

Oceanographic Observational Platforms, Baseline studies, Model Simulations, and Scenarios of the Natural Response to Large-Scale Oil Spills in the Gulf of Mexico



Dr. Guido Marinone, Director General del CICESE, Responsable Legal
M en C Leonor Falcón Omaña, Responsable Administrativo
Dr. Juan Carlos Herguera, Responsable Técnico



- Perform physical, chemical, and biological measurements to establish a baseline for the present-state and the natural variability of the greater ecosystem of the Gulf of Mexico
- Use and develop cutting-edge technologies to observe the surface ocean continuously, and in some cases in real-time, that could be used in the case of an oil spill, and which, together with numerical models, allow to estimate its dispersion and possible consequences
- Build physical, biogeochemical, and transport models of hydrocarbons integrating degradation processes, to generate risk maps, arrival times, and estimates impacts in an efficient manner, taking into account the chemical characteristics of the hydrocarbons and the location and depth of possible large hydrocarbon spills



NWRA-SEATTLE

IGPP-UCSC

MBARI

ERI-UCSB

SIO-UCSD

IIO-UABC

CICESE

BAJAINNOVA

TEXAS A&M

CICIMAR

UAN
UCOL

CIMAT

CIDESI

UAEM

UAM

CICATA-IPN

CIDIPORT-UAT

IBT-UNAM

IG-UNAM

ICMyL-UNAM

CCA-UNAM

INECC

CINVESTAV-IPN

ROSENSTIEL SCHOOL, UOF

WOODS HOLE OI

GEOMAR-KIEL

LOCEAN, UPMC-PARIS

CCMAR-ALGARVE

The Mexican Institutions involved have more than 30 years of experience in the oceanographic and ecosystem research in the Gulf of Mexico.

Long record as Institutions of higher learning in ocean sciences

Associated with well established oceanographic research institutions in US and Europe



CIGoM

Consorcio de Investigación del Golfo de México



Baseline and environmental studies

Dra. Sharon Herzka

Oceanographic Observational Platforms

Dr. Francisco Ocampo

Hydrocarbon degradation processes

Dr. Alexei Licea

Numerical modelling

Dr. Julio Sheinbaum

Spill scenarios analysis

Dra. Paula Perez Brunius

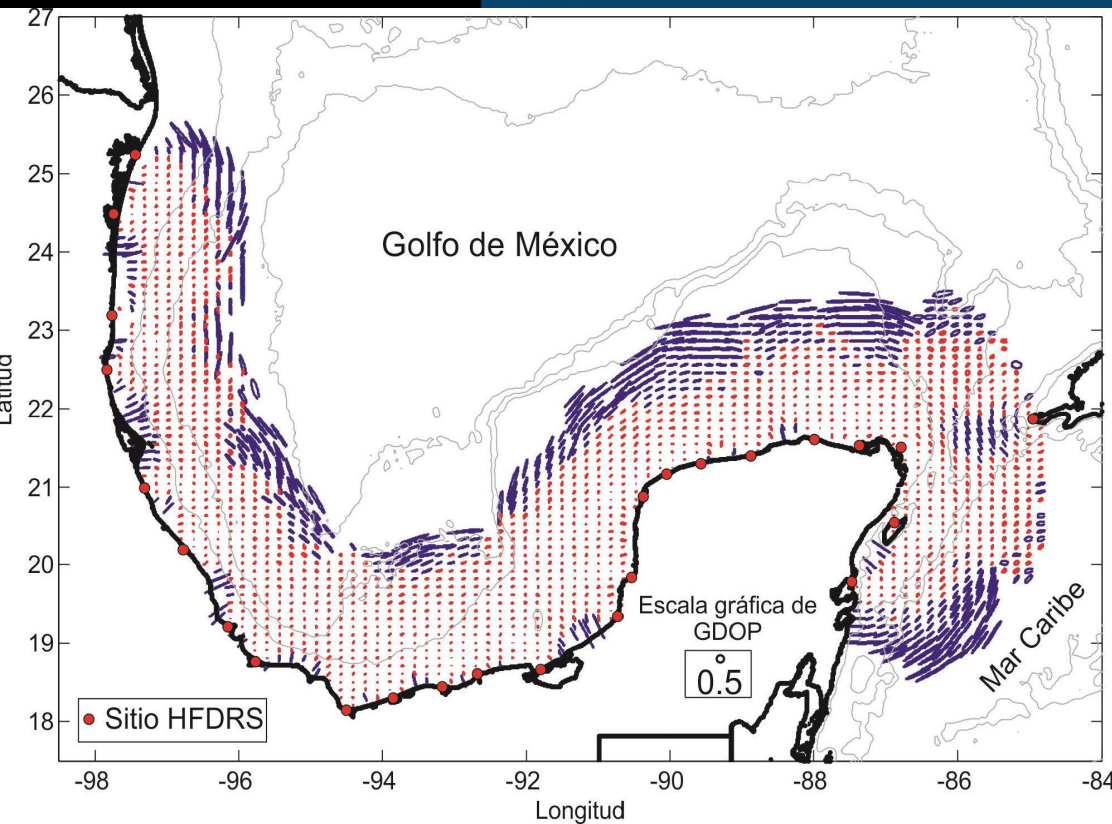


INSTITUTO NACIONAL DE ECOLOGÍA Y CAMBIO CLIMÁTICO



ICML	IG	IBT	CCA	CCA

- Implement a network of oceanographic observational platforms, discrete continuous, some in real time, fixed and drifting that incorporate cutting-edge technology



Subproyecto 1: Establecimiento de observatorios marino mediante una red de boyas oceanográficas y de sedimentos en el Golfo de México.

Francisco J. Ocampo Torres y Rubén



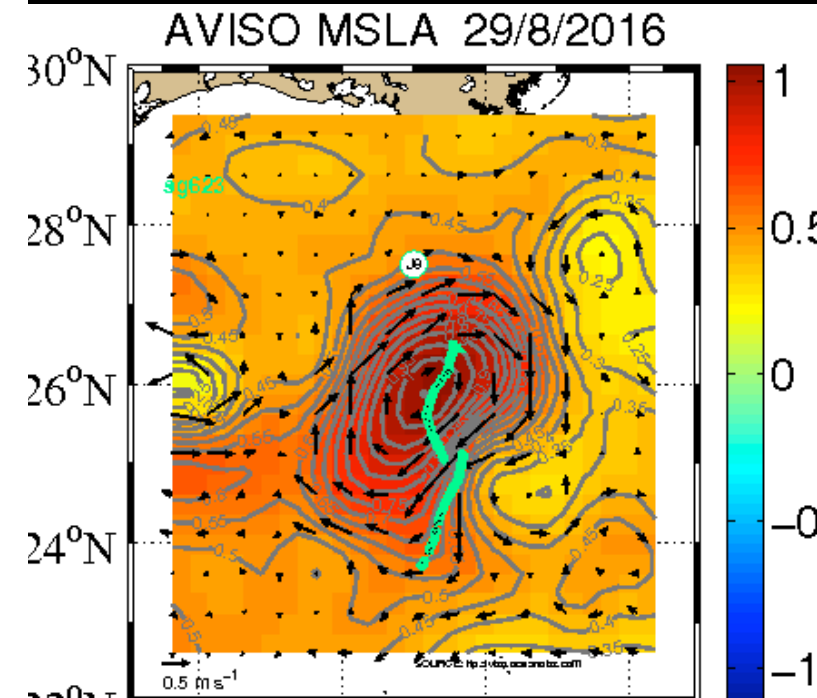
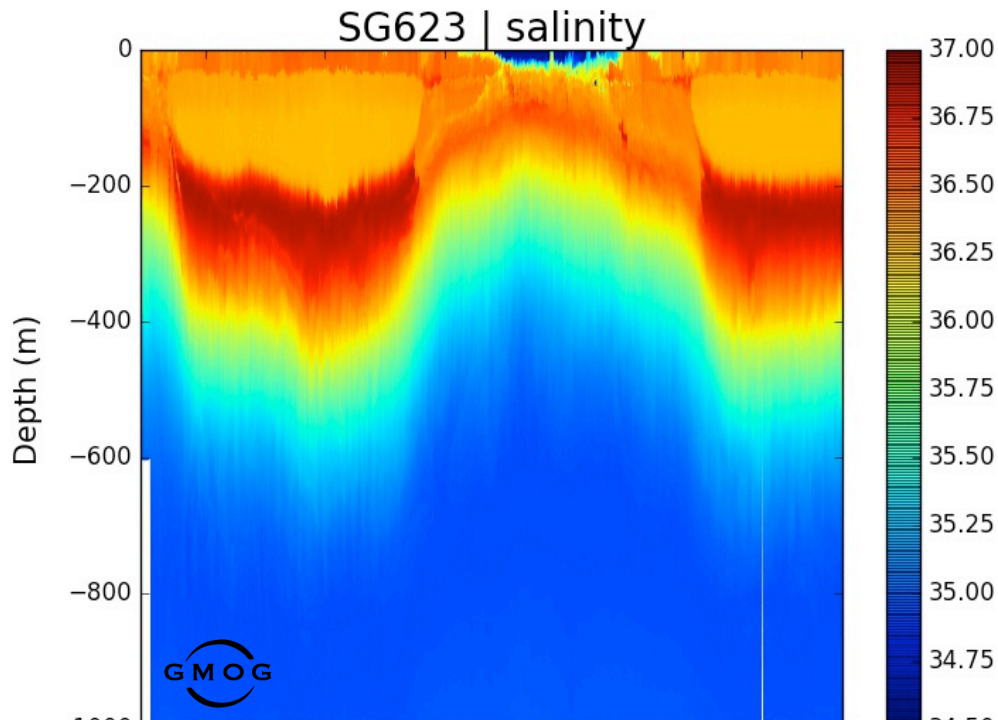
Boyas oceanográficas costeras (flujos de carbono) BOMM oceanográficas y de meteorología marina

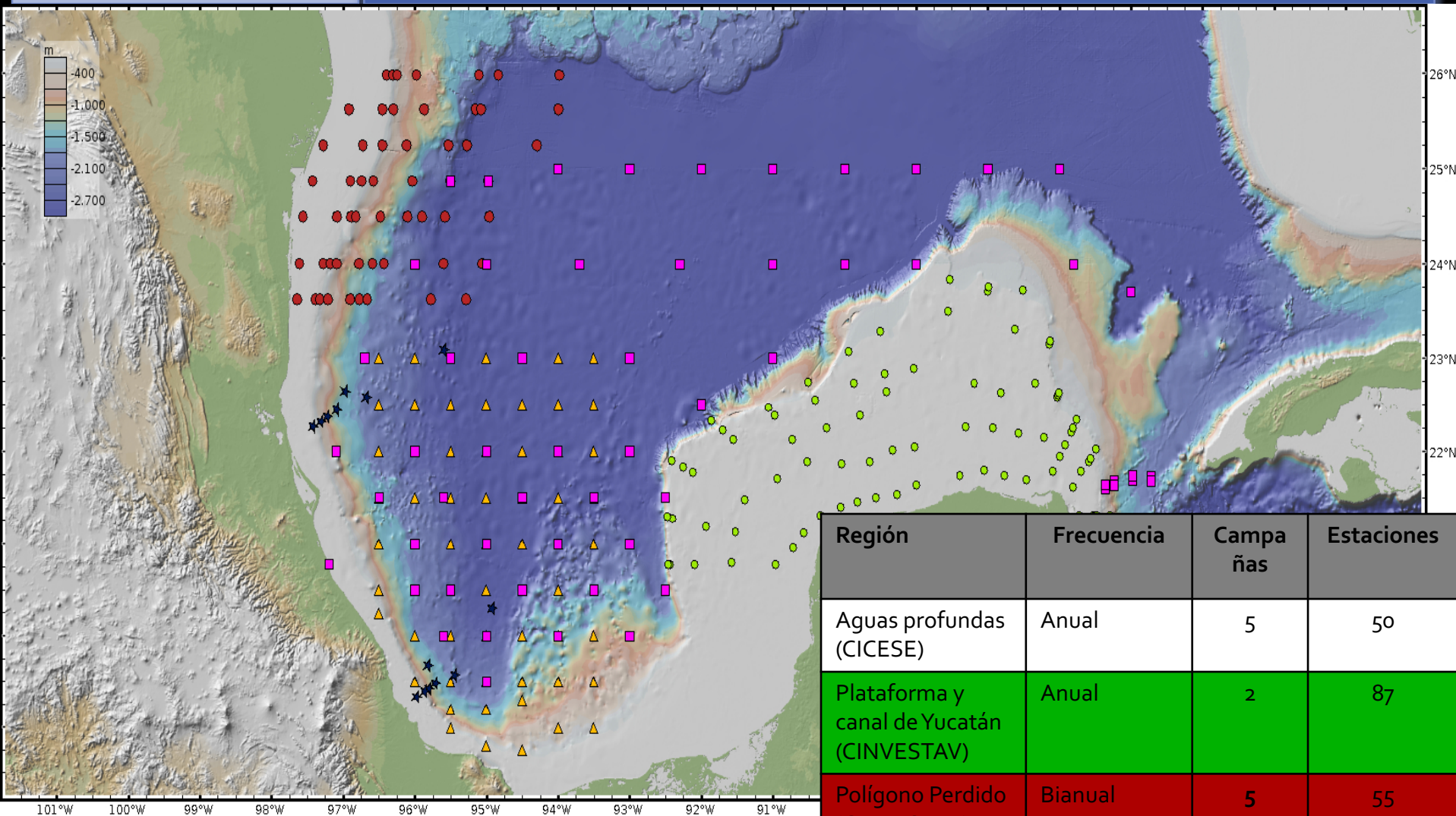
Line of Action 1: Oceanographic observational platforms

Enric Pallás y Miguel Tenreiro



Se van a utilizar instrumentos muy novedosos de observación oceanográfica como los planeadores submarinos, también conocidos como gliders, que nos proporcionarán una nueva visión de la

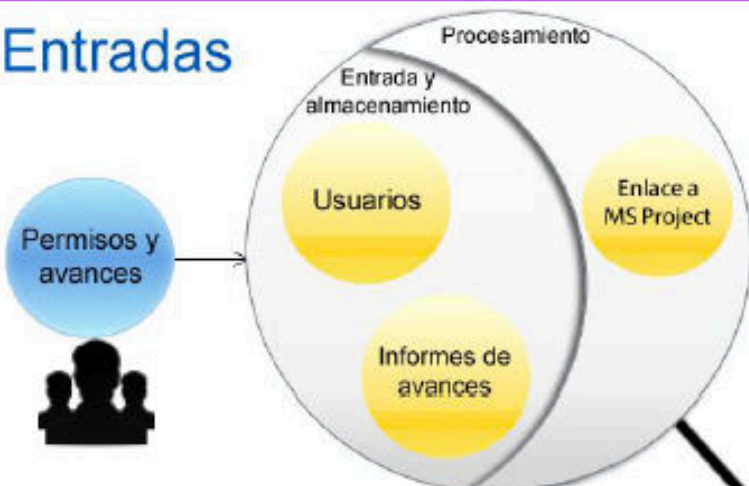




Región	Frecuencia	Campañas	Estaciones
Aguas profundas (CICESE)	Anual	5	50
Plataforma y canal de Yucatán (CINVESTAV)	Anual	2	87
Polígono Perdido (CINVESTAV)	Bianual	5	55
Golfo suroeste (ICML-UNAM)	Anual (estacional)	4	63
Malla fina Perdido y Coat. (CICESE)	Estacional (2 por año)	8	50

Information System CIGOM

Entradas



Sistema de apoyo CIGOM



- MMD - Desarrollo
- MMD - Proyectos
- IBT - Desarrollo

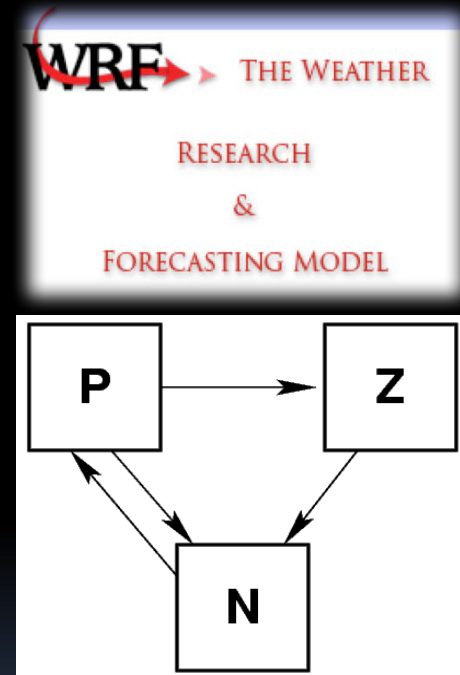
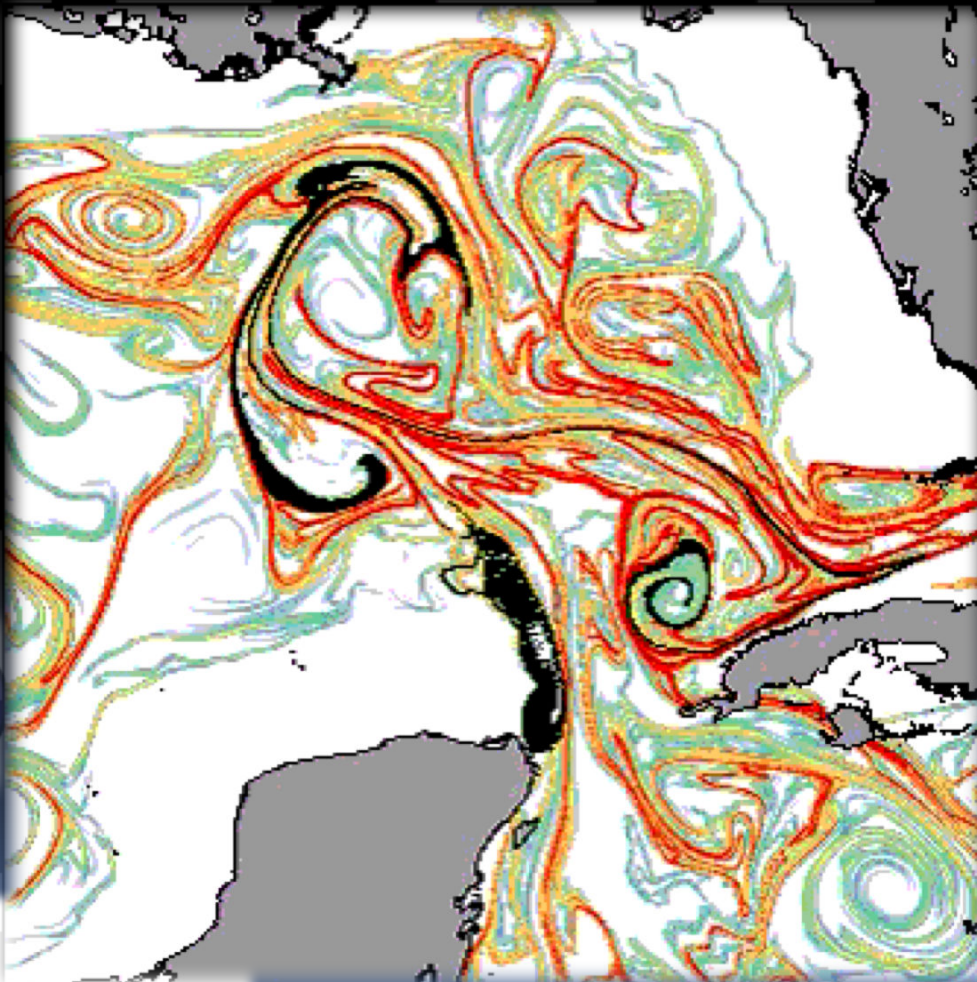
Sistema de datos Linea 2 y 4



Salidas

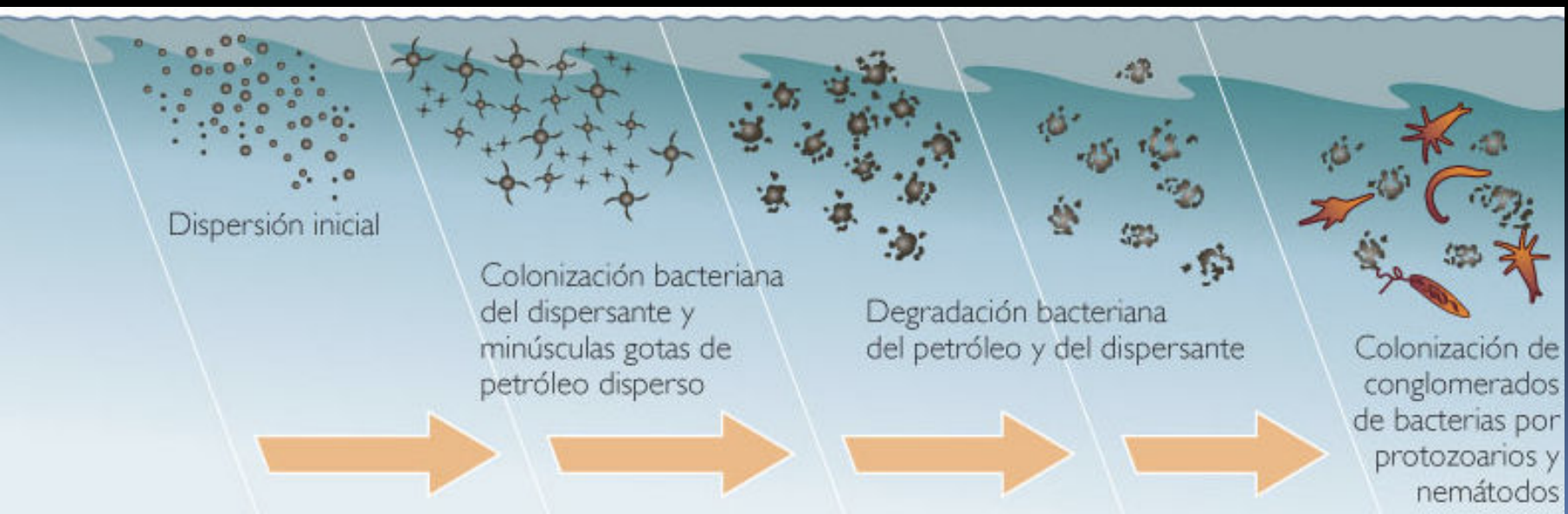


Create an integral system of observations and numerical models at different spatial and time scales, capable of generating scenarios and evaluating consequences and impacts of possible hydrocarbon spills in the Gulf of Mexico under different climate and ecological scenarios



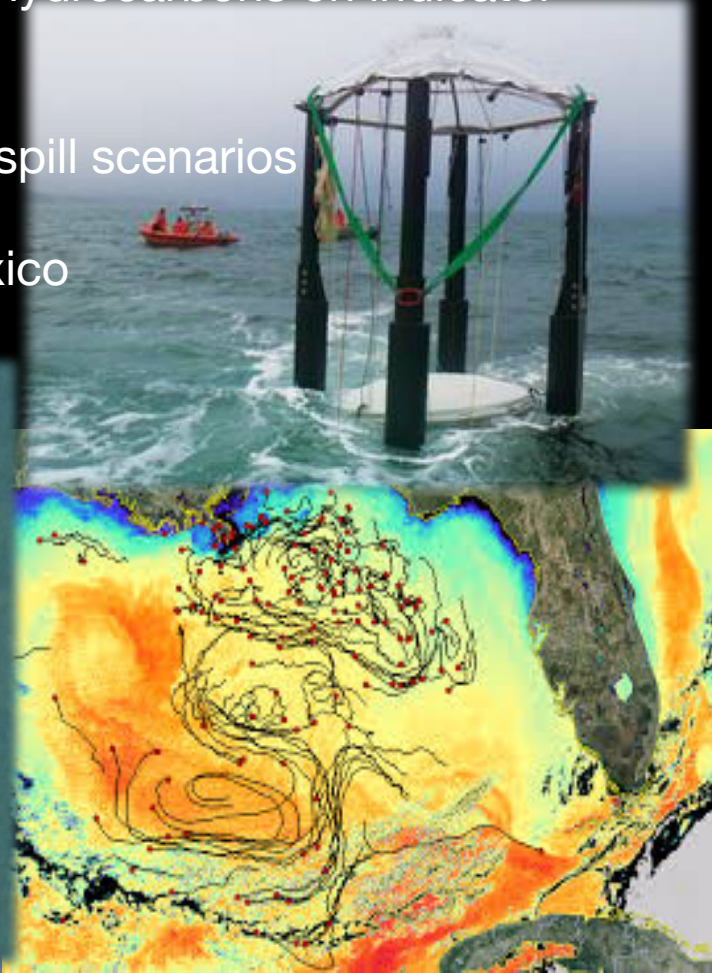
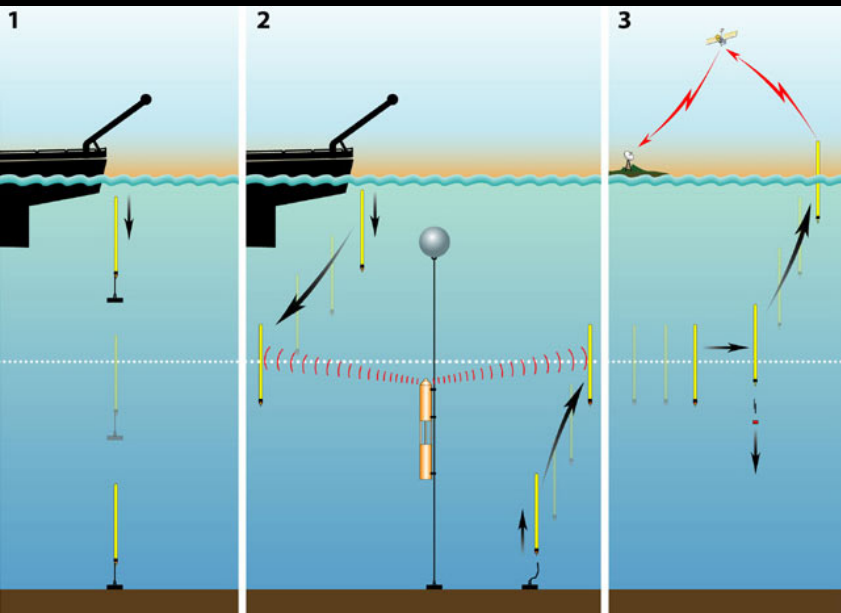
Simulating WAVes Nearshore

- Characterization of the bacterial community through metagenomic analysis, with emphasis on the identification of genes related to the degradation of hydrocarbons (particularly the aromatic fraction)
- Evaluate the microbial degradation of different hydrocarbon fractions under both controlled and natural conditions
- Experimental estimation of the biological degradation rates by the native microflora; with emphasis on the biological degradation capacity of the aromatic fraction of various Mexican crudes
- Sets the stage for selecting remediation techniques
- Parametrization of numerical models



Examine the possible consequences under different spill scenarios, using the "Perdido" region as a model system. The focus is on studying the dispersion and transport processes, and their possible impact on the ecosystem at different temporal and spatial scales

- In situ and laboratory trials to measure the effect of hydrocarbons on indicator species
- Evaluation of the recovering capacity of keystone species in the Gulf of Mexico ecosystem under large spill scenarios
- Spatial distribution of vulnerability in the Gulf of Mexico



The consortium includes highly recognized Mexican oceanographic academic Institutions

- The consortium offers a training of human resources at different levels: technicians, students, and post-docs
- Promote research exchanges between institutions collaborating with the project
- Emphasis on student mobility and link with the labor market and PEMEX



16 Postgraduate programs
4 international level
10 consolidated

CICESE: Maestría y Doctorado en Oceanografía Física, Ecología Marina y Ciencias de la Vida

UABC: Maestría y Doctorado en Oceanografía Costera

CINVESTAV: Maestría en Biología Marina y Doctorado en Ciencias Marinas

UNAM: Maestría y Doctorado en Ciencias del Mar y Limnología, Ciencias Bioquímicas, Ciencias de la Tierra

CIDESI: Maestría y Doctorado Interinstitucional en Ciencia y Tecnología

- A vanguard system of oceanographic observation platforms with technological development capacity
- A deeper understanding of the great ecosystem of the Gulf of Mexico that will help set the basis for sustainable development, security and well being for the population living on its shores
- Better understanding of the complexity of the processes that are triggered during an environmental disaster at multiple scales that will allow us to anticipate their development and minimize their impacts
- Highly trained human resources prepared to use the observation platforms, the numerical models, and the knowledge of the baseline as essential tools for any mitigation task in an environmental disaster
- Government agencies at the federal, state and local levels will have the capability to use these tools for the most effective mitigation and decision making during an oil spill