BIG DATA NETWORK

CUDI 2015

REUNIÓN DE PRIMAVERA

21 AL 24 DE ABRIL

Puerto Vallarta, Jal.

CIIMAR GOMC

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe (CiiMAR-GoMC)

Porfirio Alvarez-Torres, PhD.

alvarez.porfirio@gmail.com

Executive Secretary

CiiMAR-GoMC

Puerto Vallarta, Jalisco, 23 Abril 2105

cudi

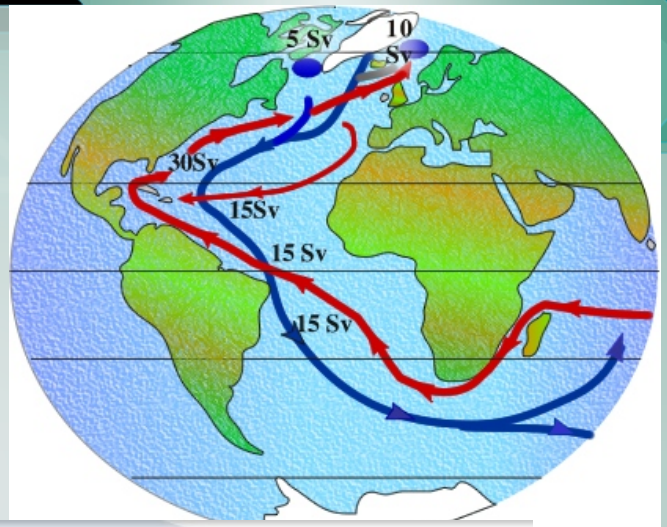
UNIVERSIDAD DE GUADALAJARA

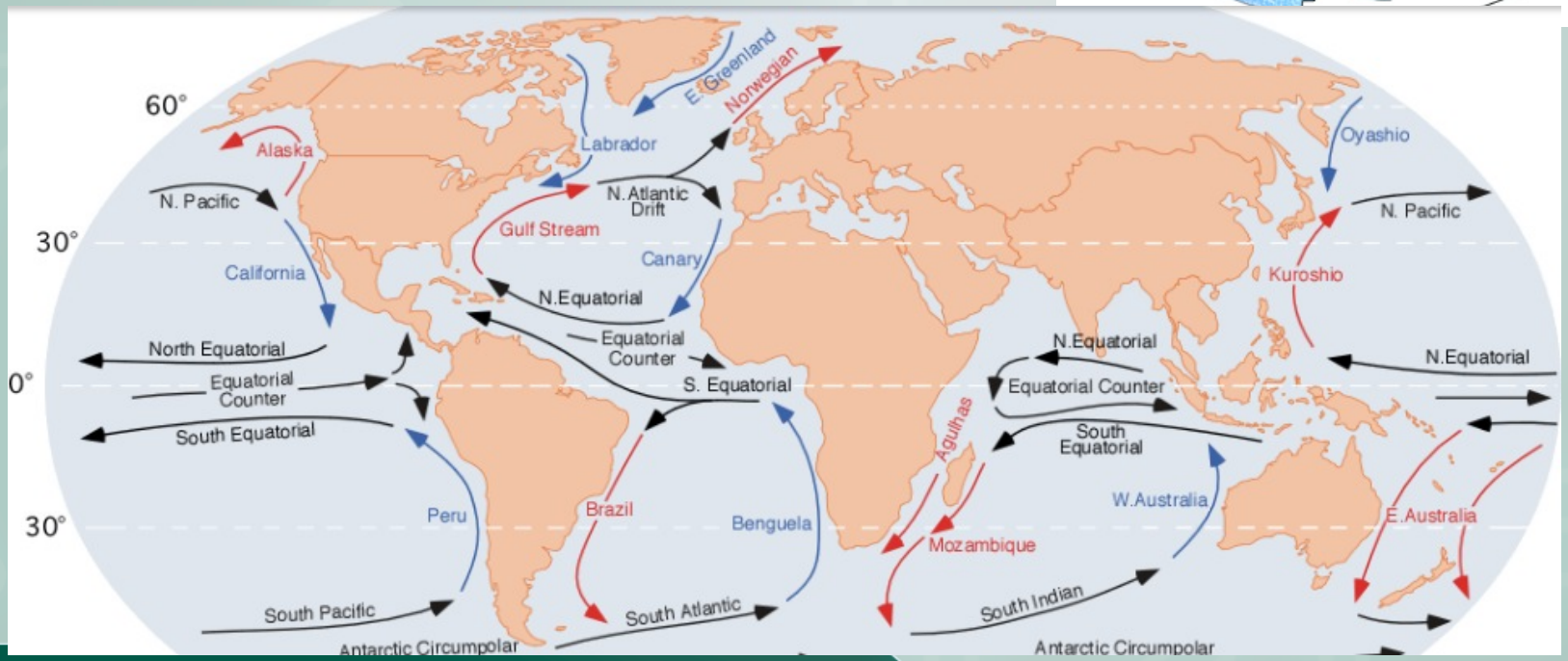
CIIMAR GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Outline

- Regional connectivity
- Population growth and sectoral activities
- Anthropogenic and natual hazards
- Multidisciplinary challenges & Ecosystem Approach
- Regional advocates and networking
- Innovative high tech oceanographic solutions
- “Mexican Integrated Coastal Ocean Observing System” Mex-ICOOS

GLOBAL CONNECTIVITY





Economic value and sustainable exploitation of marine resources



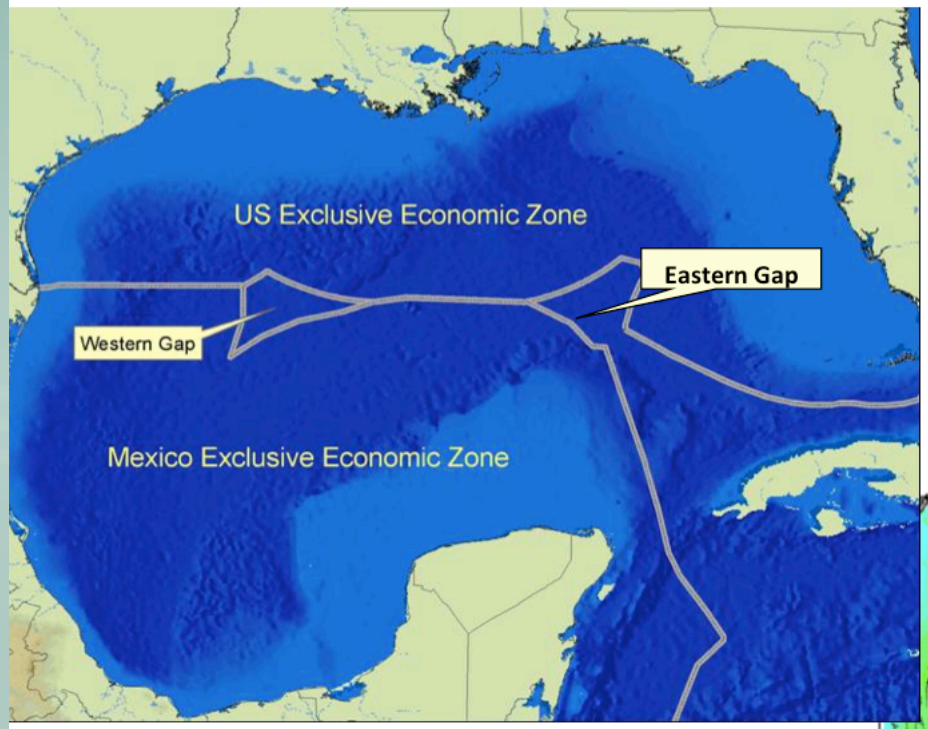


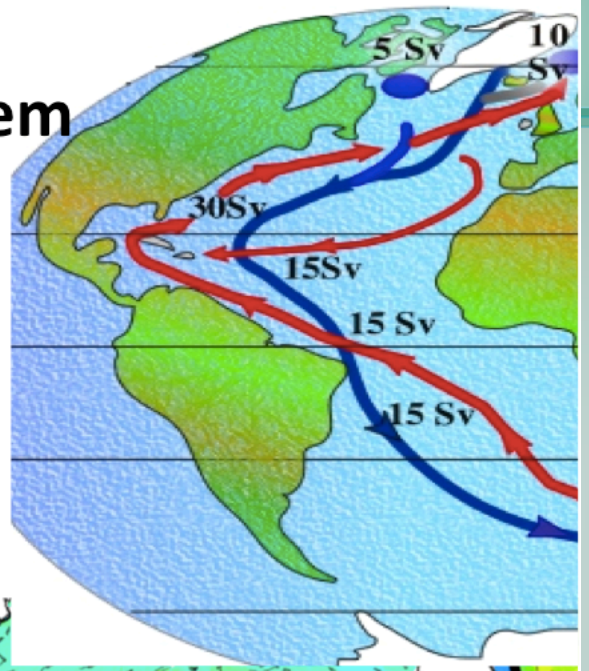


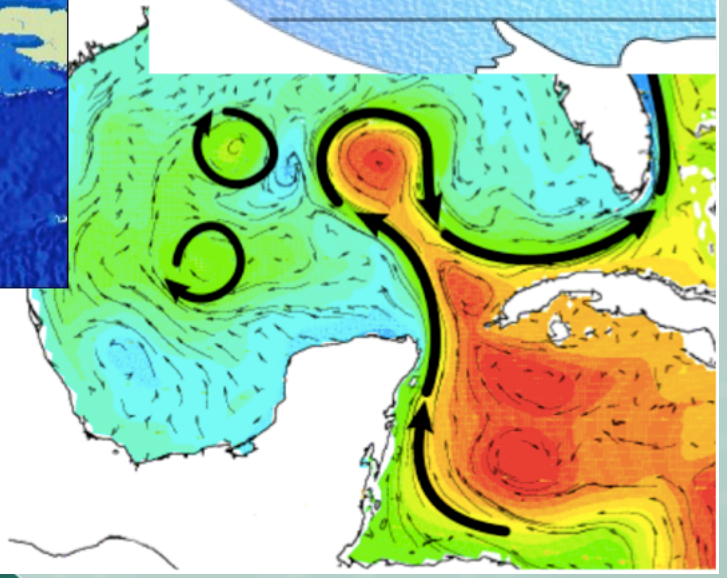


CIIMAR GOMC

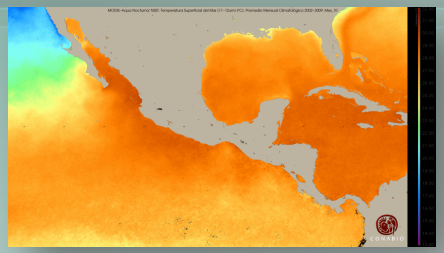
A highly connected Large Marine Ecosystem

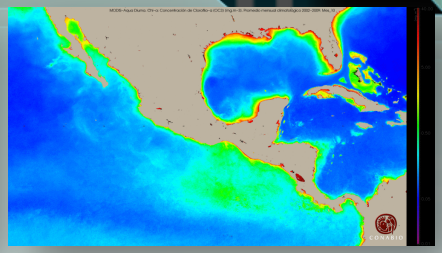






CIIMAR GOMC





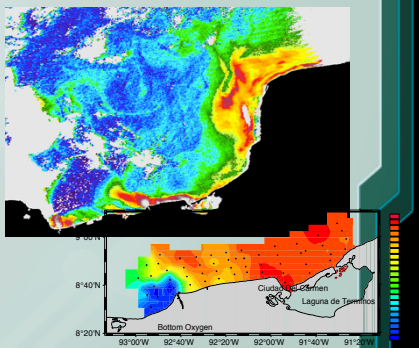
Threats under a climate change scenario

Sea Level Rise Flooding

Storm surges Marine Transgression

Hurricanes

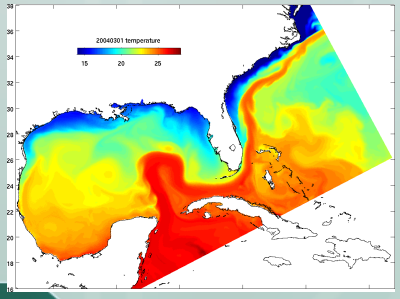
Pollution HABs, Hypoxia, Marine debris



Erosion

Sediment management

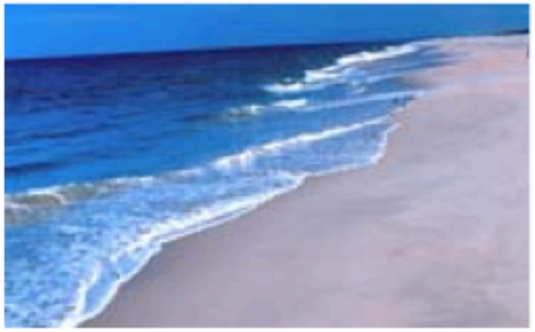
Ocean acidification



Invasive species

Public interest
for generations and generations

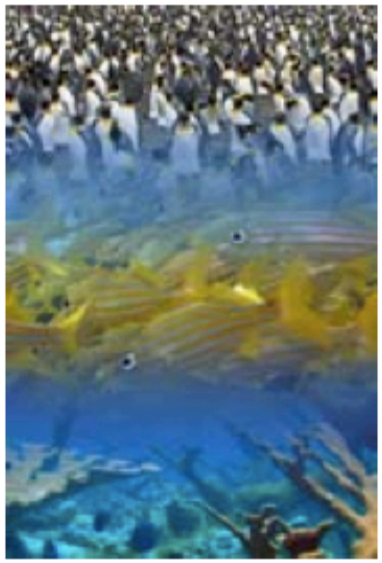
HEALTHY SEAFOOD



CLEAN BEACHES

GOOD JOBS

ABUNDANT WILDLIFE



VIBRANT COASTAL COMMUNITIES

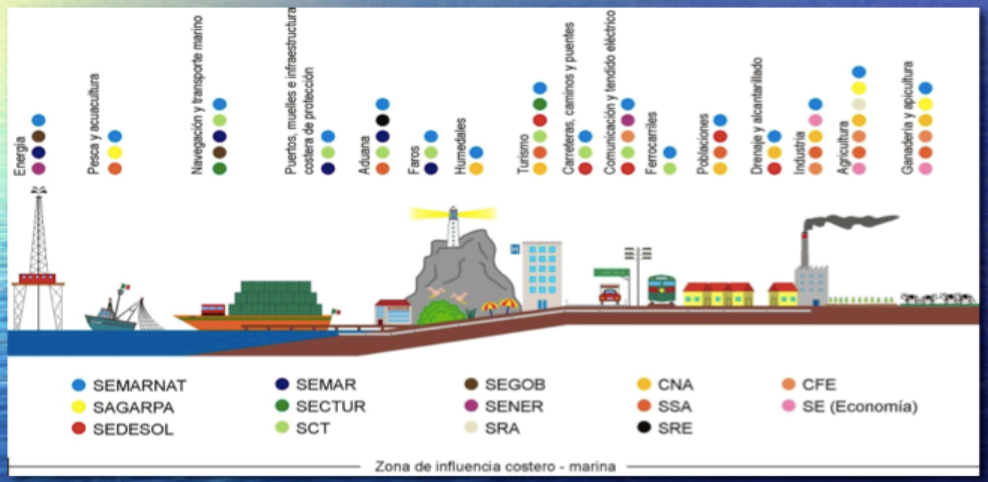
RENEWABLE ENERGY RESOURCES

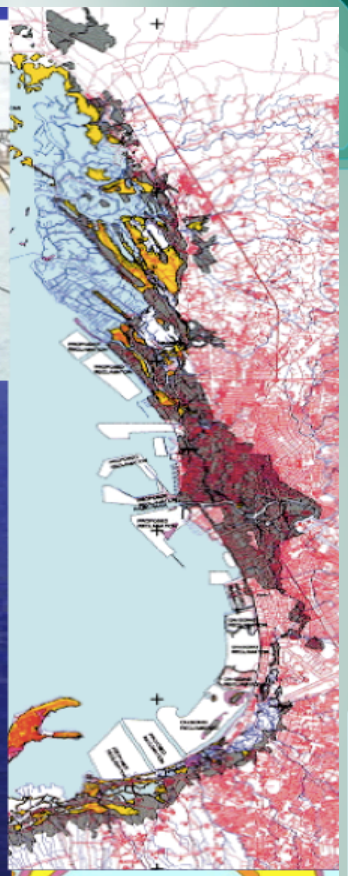
STABLE FISHERIES

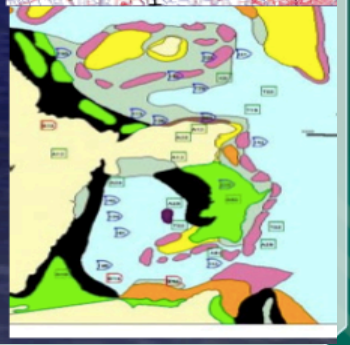
Who does what in coastal areas?

Poor federal policy integration

in coastal zones as a barrier to implement CC ADAPTATION POLICIES



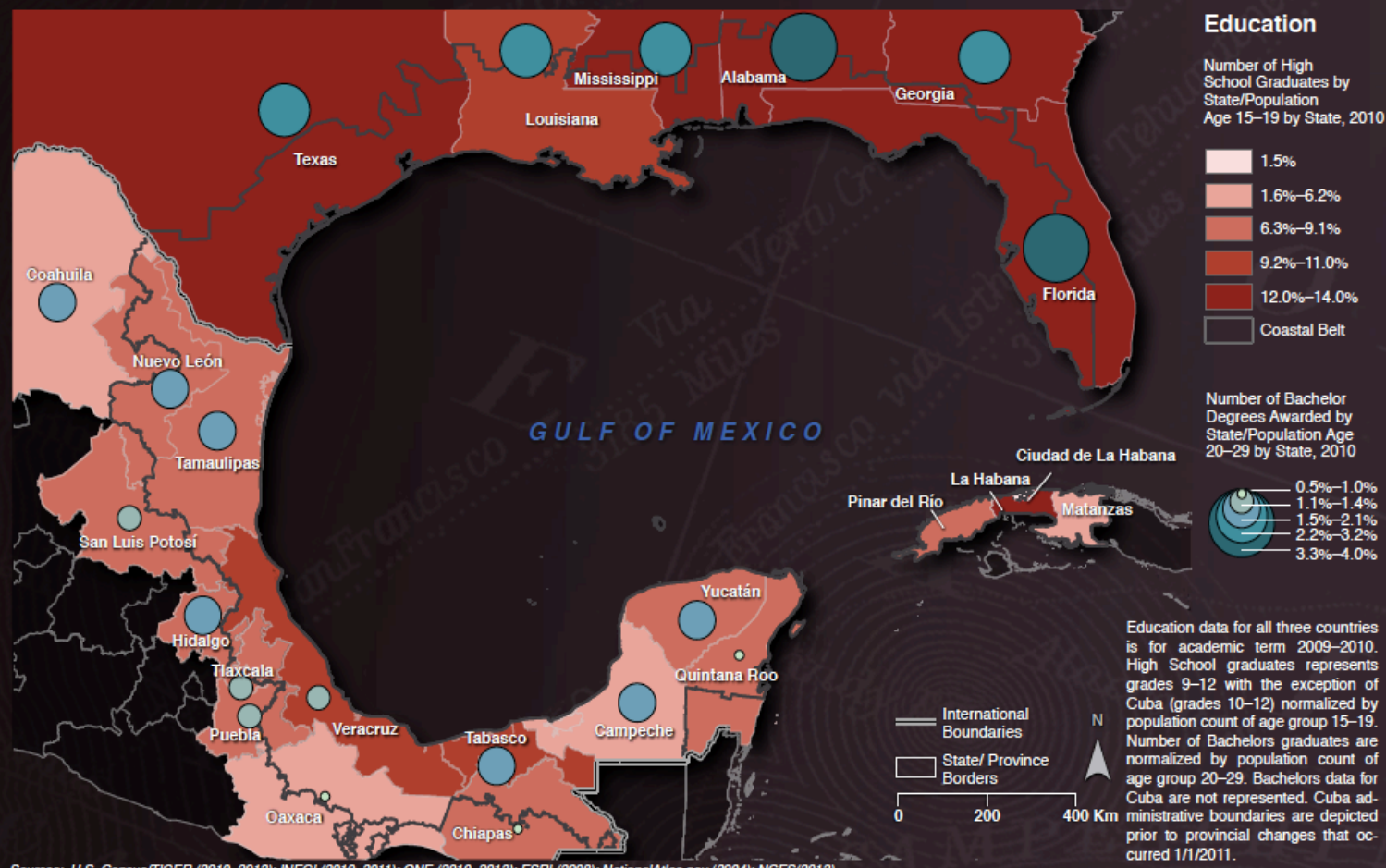




Too many users, increasing pressure

- Lack of law enforcement
- Cumulative impacts

POPULATION DEMOGRAPHICS



Context - Productive Economic Value (2009p)

	Mexico	U.S.
Oil and Gas Production	$43.1 bill	$40.0 bill
Fisheries (dockside value)	$317.2 mill	$618.9 mill
Port/Shipping Activity	$73 mill	$317.6 mill
Tourism	$9.6 bill	$42.3 bill

GRAND TOTAL: $136.3 bill

(130.2 bill) *2003 adj*

At $100 a barrel oil: $197.4 bill

(217.3 bill) *2003 adj*

These four industries would now rank 60th out of 227 countries.

We are still ahead of New Zealand but we have fallen behind Ireland.

Yoskowitz, David. 2011
http://www.sgmsummit.org/schedule/Yoskowitz.pdf

COASTAL ECONOMY in THE US

Jobs and Wages by Major Economic Sector

Industry	Employment	Average Annual Wage
Construction	628,518	$37,545
Education & Health Services	1,608,147	$31,095
Financial Activities	460,964	$38,065
Information	133,613	$35,078
Leisure & Hospitality	871,703	$14,109
Manufacturing	639,661	$45,471
Natural Resources & Mining	232,614	$43,447
Other Services	237,236	$24,353
Professional & Business Services	1,061,878	$37,393
Public Administration	398,210	$37,959
Trade, Transportation & Utilities	1,733,893	$31,551

Table 8: Total number of jobs and total wages for major industry sectors in the Gulf Coast Region in 2008.

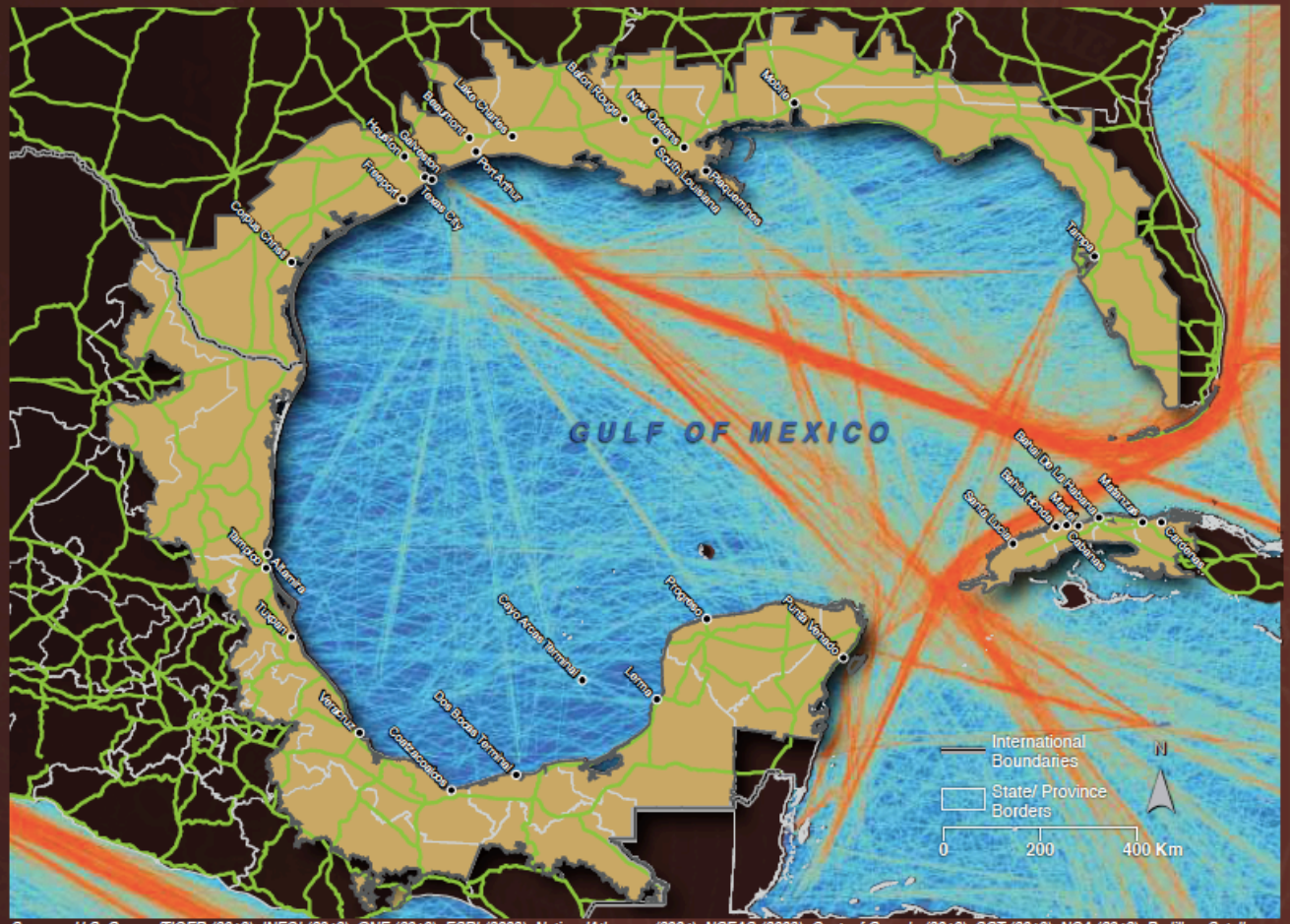
Source: Bureau of Labor Statistics, 2010

The U.S. Gulf states, if considered an individual country, would rank 7th in global Gross Domestic Product.

8.3 million

Total number of jobs in the Gulf Coast Region.

TRANSPORTATION



Transportation: Roads and Commercial Shipping

- Major Ports
- Major Roads
- Coastal Belt

Commercial Shipping Activity October 2004 to October 2005

# of vessel tracks per km²

Low : 0

High : 184

Roads connect major centers of population or selected frontier roads. Roads under construction are not shown. Ports for U.S. and Mexico represent major ports by tonnage in 2010. Cuban ports represent all known ports in the study area. Commercial shipping activity is based on World Meteorological Organization Voluntary Observing Ships (VOS) observations.

Sources: U.S. Census/TIGER (2010); INEGI (2010); ONE (2010); ESRI (2008); NationalAtlas.gov (2004); NCEAS (2008); Govt. of Canada (2010); SCT (2010); NGA (2012); Padilla y Sotello, L.S. (2010); USACE (2012)

FISHERIES

- 551 commercial species in Mexico
- 287 are captured in the Pacífico, 74% of the total national
- 264 species in the Gulf of Mexico & Caribbean, 26% of the total national

The Gulf Region's Energy Production and Hurricanes

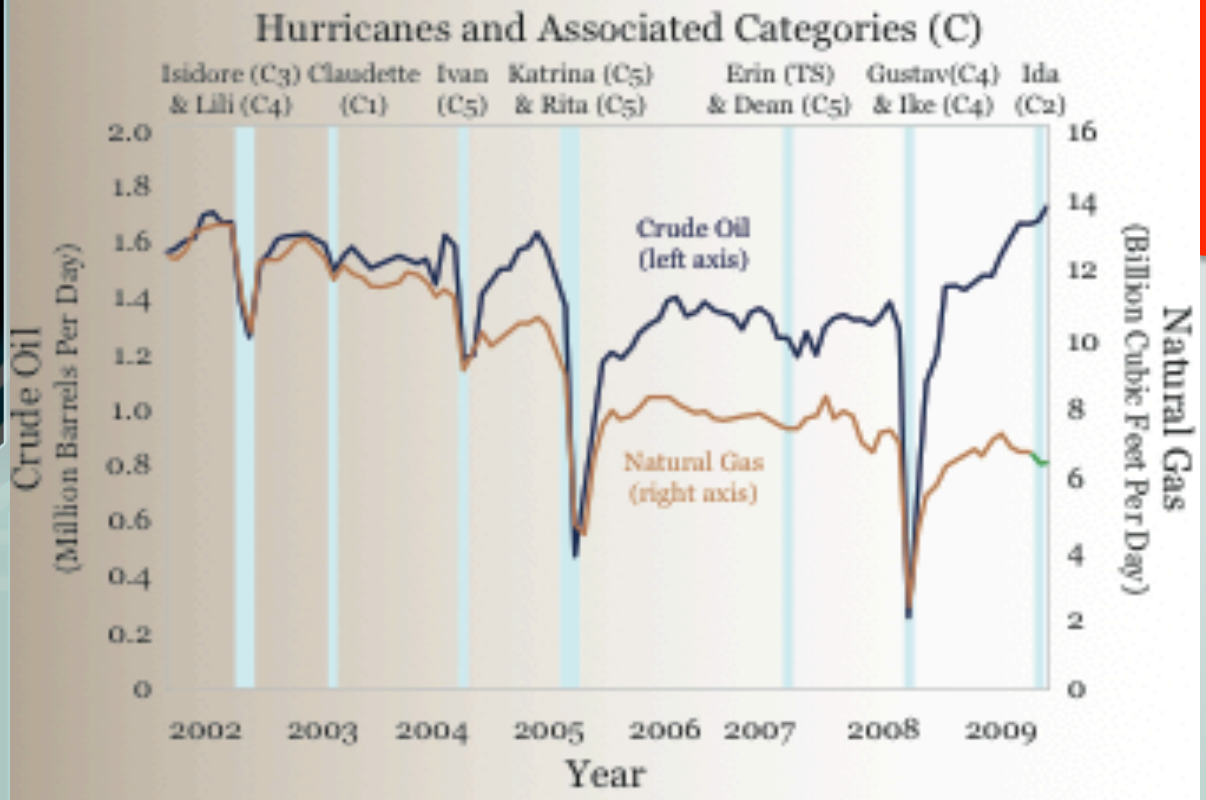
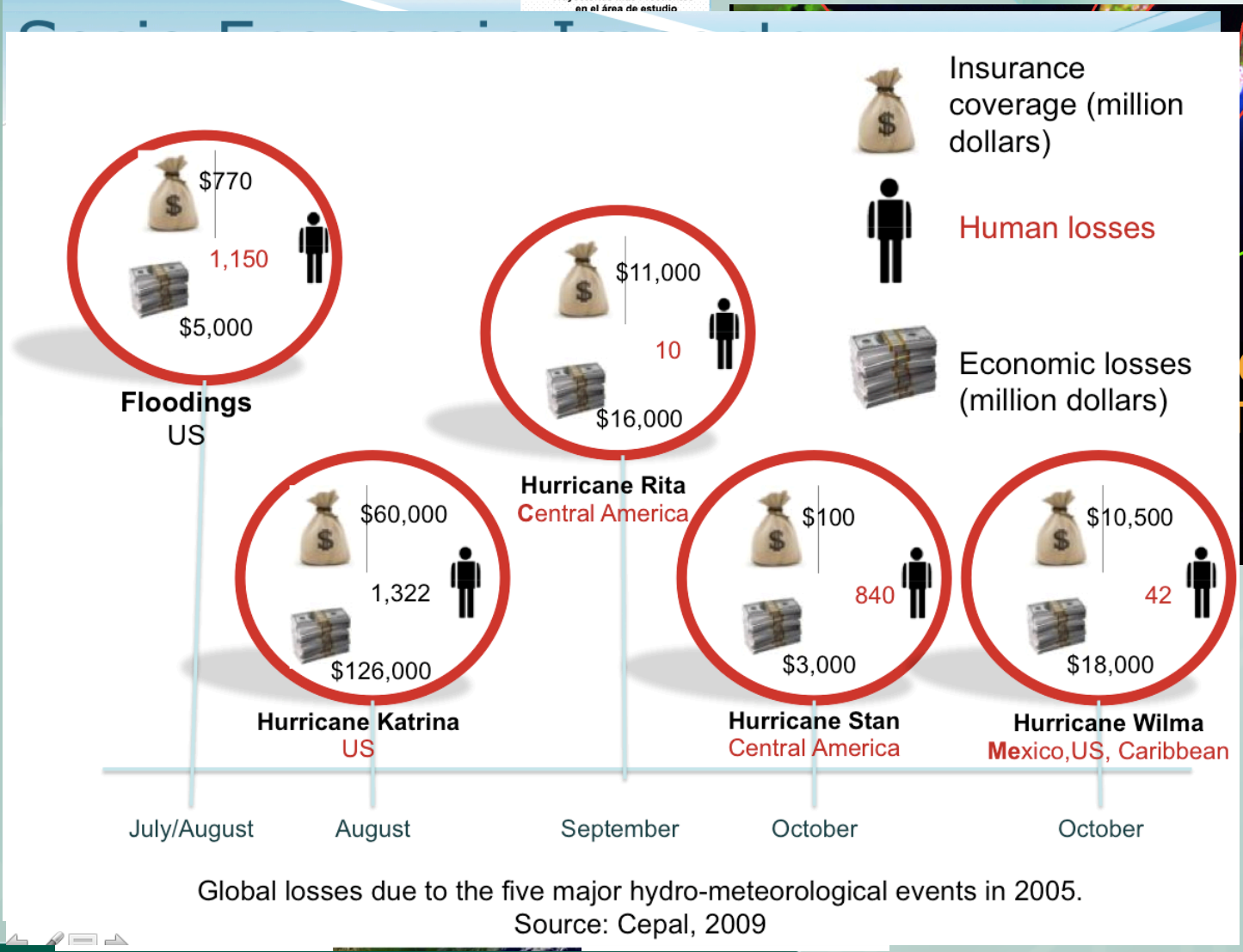


Figure 28: Crude oil and natural gas production in federal offshore Gulf of Mexcio in relation to hurricanes, 2002 to 2009.
Source: U.S. Energy Information Administration, 2010b

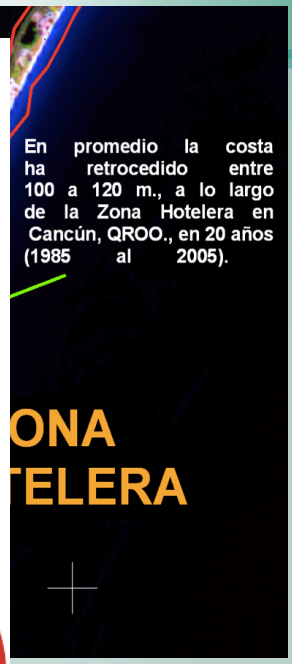
Offshore oil production is susceptible to extreme weather events. Hurricane Ivan in 2004 destroyed **seven** platforms in the Gulf of Mexico, significantly damaged **24** platforms, and damaged **102** pipelines. Hurricanes Katrina and Rita in 2005 destroyed more than **100** platforms and damaged **558** pipelines.

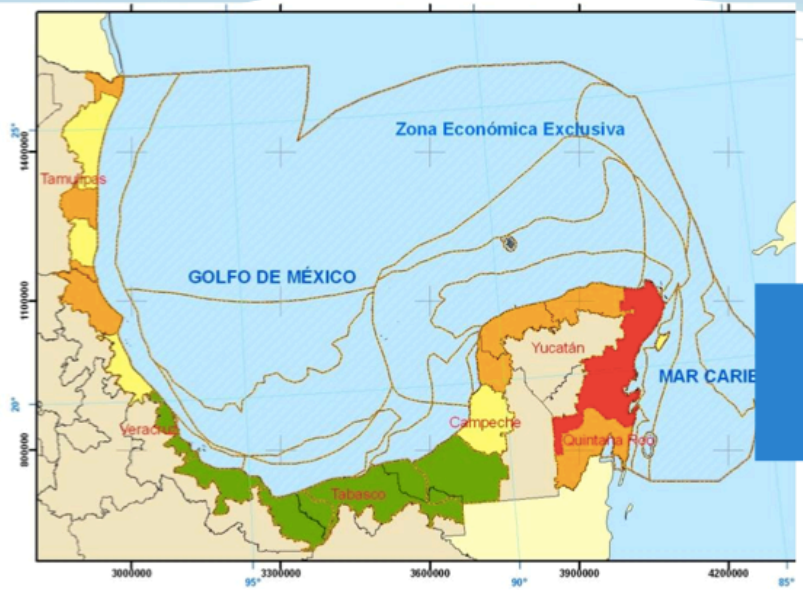
Source: U.S. Global Change Research Program, 2009

Economic burden to people and communities



Global losses due to the five major hydro-meteorological events in 2005.
Source: Cepal, 2009

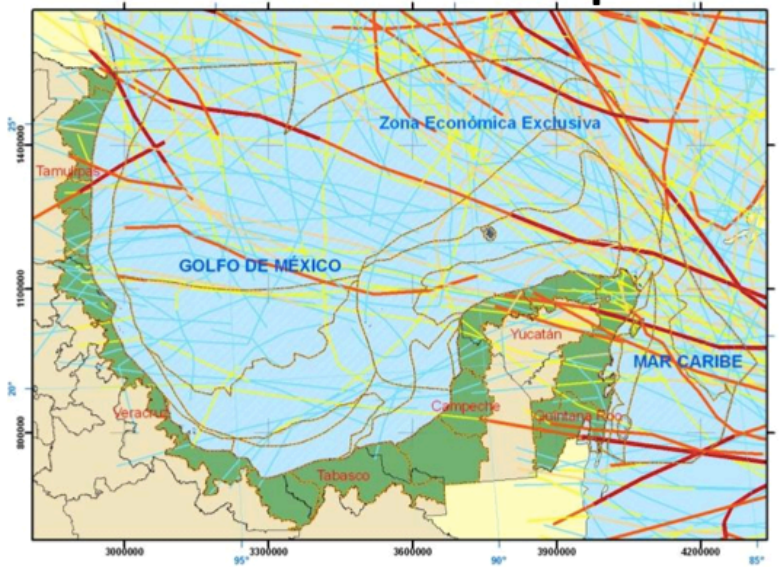




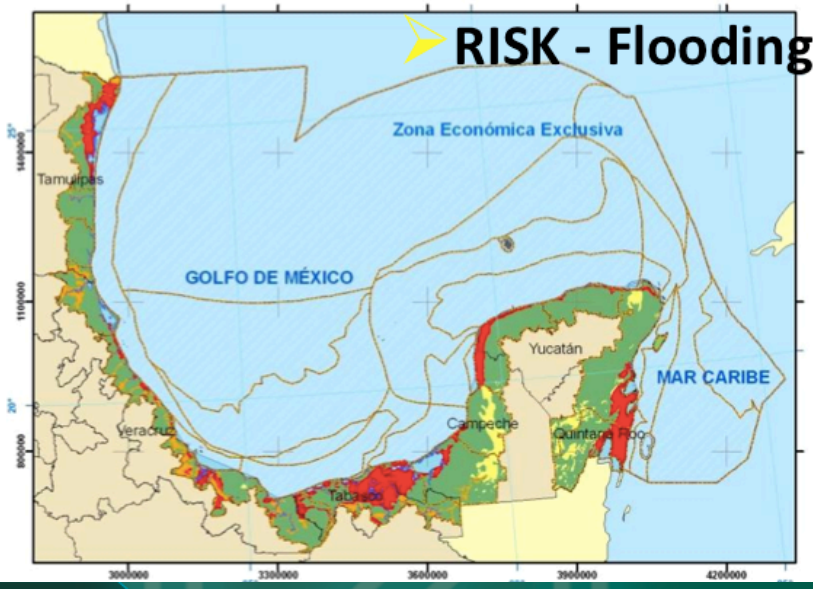
Most threatened regions (sea level rise)

- ✓ Northern areas of Tamaulipas
- ✓ Southern tip of Veracruz
- ✓ Deltaic plain Grijalva-Usumacinta system in Tabasco, and
- ✓ Coastal areas of Campeche, Yucatan and Quintana Roo

Historical hurricane paths

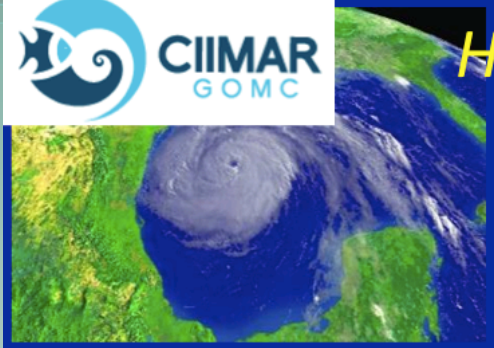


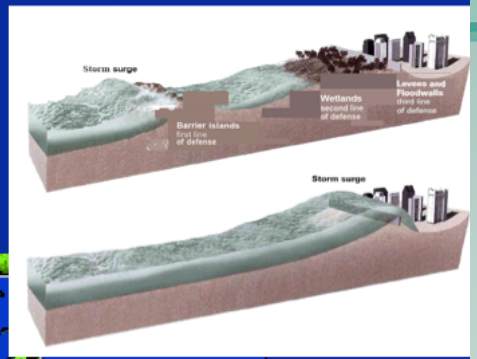
RISK - Flooding

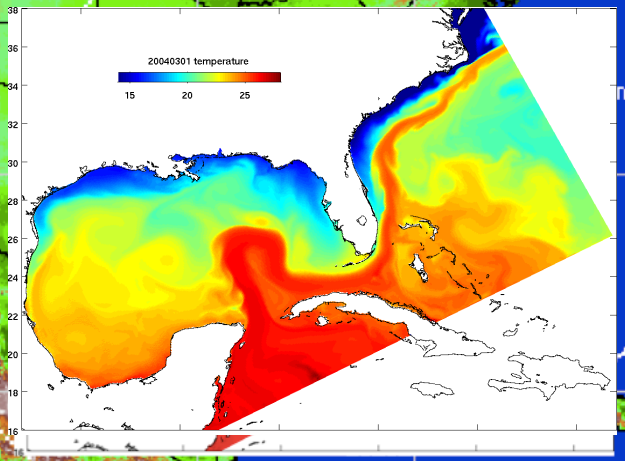


CIIMAR GOMC

Hurricanes, storm surge, flooding, etc.



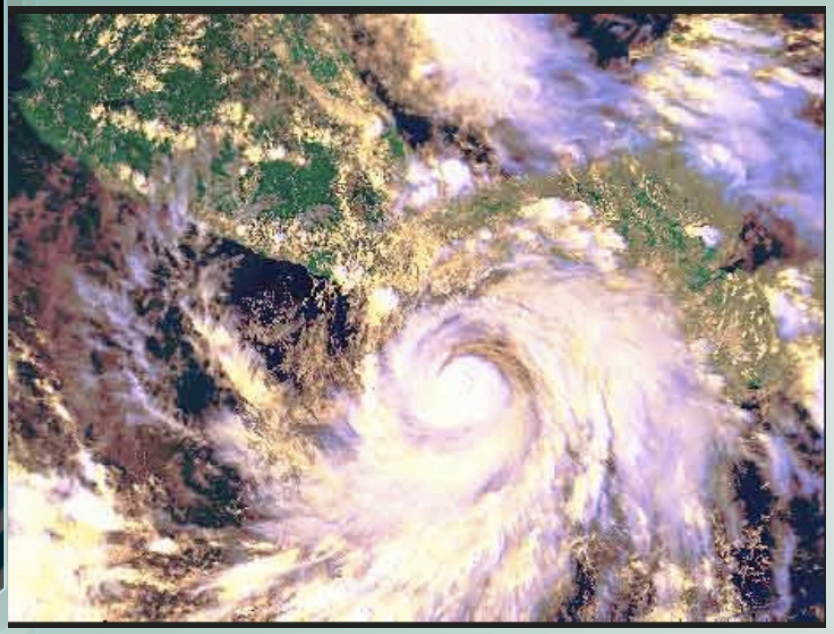


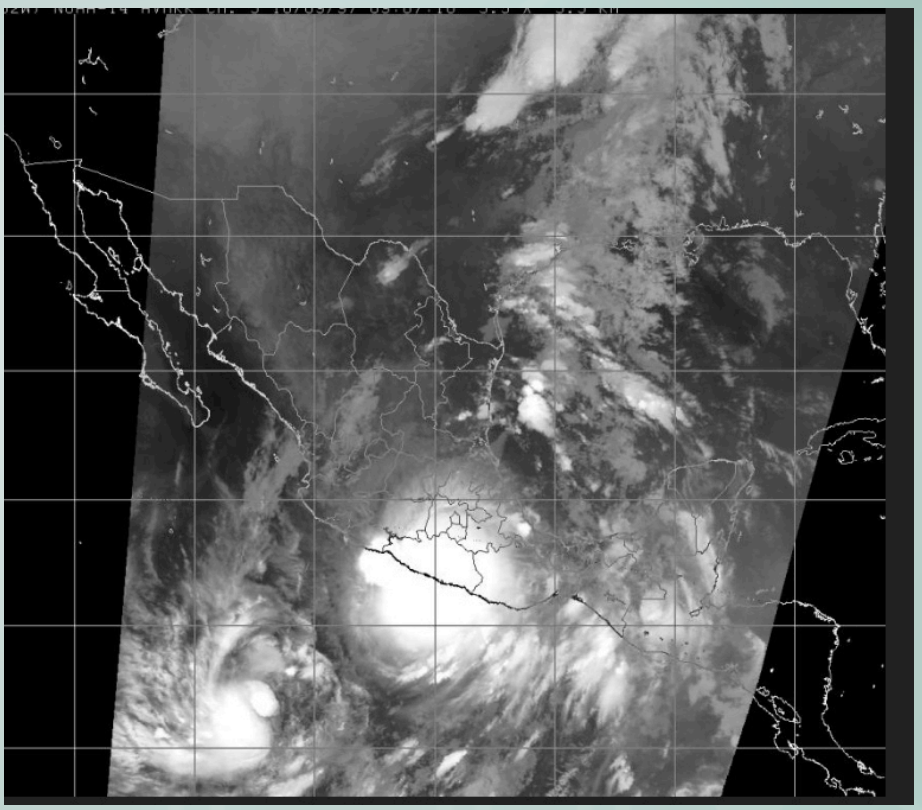


800 nmi
(1480 k
m)
30

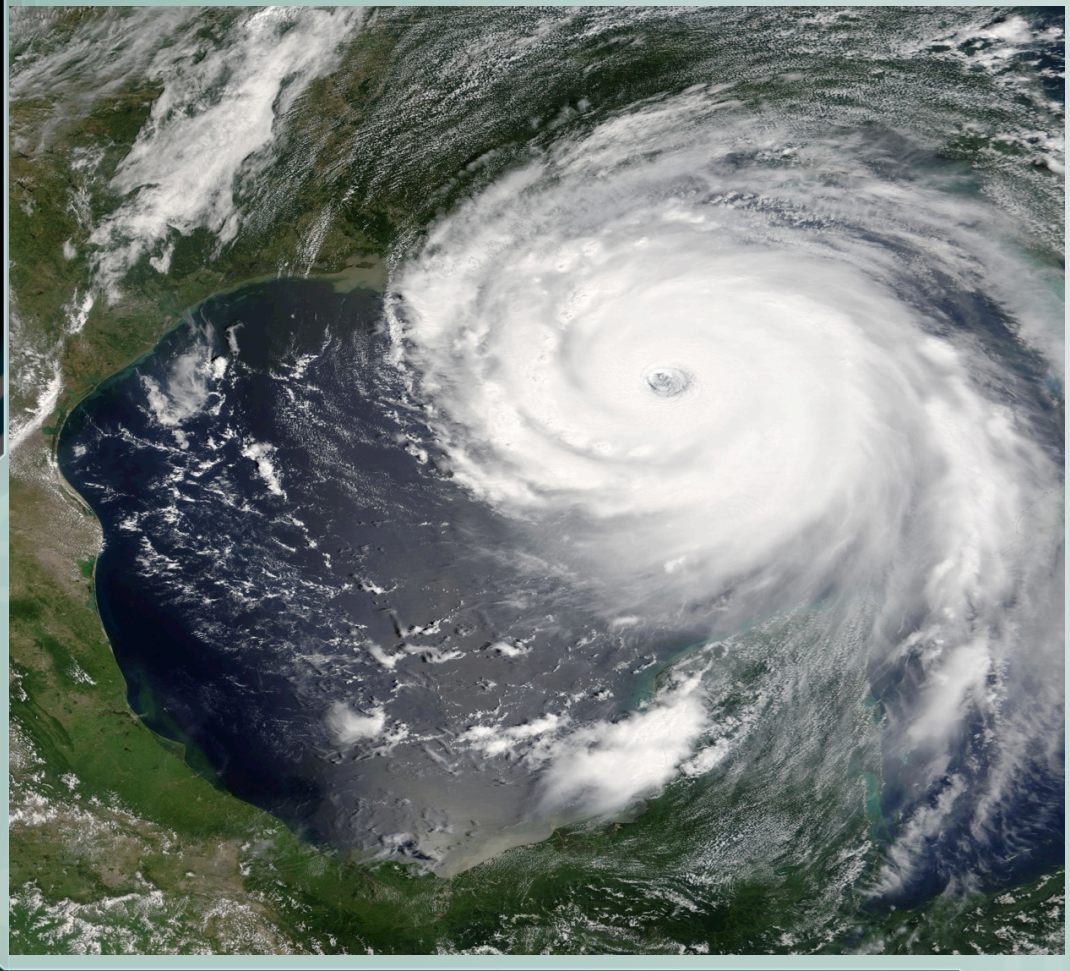
21 AL 24 DE ABRIL Puerto Vallarta, Jal.

Paulina, Octubre 1997

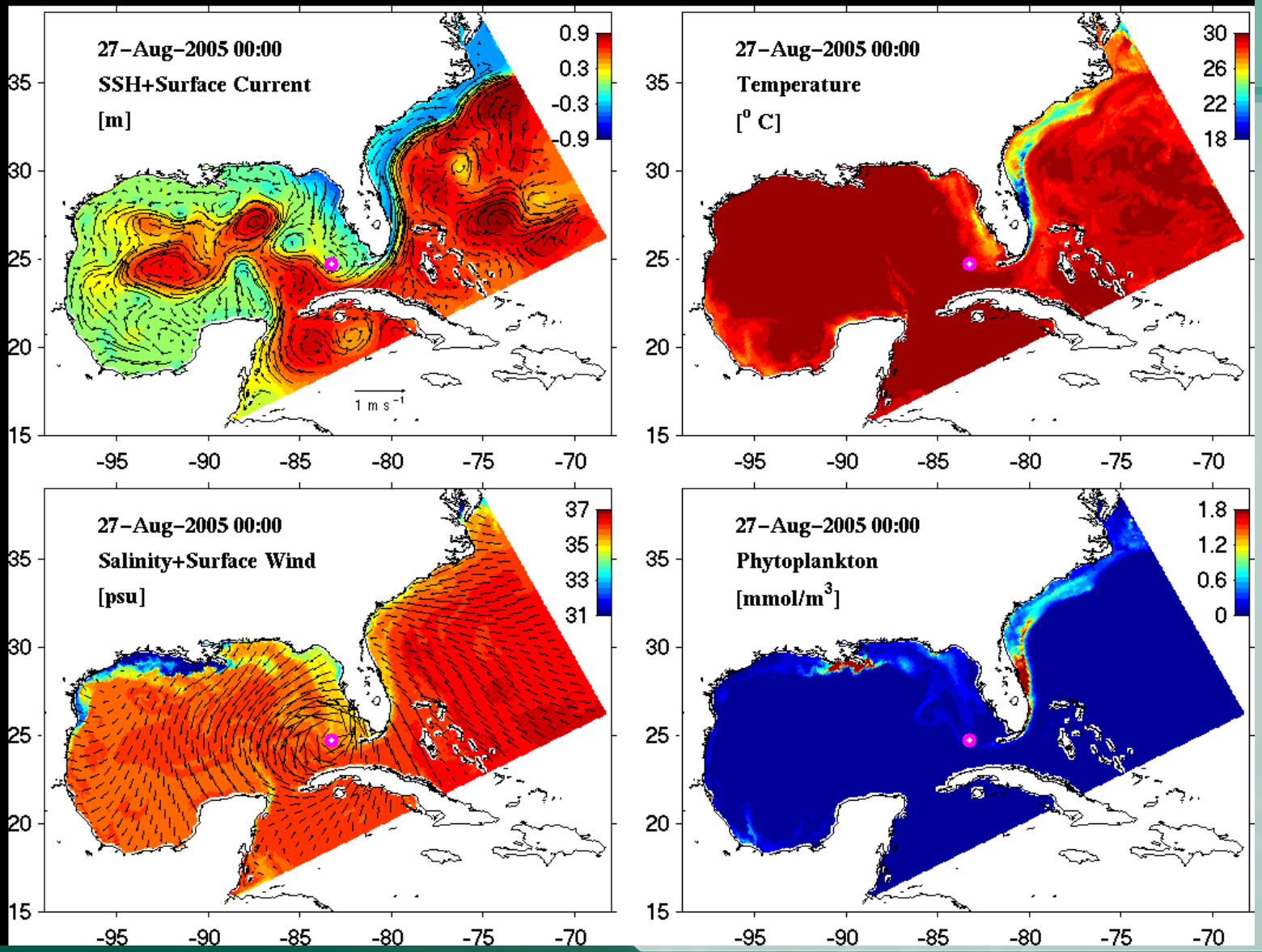


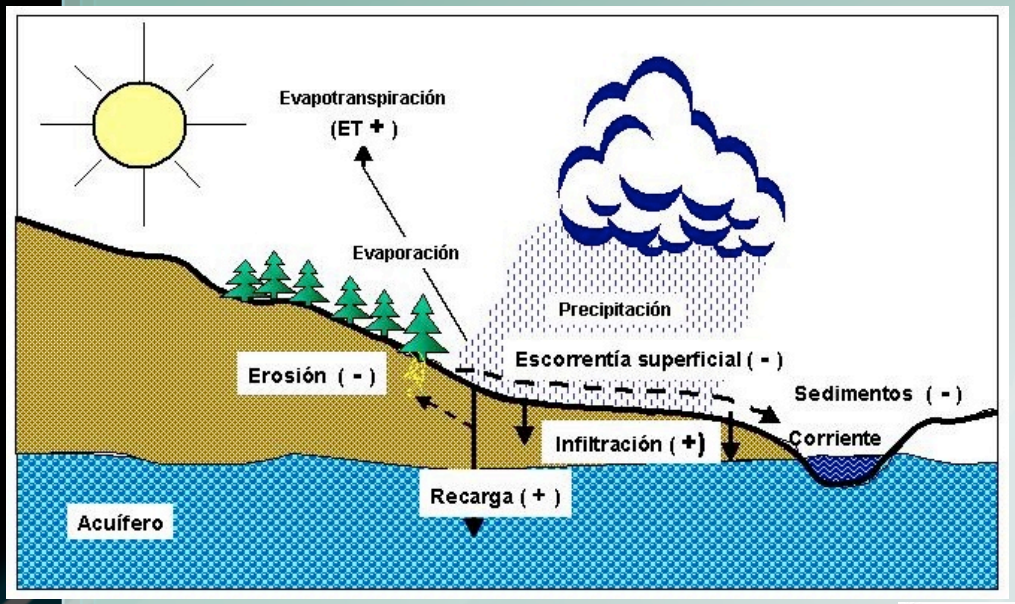


Katrina (August, 2005)

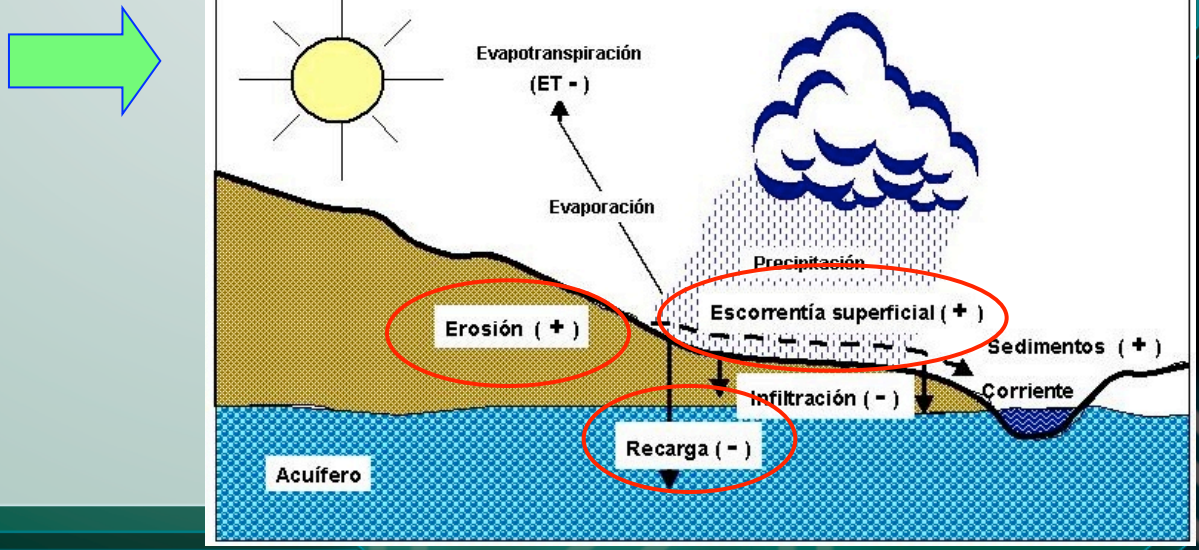


21 AL 24 DE ABRIL Puerto Vallarta, Jal.





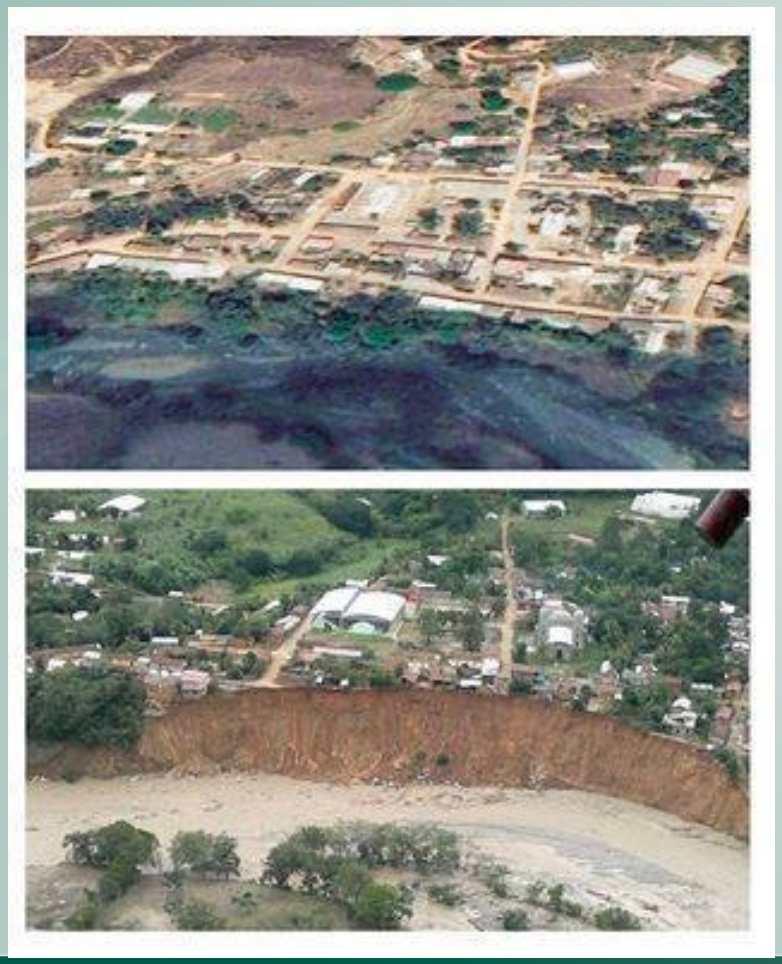
From top of the hills to the oceans



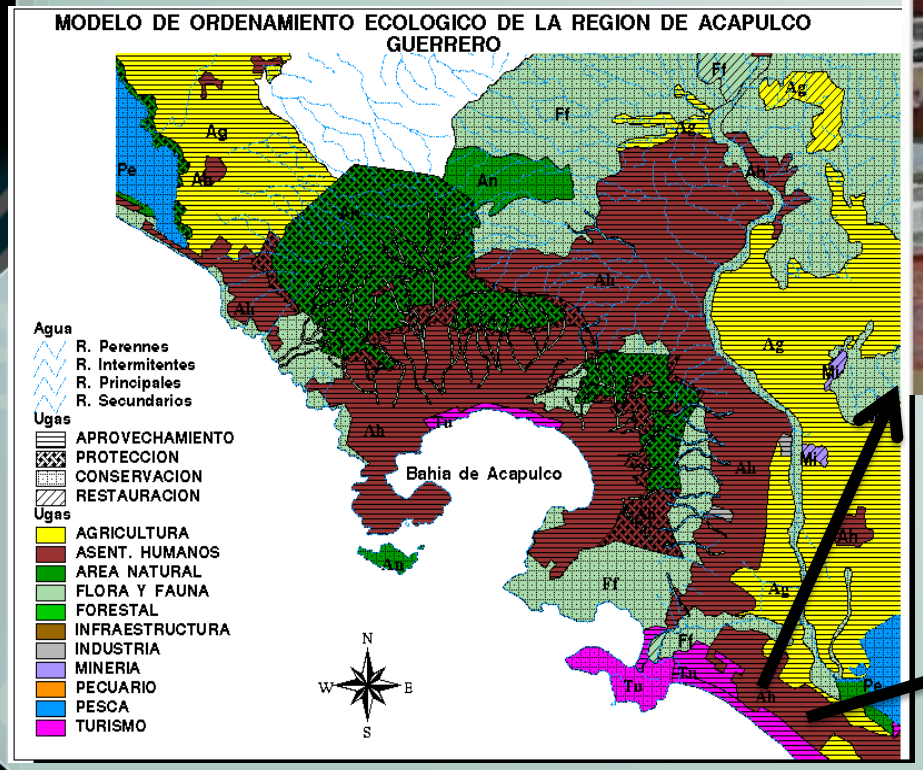
LAND AND OCEAN LINKAGES

Hurricane impacts

MANUEL – INGRID 2013



21 AL 24 DE ABRIL Puerto Vallarta, Jal.



POLLUTION ISSUES
HYPOXIC---- DEAD ZONES

Figure 52: The Mississippi River watershed and general location of the hypo "Dead Zone" in the Gulf of Mexico.

Source: EPA, Mississippi River Gulf of Mexico Watershed Nutrient Task Force, 2011

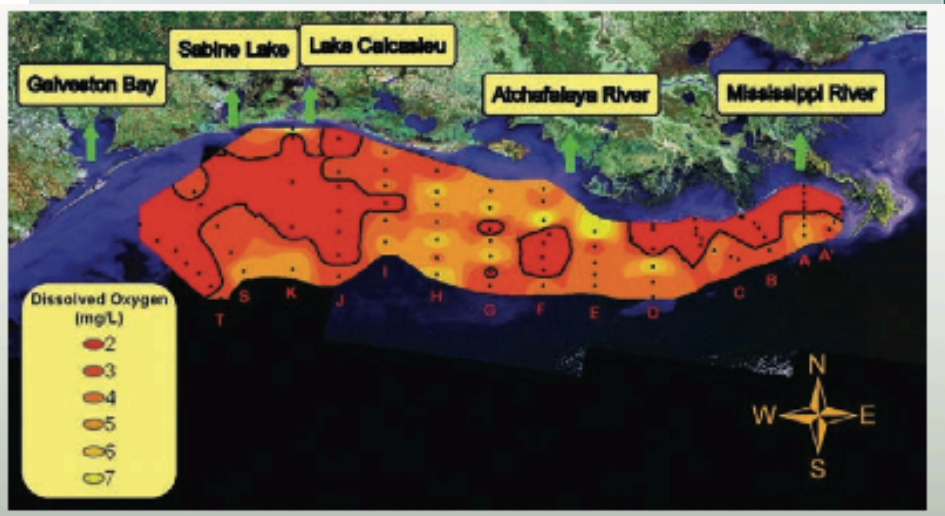
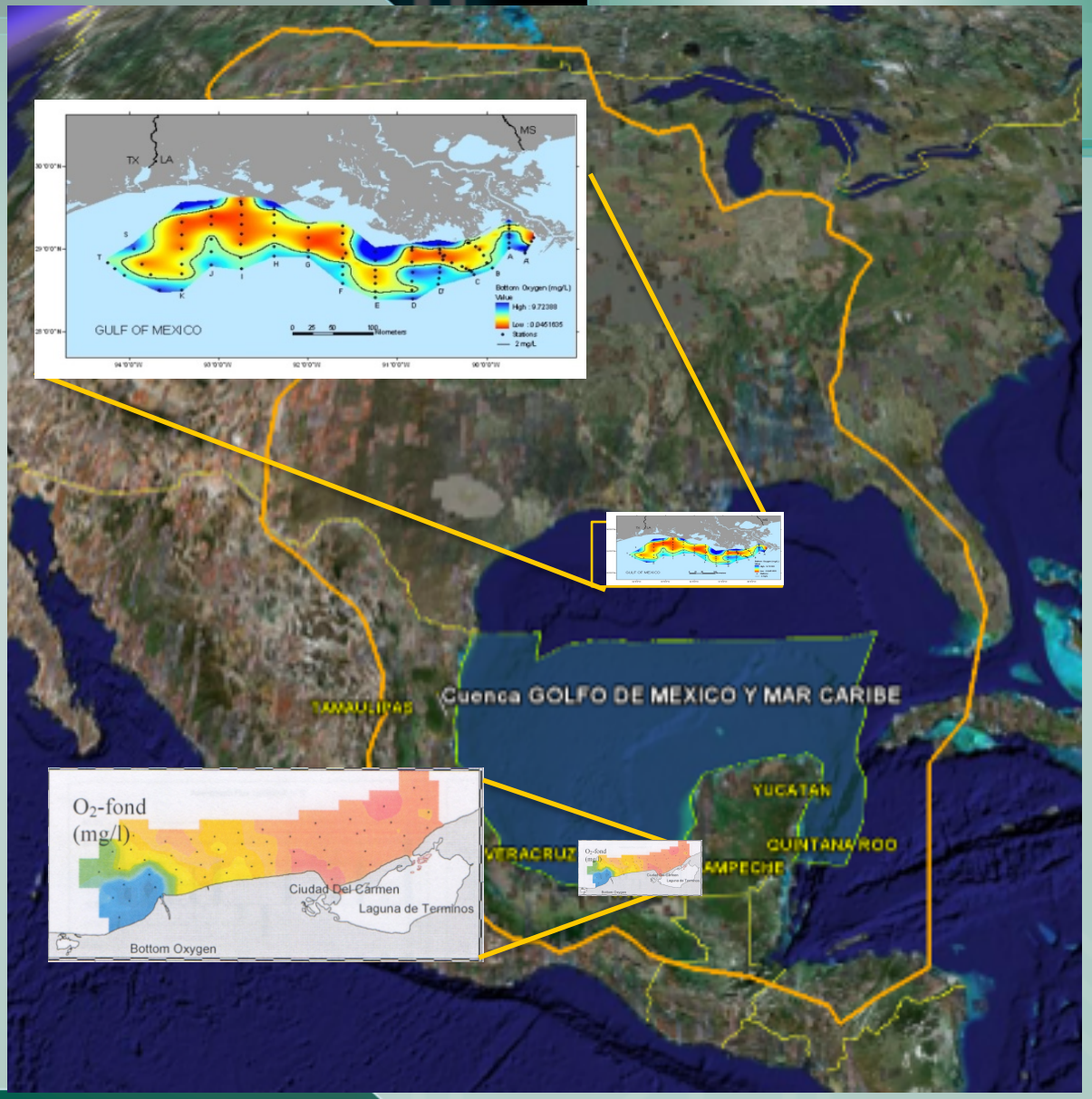


Figure 53: Dissolved oxygen concentration in bottom-water across the Louisiana-Texas shelf from July 25 to 31, 2010. The black line outlines values less than 2 mg/L, or hypoxia.

Source: Louisiana Universities Marine Consortium; Funded by NOAA, Center for Sponsored Coastal Ocean Research, 2010

CIIMAR GOMC

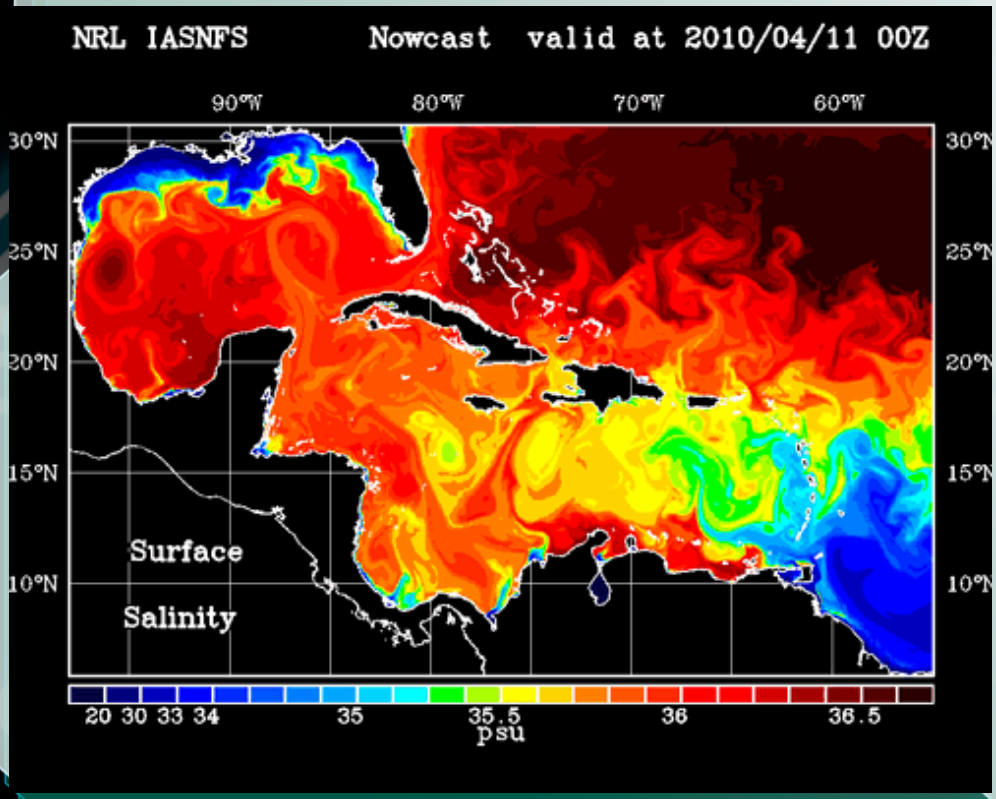
Hypoxia in the northern and southern Gulf of Mexico

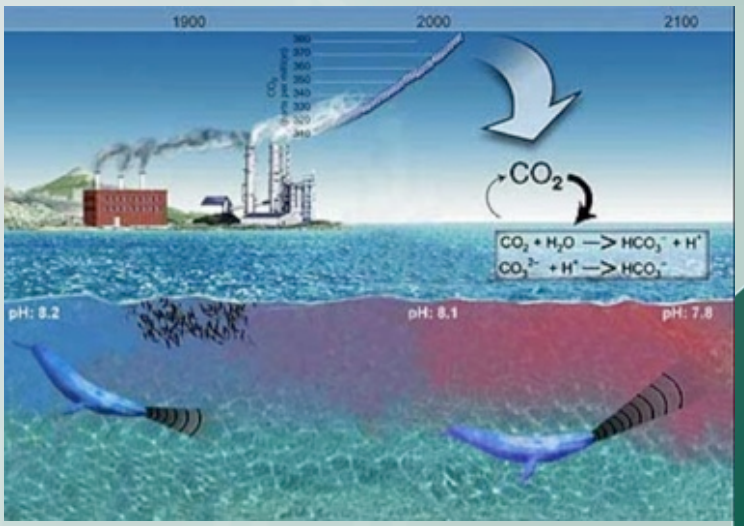


IASNFS Real-Time Prediction

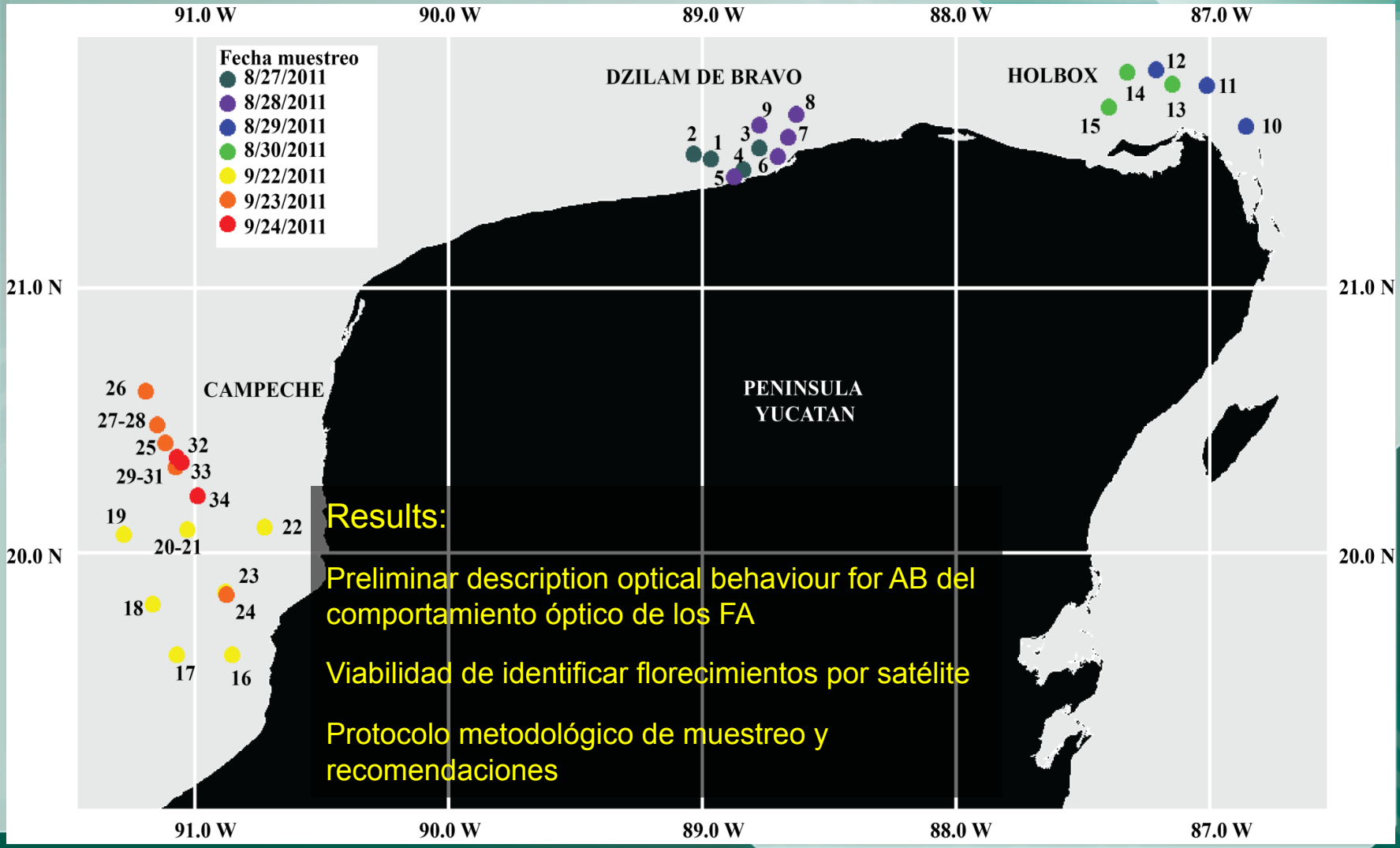
Sea Surface Salinity for NOAA/AOML

OCEAN ACIDIFICATION ASSESSMENT





Algal blooms



Results:

Preliminar description optical behaviour for AB del comportamiento óptico de los FA

Viabilidad de identificar florecimientos por satélite

Protocolo metodológico de muestreo y recomendaciones

CIIMAR GOMC

Coastal & beach erosion

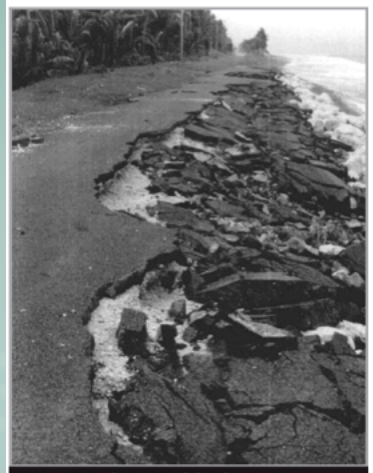


Figura 5. La destrucción de la infraestructura adyacente a la costa, es otro de los problemas que se manifiestan con el ascenso del nivel medio del mar. (Barra de Tupilco, Tabasco).

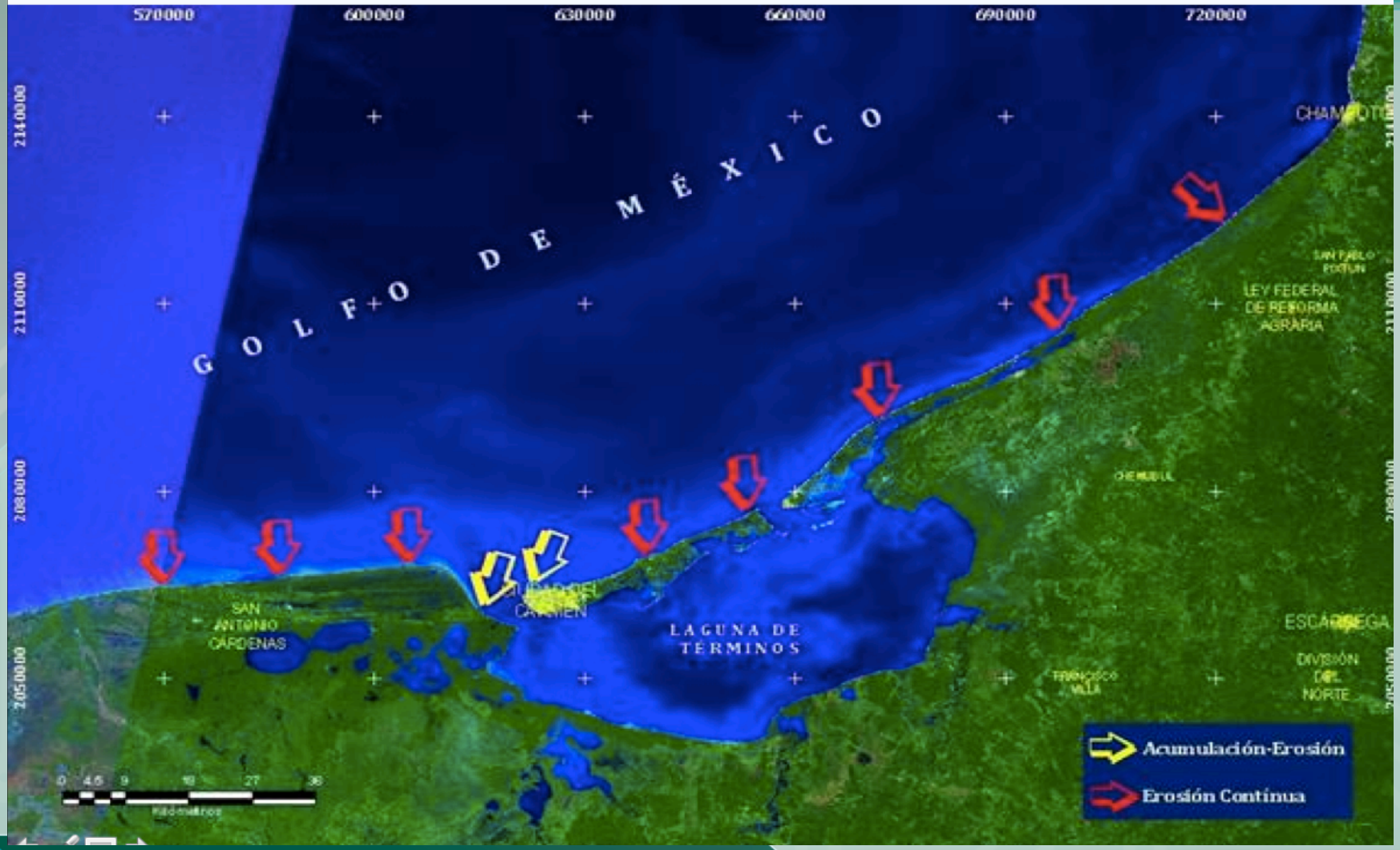
Barra de Laguna de Machona, Tabasco

Grijalva Este, Tabasco

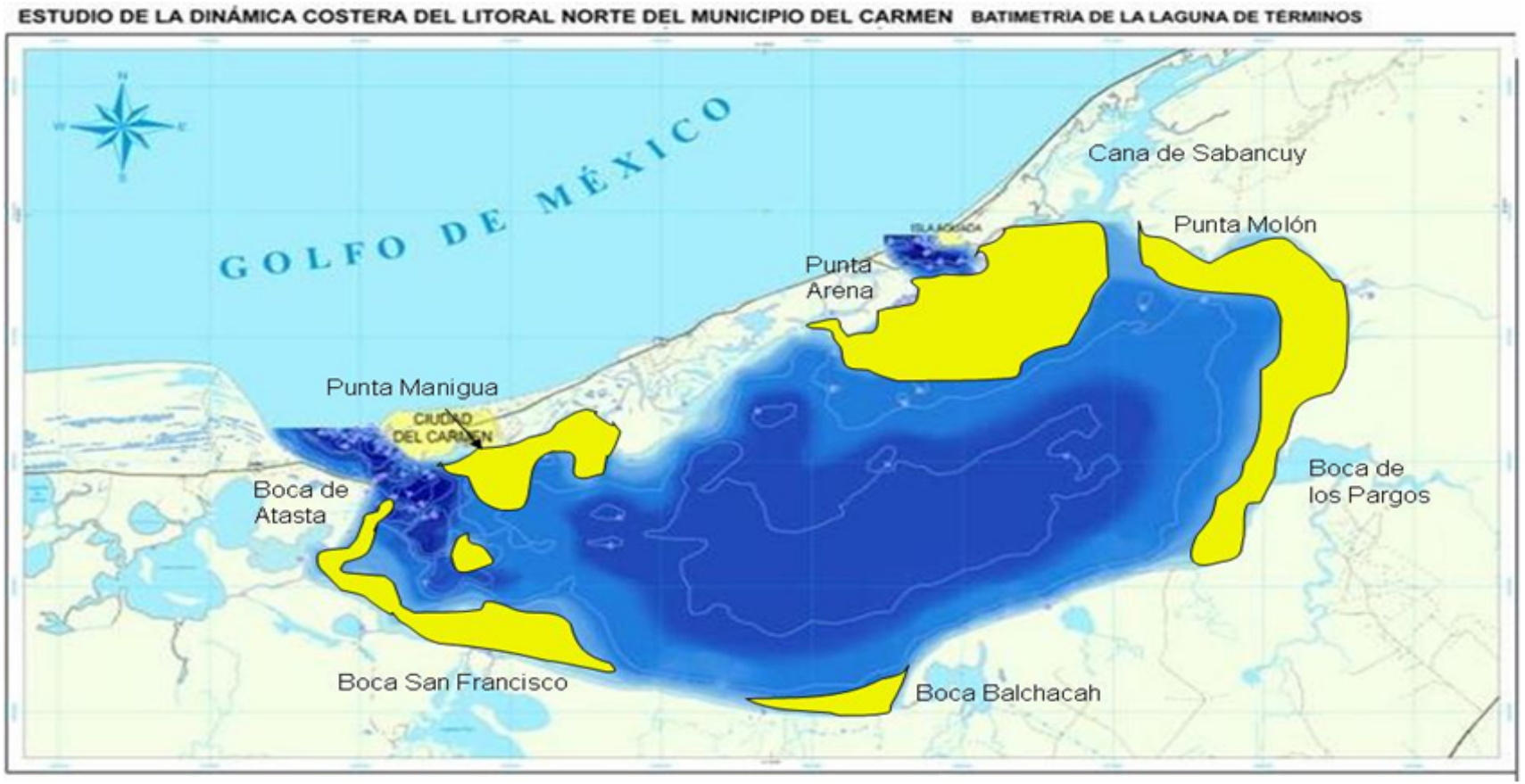
Mecoacàn, Tabasco

Barra de Machona

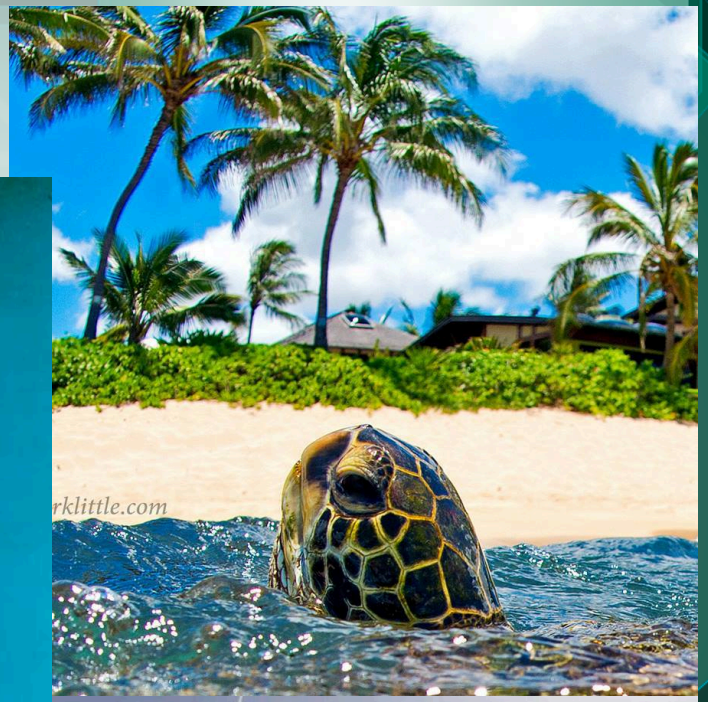
Erosion and sedimentation processes along the coast



Where the sediments goes in Laguna de Terminos?



Marine Debris



ECO-Tourism and biodiversity conservation

SHARKS overfished

LYON FISH INVASION

CIIMAR GOMC

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Mexican Consortium of Marine Research Institutions of the Gulf of Mexico and the Caribbean

CIIMAR GOMC

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Dr. Jose Manuel Piña
President of CiiMar-GoMC

Mexican Consortium was funded in November 2012 and has a membership of 25 universities and research centers in Mexico working on marine science, and aims to foster collaborative work and regional development.

CIIMAR GOMC

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

MISSION

Integrate, organize and enhance institutional efforts conducting scientific research to generate appropriate diagnostics and propose and implement sustainable solutions to the environmental, social and economic problems of the Gulf of Mexico region.

VISION

To be recognized as a high level and scientific authority organization committed to strengthening the sustainable development and integral well-being of the Gulf of Mexico.

CIIMAR GOMC

Consortium main objectives

- Enhance collaboration with U.S. academic & research institutions
- Strengthen joint research between the U.S. & Mexico
- Provide sound science for informed decision-making
- Strengthen higher education and technological development
- Strengthen national and international collaboration and exchange
- Consolidate public policies for regional benefit

CIIMAR GOMC

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Mexican Consortia capacity building network

Nov 2012 to Oct 2014

7th Tampico

2nd Veracruz

9th VERACRUZ

3rd Cd Carmen

4th Merida

5th Campeche

6th Playa Carmen

8th MEXICO CITY

1st Tabasco

3rd Tabasco

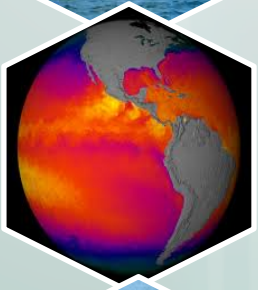
CIIMAR GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Main Priority Regional Issues

POLLUTION

LVING MARINE RESOURCES

COASTAL AND MARINE ECOSYSTEMS



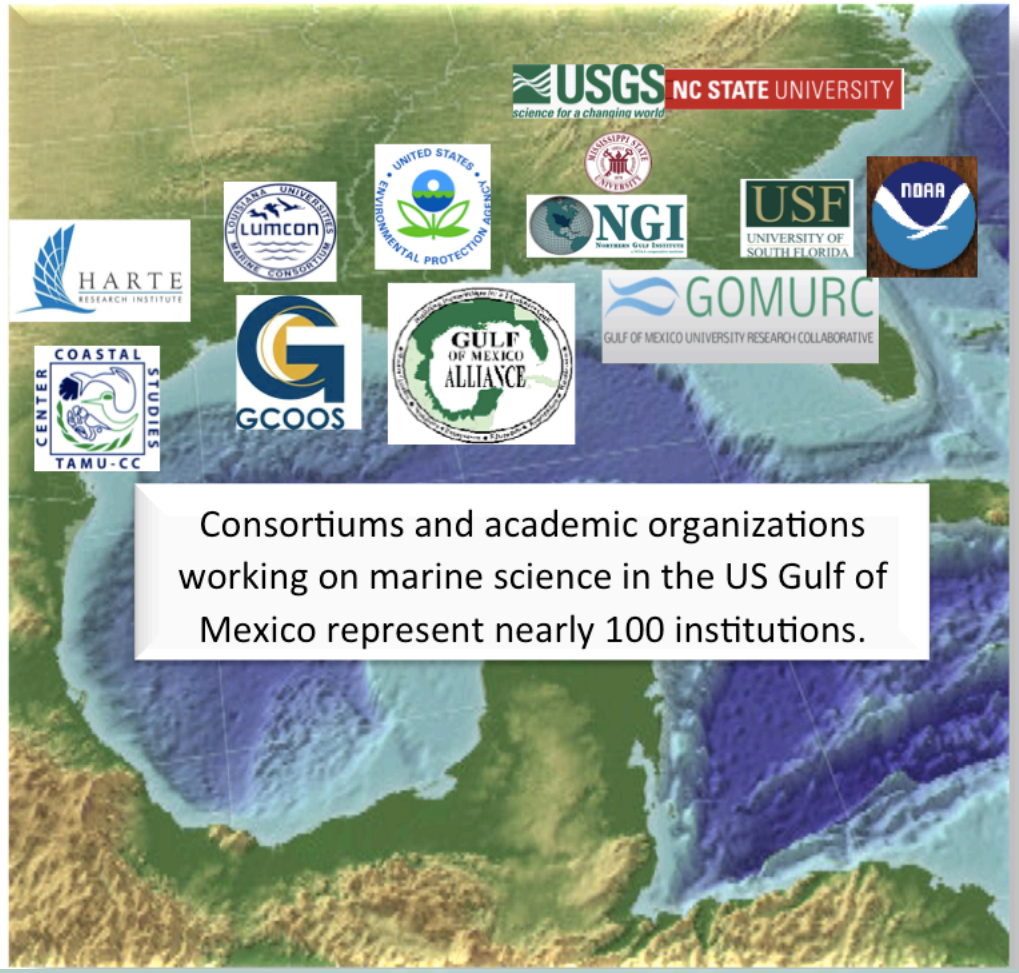
CLIMATE CHANGE

SOCIO ECONOMIC & MARINE POLICIES

CIIMAR GOMC

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Mexican CiiMar has established strategic partnerships with U.S. organizations



Meeting with our U.S. Partners

- Gulf of Mexico Alliance (GOMA)
- National Academy of Science (NAS)
- Gulf of Mexico Universities Research Consortium (GOMURC)

CIIMAR GOMC

Steps Towards Consolidating the Gulf of Mexico and Caribbean's Alliance for Environmental Educators

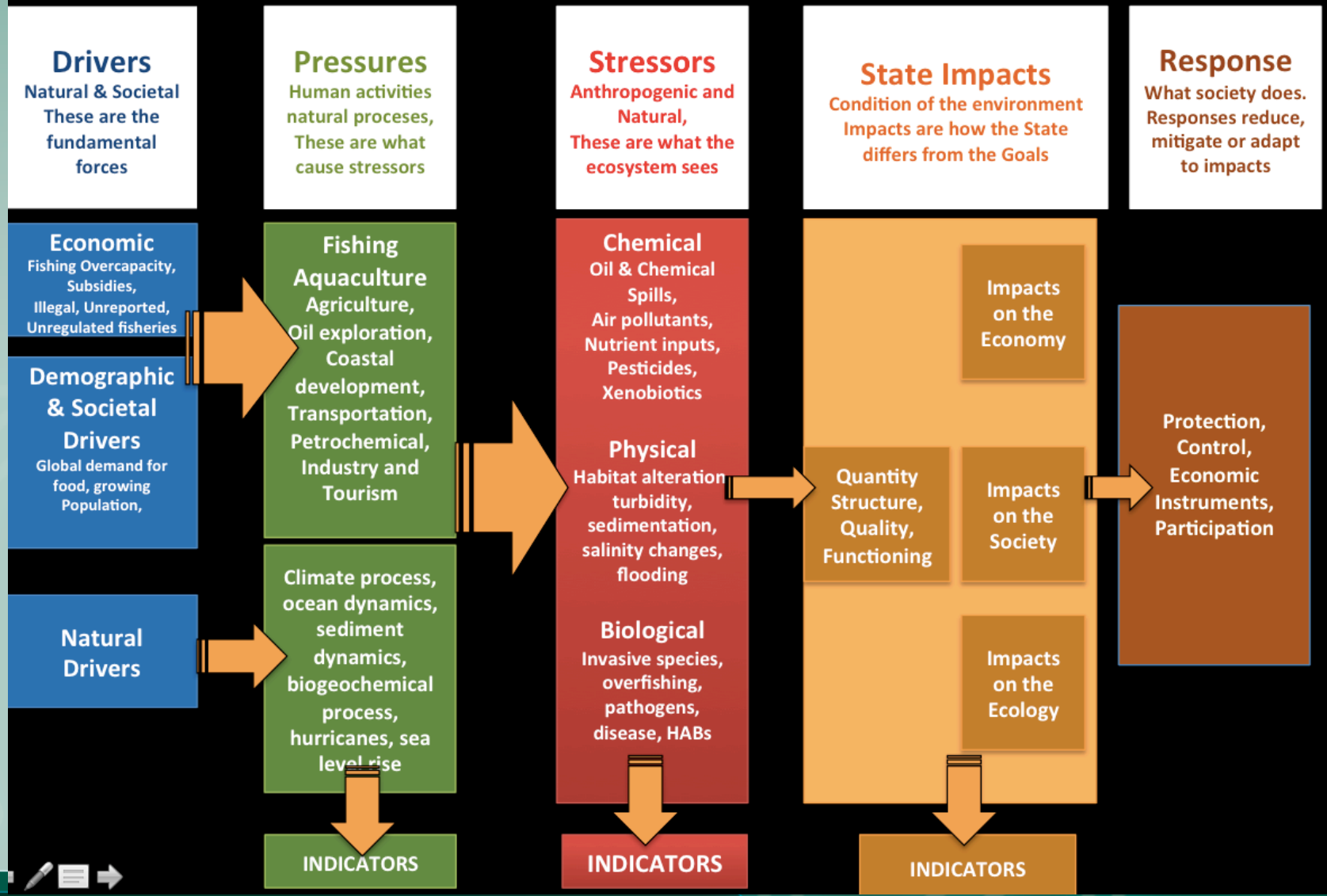
Alianza de Educadores Ambientales para el Golfo de México
CONSTRUYENDO UNA COMPROMISO POR LA NATURALEZA

CIIMAR GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

SUMMIT | 2014
STATE OF THE GULF OF MEXICO

Key participation at the Gulf Summit
Houston, 24 March, 2014

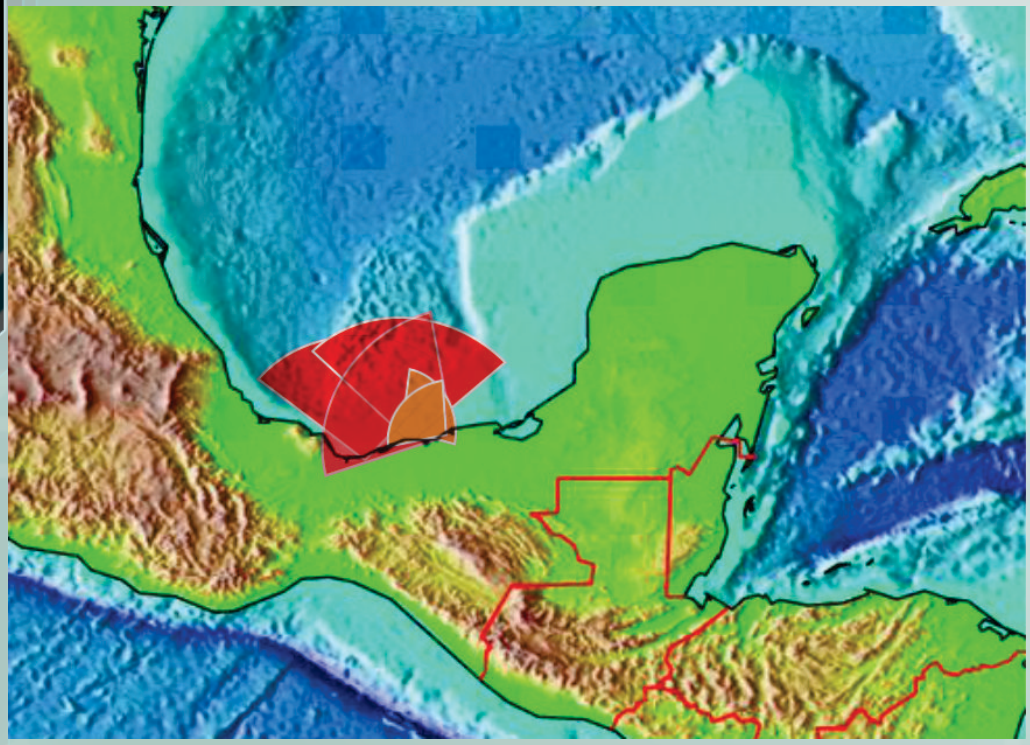
Developing indicators for the Gulf of Mexico




Instituto Politécnico Nacional
"La Técnica al Servicio de la Patria"
SEP
SECRETARÍA DE EDUCACIÓN PÚBLICA
SEMAR
SECRETARÍA DE MARINA
CIIMAR
GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe
CONABIO
AEM
AGENCIA ESPACIAL MEXICANA
MexICOOS
An international cooperation project to set up the
Mexican Integrated Coastal and Ocean Observing System

CIIMAR GOMC

Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe



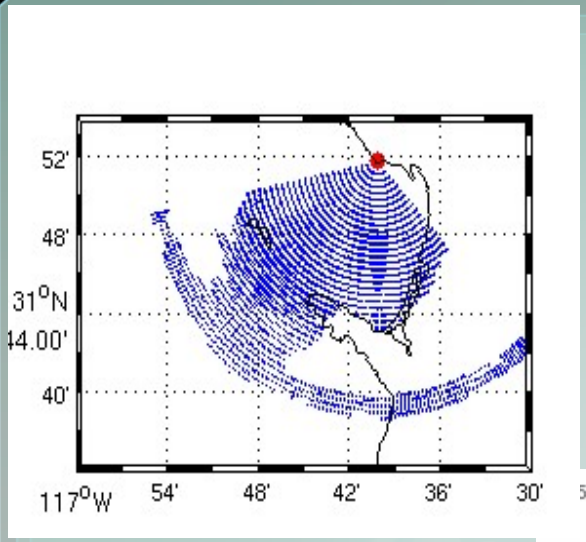
Monitoring of ocean current using High Frequency Radars in the coastal areas of the Tabasco State

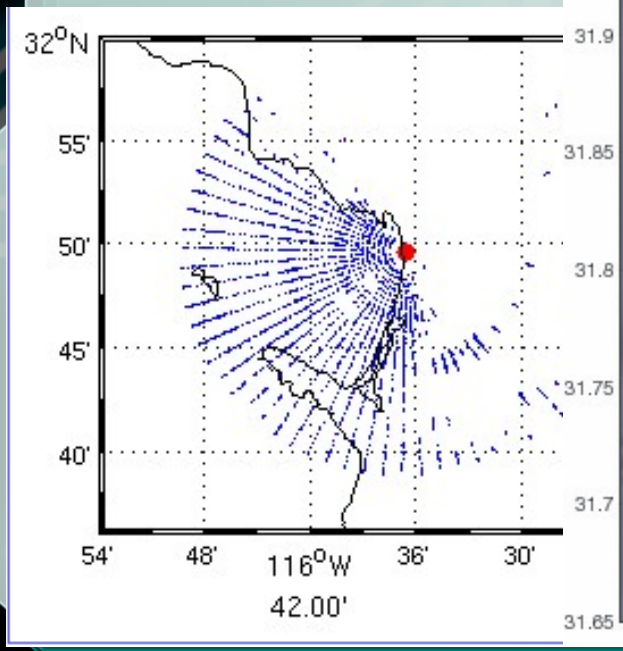
Xavier Flores Vidal (UABC)
Porfirio Álvarez –Torres (UJAT)

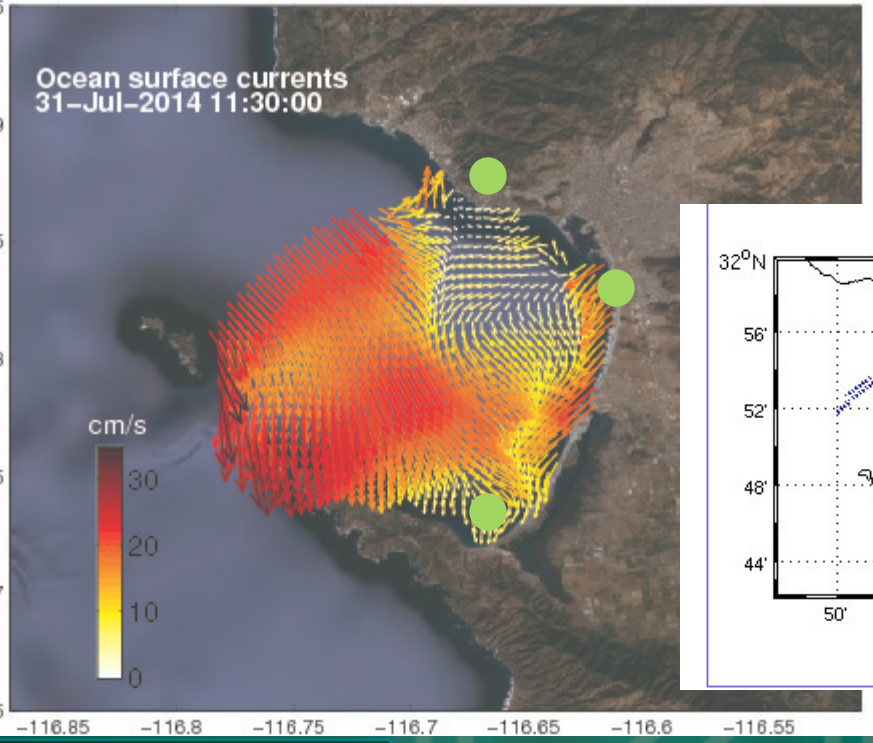
Examples of HFR´s

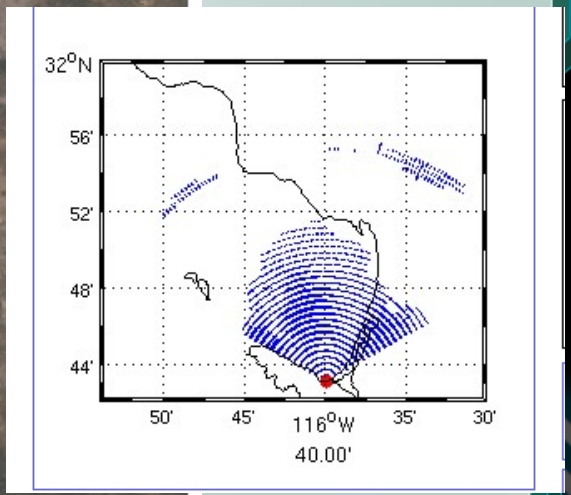
21 AL 24 DE ABRIL Puerto Vallarta, Jal.

Data taken from over 2 HFR stations









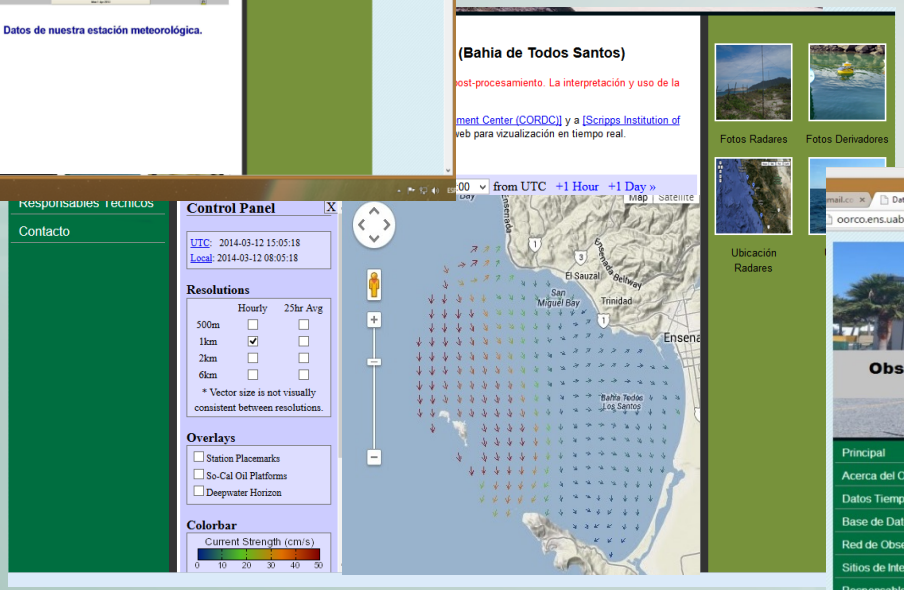
OORCo measures:

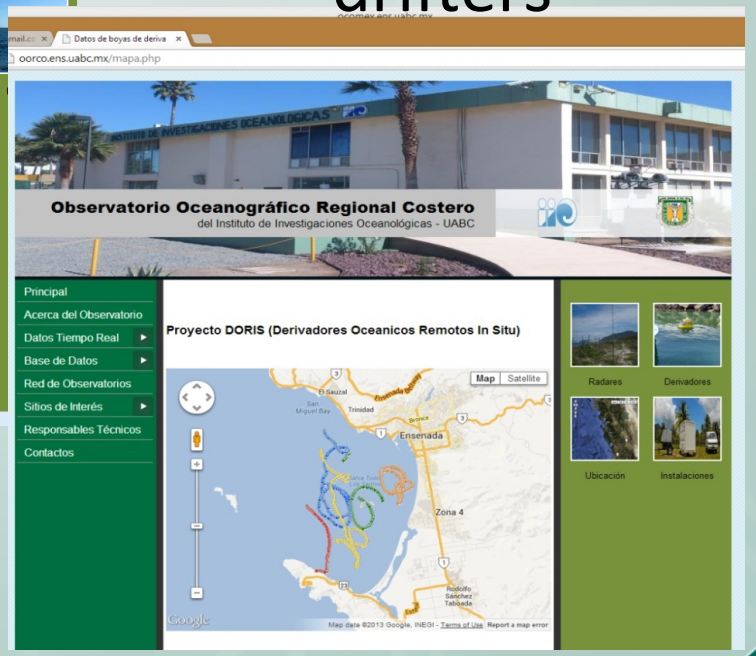
- ✓Radio Scatterometers (HFR)
- ✓Weather stations
- ✓Drifters (developed by ourself)
- ✓Numerical Models

1. Weather conditions

2. Sea surface currents

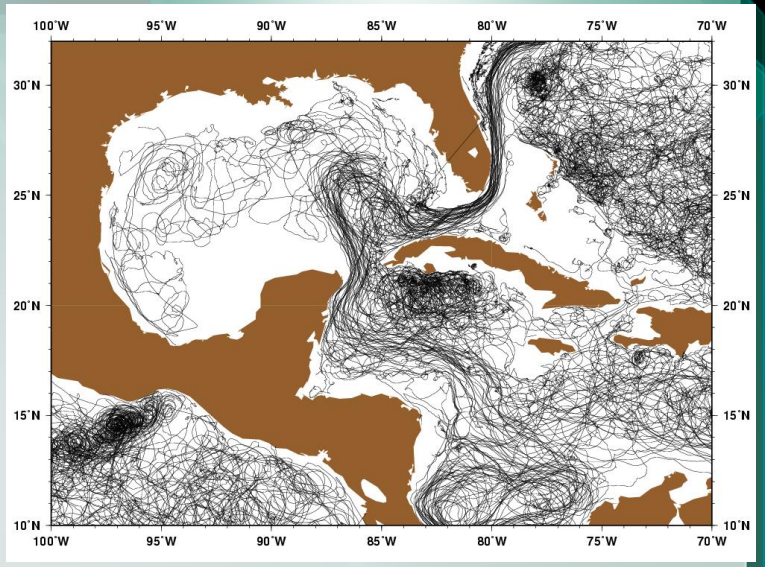
3. Paths from drifters

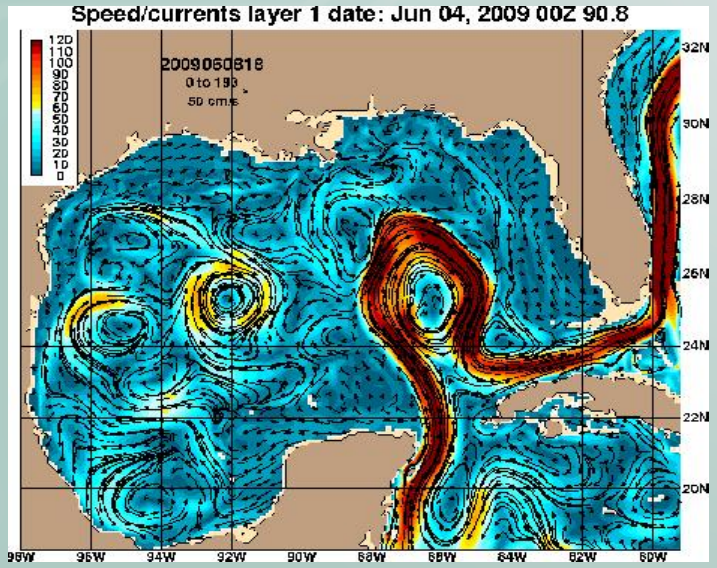


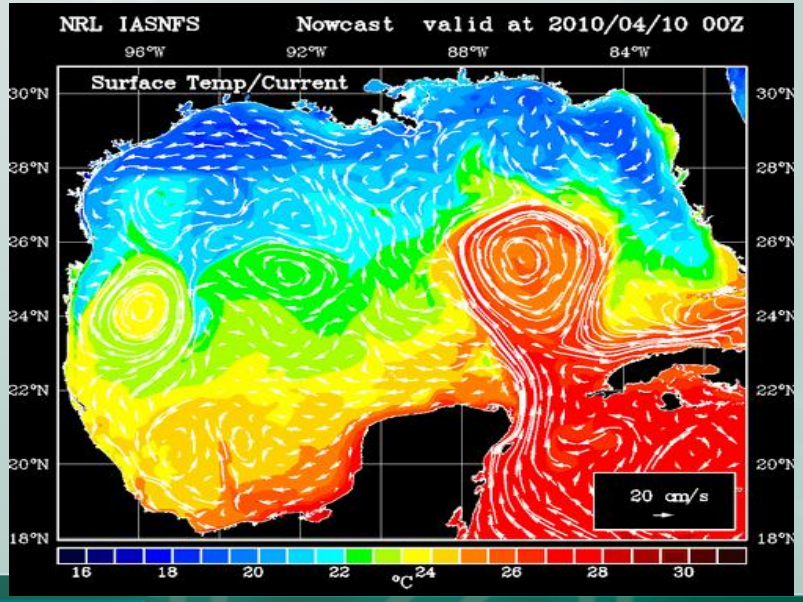


http://
oorco.ens.uabc.mx

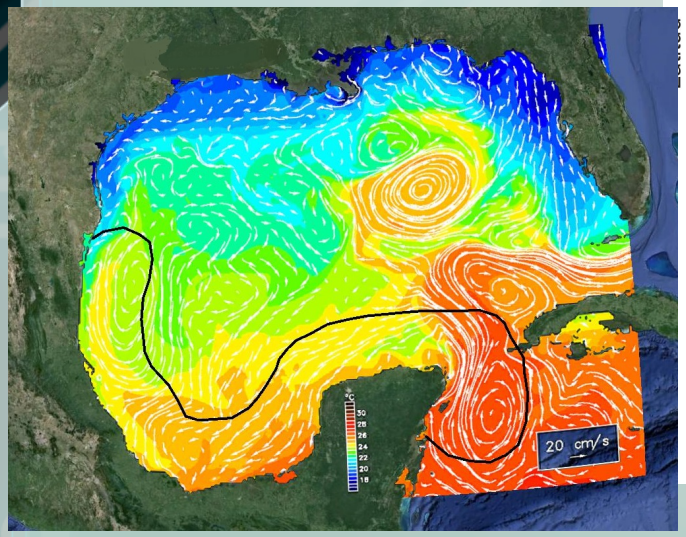
a) Interaction of the Loop current with coastal currents on the continental platform
b) Hydrodynamic effects generated by the Grijalva Usumacinta and Gonzalez rivers

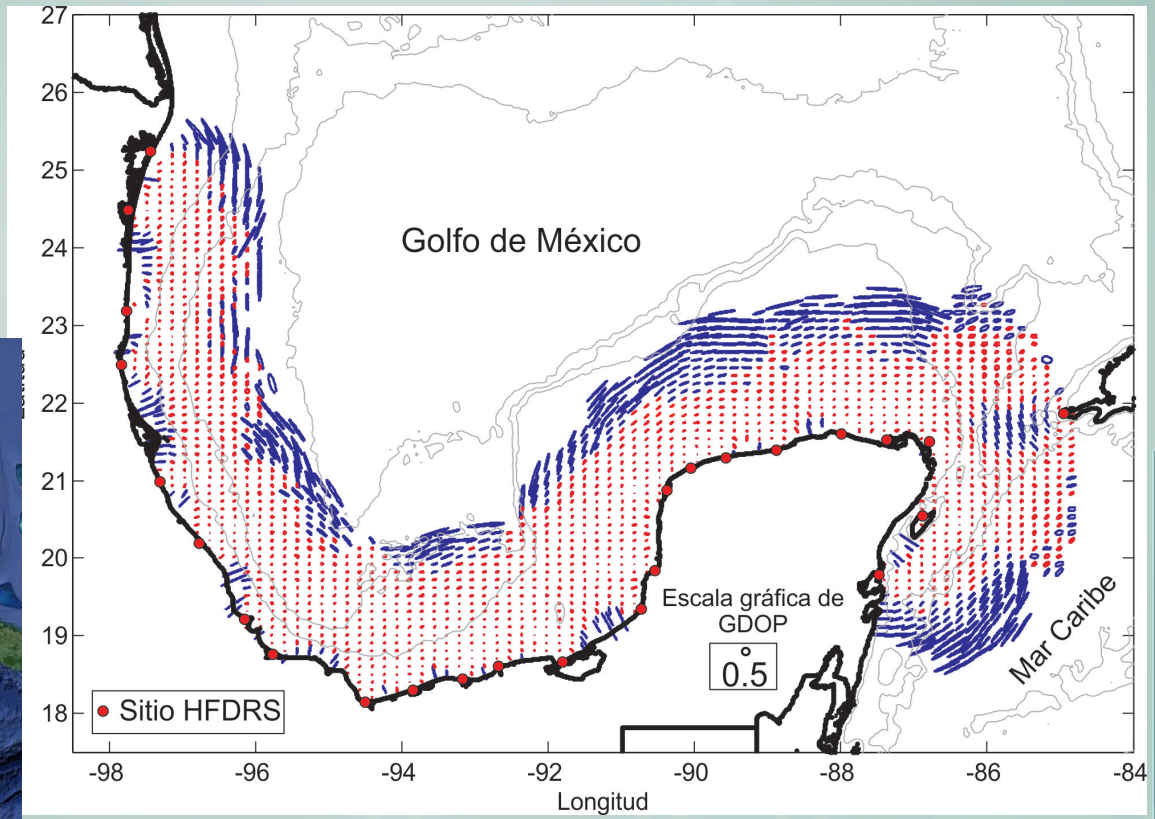






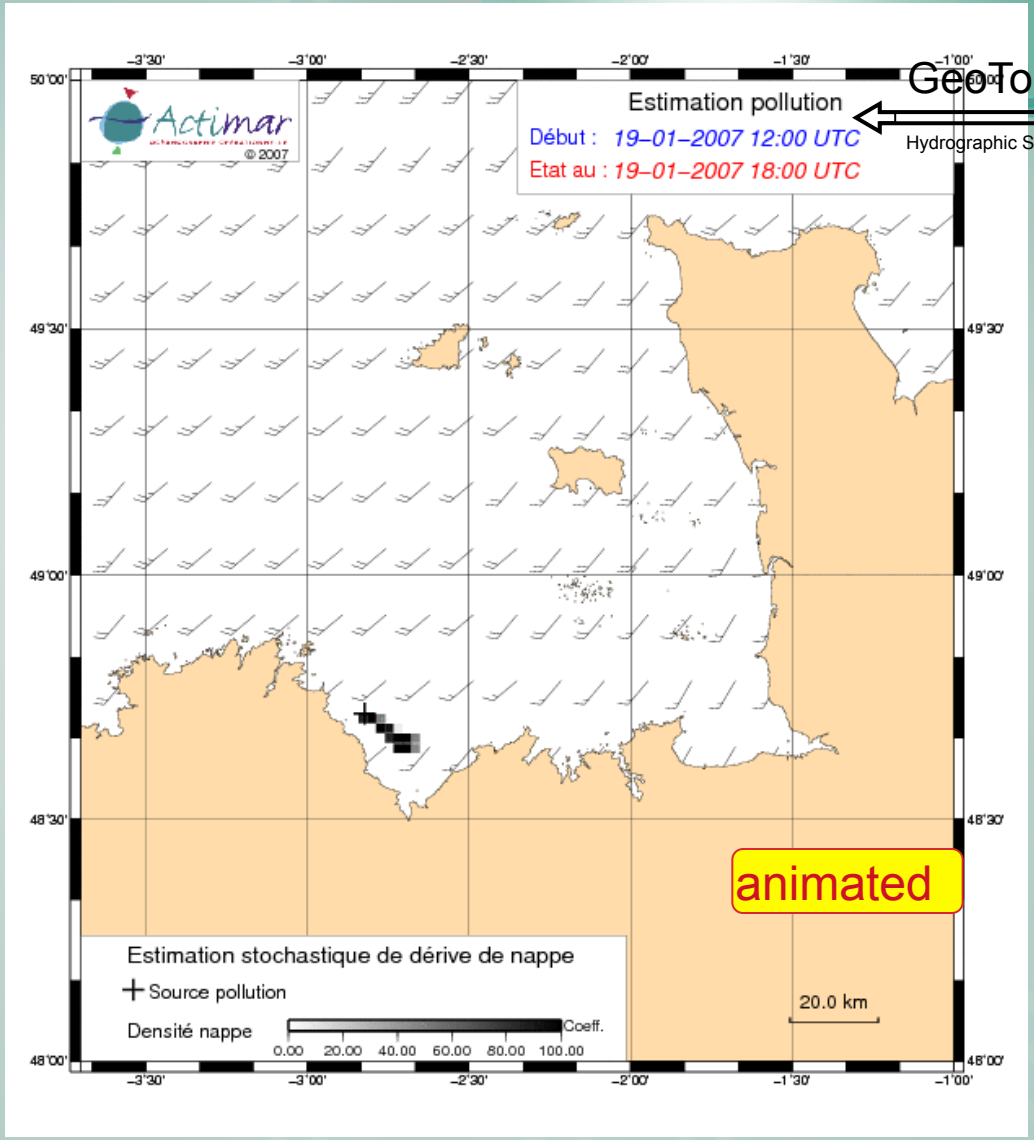
Proposal for 20 Stations of HFR in the Gulf and Caribbean





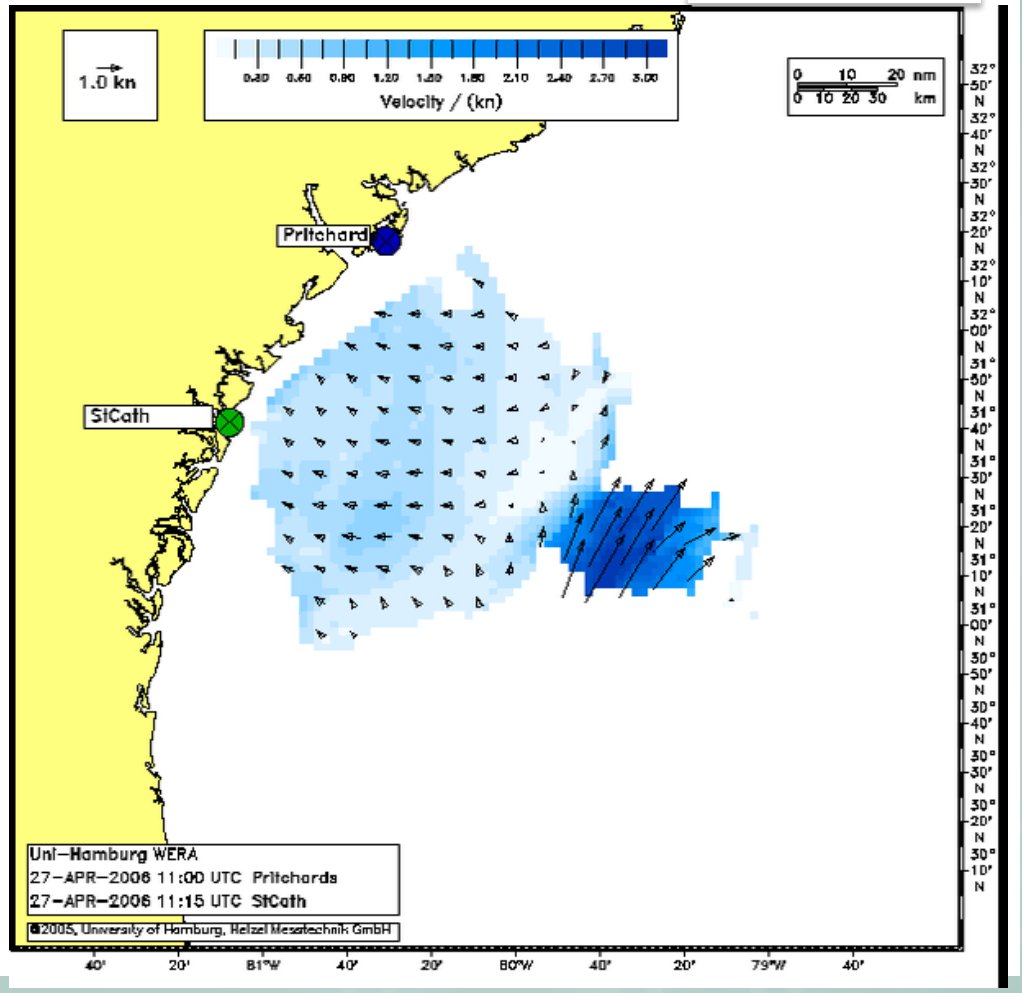
Oil Spill Forecast

Oil drift with a continuous source



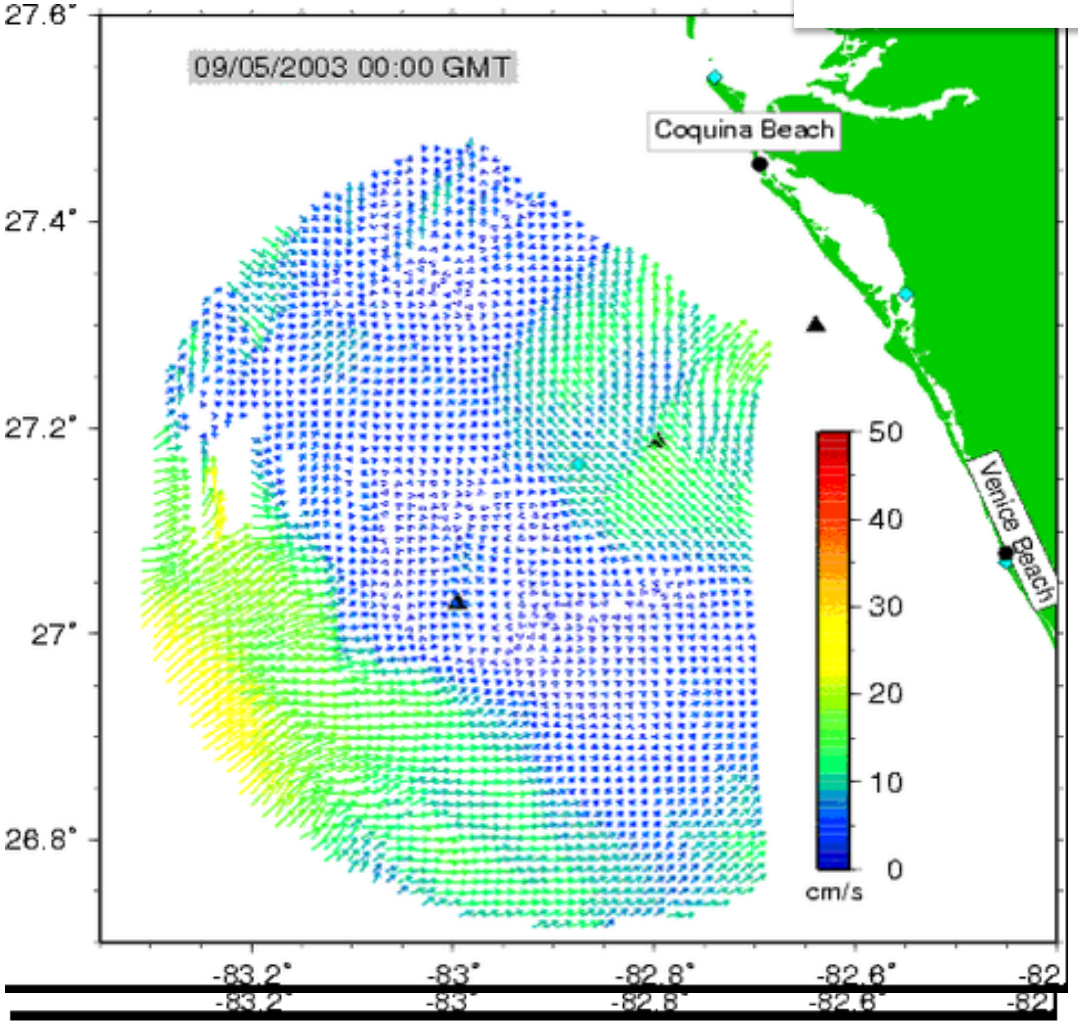
Measurement Results

- 36 hours of **raw data** processed **without** any **noise reduction, artefact suppression** or **special filtering**
- One new map from complete new data set **every 30 min**
- Range varies from **120 to 220 km**
- 8.35 MHz, 30 Watts, **3 km range cell size**

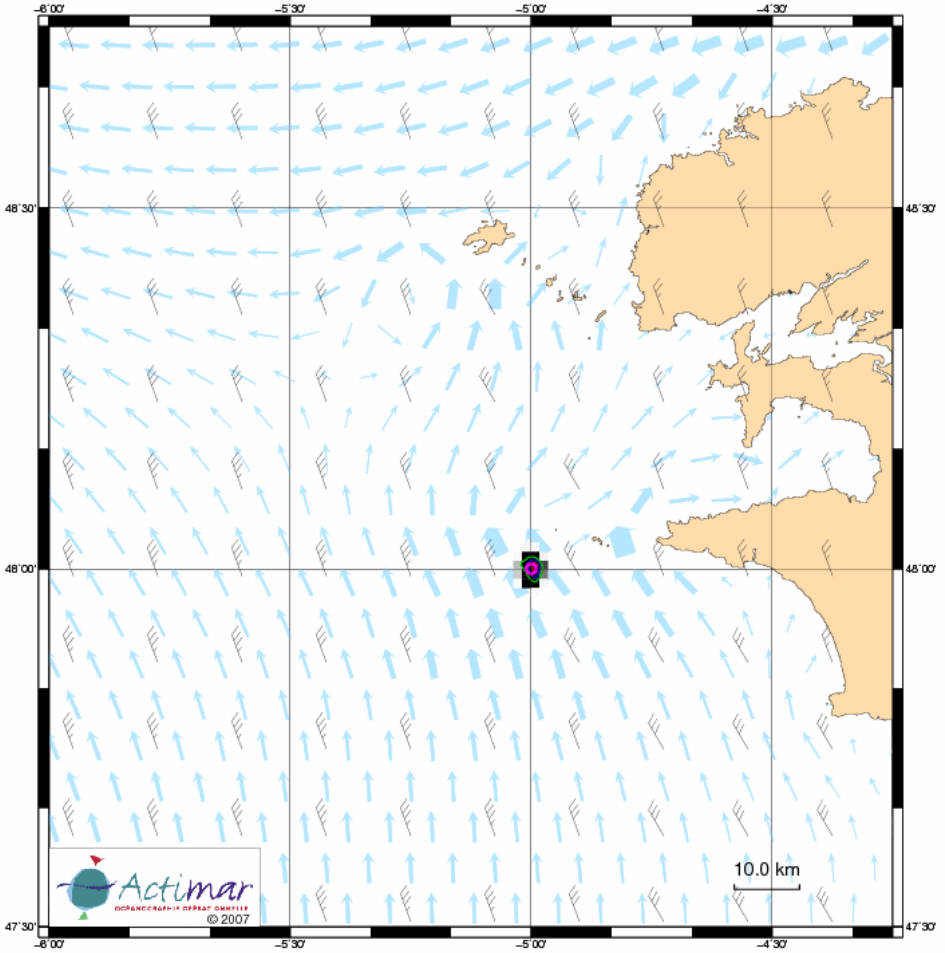


Over the Horizon Radar

- Example of a hurricane West of Florida
- 2003-09-05



Prediction of Oil Drift



Stochastical estimate of pollution drift

-- Iroise_obj_backward --

Map of presence probabilities of the pollution source

Parameters

Type of pollutant : Container – fût
Wind influence :
Start pollution : 19–03–2007 12:00 UTC

Current situation

Date : 19–03–2007 12:00 UTC
End of calculation : 26–04–2007 16:08 UTC
Prob. 50% to find the src. in 1.84e+00 KM2 of sea.
Prob. 70% to find the src. in 3.69e+00 KM2 of sea.
Prob. 90% to find the src. in 5.53e+00 KM2 of sea.

Key

Observed pollution
Prob. src. inside : 50%
Prob. src. inside : 70%
Prob. src. inside : 90%
Surface probability of source presence
KM-2
0.0e+00 1.0e-03 2.0e-03 3.0e-03

CIIMAR GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Develop Join Research

Gulf of Mexico & Caribbean

DEFINE: Principles and challenges

FOCUS on priority and Transboundary Issues

DEVELOP: Actions

DEFINE: Soureces of Funding and future cooperation

CIIMAR GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

BUILIDING SPECIFIC MEX-US EXCHANGE PROJECTS

- Focus on four priority issues
  1. Restoration of Coastal Ecosystems
     - ✓ Mangrove Restoration
     - ✓ Blue carbon assessment in wetlands
  2. Monitoring Marine Ecosystems
     - ✓ Coastal and Ocean Observing System Development
     - ✓ High Frequency radars, Glider technology development and oceanic buoys
  3. Assessment of sources of pollution
     - ✓ Oil, gas, hypoxia, harmful algal blooms
  4. Adapt to Climate Change
     - ✓ Local models for Sea Level Rise & Flooding
     - ✓ Models and assessment of coastal erosion
     - ✓ Enhance coastal communities resilience

CIIMAR GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Examples of collaboration

Restoration of Coastal Ecosystems

✓Mangrove Restoration;

LSU, MSU,

✓Blue carbon assessment in wetlands;

Smithsonian Environmental Research Center

Monitoring Marine Ecosystems

✓Coastal and Ocean Observing System Development;

Woods Hole, MIT, Scripps

Assessment of sources of pollution

✓Oil, gas, hypoxia, harmful algal blooms

LUMCON, LSU

Adapt to Climate Change

Scripps, NGI, Woods Hole, TAMUCC, FSU


CIIMAR
GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe
FEDERAL GOV.
MX – US
GULF ACCORD &
STATES ALLIANCE
MX - US
RESEARCH
CONSORTIA
MX - US
CIVIL SOCIETY
MX - US
Reduce Pollution
Foster Education & Outreach
Conserve Ecosystems
Recover Living Marine Resources
Enhance Coastal Communities Resiliency
Academic & Scientific Programs
GOMA
Plan of Action
EPA Gulf
Restoration
Program

CIIMAR
GOMC
Consorcio de Instituciones de Investigación Marina del Golfo de México y del Caribe

Dr. José Manuel Piña Gutiérrez
President University Juarez Tabasco
President of CiiMar-GoM

Dr. Porfirio Alvarez Torres
Executive Secretary
CiiMar-GoM

Ms. Rosa Martha Padrón López
Director, Academic División Biological Sciences, UJAT