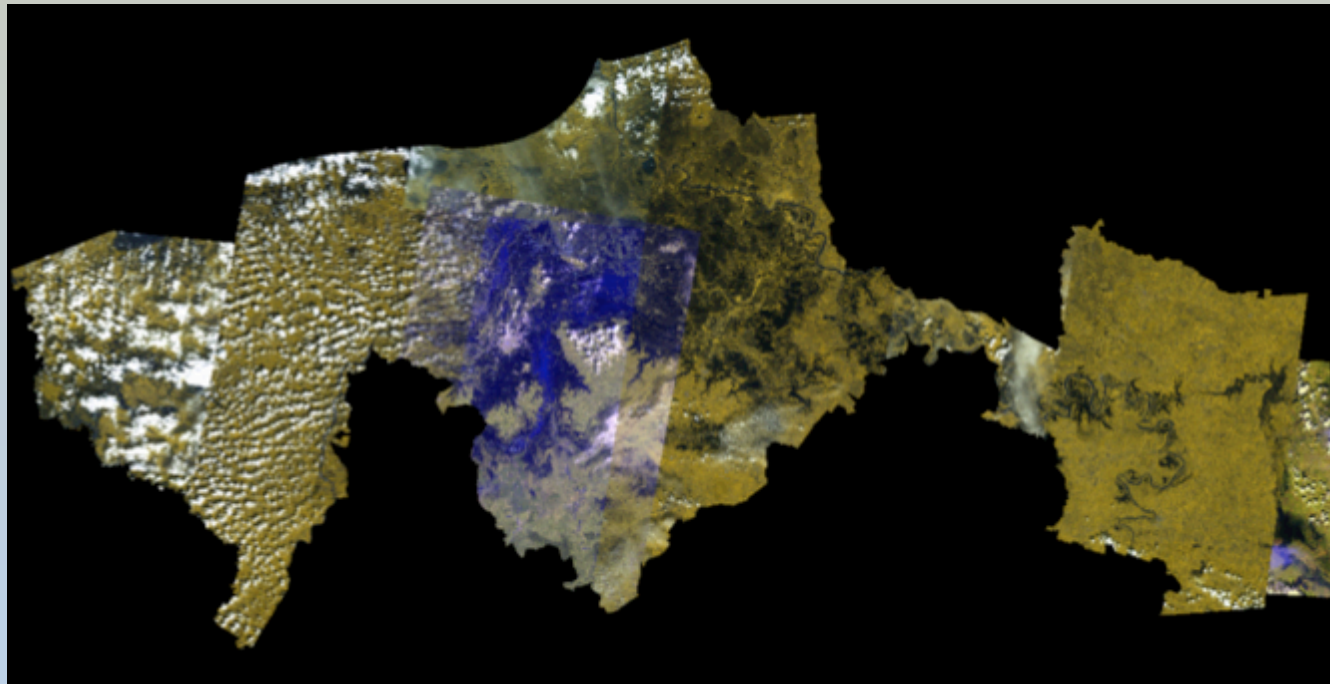


AEM

AGENCIA  
ESPACIAL  
MEXICANA

# Remote sensing applications for the mitigation of floods in Mexico (Tabasco case, 2007)



Global Solutions for the Challenges of  
Sustainable Development in Societies at Risk  
UN-SPIDER

Bonn, Germany, 27 May 2015

# Background

- Mexico's geographical location makes it susceptible to these type of natural disasters, in particular the southeastern territories (becoming more frequent since the last decade)
- Particularly in the southeastern region (tropical evergreen forest and wetlands).
- **Isthmus of Tehuantepec**: was the shortest route between the Gulf of Mexico and the Pacific Ocean before the Panama Canal was opened
- States of Oaxaca, Chiapas, Tabasco & Veracruz
- Plus, the Yucatan Peninsula (Yucatan, Campeche & Quintana Roo)
- Affected by hurricanes, cold fronts and tropical storms...



**Flood vulnerability**

Gulf of Mexico

PACIFIC OCEAN

## Particularly in Tabasco...


- 2007, 2008 & 2009 during October & November, every year
- In 2007, 80% of the territory was severely affected by floods
- The floods were the result of a series of weather events that caused the fall of more than 1000 mm of rain in less than four days ! (average 2000 mm per year)
- Affected  $\approx$ 1 million people



# CONTEXT

- Development asymetries between countries
- Emerging economy / developing country...
- Currently WE don't have our own EO system
  - "...The potential of EO is enormous..."
  - ..."The use of data from Space makes a HUGE difference..." Lord Mayor Jürgen Nimptsch, City of Bonn

## THEREFORE...

A satellite view of Earth from space, showing the Americas and surrounding oceans. The text "INTERNATIONAL COOPERATION!" is overlaid in red.

**INTERNATIONAL  
COOPERATION!**



# National Level:

SEGOB  
SECRETARÍA DE GOBERNACIÓN



SISTEMA NACIONAL DE  
PROTECCIÓN CIVIL  
MÉXICO



CENAPRED  
MÉXICO

# International Level:



Dartmouth  
Flood Observatory



- A particular useful tool in these cases is remote sensing; flood mapping and crop and infrastructure damage assessment are just two examples of the possible applications
- In the aftermath, these satellite imagery were also used to corroborate the areas of affectation when the farmers of this location claimed their insurances against disasters.

- The success of flood mapping set the tone for management of the forthcoming floods (2008,2009 y 2011)
- Same tool and methodology was used at the flooding aftermath to prevent a larger disaster
- The most vulnerable spots were detected and there was more time to evacuate population from high risk areas
- Improvement of dam control in the state
- Remote sensing and satellite imagery were used to develop accurate cartography that helped in the visualization of the impact

# Products...

- **Flood mapping:** developed by Dartmouth Flood Observatory (University of Dartmouth, Hanover, New Hampshire, USA; Using imagery from ASTER & TERRA satellites.
- Risk assesment developed by the German Aerospace Center Deutsches Zentrum für Luft- und Raumfahrt e.V., (DLR) using TerraSAR-X satellites in Germany
- Satellite imagery by SPOT, also developed by DLR.

# DFO Event # 2007-213 - Mexico - Tabasco - Rapid Response Inundation Map 1

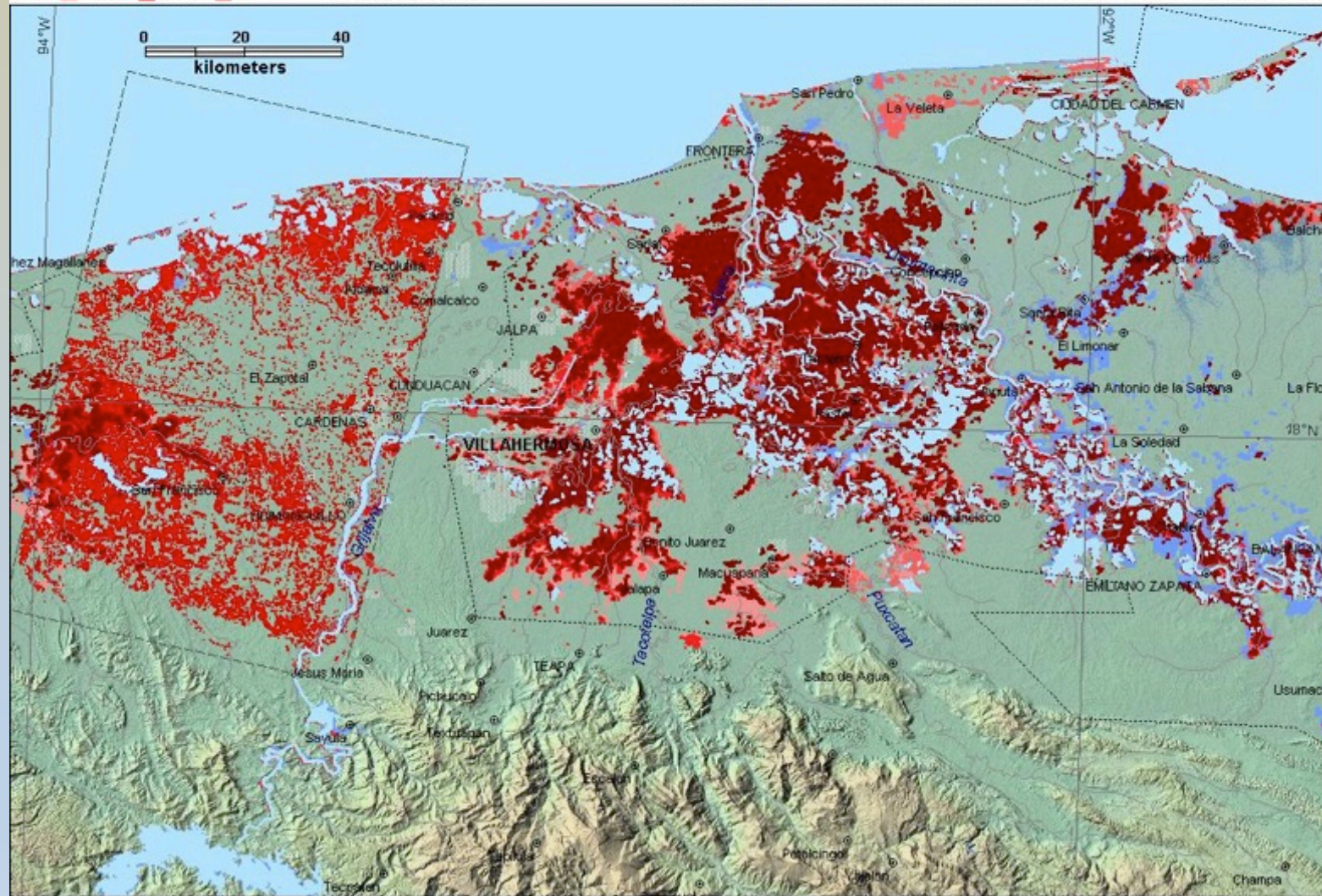
ALOS PALSAR\* flood inundation limit November 8, 2007: ■  
\* ALOS PALSAR data obtained by CATHALAC through the International Charter "Space and Major Disasters"  
 MODIS flood inundation limits  
 November 10, 2007: ■  
 November 6: ■ Nov 5: ■ Nov 3: ■

GLIDE#: FL-2007-000200-MEX

SRTM SWBD reference water: ■  
 DCW Rivers: — Urban Areas: ■  
 Maximum Observed Inundation Limit  
 1999 - 2005: ■

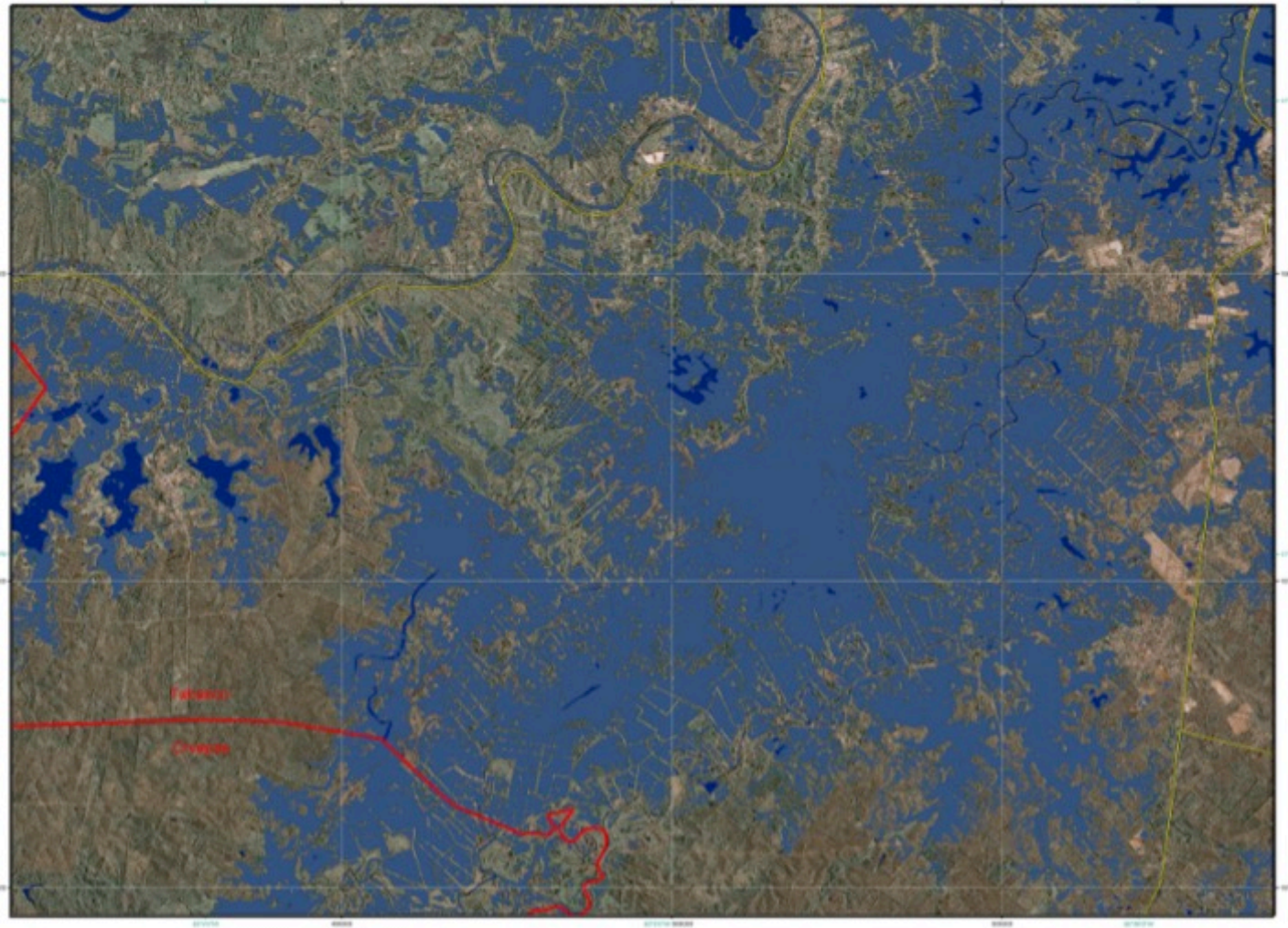
Universal Transverse Mercator  
 UTM Zone 16 North  
 WGS 84 - Graticule: 2 degrees  
 Shaded Relief from SRTM data

Copyright 2007  
 Dartmouth Flood Observatory  
 Dartmouth College  
 Hanover, NH 03755 USA  
 Elaine K. Anderson, G. R. Brakenridge

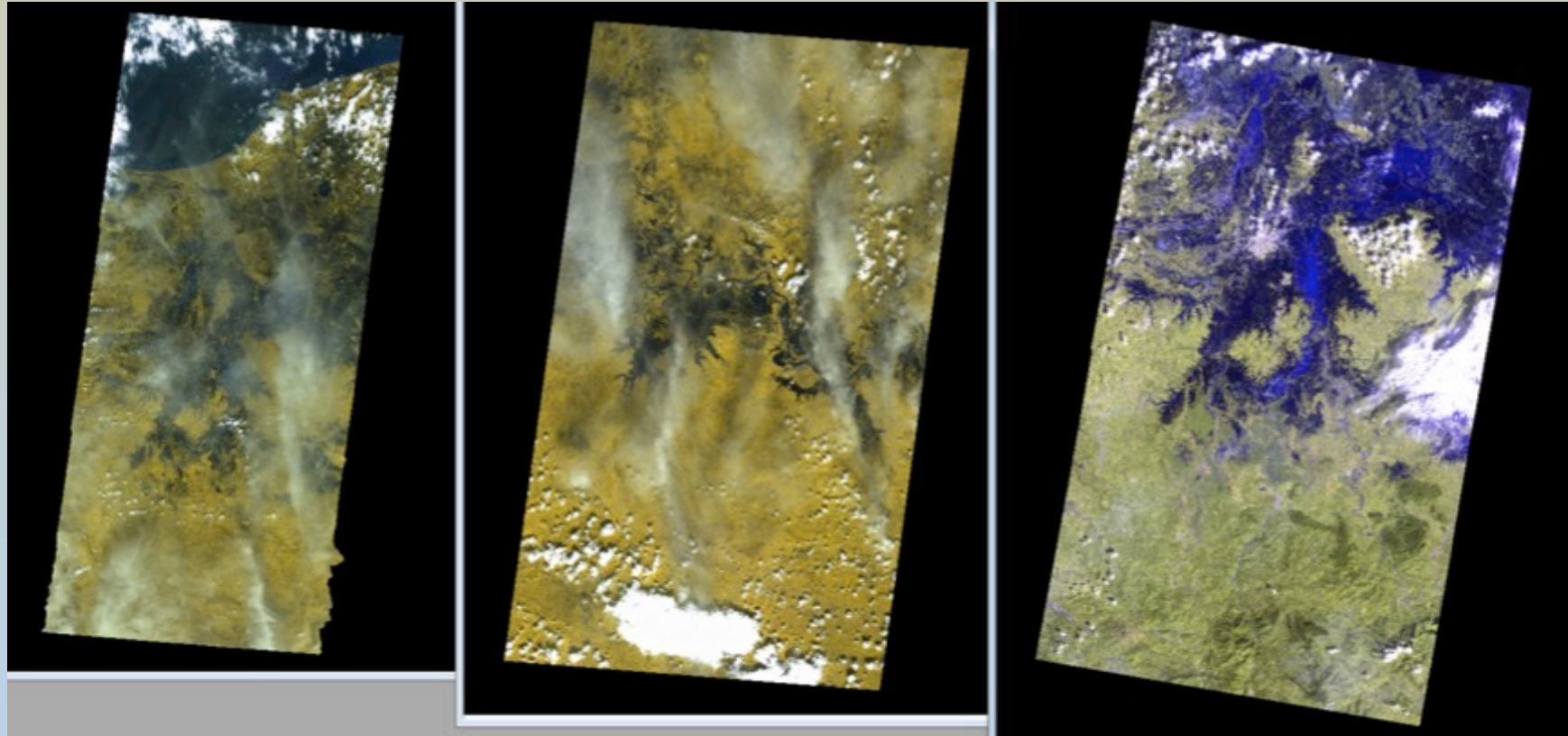


DFO imagery

MEXICO - Tabasco - Flood Situation around Villahermosa - November 6, 2007 - Map 3 (South) 1:30.000



TerraSAR-X



SPOT

The full case study will be available in  
Spanish & English version  
(within two weeks)

@

[www.aem.gob.mx/internationalaffairs.gob.mx](http://www.aem.gob.mx/internationalaffairs.gob.mx)



# Thank you !

Julio Castillo  
Director of Space Security  
[castillo.julio@aem.gob.mx](mailto:castillo.julio@aem.gob.mx)