004-08)

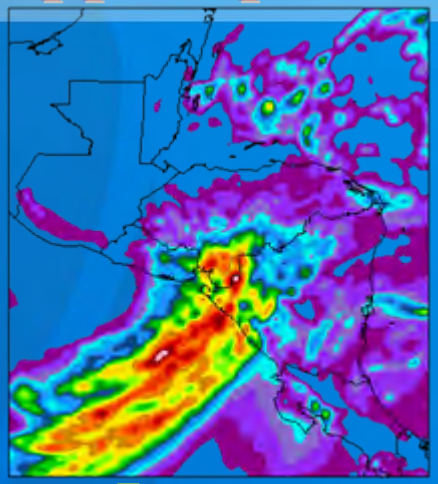
1. Red tide event - El Salvador (June 2004)
2. Panama City flooding – Panama (Sept 2004)
3. Rio Sixaola flooding – Costa Rica / Panama (Jan 2005)
4. Hurricane Stan – Guatemala, Mexico, El Salvador (Oct 2005)
5. Colon Province flooding – Panama (Nov 2006)
6. Mountain Pine Ridge fire – Belize (May 2007)
7. Hurricane Dean – Mexico (Aug 2007)
8. Hurricane Felix – Nicaragua (Sept 2007)
9. Tropical Storm Noel – Dominican Republic (Oct 2007
10. Tropical Storm Olga – Dominican Republic (Dec 2007
11. Turrialba Volcano – Costa Rica (April 2008)
12. Tropical Storm Arthur – Belize (June 2008)
13. Hurricane Gustav – Haiti / Dominican Rep. (August 2008)
14. Hurricane Hanna – Haiti (Sept. 2008)
15. Hurricane Gustav – Haiti (Sept. 2008)



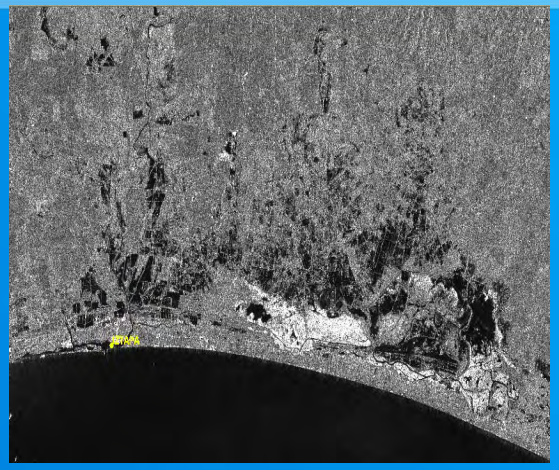
During Disasters such as Hurricane Stan in Guatemala, SERVIR provides a variety of decision support products



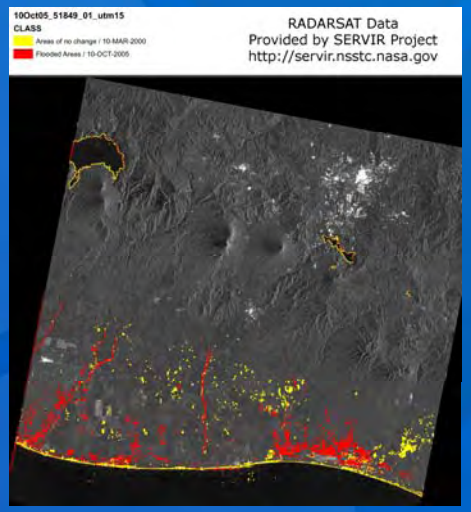
Current Conditions



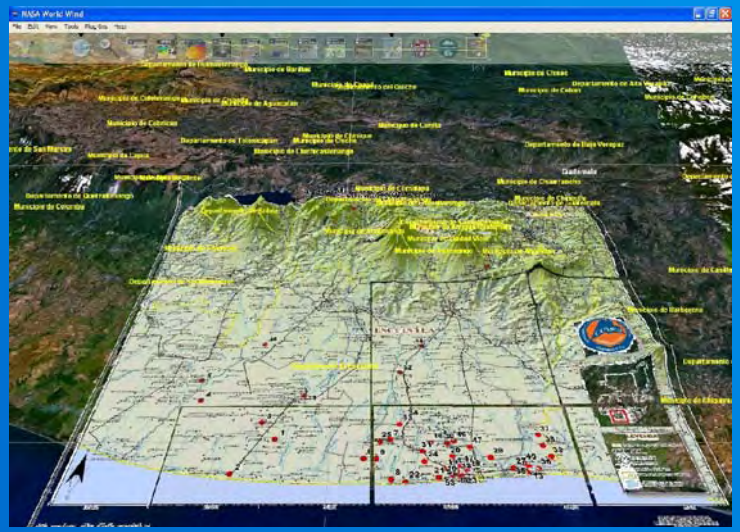
Forecasts



Near Realtime Flood Maps

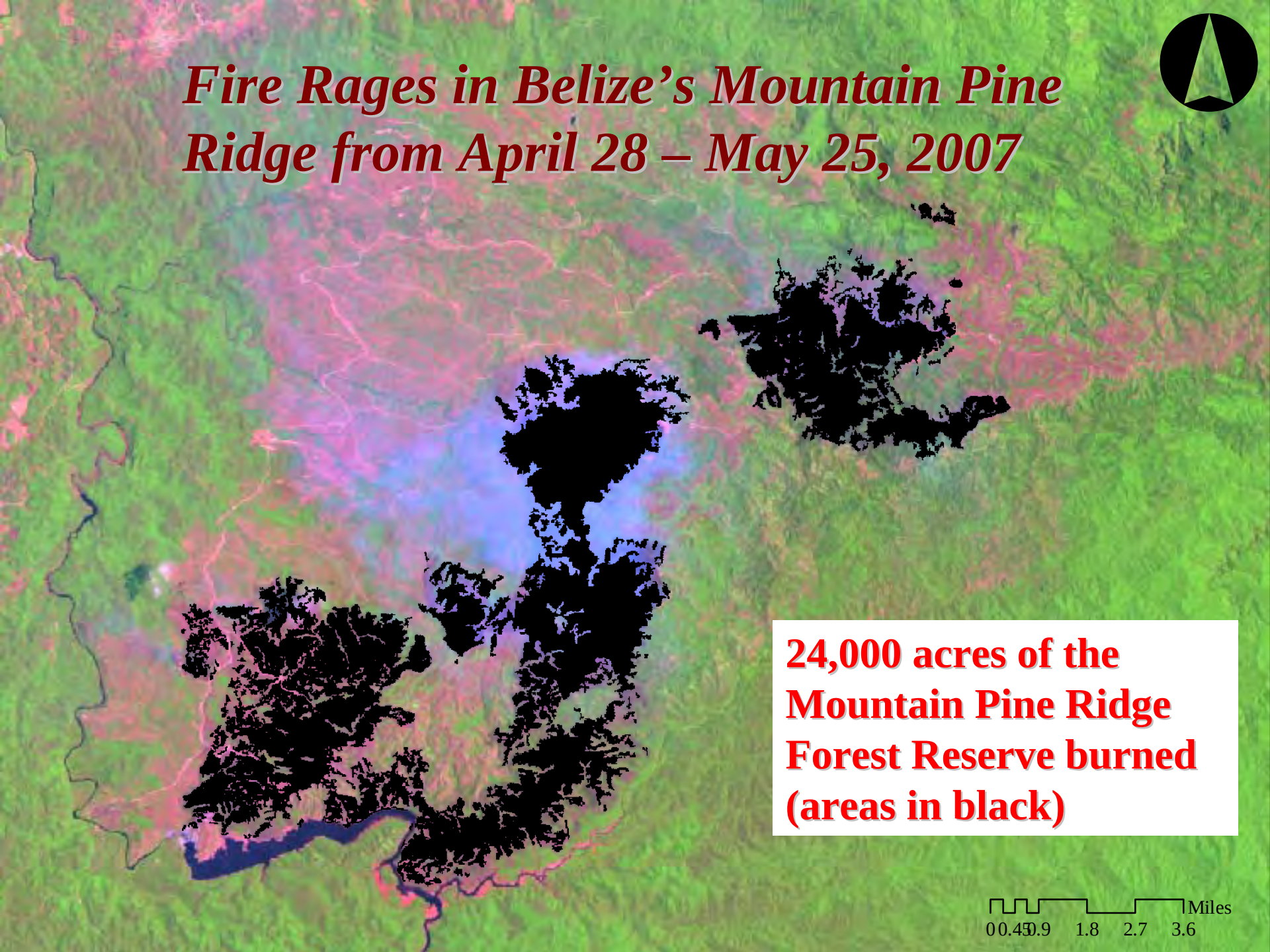


Processed Flood Maps



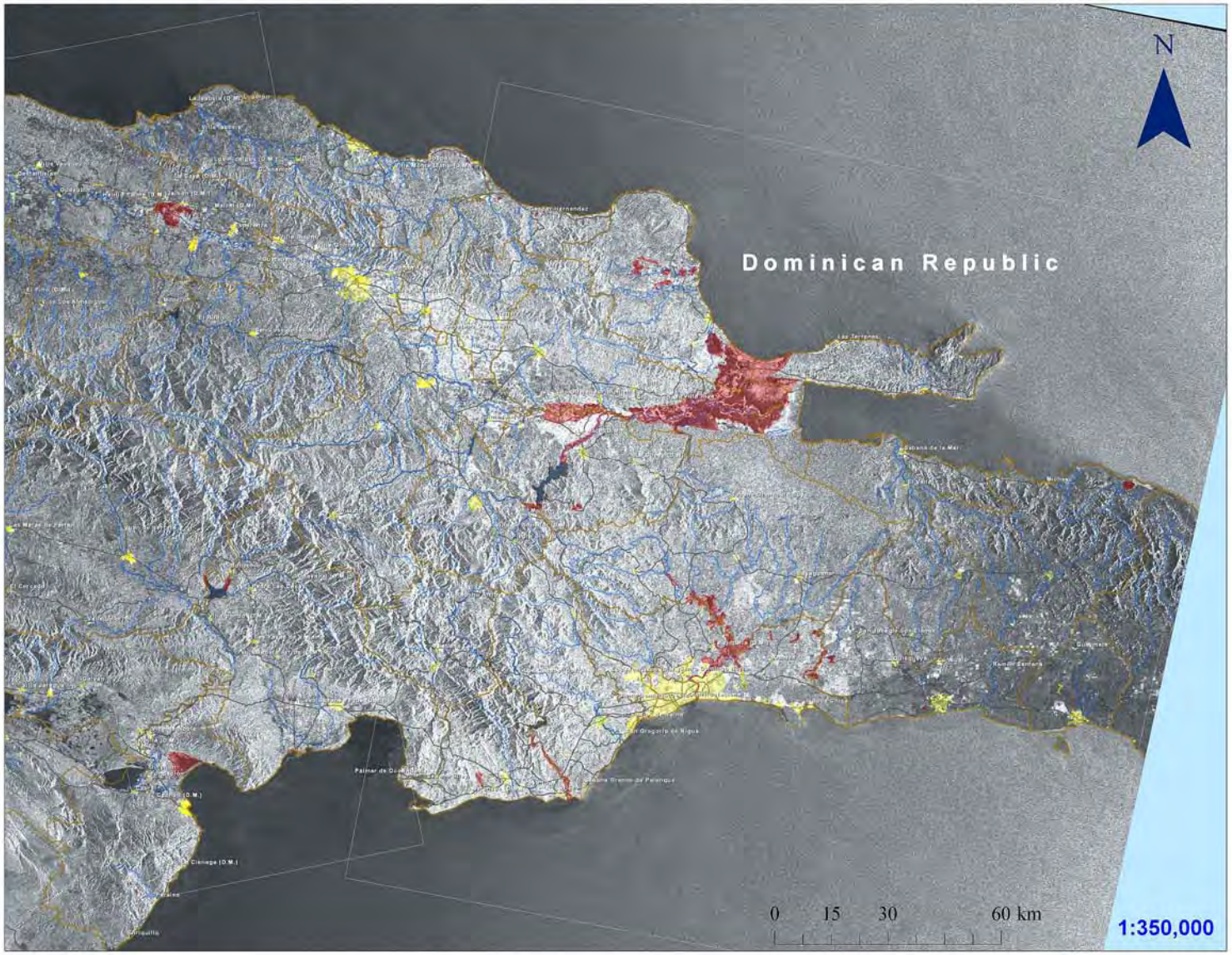
3D Composites

Fire Rages in Belize's Mountain Pine Ridge from April 28 – May 25, 2007



24,000 acres of the Mountain Pine Ridge Forest Reserve burned (areas in black)

Areas de Inundaciones Substanciales de Tormenta Tropical Noel



Legend

- Provincias
- Areas de Inundacion
- Areas de Imagenes de Satelite
- Areas Pobladas
- Rios
- Calles Principales

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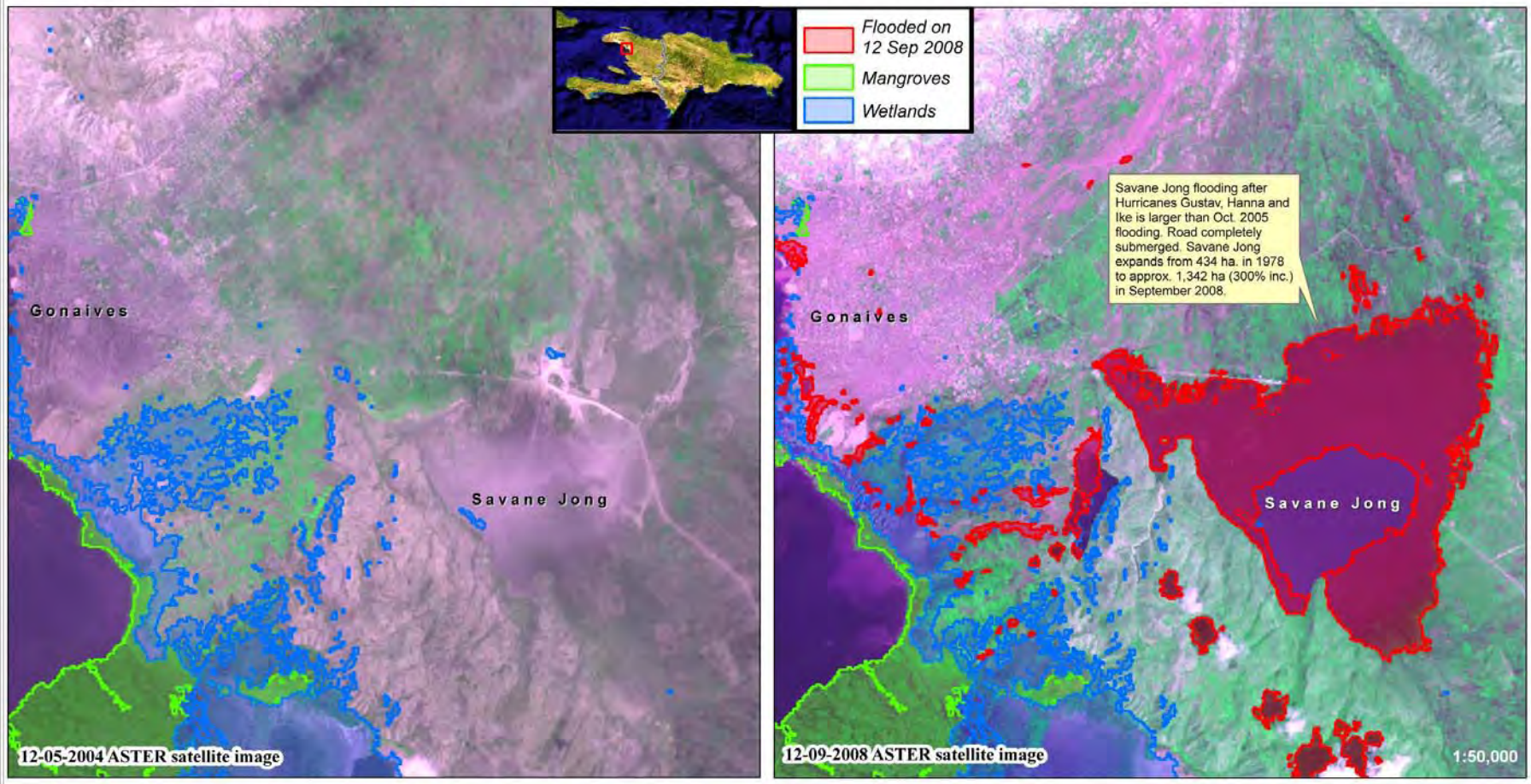
Este es un análisis preliminar de las inundaciones substanciales de la Tormenta Tropical Noel. Se realizo el mapa usando datos de radar del satélite Japonés ALOS, sensor PALSAR. La resolución de las imágenes es de aproximadamente 100 metros. Se realizó el análisis por digitalización en pantalla (heads up digitizing) basado en una imagenes antes de la tormenta (19 septiembre 2007, 03:21UTC y 27 de octubre de 2007, 15:01UTC) y una después de la tormenta (1 Noviembre 2007, 15:08UTC). Las imágenes fueron proporcionadas por medio de la Carta Internacional del Espacio y las Grandes Catástrofes (www.disasterscharter.org), Activación 183. Nuevamente, esto es un analisis preliminar y no tiene verificacion del campo.

CATHALAC/SERVIR esta trabajando como "Project Manager" para esta activación. Para más información, ver www.servir.net

Before and After Flooding in Savane Jong, Gonaives / Haiti: Pre- and Post- Hurricanes Gustav, Hanna and Ike



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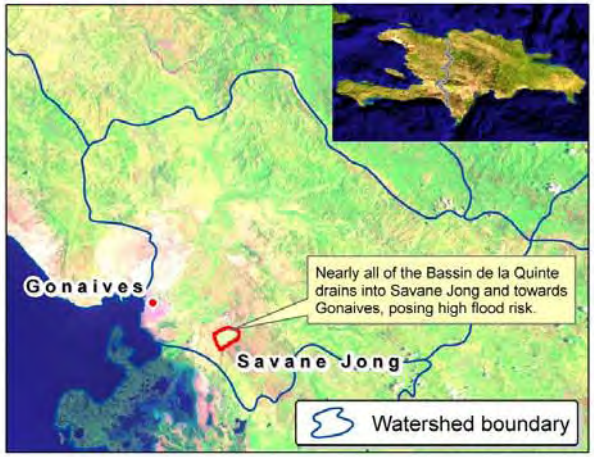
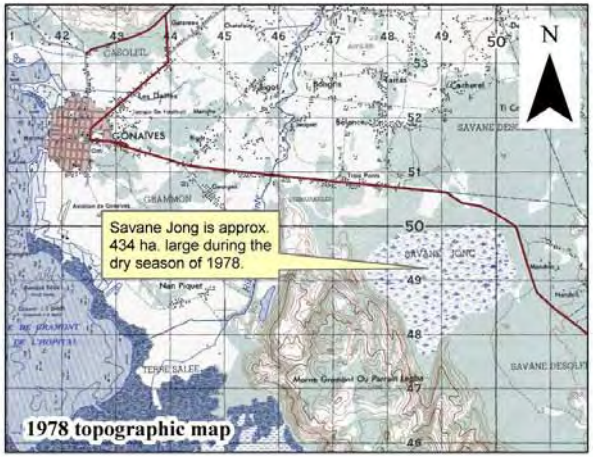
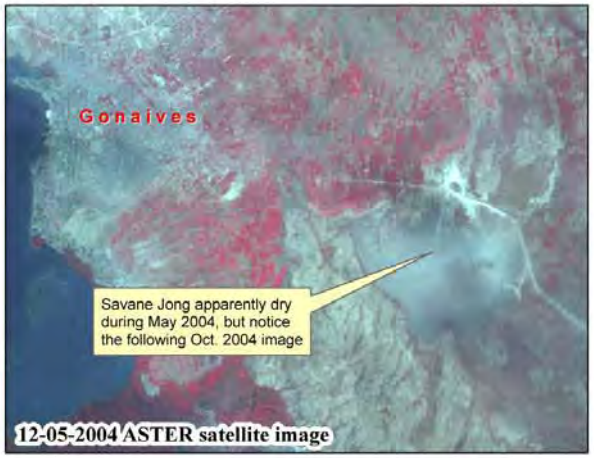
SERVIR CATHALAC NASA USAID FROM THE AMERICAN PEOPLE CCAD

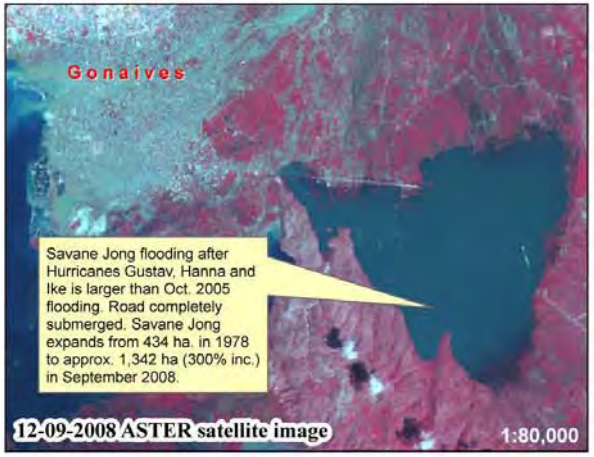
Data sources: JAXA, NASA, NGA, USGS
Flood extent analysis by CATHALAC-DIAD

Flooding Trends in Savane Jong, Gonaives / Haiti: Pre- and Post- Hurricanes Gustav, Hanna and Ike









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Data sources: JAXA, NASA, NGA, USGS
Flood extent analysis by CATHALAC-DIAD

For more info, please visit:
www.servir.net or contact
servir@cathalac.org

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