

Geostationary Coastal & Air Pollution Events



Gulf of Mexico (GoMex) Field Campaign Sept. 9-22, 2013 Preliminary Plans

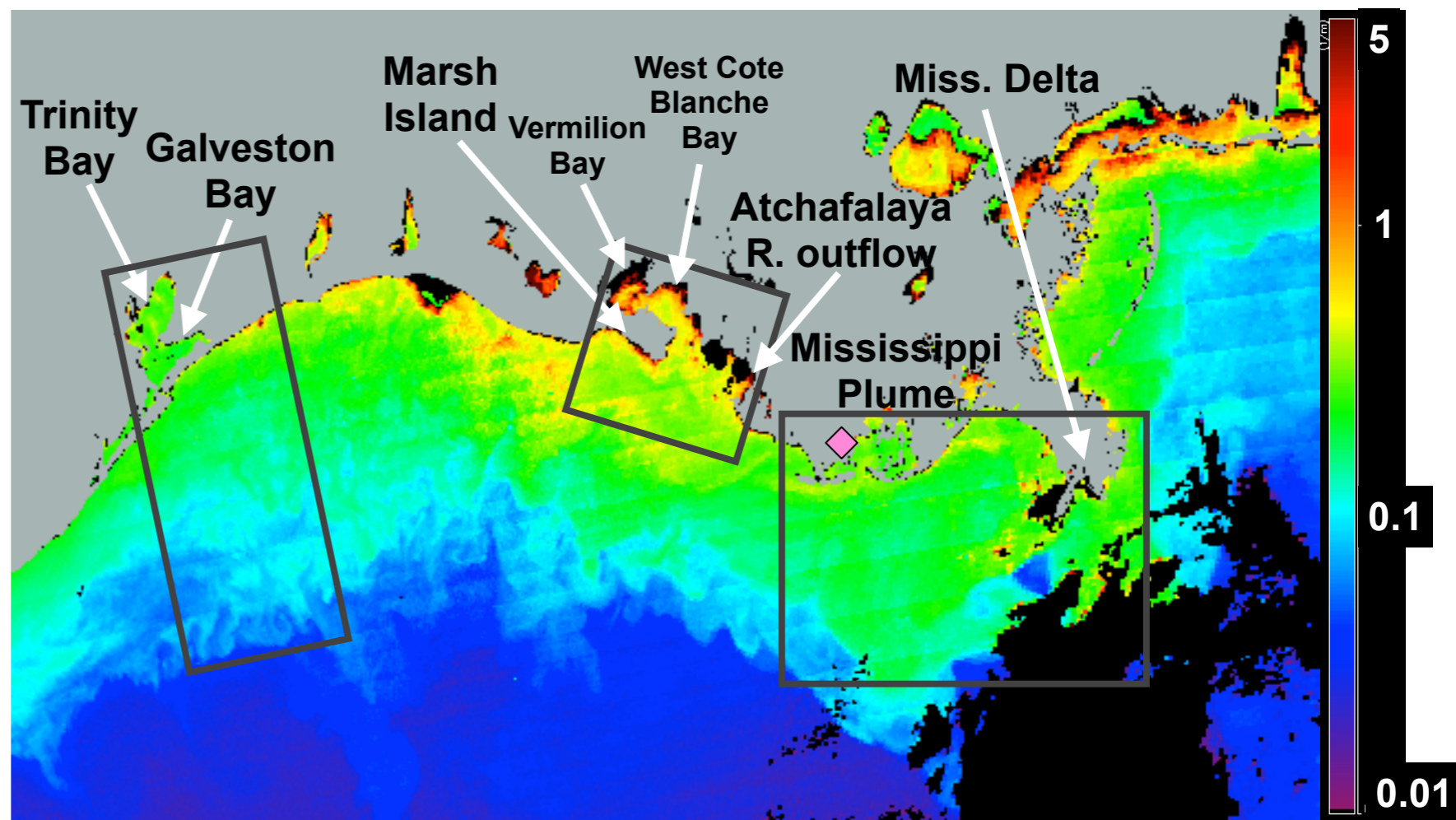


with
DISCOVER-AQ

GOAL: to evaluate whether current STM sensor requirements are optimized to address STM objectives while minimizing satellite sensor complexity, size and cost

Preliminary General Plans

- Departure from & return to Cocodrie, LA ♦
- 3 days of overflights w/ King Air - ACAM or GCAS & HSRL
 - 1 or 2 days over Louisiana shelf & Texas shelf
 - D-AQ overflights of opportunity - TX shelf & Galveston Bay
- 14 days at sea on R/V Pelican - 14 scientists
- ~5 days on LA shelf;
- ~5 days on TX shelf (one day in Galveston Bay)
- ~2 day transit to TX
- ~2 day transit to LA



Sampling Approaches - Preliminary

- Diurnal Sampling - ~every 90 minutes (6 to 8 stations/day)
 - Rosette casts (water samples; salinity, temp., IOPs)
 - IOPs (absorption, backscatter, fluorescence, etc.)
 - Radiometry profiles UV-NIR
- Continuous underway near-surface IOPs
- Above-water radiometry UV-SWIR
- Instrumented drogue - evolution of DO, salinity, temp., IOPs

- Overflights with King Air - ACAM or GCAS and HSRL-2; possibly flights of opportunity w/ GEO-TASO (TBD)

Sampling Approaches - Preliminary

- Transects along gradients
 - nearshore to offshore, river plumes, algal bloom patches
 - addresses aquatic & atmospheric spatial variability
- Tracking water masses (follow instrumented drogue)
 - diurnal evolution of biology & biogeochemistry
- Stationary
 - diurnal within pixel variability
- Small boat operations (more optically complex waters)
 - Marsh Island area; Galveston & Trinity Bay

Planned Measurements

- IOPs: profiles and underway (a, b, c, bb, VSF)
- Radiometry: profiles and underway
- Water sample IOPs (Particle abs., CDOM abs. & fluorescence)
- Phytoplankton cell counts & taxonomy
- Underway O₂, pCO₂, DIC, TA & pH
- Discrete organics (POC/PN, DOC, DON, HPLC pigments, black carbon & lignin)
- Suspended particulate matter (SPM)
- Discrete nutrients inorganic and organic
- Aerosols (AOT spectra) and trace gases (NO₂, ozone, ...) from the ship (total column).
- Primary production

OBB Field Support Group at GSFC

to provide water analysis support for Rosette bottle samples:
HPLC pigments, CDOM & particle abs., POC/PN, DOC and SPM
AT NO COST

Selected Proposals

PI	Title	Discrete	Underway	Profile	Other	Required FSG measurements
Joe Salisbury	Langrangian studies and measurement support during the NASA GEOCAPE Gulf of Mexico field campaign	DIC, pH, total & non-carbonate alkalinity, Winkler O2, Respiration, triple O2 isotopes (NCP)	pCO2, DO, ac-9, Chl-Fluor, CDOM-Fluor, ISUS-UV abs, O2, S, T, O2:Ar (NCP)	ac-s, CTD, bb-9, DO, Chl-Fluor, CDOM-Fluor	Lagrangian O2, DIC, POC (NCP)	POC
Chuanmin Hu	Analysis of and interpretation of DISCOVER-AQ data for GEO-CAPE mission planning a proposal to analyze the FY13 and FY11 field campaign airborne data				Analysis of ACAM data to retrieve ocean color data	
Zhongping Lee	Measurement of water-leaving radiance and inherent optical properties in support of GEO-CAPE	Lw, Ed(0+) and Rrs (350-800nm), AOD		ac-s		
Stan Hooker & John Morrow	Next-generation algorithm development for GEO-CAPE leveraged from the Northern Gulf of Mexico September 2013 Field Campaign and Linked to Discover AQ 2011	Above water radiometry (sky & ocean): (1) 19 bands or (2) hyperspectral, both with SWIR bands		Ed, Lu & Rrs (19 channel UV-Vis-NIR) and other derived AOP products		POC, SPM, CDOM & particle abs., DOC, HPLC pigments
Antonio Mannino & Maria Tzortziou	GEO-CAPE: capturing CDOM and DOC short-term and small-scale dynamics in highly vulnerable coastal ecosystems	Dissolved lignin and black carbon, plus small boat measurements of CDOM absorption & EEMs, POC, PN, DOC				POC, DOC, CDOM abs.
Maria Tzortziou & Jay Herman	Refining requirements for aerosol and trace gas retrievals necessary for ocean color atmospheric corrections from GEO-CAPE	Microtops AOT (340-936 nm) and ozone	Pandora NO2, ozone and other gases			
Margaret Mulholland	Primary productivity in coastal waters in the western Gulf of Mexico	13C-NPP (4 & 24 hr), NO3, NO3, NH4, TDN, DON, N2 fixation rates, PC, PN				
Frank Muller-Karger & Gerardo Toro-Farmer	Major phytoplankton functional types in the Gulf of Mexico: A hyperspectral assessment in preparation of GEO-CAPE algorithm and product development	phytoplakton taxonomic enumeration, subset of particle & CDOM absorption, Fluometric Chl-a		total & dissolved ac-s, bb-3, Chl & CDOM fluor., Temp., and Salinity		HPLC pigments), particle & CDOM absorption, Fluometric Chl-a
Carolyn Jordan	SHIPBOARD IN SITU AEROSOL SAMPLING FOR THE 2013 GULF OF MEXICO CRUISE AFFILIATED WITH DISCOVER-AQ	Aerosols: Na+,NH4+,K+,Mg2+,Ca2+,Cl-, NO3-, SO4=, OC, EC/OC, FTIR organic functional groups,		absorption coefficient @ 565nm, scattering @ 550n, extinction 300-650nm, size distribution (15-700nm)		

Optics

	Specifics	Instruments
AOPs	Lee: Lw, Ed(0+) and Rrs (350-800nm)	Hyper-Pro collared
	H&M: Ed, Lu, Rrs & Kd - 19 bands UV-Vis-NIR	C-PrOPS profiler
	H&M: Above water (sky & ocean): (1) 19 bands or (2) hyperspectral, UV-SWIR	(1) BioSors - 320...1640 nm; (2) EMR (OSPRey) 305-1640 nm
	TBD - Ondrusek: Lw, Ed(0+) & Rrs (350-800nm)	Hyper-Pro profiler
	Hu et al.: hyperspectral Rrs UV-VIS	ACAM or GCAS
IOPs	Joe: profiling - a, c, bb, Chl-Fluor, CDOM-Fluor, CTD	ac-s, CTD, bb-9, DO, Chl-Fluor, CDOM-Fluor, CTD
	Lee: profiling - a, c	ac-s
	Joe: underway - a, c, CDOM-Fluor, UV abs., TSG	ac-9, Chl-Fluor, CDOM-Fluor, ISUS-UV abs., DO, S, T
	FM-G & GT-F: underway - a, c, bb, Chl-Fluor, CDOM-Fluor, TSG PENDING	total & dissolved ac-s, bb-3, Chl & CDOM fluor., Temp., and Salinity
	MISSING: profiling & discrete VSF	

Biology & Biogeochemistry

PIs	Measurements
Joe: discrete	DIC, pH, total & non-carbonate alkalinity, Winkler O ₂ , Respiration, triple O ₂ isotopes (NCP)
Joe: underway	O ₂ :Ar (NCP)
Joe: Lagrangian	DO, DIC, POC (NCP)
Mulholland: discrete 4 stations/day 2-3 depths	13C-NPP (4 & 24 hr), NO ₃ , NO ₃ , NH ₄ , TDN, DON, N₂ fixation rates, PC, PN
Antonio & Maria: discrete 30 LOPs & 60 BC	Dissolved lignin and black carbon with CDOM absorption & EEMs, POC, PN, DOC for those near-surface samples - includes small boat measurements
FSG: discrete Rosette bottle samples 3-4 depths	HPLC pigments, CDOM & particle abs., POC/PN, DOC and SPM (surface only) (at no cost to GEO-CAPE) (HPLC pigments & SPM requested)
FM-G & GT-F: discrete PENDING	phytoplankton taxonomy
	MISSING: phytoplankton taxonomy

Atmospheric

PIs	Measurements
Tzortziou & Herman underway	Pandora NO ₂ , ozone and other gases (aerosols?)
Tzortziou & Herman discrete	Microtops AOT (340-936 nm) and ozone
Lee discrete	Microtops AOD
Hooker & Morrow ? underway/discrete	sky measurements (products possible?)
Jordan: underway	absorption coefficient @ 565nm, scattering @ 550nm, extinction 300-650nm, size distribution (15-700nm)
Jordan: discrete	Aerosols: Na ⁺ , NH ₄ ⁺ , K ⁺ , Mg ²⁺ , Ca ²⁺ , Cl ⁻ , NO ₃ ⁻ , SO ₄ ⁼ , OC, EC/OC, FTIR organic functional groups,
Volkamer: discrete	MAX-DOAS measurements of NO ₂ , glyoxal, water vapor, IO, AOD and aerosol extinction (30 min; 10km spatial resolution)
	Instruments of opportunity - discrete O ₃ , NO ₂ , etc. MISSING: ???

HICO Image of WaveCIS_GOM

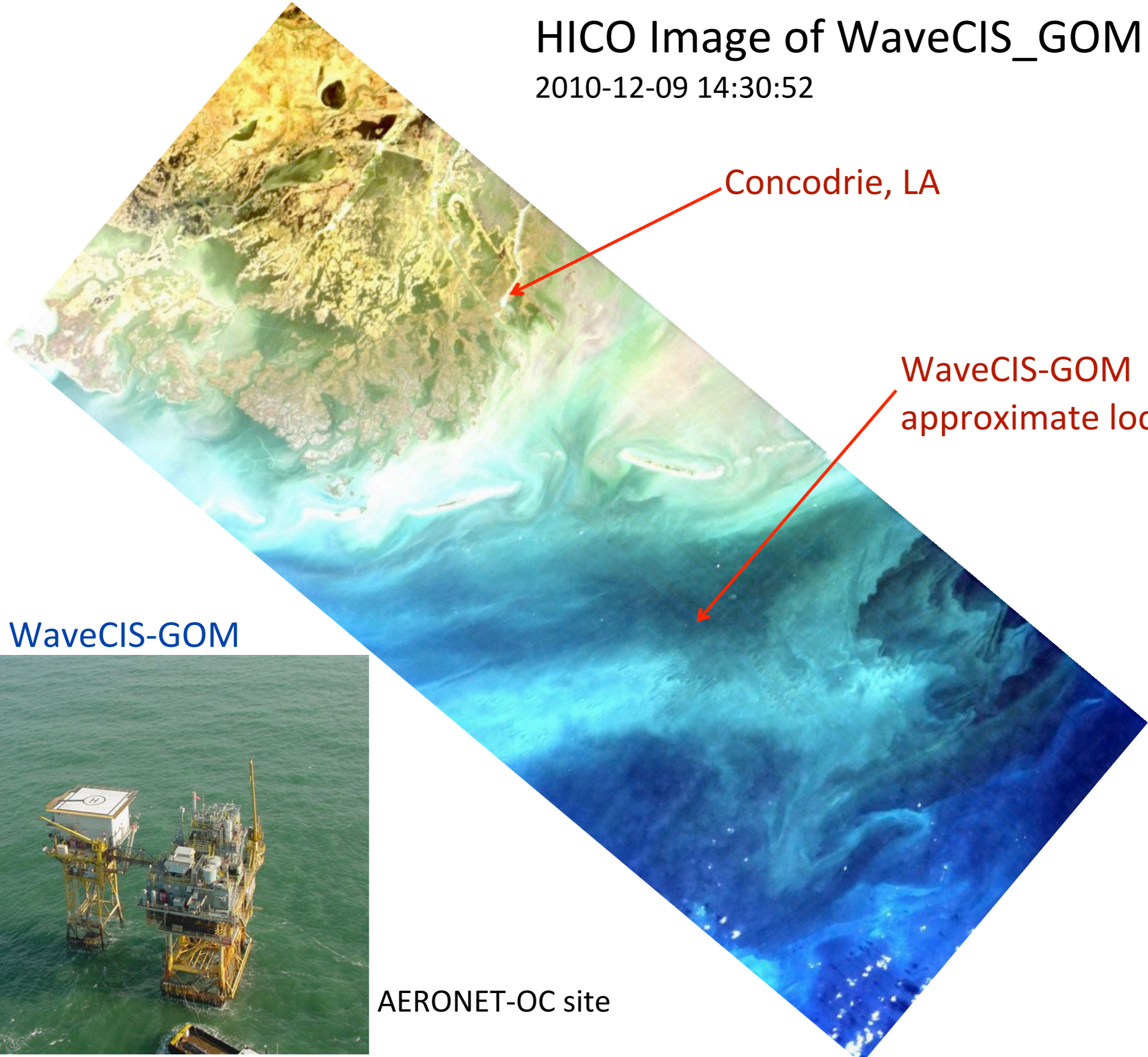
2010-12-09 14:30:52

Concodrie, LA

WaveCIS-GOM
approximate location

WaveCIS-GOM

AERONET-OC site

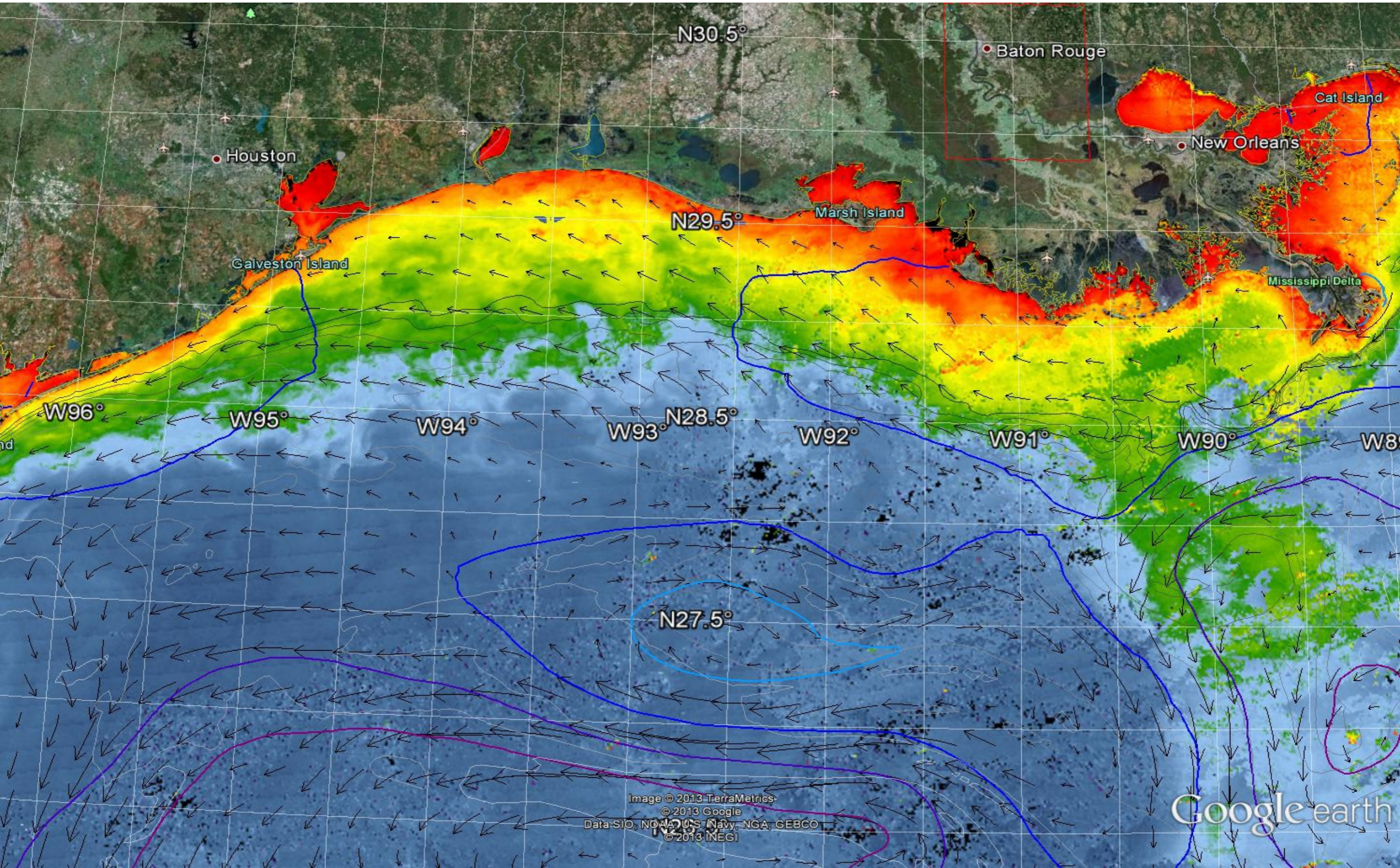


Arnone planned GeoCape Sept cruise Participation :

- Sequential Images NPP (2) and MODIS processing
- Bio-optical and advective response
- examine the color processing
 - BRDF
 - Aerosols
- Ocean currents from Model

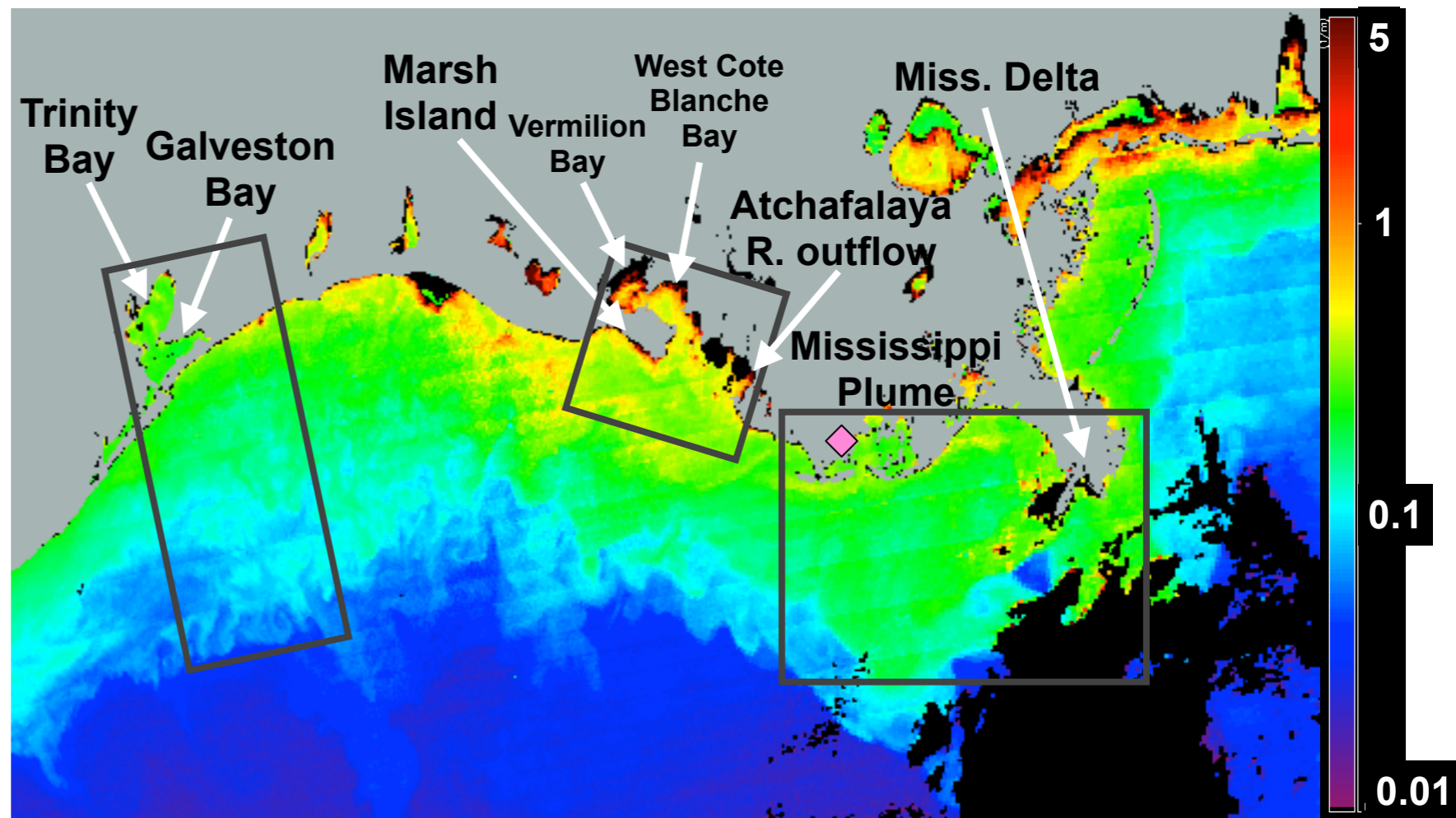
Model Ocean Currents, Salinity and SSH

Ocean color - Chlorophyll

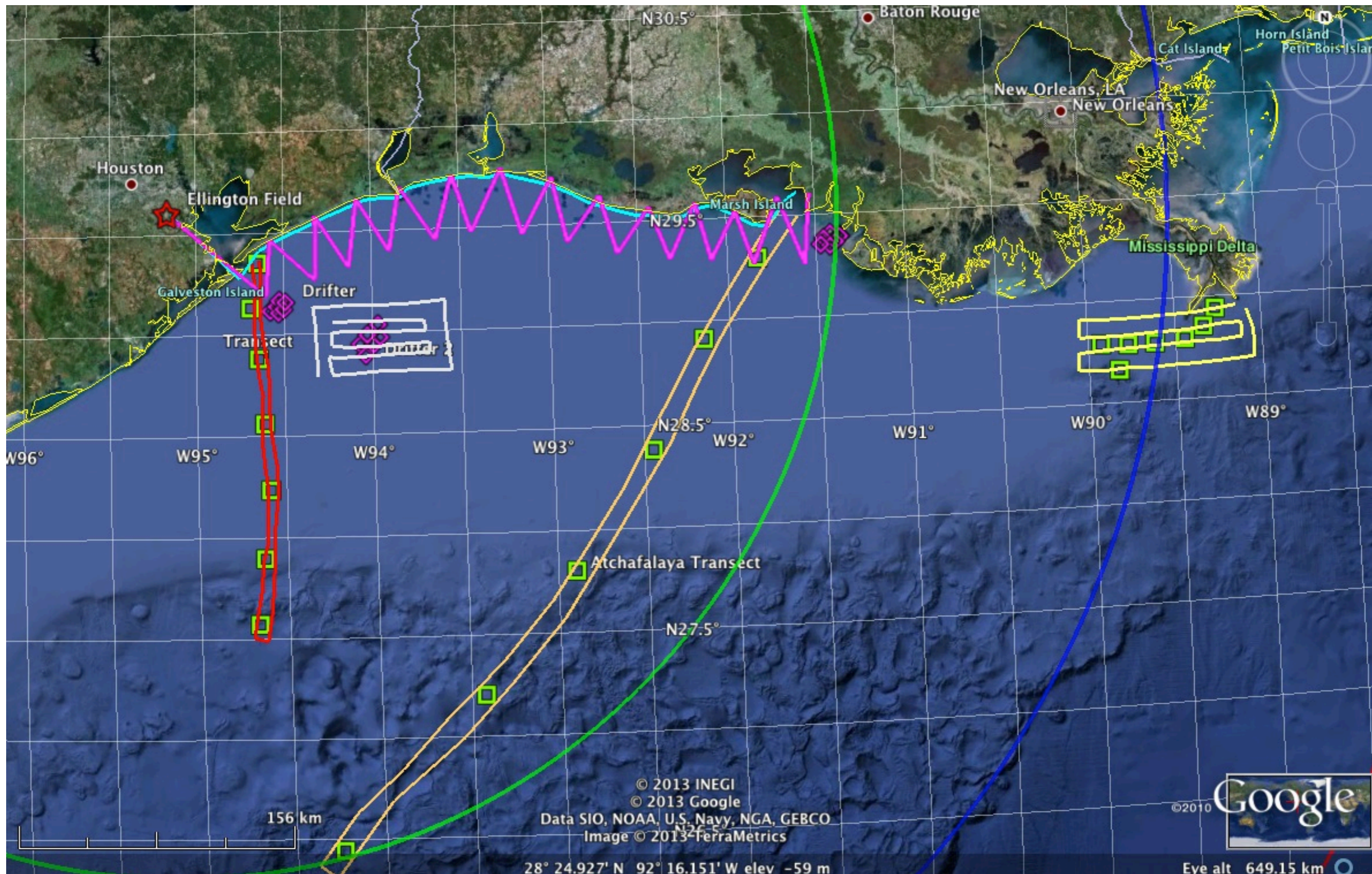


Preliminary General Plans

- 3 days of overflights w/ King Air - ACAM or GCAS & HSRL
 - 1 or 2 days over Louisiana shelf & Texas shelf
 - D-AQ overflights of opportunity - TX shelf & Galveston Bay
- 14 days at sea on R/V Pelican - 14 scientists
- small boat operations ???
 - **Galveston & Trinity Bay**
 - Miss. River outflow
 - WaveCIS
 - **Marsh Island**



Discussion on Sampling Approaches & Location



Need Requirements from Participants

- Wet or Dry lab space
- deck space
- etc.