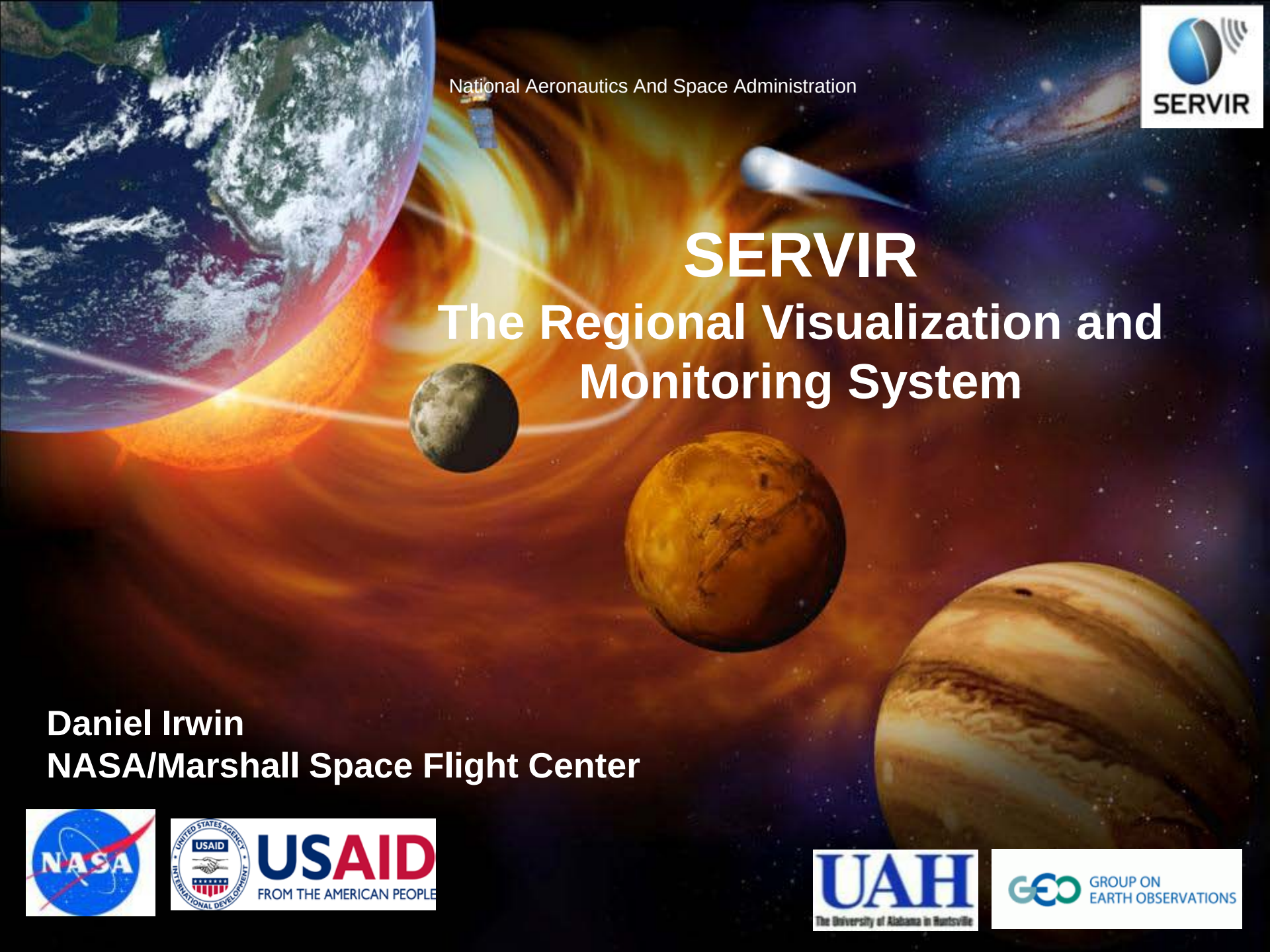
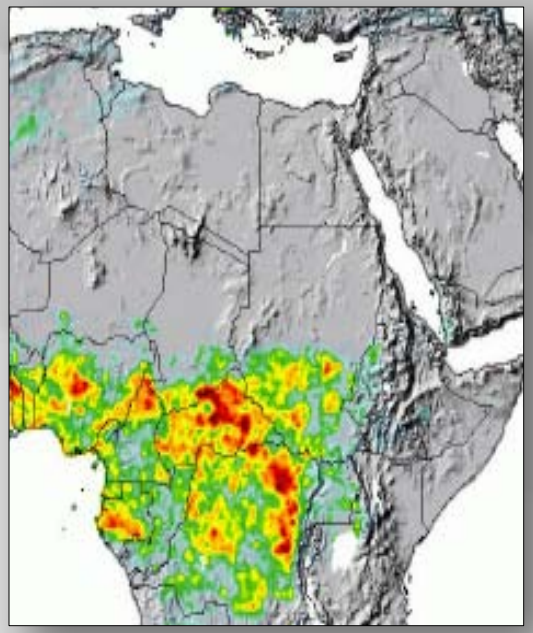

National Aeronautics And Space Administration
SERVIR
SERVIR
The Regional Visualization and Monitoring System
Daniel Irwin
NASA/Marshall Space Flight Center
NASA
USAID
FROM THE AMERICAN PEOPLE
UAH
The University of Alabama in Huntsville
GEO
GROUP ON EARTH OBSERVATIONS

SERVIR

Enabling the use of earth observations and models for timely decision making to benefit society



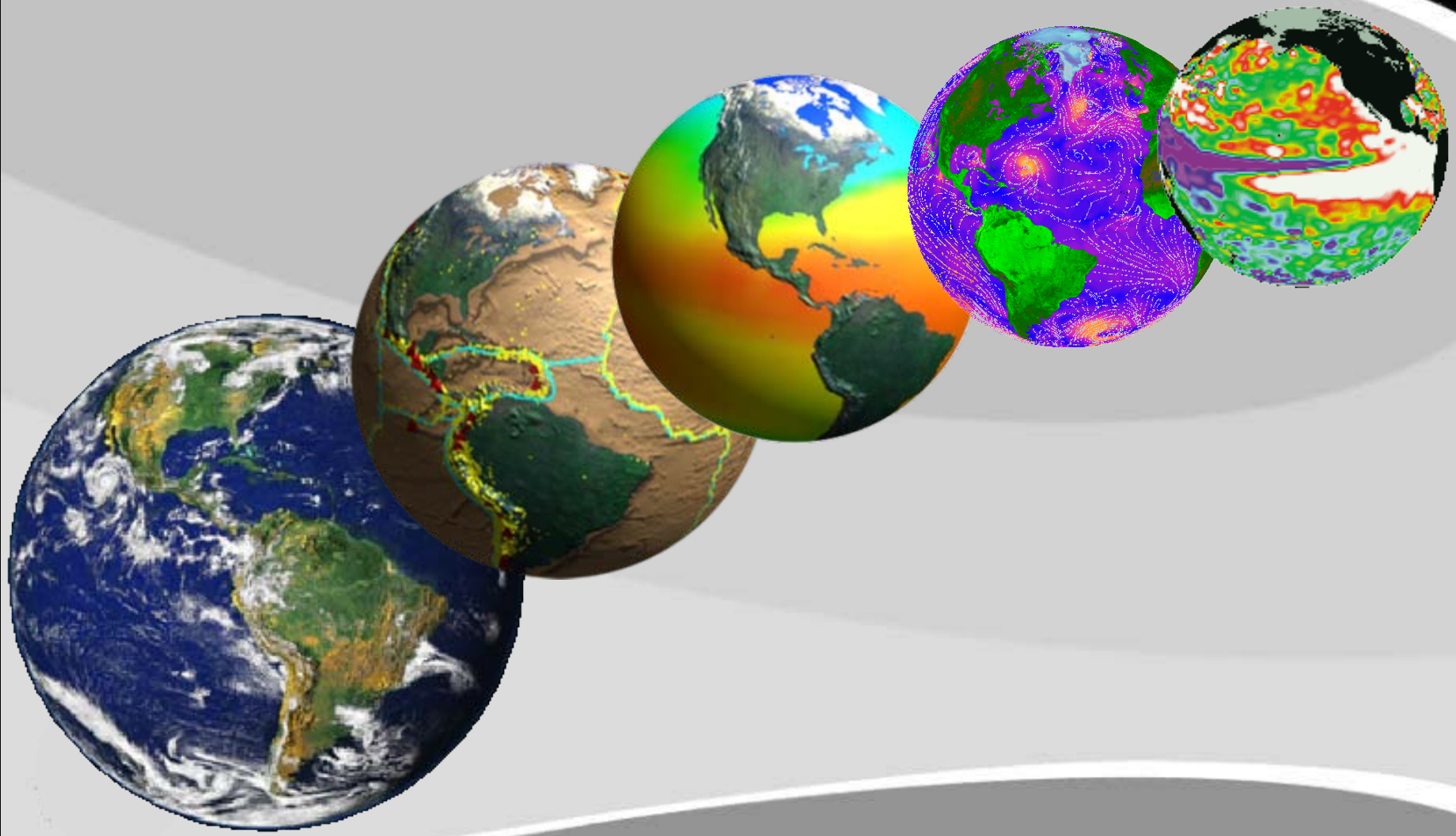
Flood Forecasting in Africa

Training and Capacity Building

Mapping Fires in Guatemala Mexico

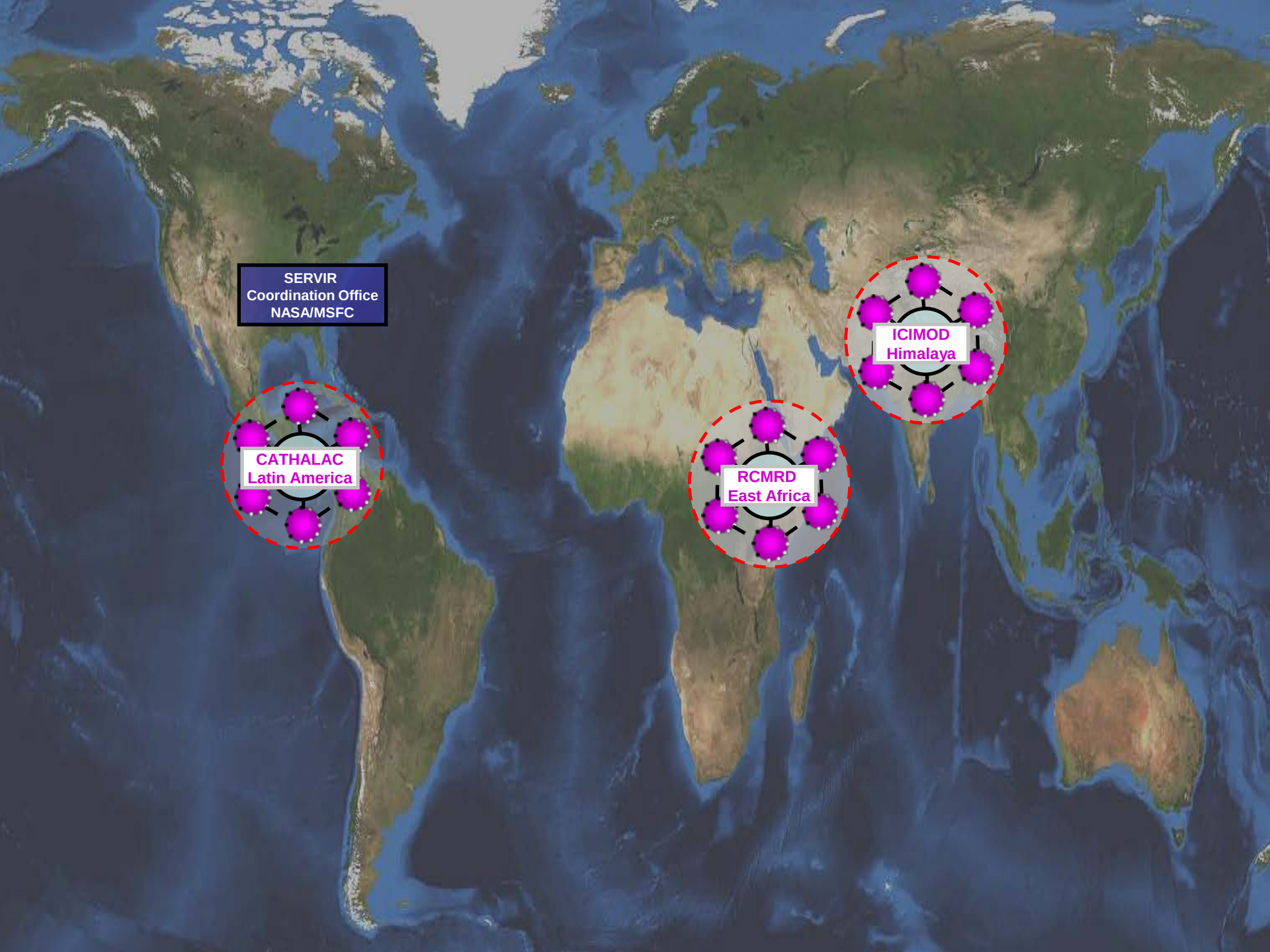
- Data and Models
- Online Maps
- Visualizations
- Decision Support
- Training
- Partnerships

NASA - Pioneering Observations of the Earth



US Agency for International Development

Science and Technology –renewed focus on integrating science, technology, and innovation in the practice of development to solve today's most pressing development challenges around the globe.


SERVIR
Coordination Office
NASA/MSFC
CATHALAC
Latin America
RCMRD
East Africa
ICIMOD
Himalaya

SERVIR-Mesoamerica at CATHALAC

City of Knowledge, Panama

Dedicated on February 3, 2005

SERVIR-Africa @ RCMRD

Nairobi, Kenya

Dedicated on
November 21, 2008

Daniel
Database Mgt
Specialist

Erick
Project Lead
at
RCMRD

Tesfaye
Senior Scientist

Lawrence
RCMRD
Database
Manager

Wafula
IT System
Administrator

Catherine
Remote
Sensing
Analyst

John
Web services
Specialist

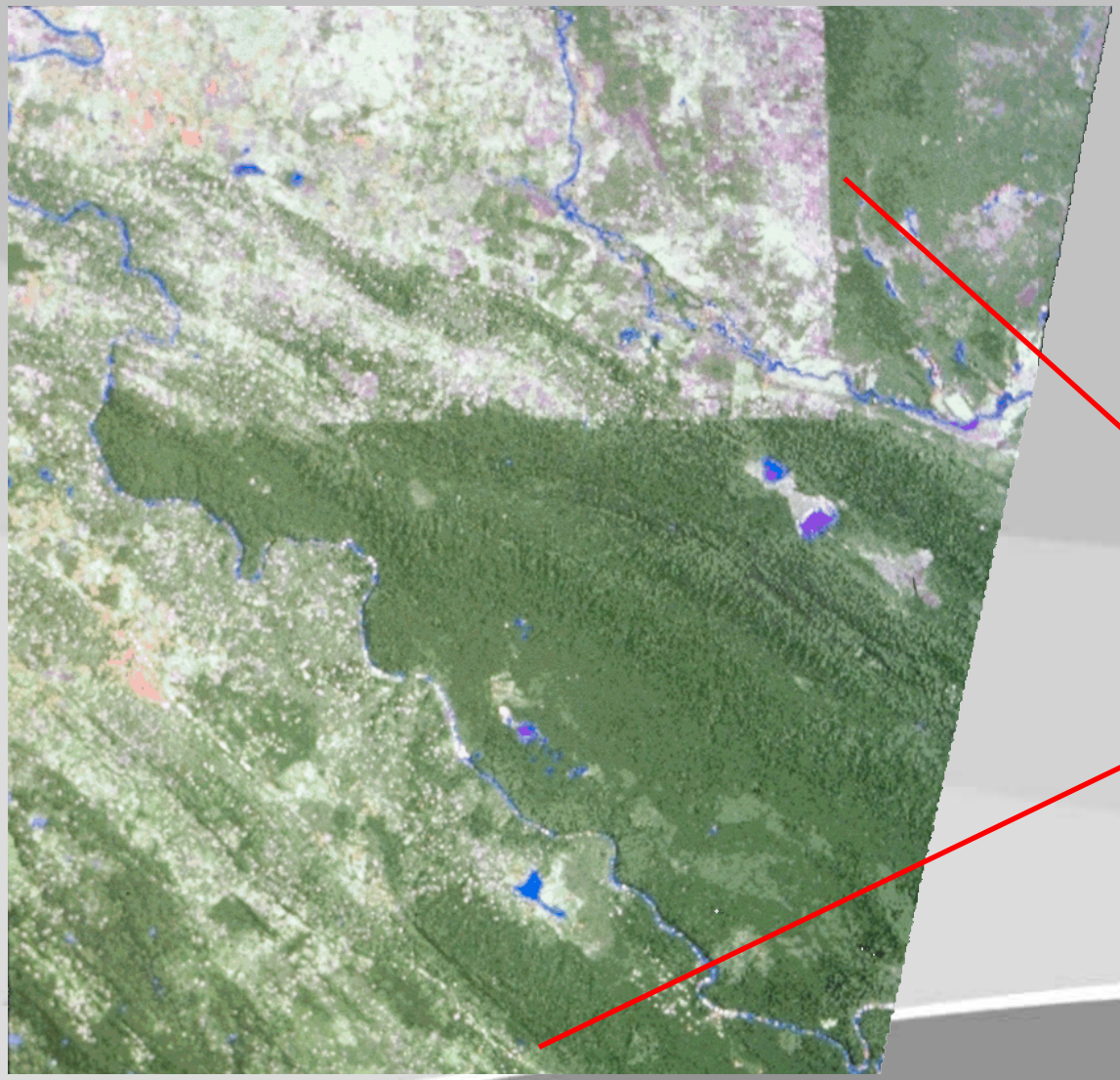
SERVIR-Himalaya @ ICIMOD

Kathmandu, Nepal

Dedicated on
October 5, 2010

ICIMOD

International Boundary…From Space



SERVIR Focus Areas

- Building EO & Geospatial Capacity
- Daily Environmental Information
- Extreme Events
- Land Cover Change

EO & Geospatial Capacity

MyCOE-SERVIR Initiative

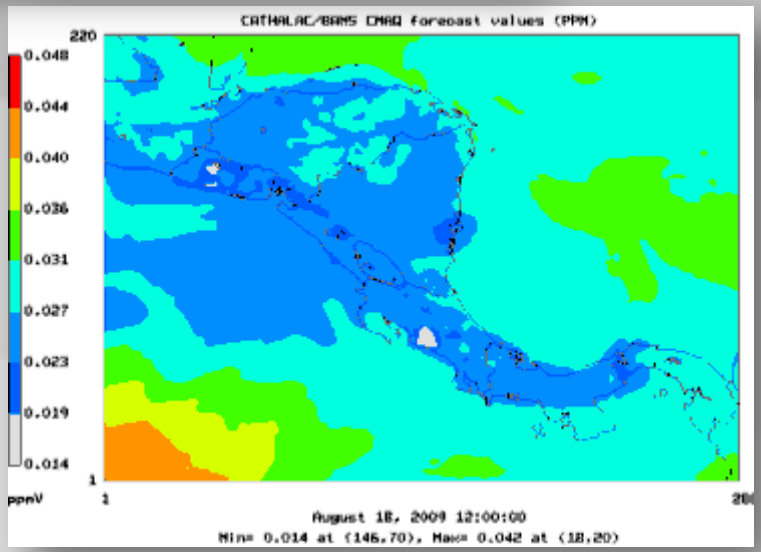
- Building capacity to protect biodiversity using GIS, RS, and geospatial analytical techniques.
- Strengthening collaboration amongst universities, government environmental authorities, and NGOs.
- Students & mentors competitively selected; both receive modest stipends to conduct 6-month long projects and travel support .

Daily Environmental Information

SERVIR Air Quality Modeling

Yesterday

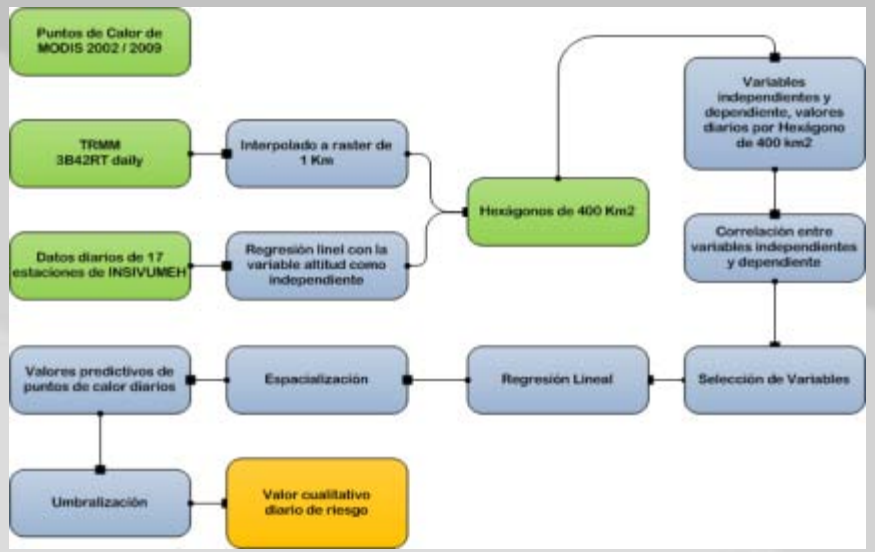
Today

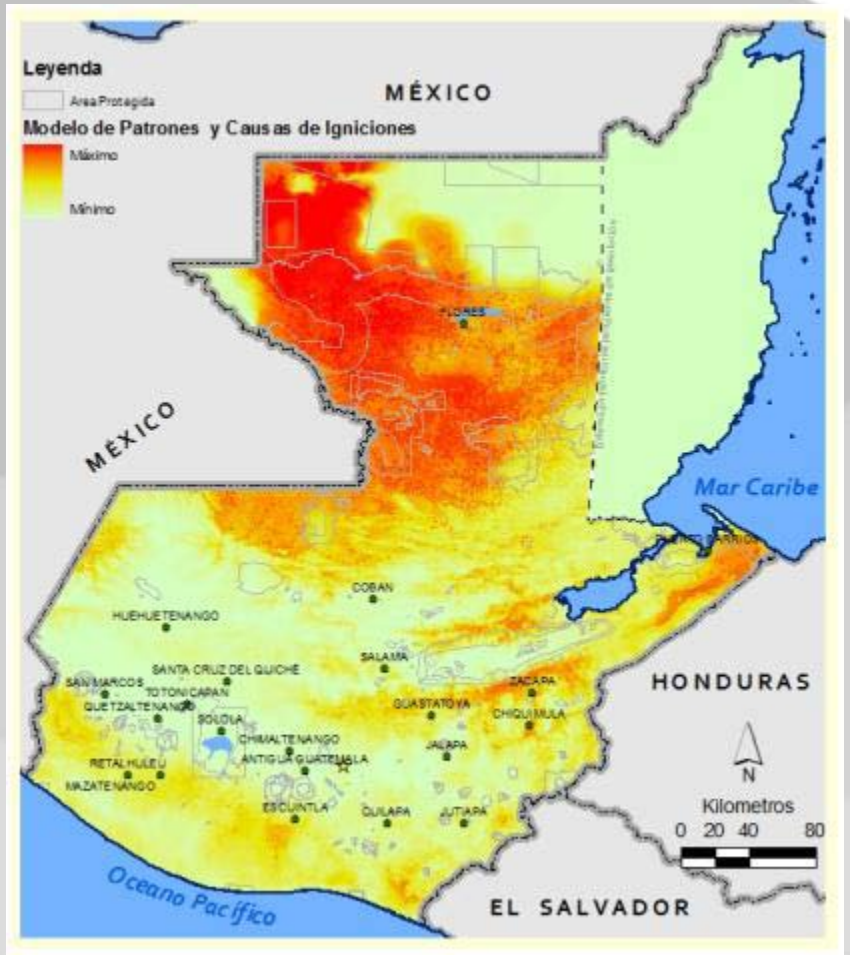


Tomorrow

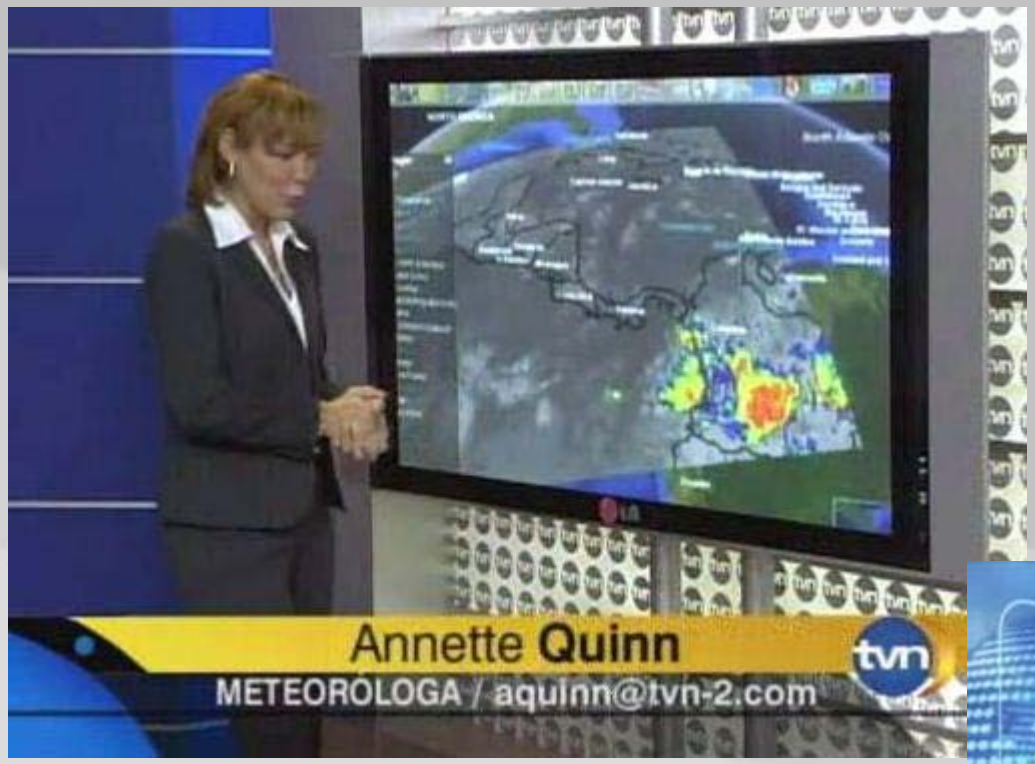
SERVIR Fire Forecasting

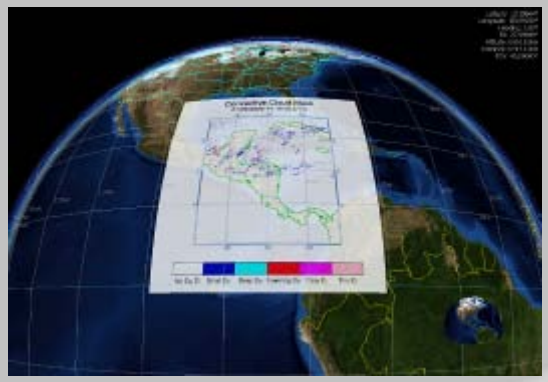
Fire forecasting uses MODIS Rapid Response System, a collaborative effort between GSFC and University of Maryland



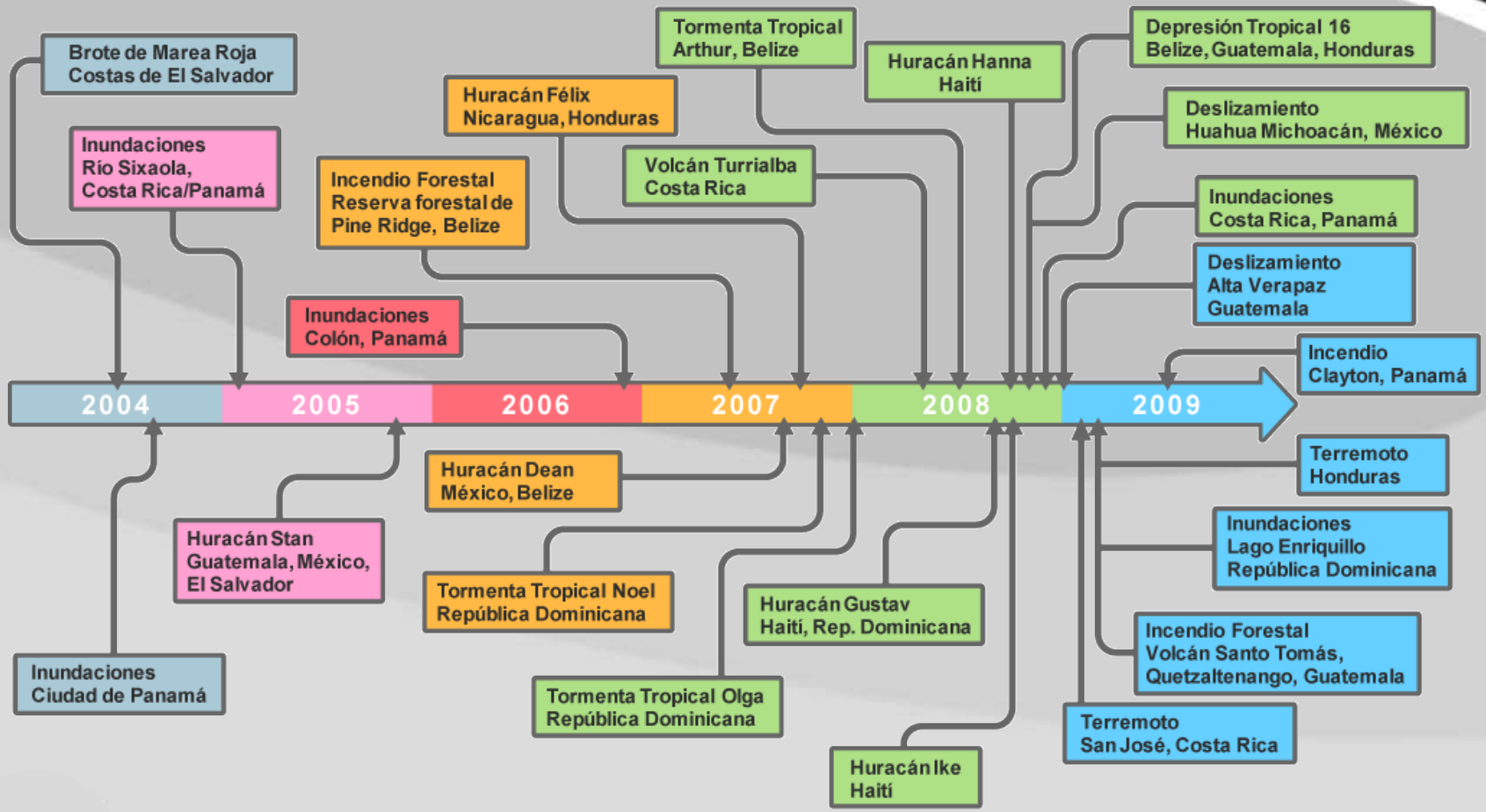


Daily Broadcast: Panama

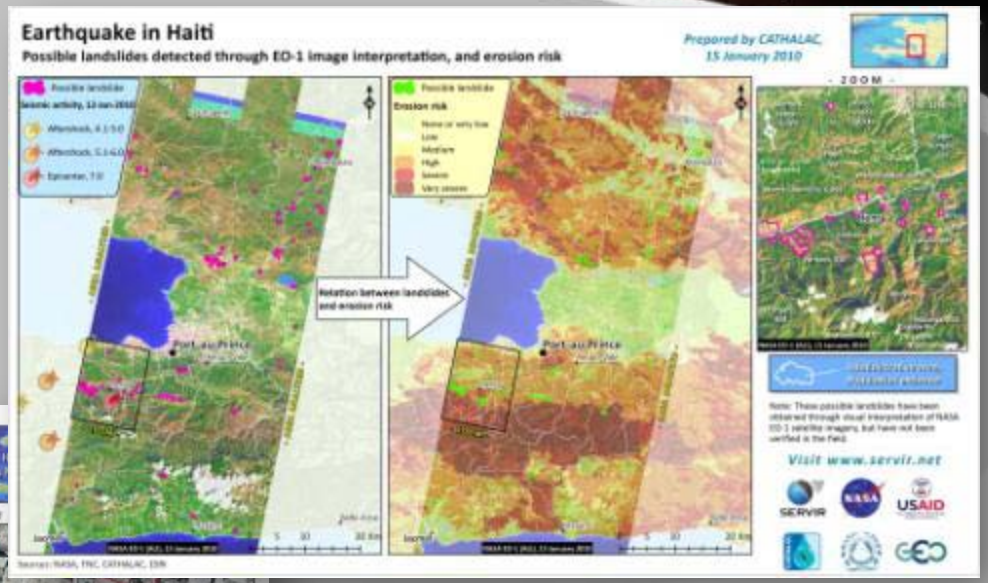


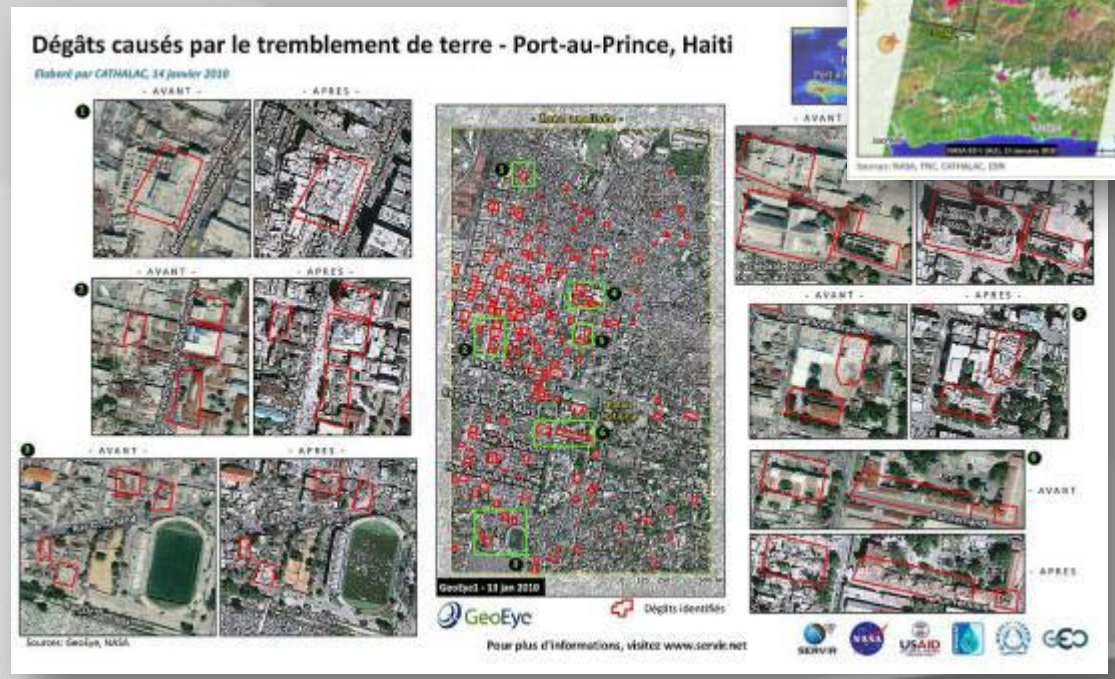


Extreme Events

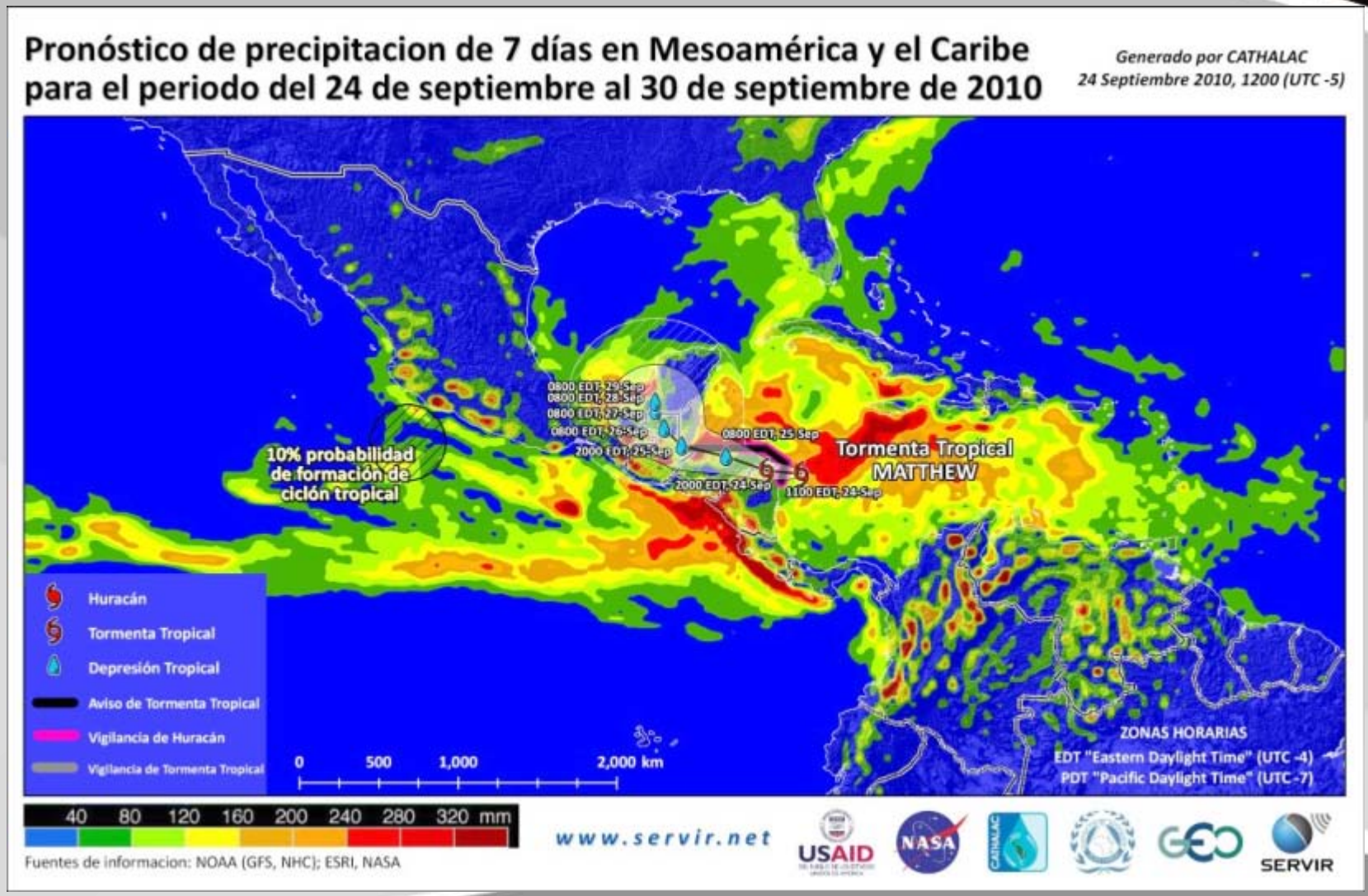

Brote de Marea Roja
Costas de El Salvador
Inundaciones
Río Sixaola,
Costa Rica/Panamá
Incendio Forestal
Reserva forestal de
Pine Ridge, Belize
Inundaciones
Colón, Panamá
Huracán Félix
Nicaragua, Honduras
Tormenta Tropical
Arthur, Belize
Volcán Turrialba
Costa Rica
Huracán Hanna
Haití
Depresión Tropical 16
Belize, Guatemala, Honduras
Deslizamiento
Huahua Michoacán, México
Inundaciones
Costa Rica, Panamá
Deslizamiento
Alta Verapaz
Guatemala
Incendio
Clayton, Panamá
2004
2005
2006
2007
2008
2009
Inundaciones
Ciudad de Panamá
Huracán Stan
Guatemala, México,
El Salvador
Huracán Dean
México, Belize
Tormenta Tropical Noel
República Dominicana
Tormenta Tropical Olga
República Dominicana
Huracán Gustav
Haití, Rep. Dominicana
Huracán Ike
Haití
Terremoto
Honduras
Inundaciones
Lago Enriquillo
República Dominicana
Incendio Forestal
Volcán Santo Tomás,
Quetzaltenango, Guatemala
Terremoto
San José, Costa Rica

Earthquake in Haiti



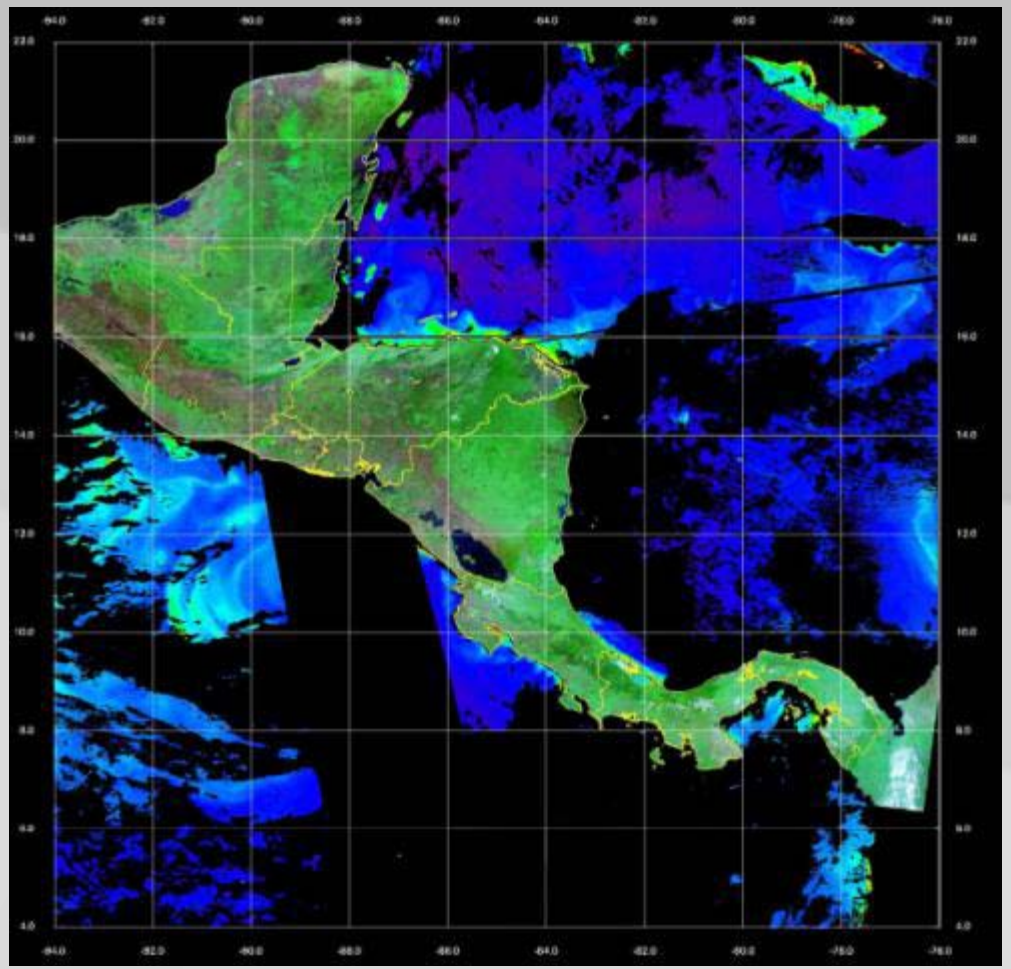


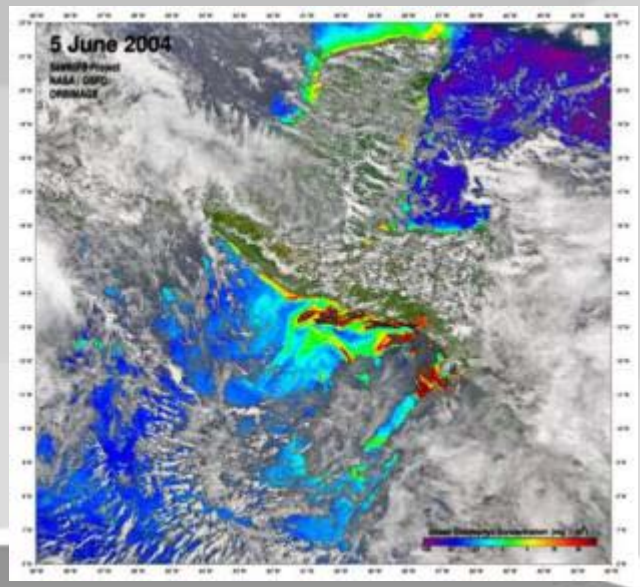
Extreme Events
Rainfall Forecasts for Mesoamerica



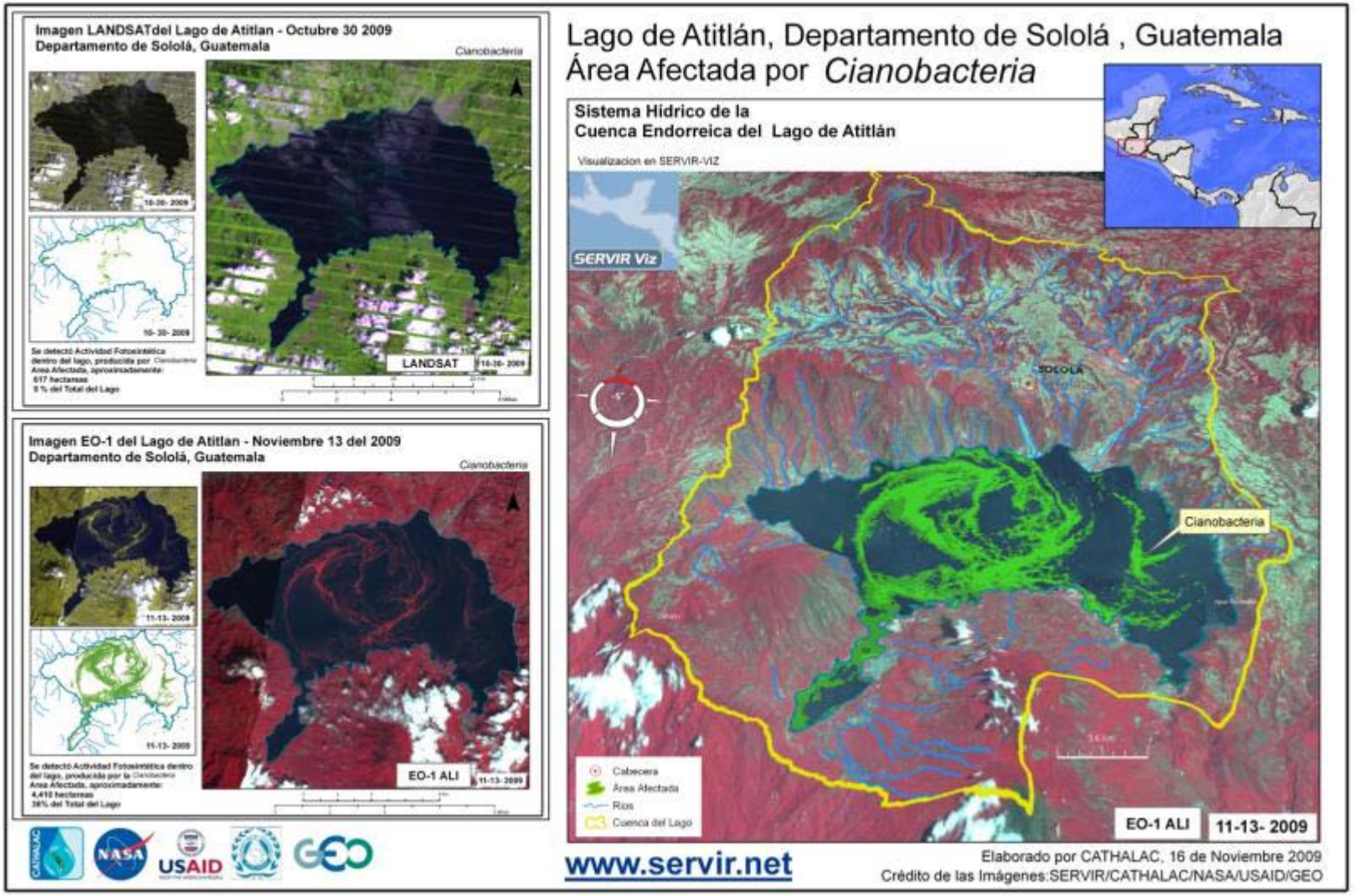
Harmful Algal Blooms

Real time monitoring of Harmful Algal Blooms (HAB) using remotely sensed data products



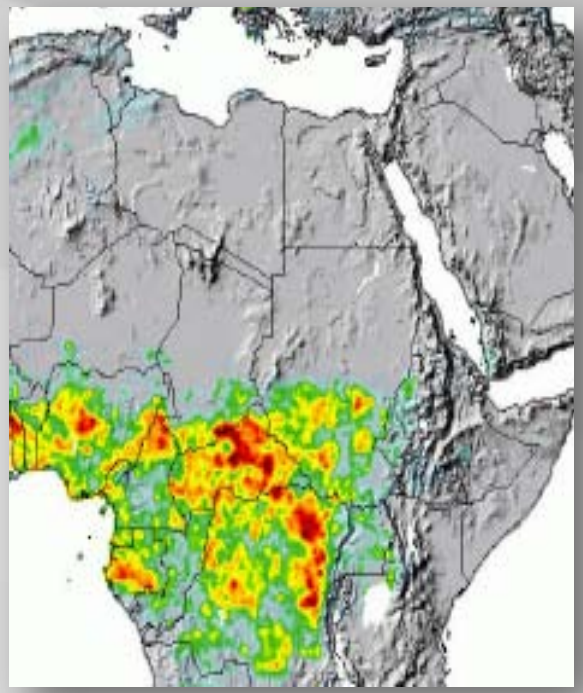


Lake Water Quality
Cyanobacteria Growth



Mapping Flood Potential in Africa

- Using a regional version of the hydrologic model with near-real time precipitation from the 3B42 TRMM rainfall to derive flood potential over a much larger area
- Provides an estimate of expected depth of flood inundation at a 0.25 degree resolution
- Precipitation forecast data can be used with the model to provide longer lead time forecasts



TRMM 3B42 Precipitation

Model

Flood Potential

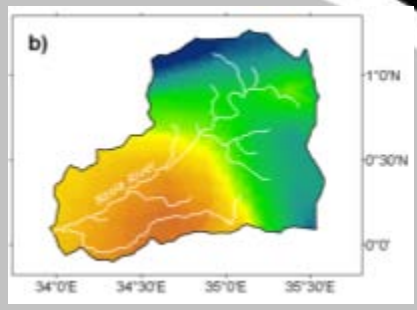
SERVIR Hydrologic Modeling

Spatially distributed hydrologic model CREST is developed by University of Oklahoma

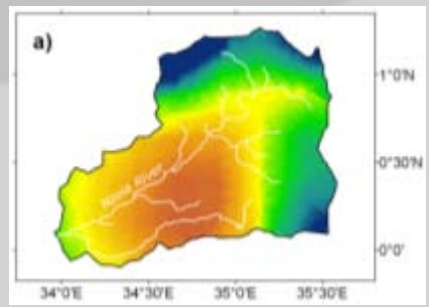
Based on Variable Infiltration Capacity (VIC)

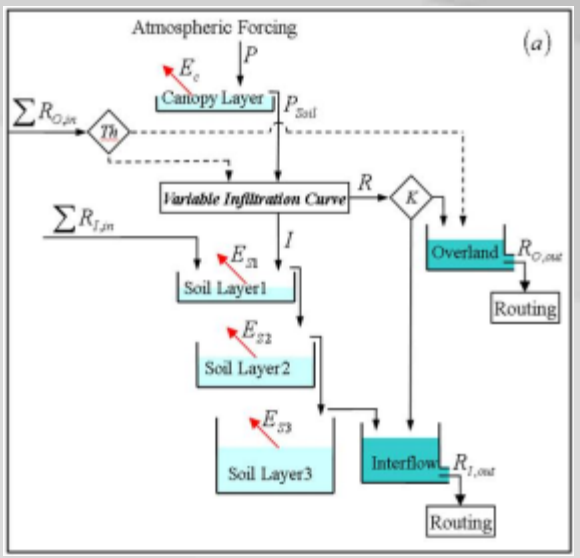
Spatial resolution ~1km

Uses near real-time 3B42 TRMM rainfall estimates to produce soil moisture, evapotranspiration and streamflow

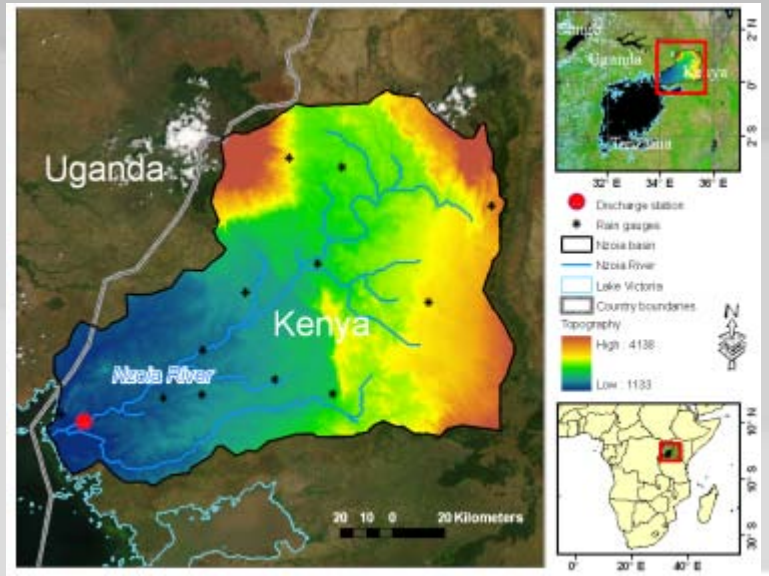


Modeled Evapotranspiration

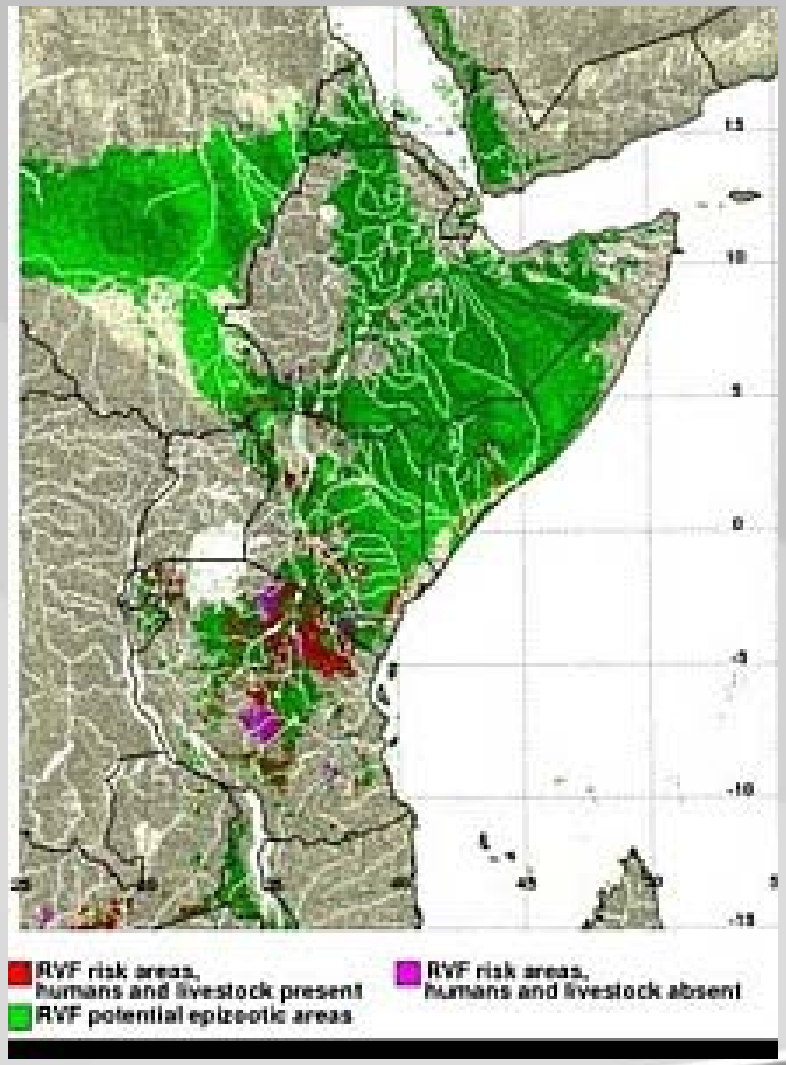




Nzoia River in the Lake Victoria Basin

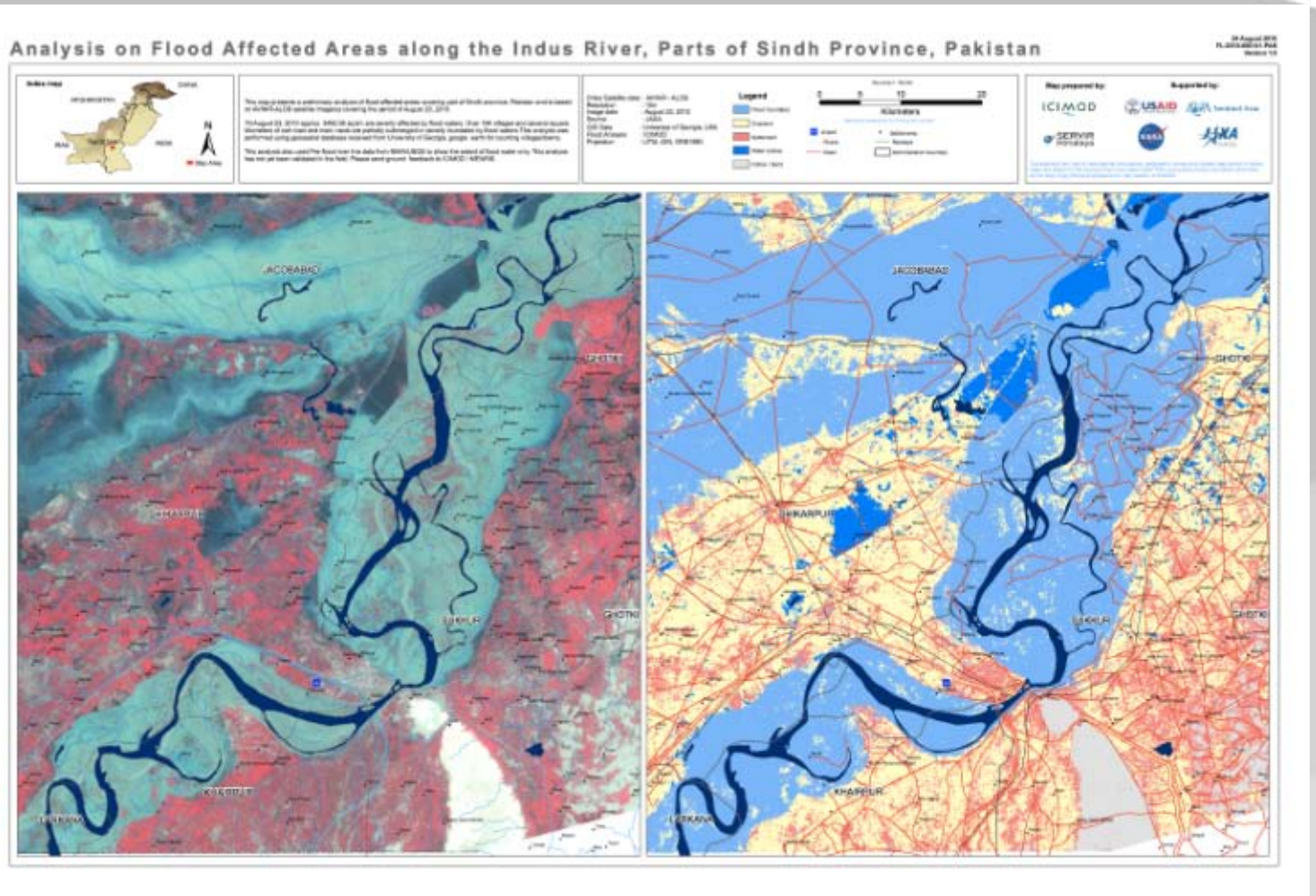


Rift Valley Fever in Africa



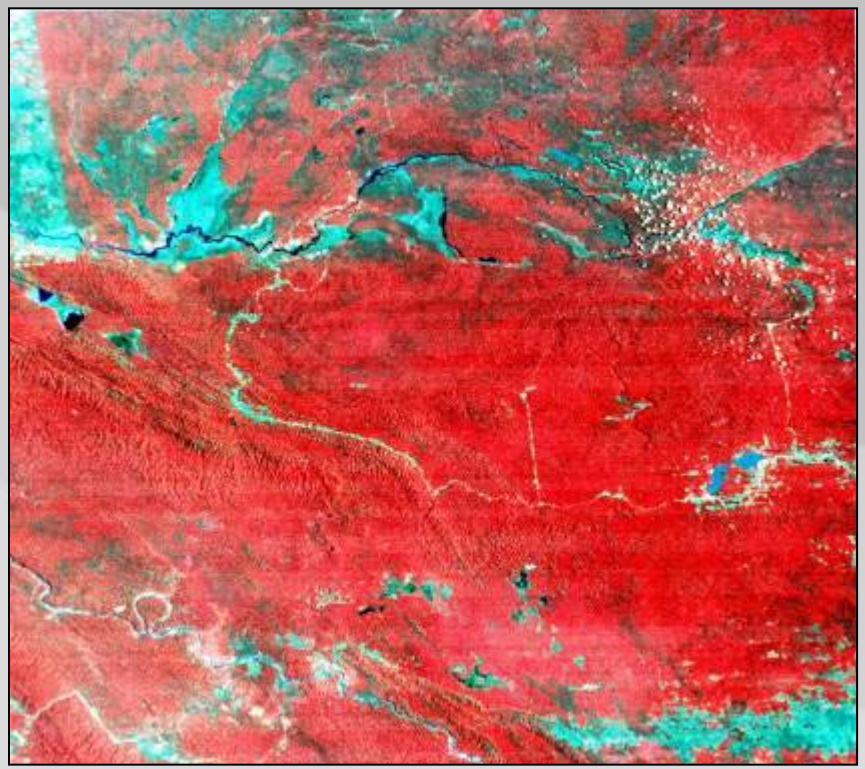
Rift Valley Fever Risk Mapping using AVHRR data and flooding potential maps

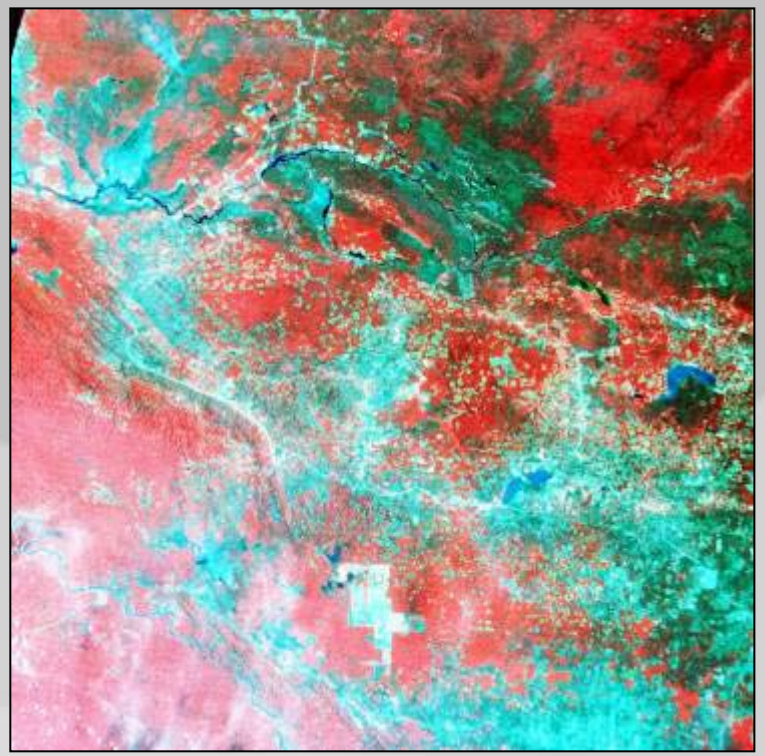
Flooding in Pakistan



Land Cover Change

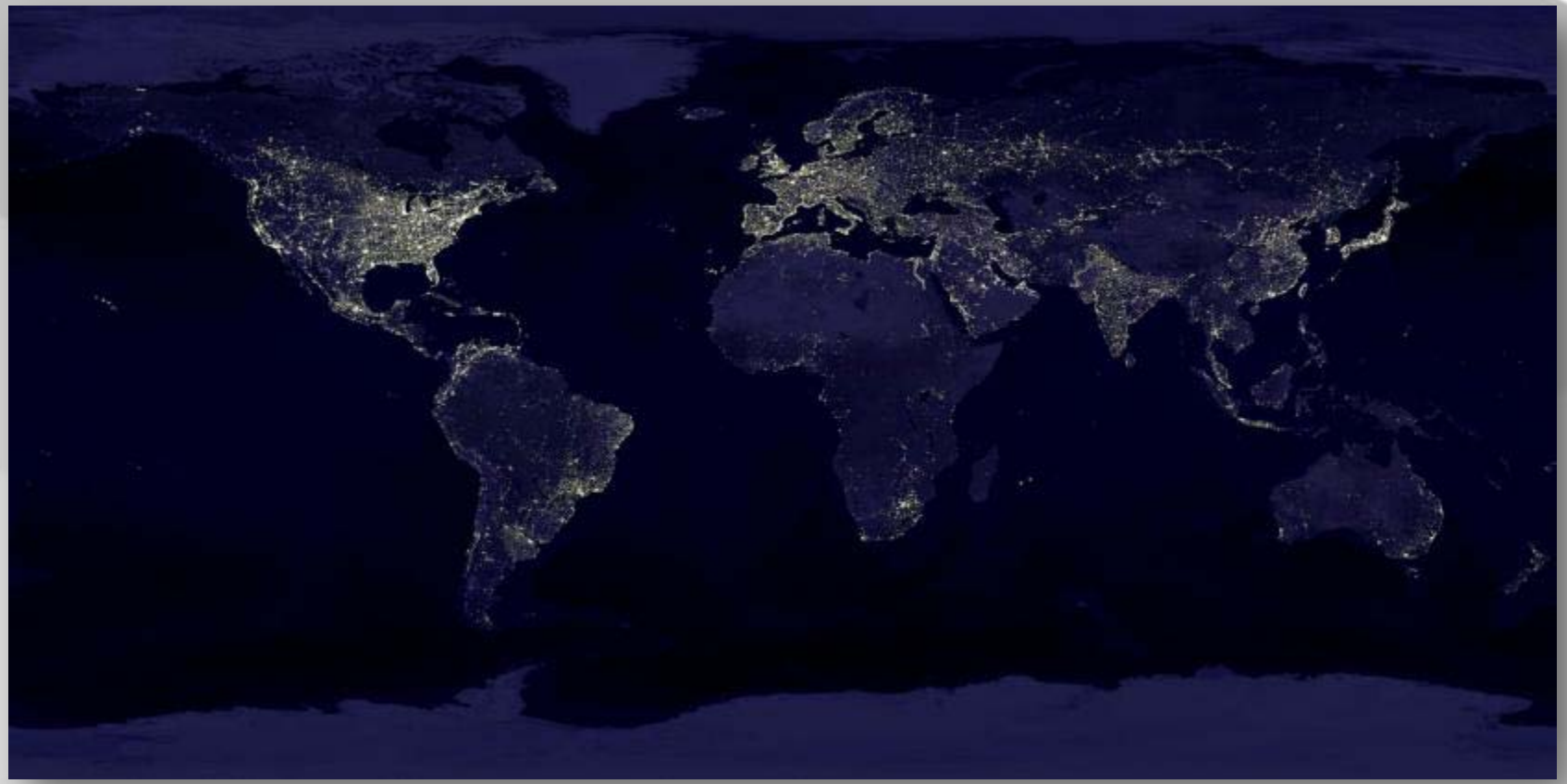
Landcover Change





Peten, Guatemala
(1986-1995)

Lights at Night



Areas of High Carbon Stocks & Deforestation

FOREST COVER AND DEFORESTATION IN BELIZE: 1980-2010

EMIL A. CHERRINGTON[1], EDGAR EK[2], PERCIVAL CHO[3], BURGESS F. HOWELL[4], BETZY E. HERNANDEZ[1], ERIC R. ANDERSON[1], AFRICA I. FLORES[1], BESSY C. GARCIA[1], EMILIO SEMPRIS[1], AND DANIEL E. IRWIN[4]

[1] Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC), Panama
[2] Land Information Centre (LIC), Lands & Surveys Department, Ministry of Natural Resources and the Environment, Belize
[3] Forest Department, Ministry of Natural Resources and the Environment, Belmopan, Belize
[4] Marshall Space Flight Center, National Aeronautics & Space Administration (NASA MSFC), USA

July 2010

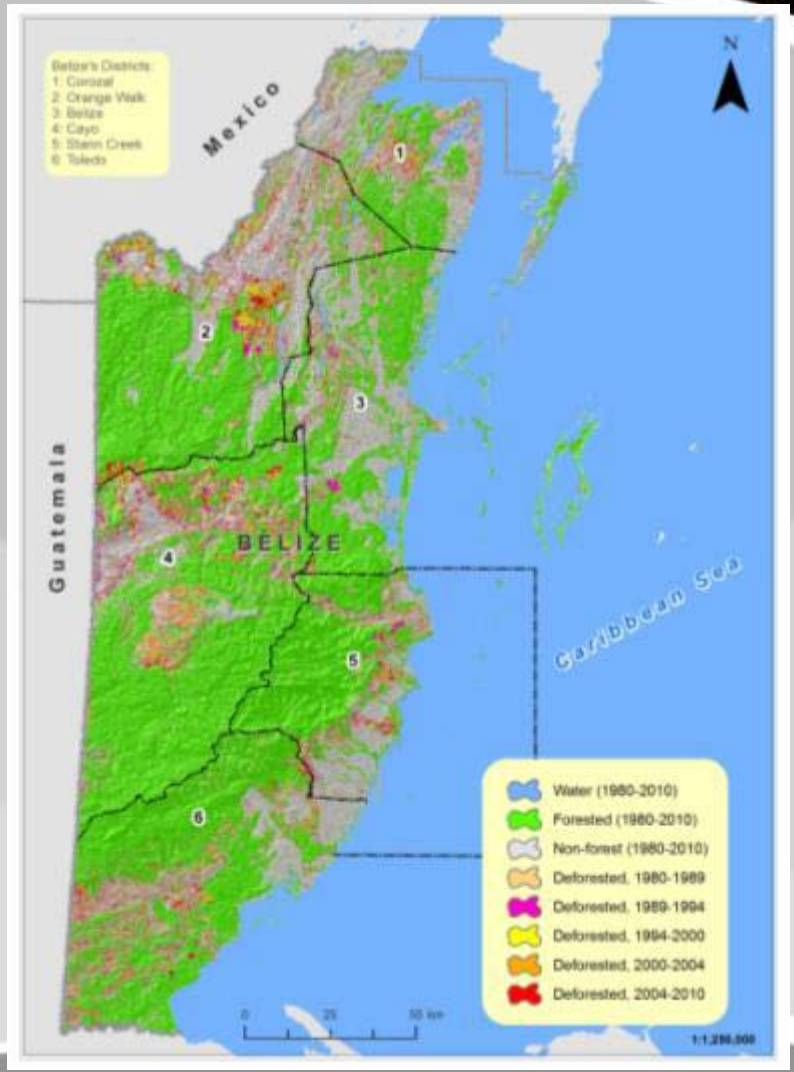
Abstract: Making use of a thirty year archive of satellite imagery available through the Regional Visualization & Monitoring System (SERVIR), the forest cover of Belize was analyzed at the national level, providing information never before available on deforestation rates in the Central American nation with the highest relative forest cover. A multi-temporal maximum likelihood classification was conducted on satellite image mosaics for the years 1980, 1989, 1994, 2000, 2004, and 2010, putting to use part of the extensive archive of data collected by the Landsat series of satellites since July 1972. The results of this assessment adjust down previous estimates of Belize's deforestation rate, such as the UN Food & Agriculture Organization (FAO)'s estimate of ~89,000 acres / year (2.3%). This study assesses Belize's deforestation rate between 1980 and 2010 to be under 25,000 acres / year (0.6%). Additionally, where estimates of Belize's forest cover have ranged widely, from 79% (Fairweather & Gray 1994) to 61.6% (Meerman et al 2010), this study estimates that the country's forest cover declined from approximately 75.9% in 1980 to 62.7% as of February 2010. With a short turn-around time between image acquisition and production of forest cover data, this study demonstrates SERVIR's capacities for rapidly converting satellite data into information. The information presented here is intended to be of use as an input to processes ranging from Reducing Emissions from Deforestation & Forest Degradation (REDD) to the UN Millennium Development Goals to national implementation of the Global Program of Action to Protect the Marine Environment from Land-based Activities.

Key words: Belize, forest, deforestation, land cover, remote sensing, CATHALAC, SERVIR, TROPICARMS

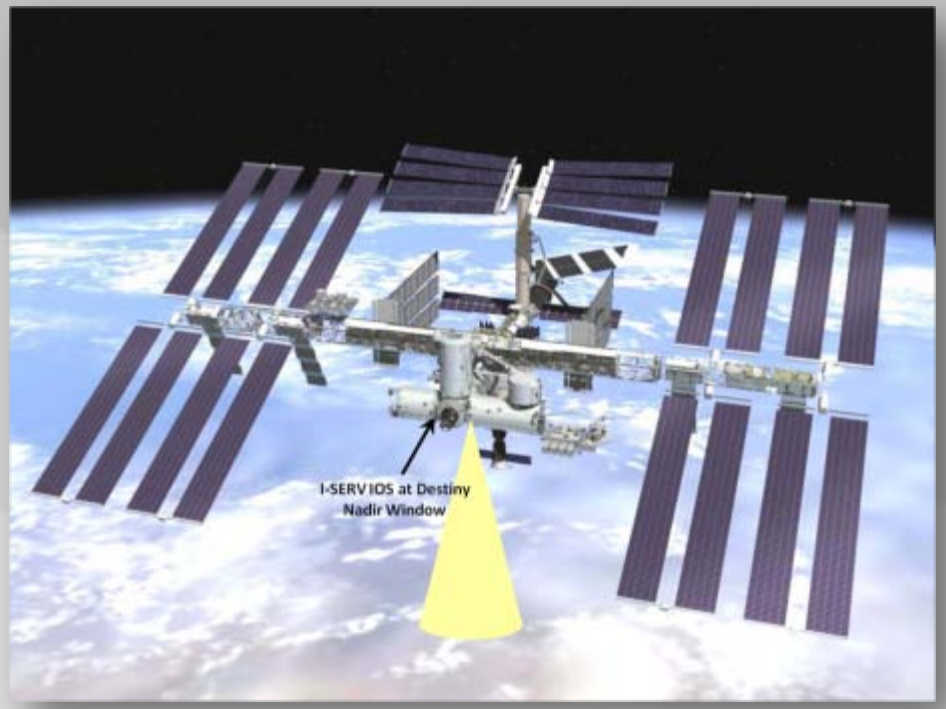
The Mesoamerican *Regional Visualization & Monitoring System (SERVIR* in Spanish, see www.servir.net) was formally launched in February 2005 at the Water Center for the Humid Tropics of Latin America & the Caribbean (CATHALAC) in Panama, in direct response to the expanded CONCAUSA agreement between the Governments of Central America and the USA. The system is jointly implemented by CATHALAC, NASA, the U.S. Agency for International Development (USAID), and various other partner institutions (Stokes 2007). As a platform for monitoring and forecasting Mesoamerica's land surface, oceans, and atmosphere, the system has provided the region with free and open access to a large archive of satellite imagery previously inaccessible because of cost. In providing products and datasets on the region's changing landscape, SERVIR has also supported monitoring of the land cover at the regional, national, and sub-national scale since its inception. This study – in supporting Belize's Ministry of Natural Resources and the Environment (MNRE) – examines national forest cover dynamics for the years 1980, 1989, 1994, 2000, 2004, and 2010, and the periods in between.

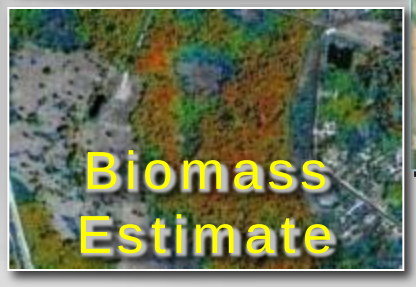
I. BACKGROUND

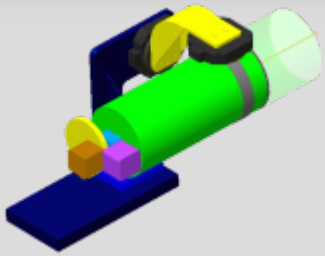
Various documents, ranging from the 1984 *Belize Country Environmental Profile* to the more recent 2010 United Nations Environment Programme (UNEP)-funded *GEO Belize* national



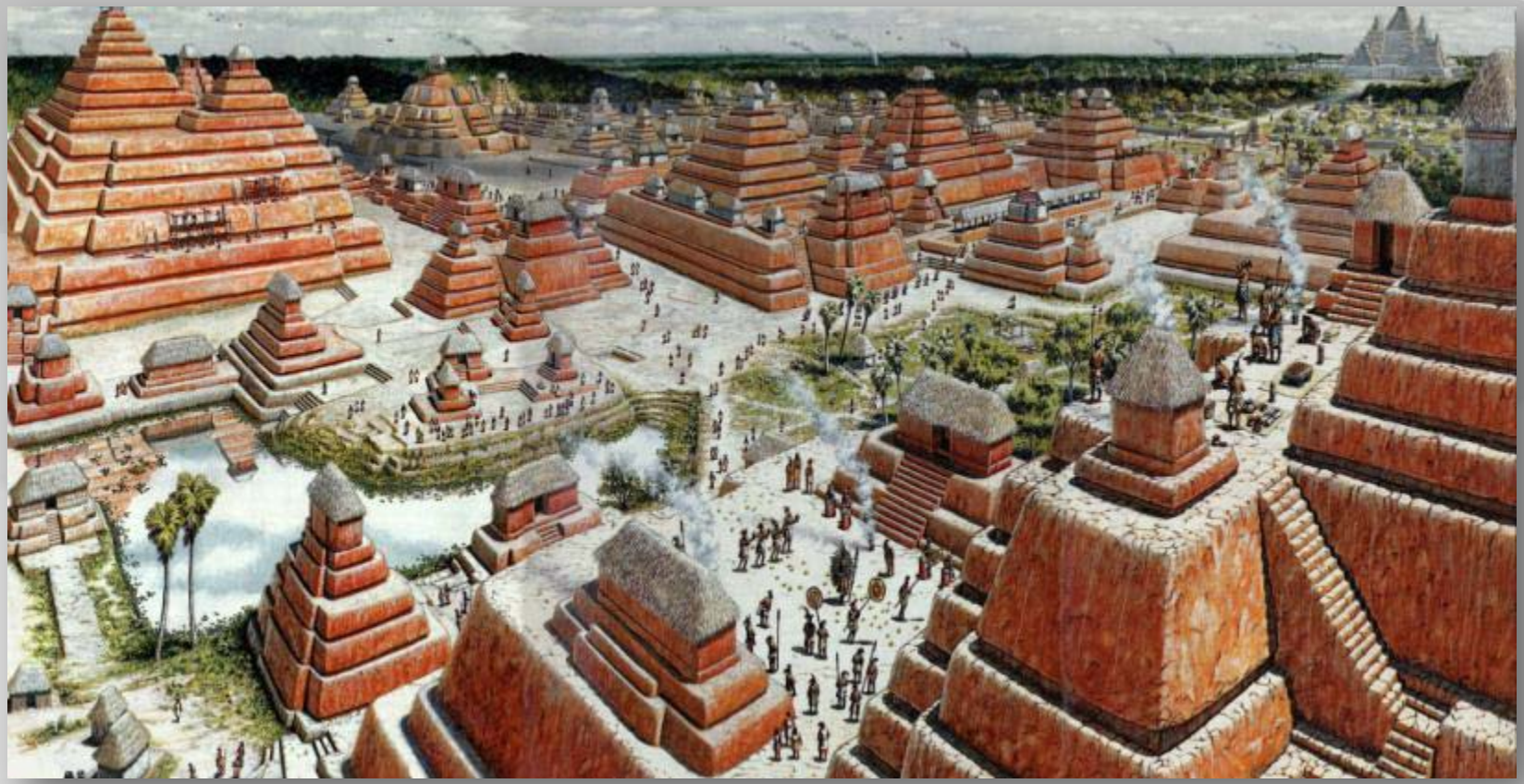
Space Station Utilization







Maya Civilization and Climate Change



“We have not inherited the earth from our fathers, we are borrowing it from our children.”