Survey of NASA Sponsored Water Quality Research

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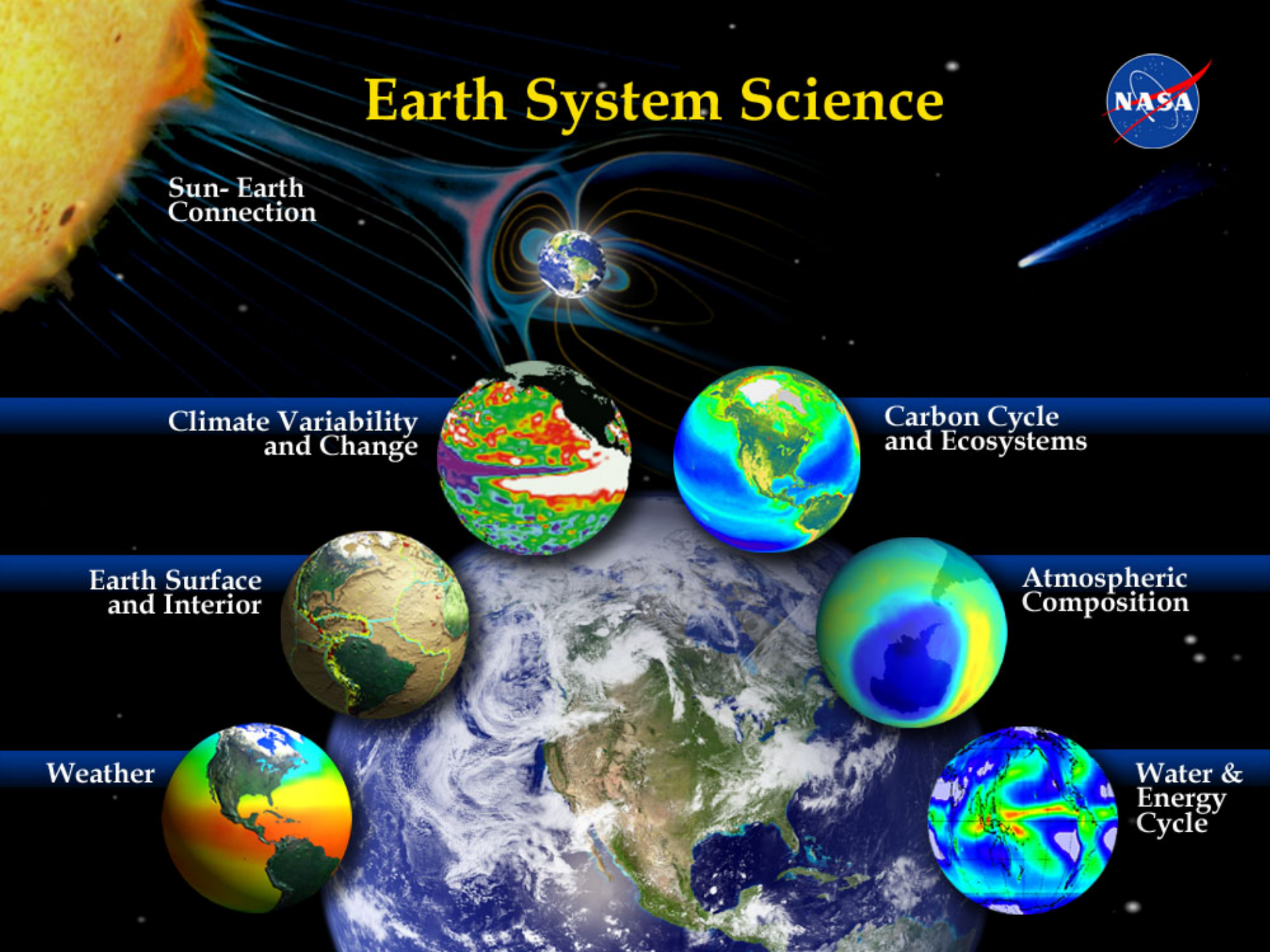
Chief, Applied Science & Technology Project Office
NASA, Stennis Space Center

http://science.ssc.nasa.gov

Earth System Science



Gulf of Mexico Initiative

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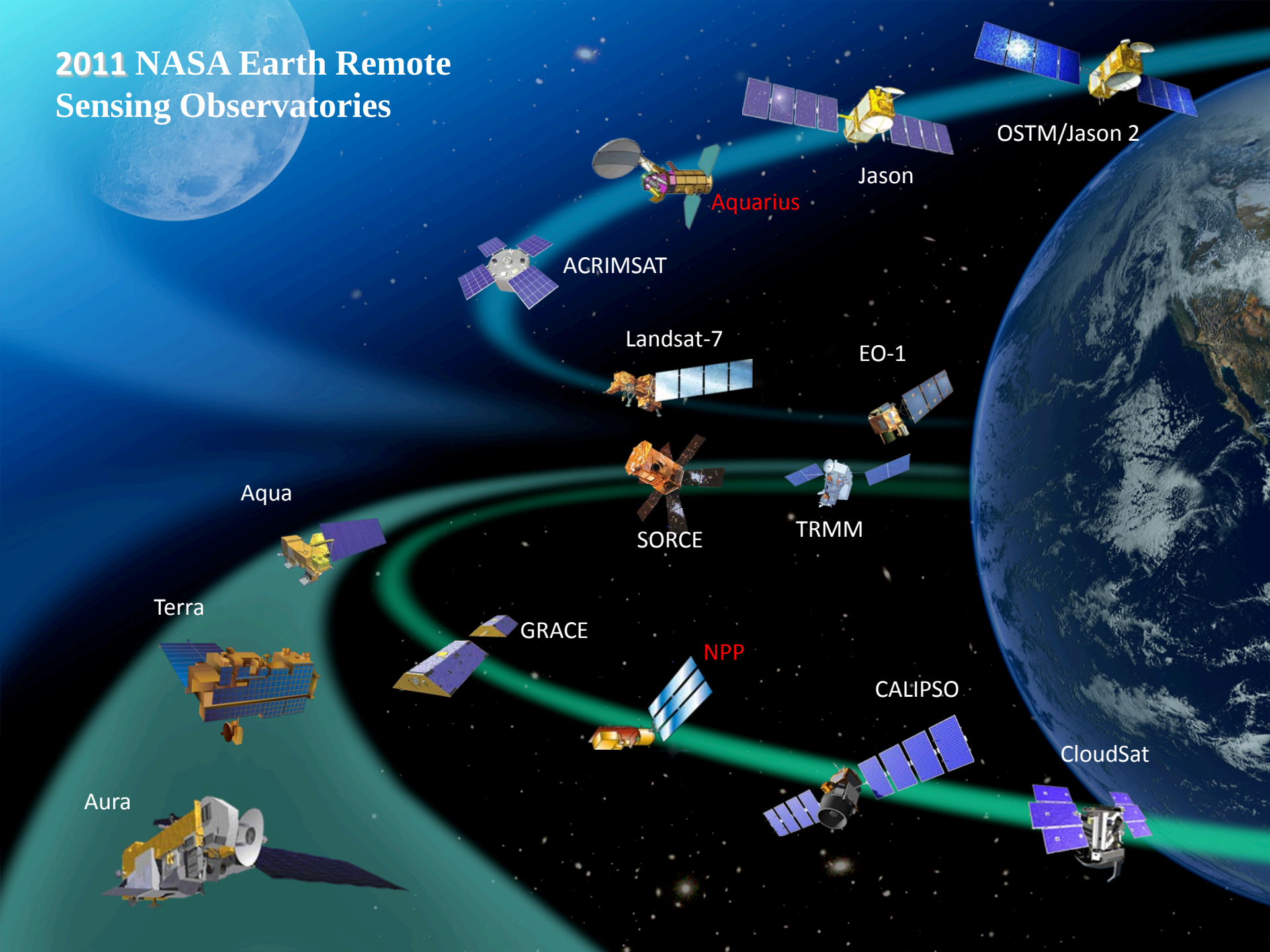
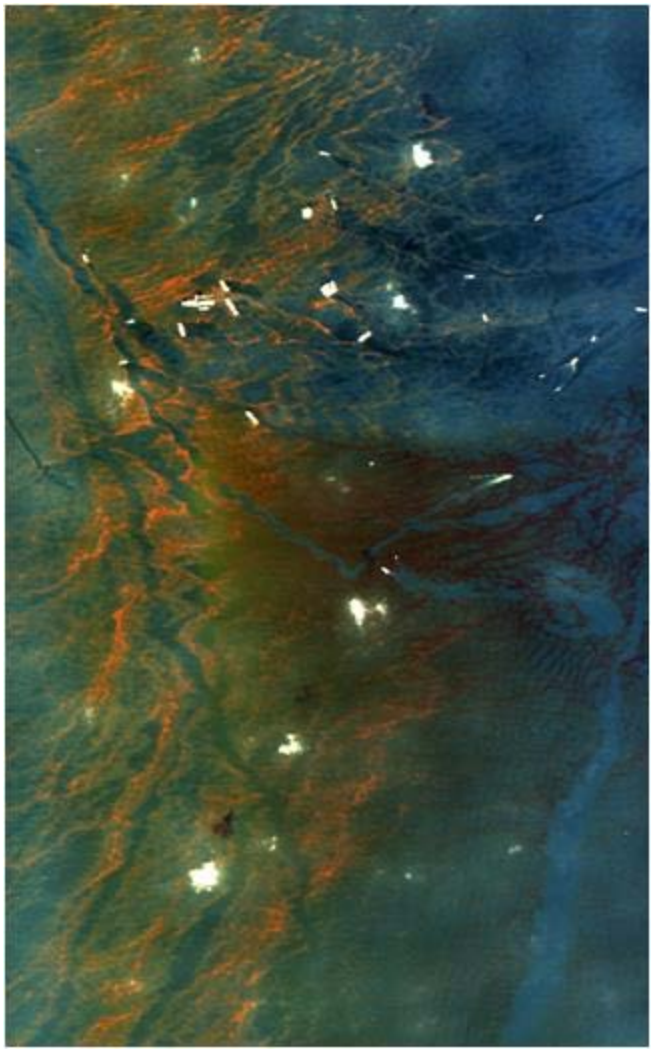
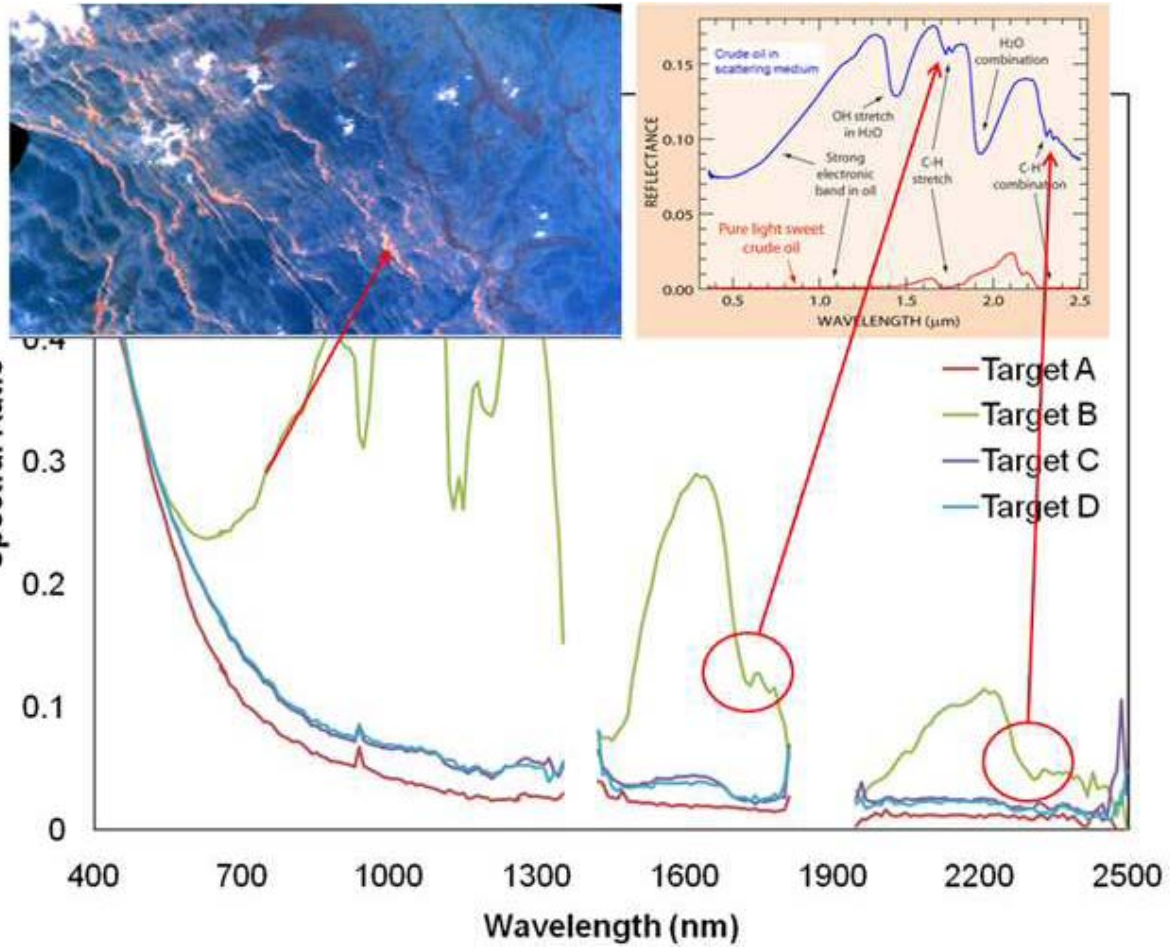
- Established in 2007 to help the Gulf Coast recover from the devastation of Hurricanes Katrina and Rita that devastated large parts of the region
- Engages hundreds of NASA Earth science assets to address the priorities of the high priority issues identified by the Gulf states and the Gulf of Mexico Alliance


2011 NASA Earth Remote Sensing Observatories
OSTM/Jason 2
Jason
Aquarius
ACRIMSAT
Landsat-7
EO-1
SORCE
TRMM
Aqua
Terra
GRACE
NPP
CALIPSO
CloudSat
Aura

AVIRIS – Oil Slick Mapping

Stennis Space Center





Stennis Space Center (SSC)
Quantitative Underwater Instrument Cluster (QUIC)

Stennis Space Center

SBE43-Dissolved Oxygen Sensor-(Seabird Electronics, Inc.)

SBE18-pH Sensor- -(Seabird Electronics, Inc.)-uses a pressure-balanced glass-electrode / Ag/AgCl-reference pH probe to provide *in-situ* measurements at depths up to 1200 meters; is intended for use as an add-on auxiliary sensor for profiling CTDs

SBE *19plus* (Seabird Electronics, Inc.)-CTD-Conductivity, Temperature and Depth profiling instrument

OCR-507 (Satlantic)-Ocean Color Radiometer

BBFL/Triplet- (WET Labs, Inc.)-Eco Scattering Meter

BB9 (WET Labs, Inc.)-Eco Scattering Meter

SUNA (Satlantic)- Submersible Ultraviolet Nitrate Analyzer

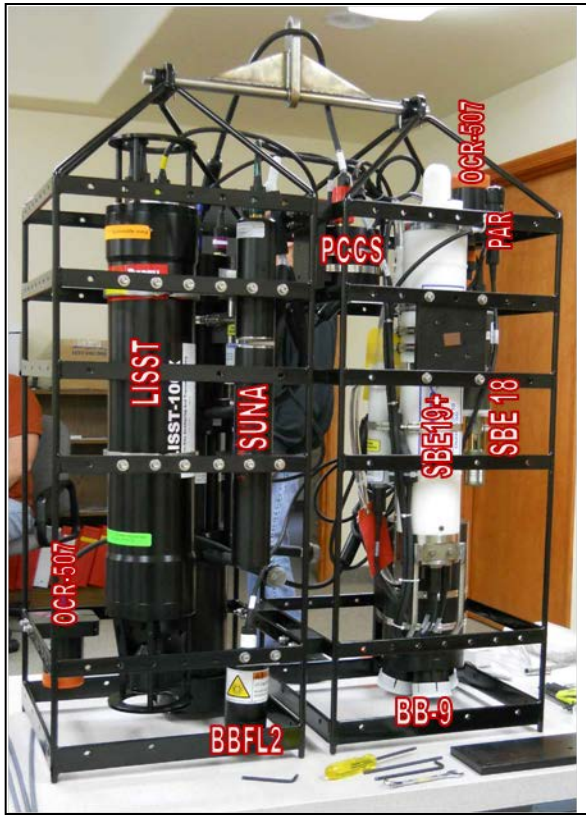
LISST (Sequoia)-Submersible Suspended Sediment Sensor/laser particle size analyzer

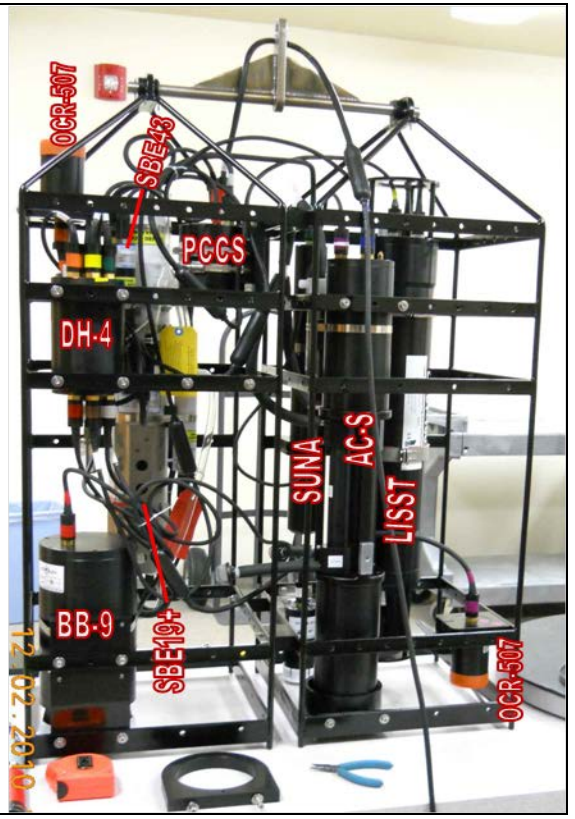
PAR (Satlantic)-Photosynthetically Activation Radiation

PCCS (WET Labs)- Power and Communication Conversion System

DH4 (WET Labs)-data logger

AC-S (Wet Labs)-absorption and attenuation meter

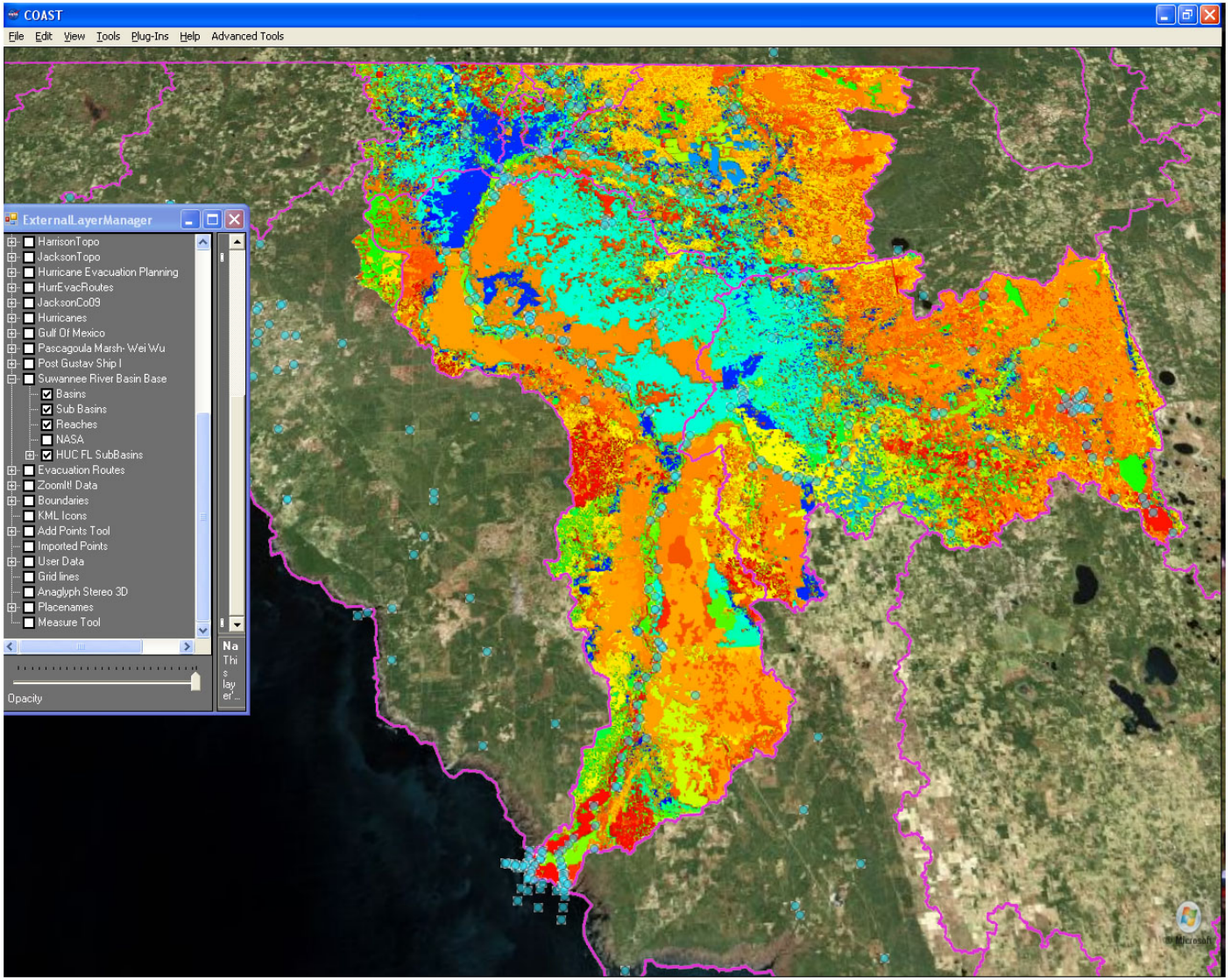




Enhancing NASA's COAST Online Application for Agricultural Best Management Practices Decision Support

Stennis Space Center

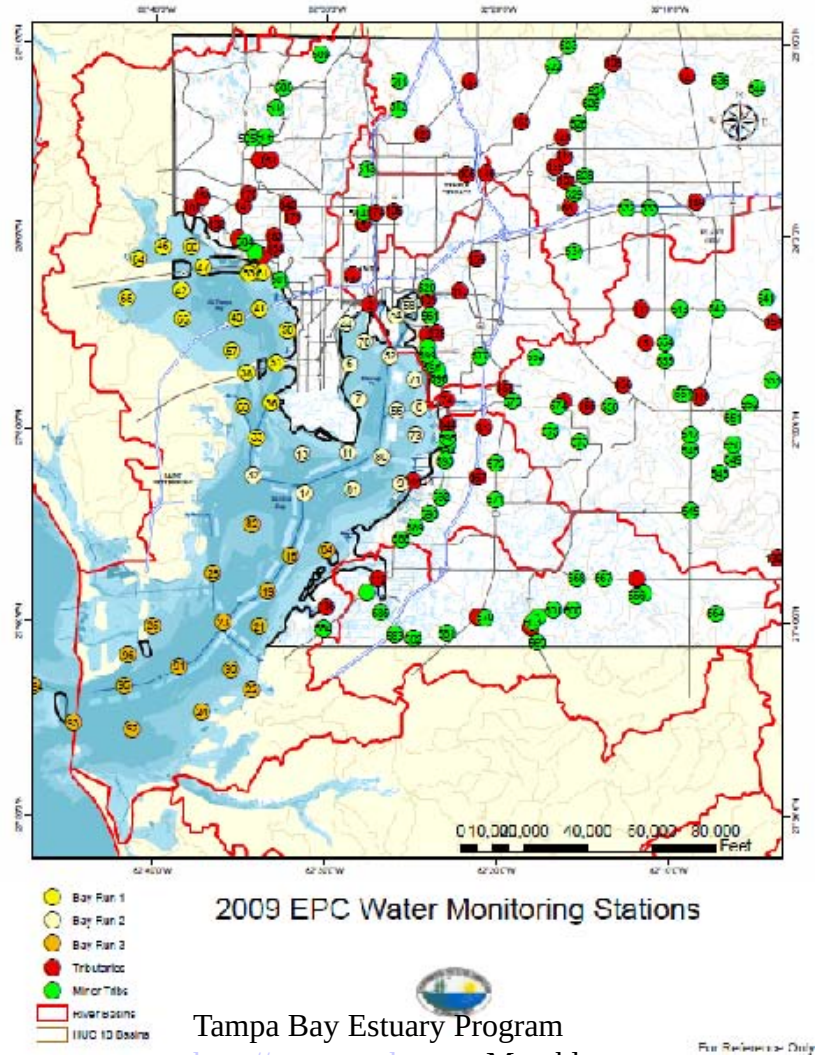
Katherine Milla, Florida A&M University



Enhancing Estuarine Water Quality Management Through Integrating Earth Science Research Results: A targeted Project for Tampa Bay, Florida

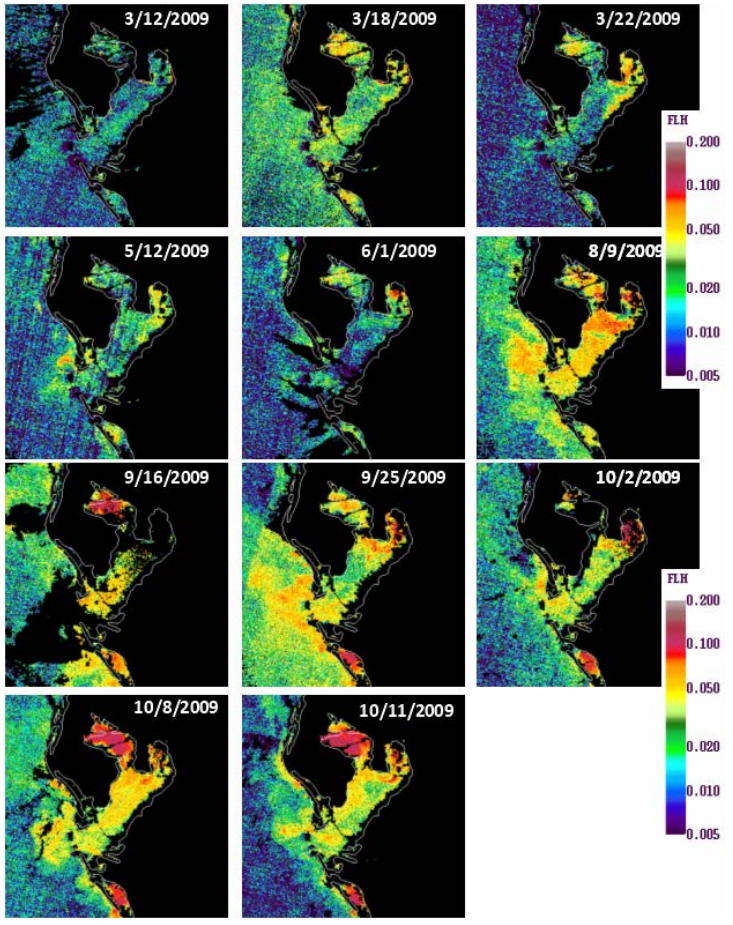
Stennis Space Center

Chuanmin Hu, University of South Florida



2009 EPC Water Monitoring Stations

Tampa Bay Estuary Program http://www.epchc.org Monthly sampling 1972 - present



MERIS 300-m resolution fluorescence images show a sequence of bloom events in Tampa Bay, FL. The spring bloom in Old Tampa Bay (upper left segment) was confirmed by field survey and the summer blooms agree with common sense. Further analysis is underway.

Estuary Variance Map for In-Situ Sample Station Placement

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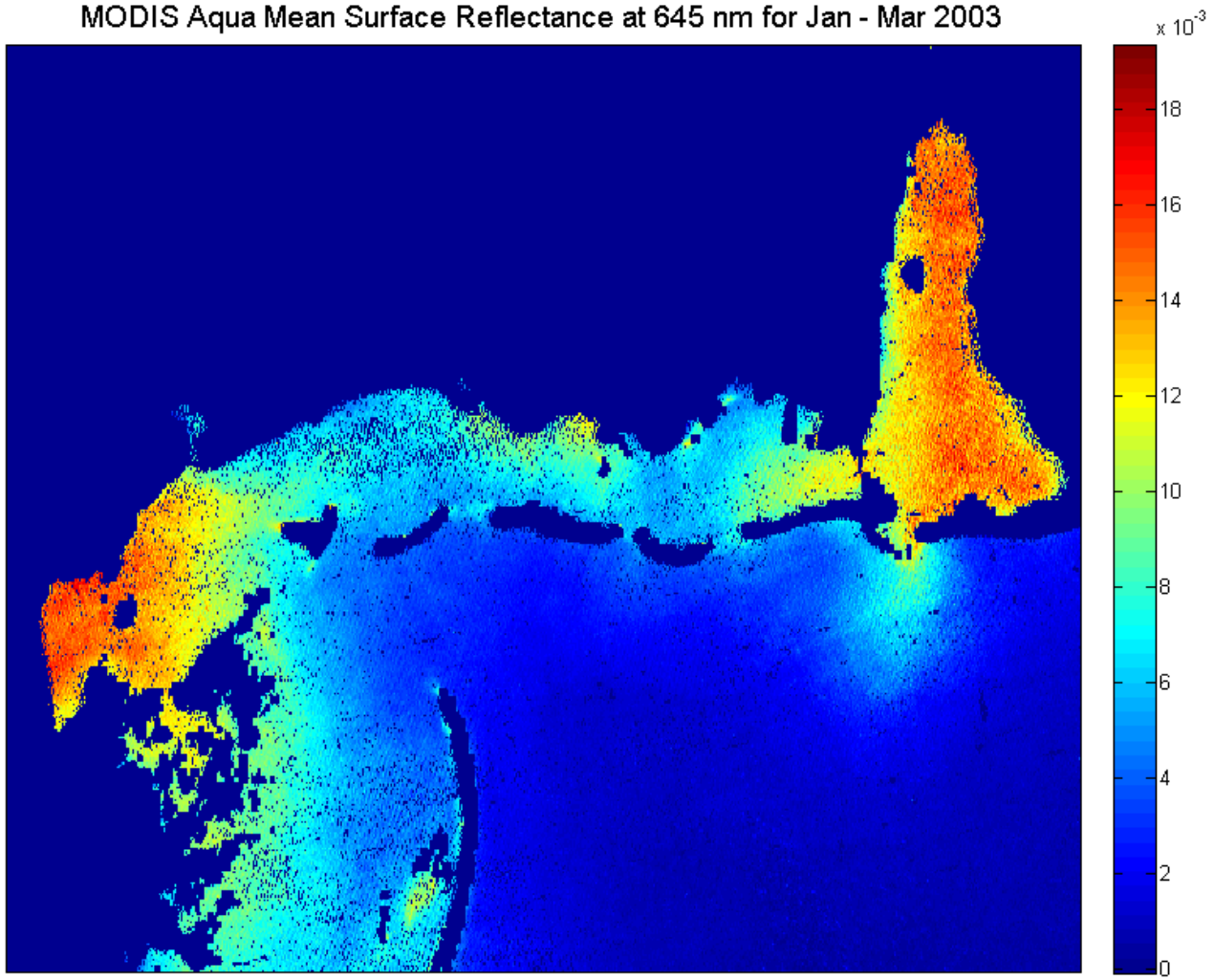
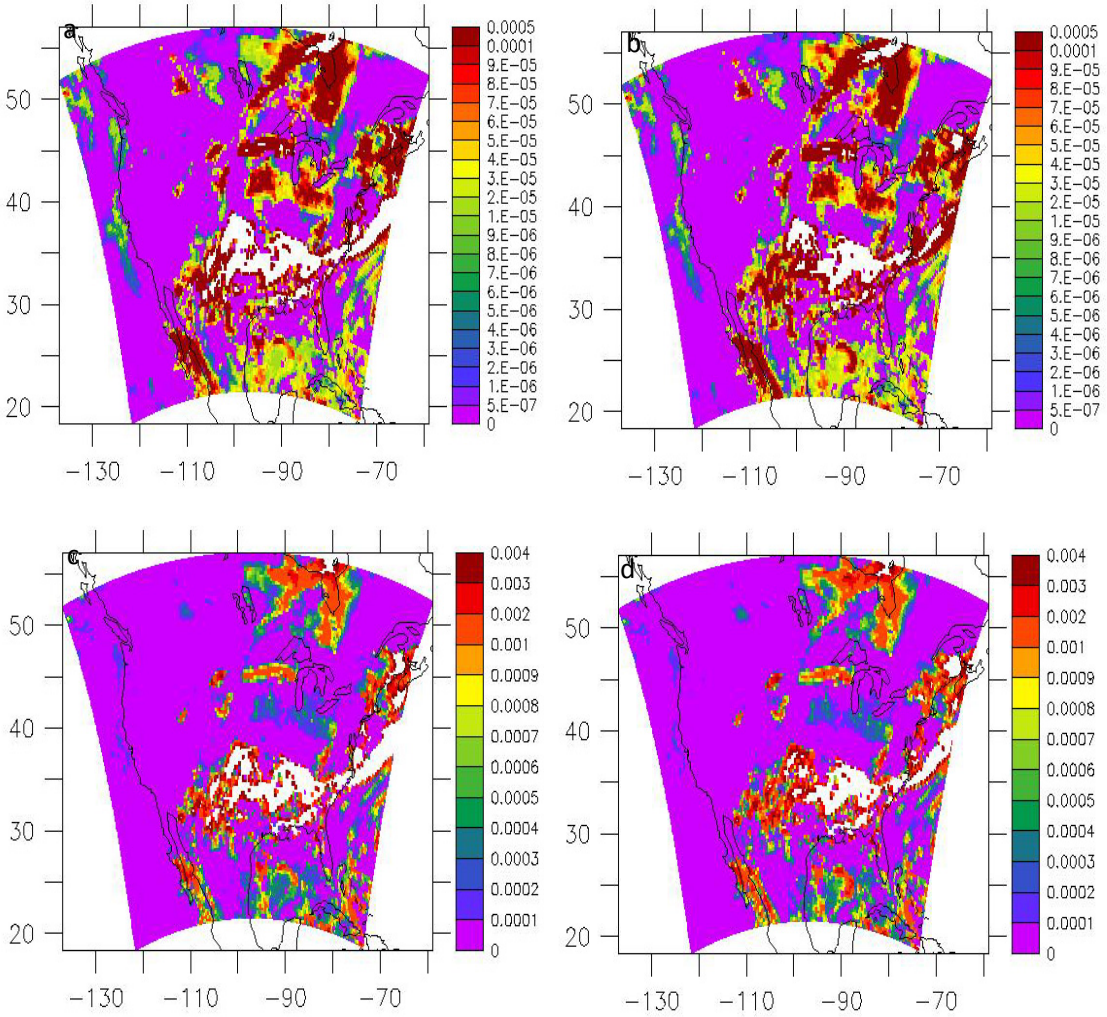
Bruce Spiering, NASA (SSC)



DEMAND – DSS Environment for Modeling of Atmospheric Nutrient Deposition

Stennis Space Center

Udaysankar Nair, University of Alabama, Huntsville

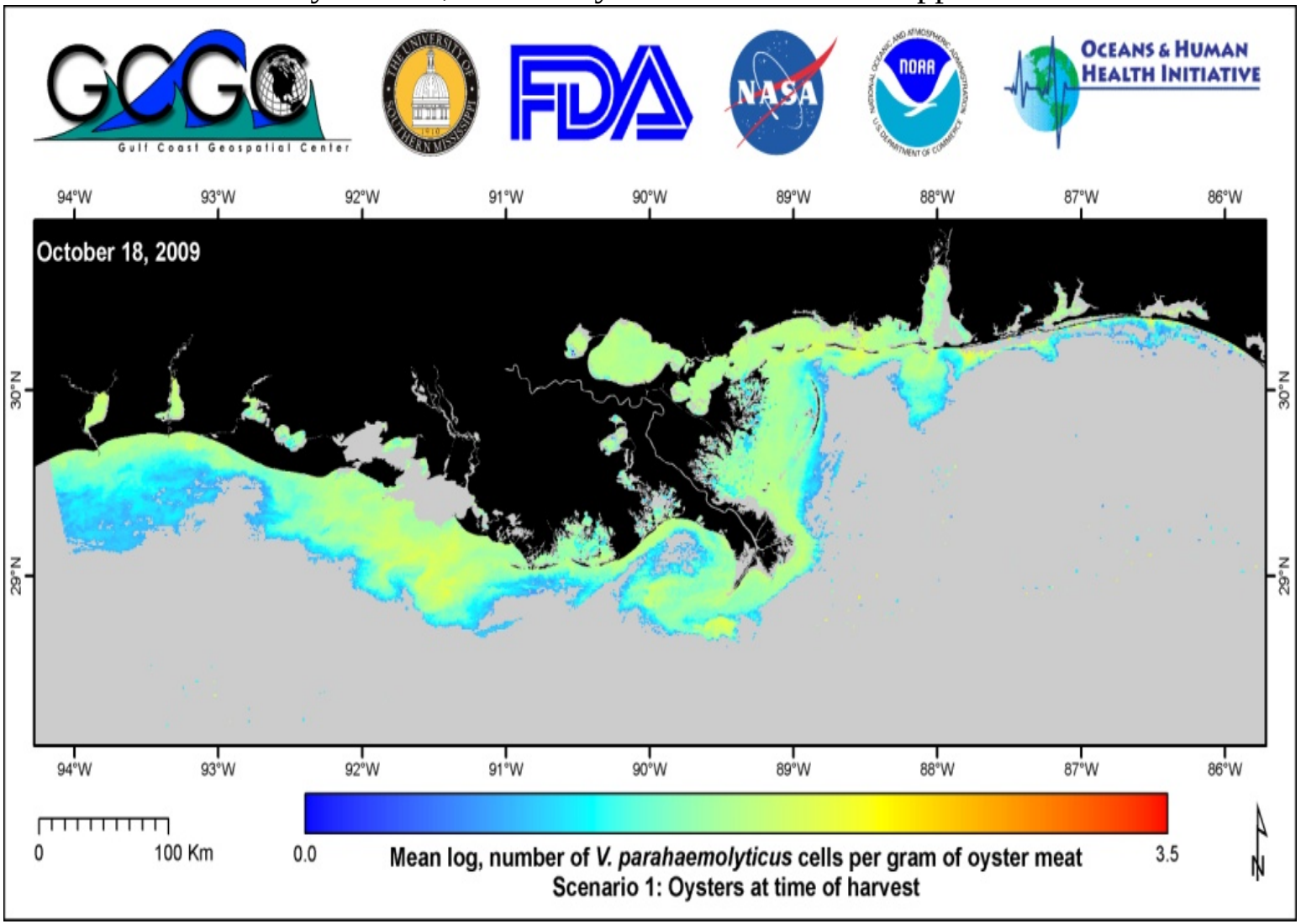


Wet deposition of ammonium (panels a, b) and sulphate (panels c,d) for 21 August 2006 (Kg/Ha/Hr). The panels b and d are results from the simulation that utilize the assimilation of MODIS derived aerosols, while a and b are control simulations. Note that satellite data assimilation does produce differences in wet deposition of these species along the gulf coast of Alabama and also along the inland regions.

Forecasting Microbial Contamination of Coastal Waters

Stennis Space Center

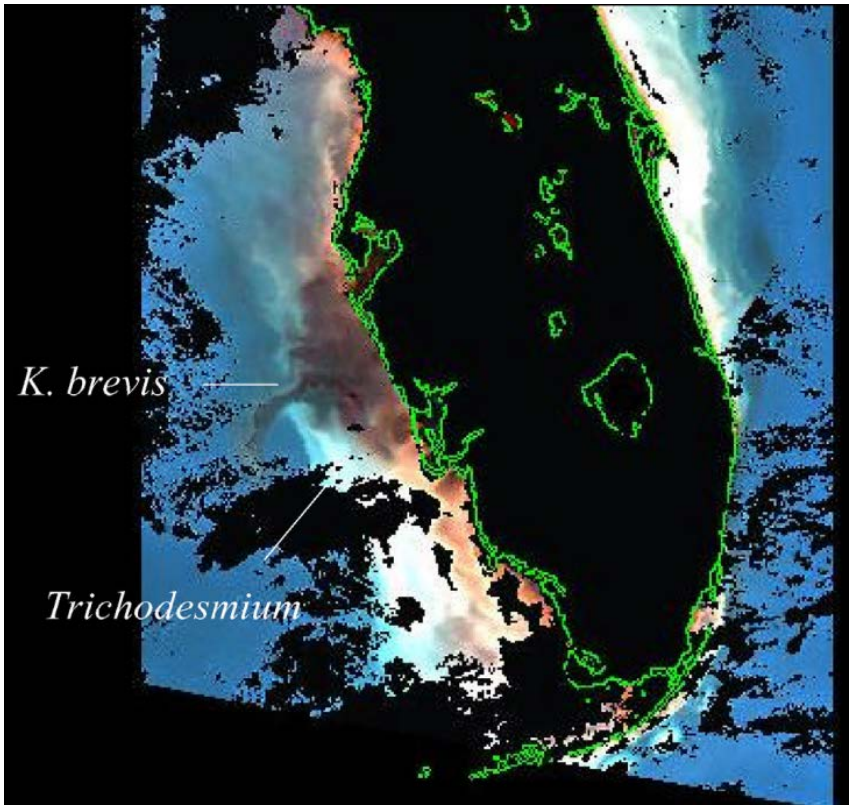
Jay Grimes, University of Southern Mississippi

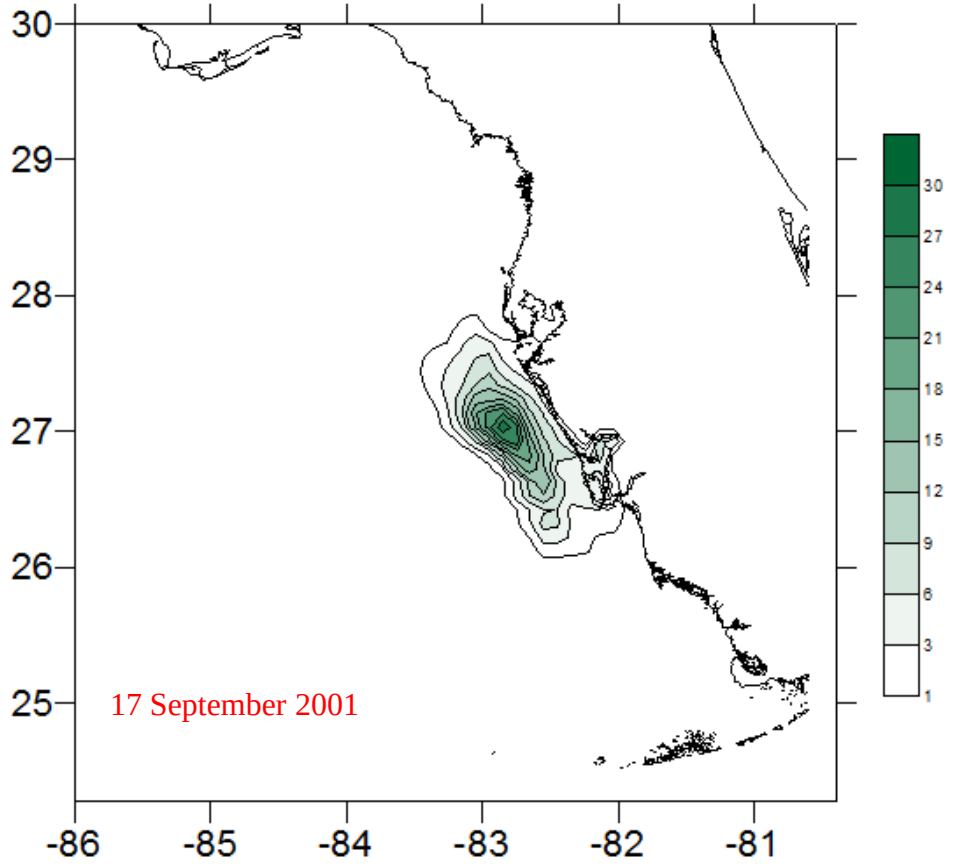


Multi-Model Simulations with Data Assimilation for Harmful Algal Blooms in the Eastern Gulf of Mexico

Stennis Space Center

Jason Lenes, University of South Florida





The 3D HABSIM model surface output for *K. brevis* as spatially compared to the SeaWiFs retrieval on 17 September 2001.

Detecting Suspended Sediments with MODIS and Simulated VIIRS

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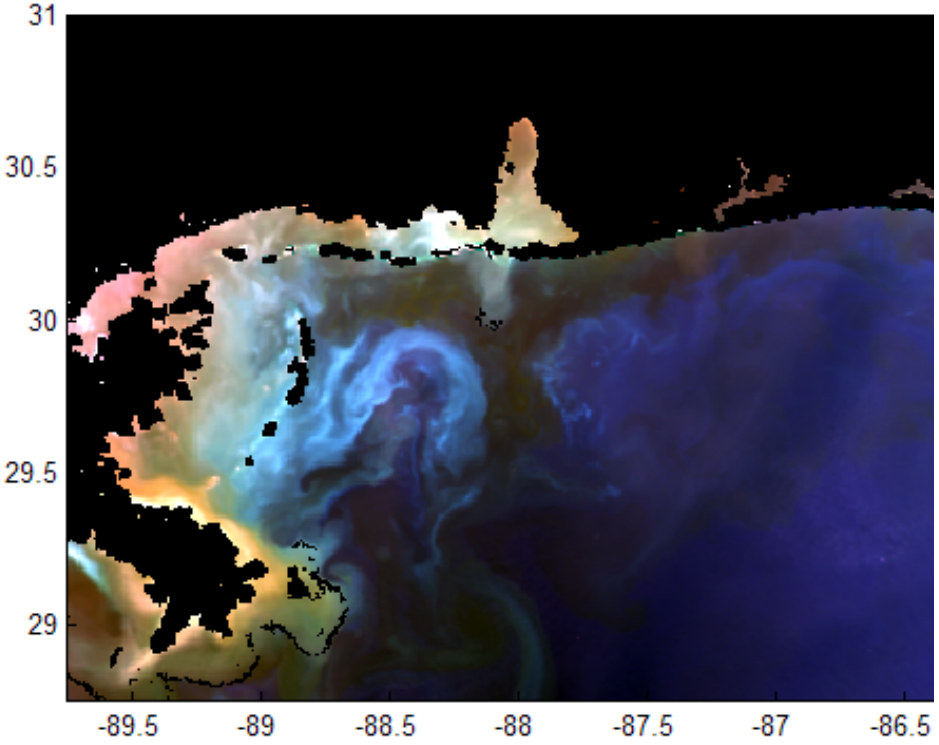
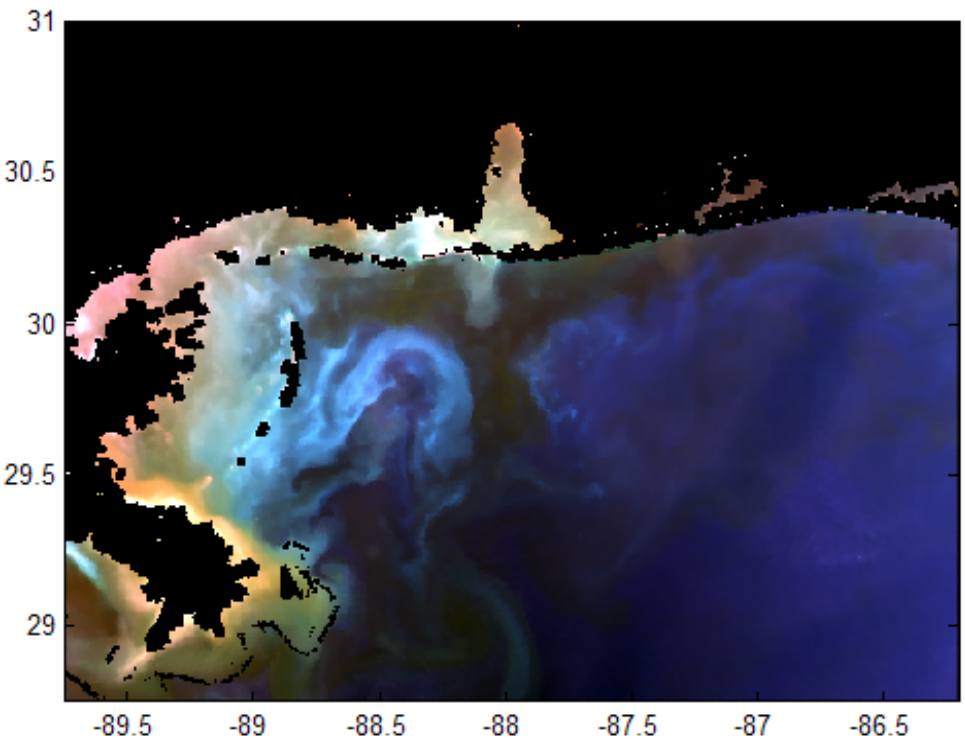
Slawomir Blonski, CSC (SSC)

MODIS 1000m



MODIS-Aqua, 9 Nov 2007, 1000m (Bands 10, 12, 13lo), atmospheric corrected (dark pixel subtraction)

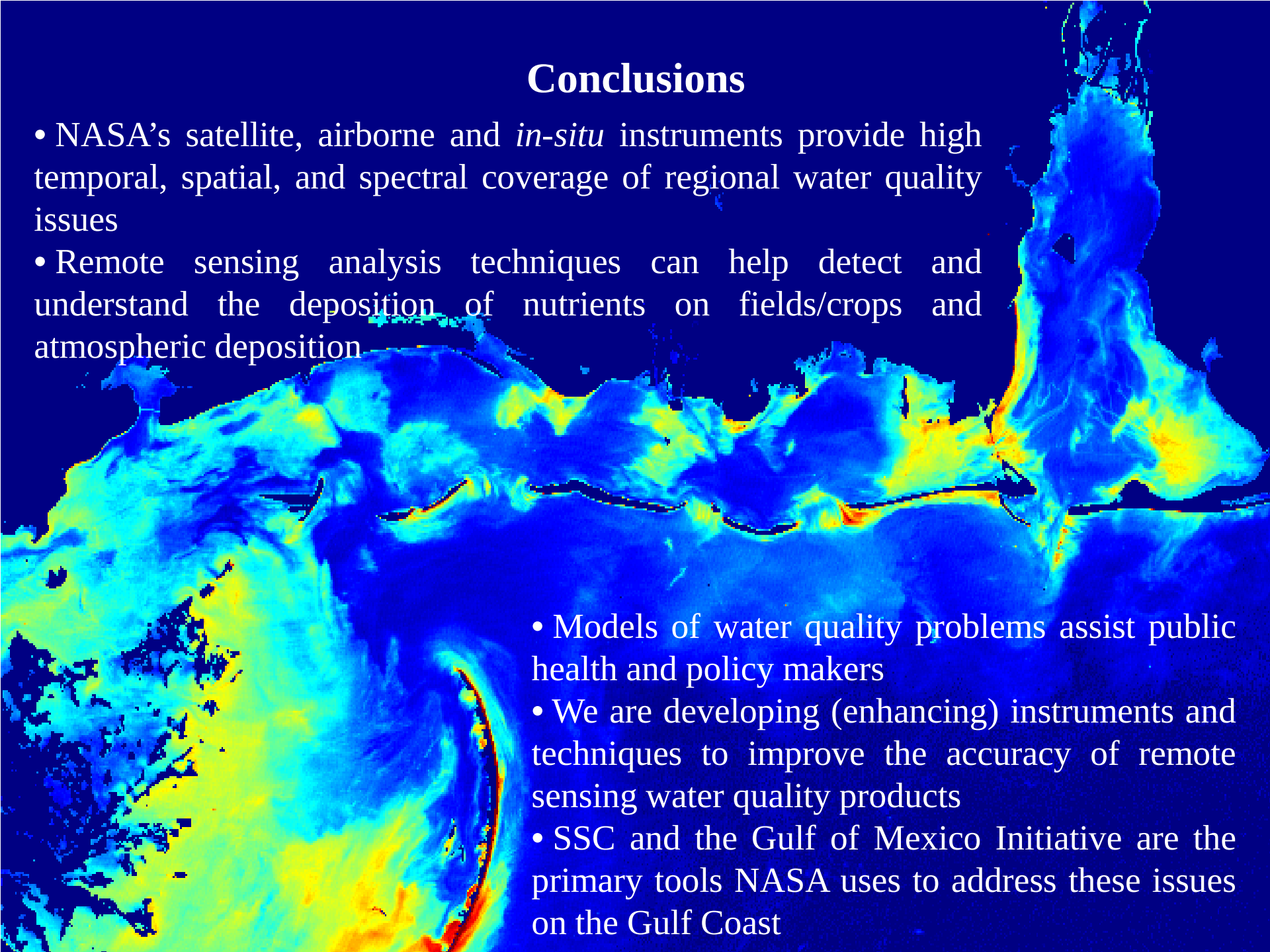
Simulated VIIRS 750m



VIIRS1330 simulated, 9 Nov 2007

Conclusions

- NASA's satellite, airborne and *in-situ* instruments provide high temporal, spatial, and spectral coverage of regional water quality issues
- Remote sensing analysis techniques can help detect and understand the deposition of nutrients on fields/crops and atmospheric deposition



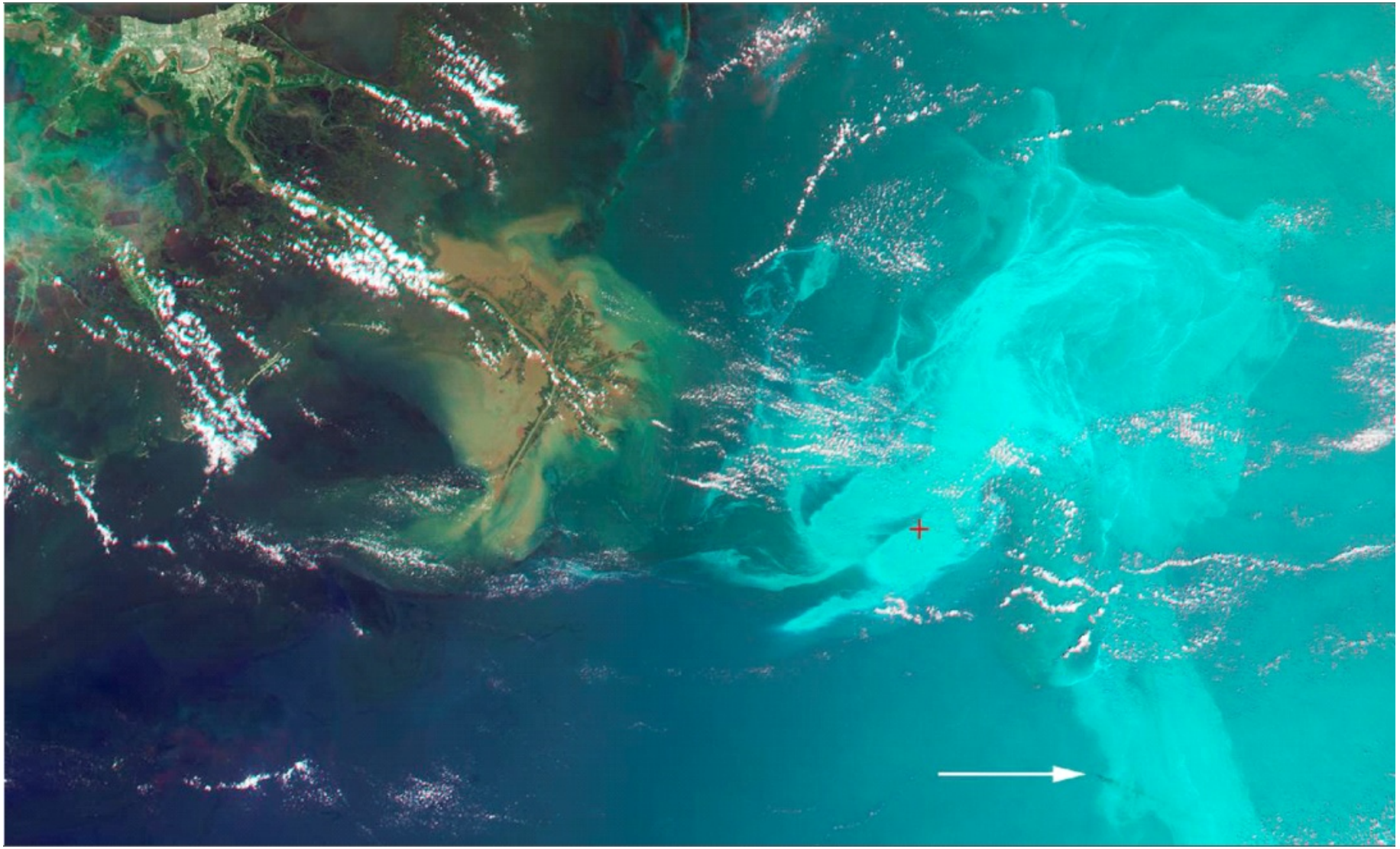
- Models of water quality problems assist public health and policy makers
- We are developing (enhancing) instruments and techniques to improve the accuracy of remote sensing water quality products
- SSC and the Gulf of Mexico Initiative are the primary tools NASA uses to address these issues on the Gulf Coast

DRIFTER

(Top right) DRIFTER – a low cost environmental monitor that enables student participation in ASTPO research projects is assembled by students at Hancock High School

(Bottom left) DRIFTER prototype prepared for testing in the Pearl River

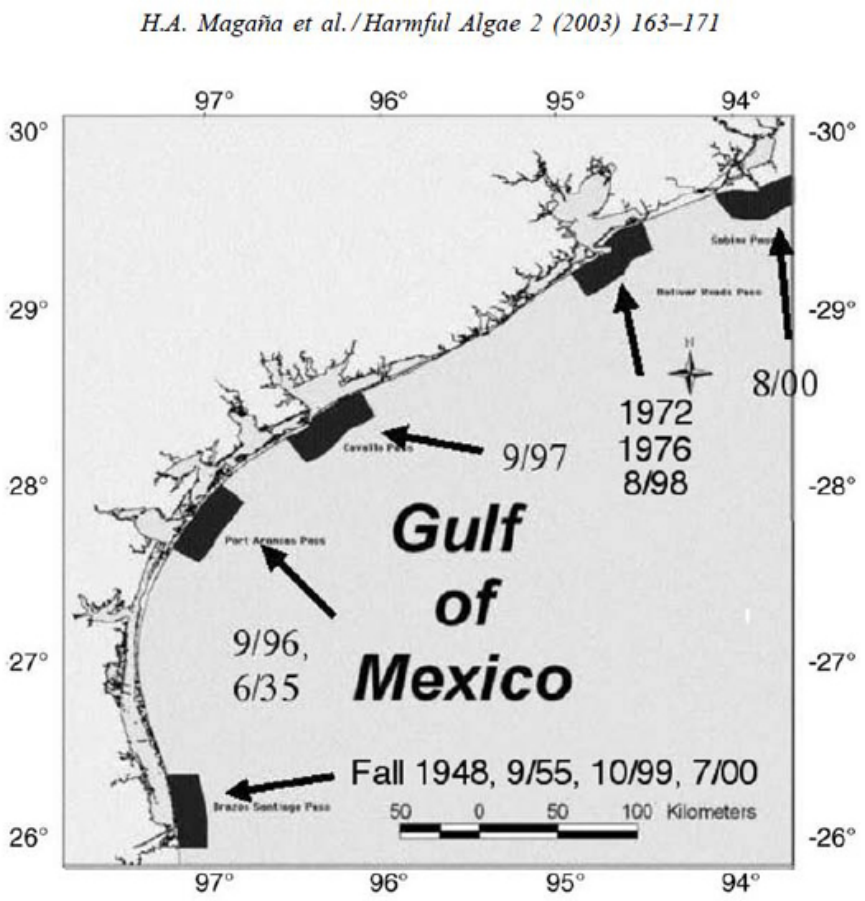
MISR – Oil Slick Detection



Origins and Mechanisms of *Karenia brevis* Bloom Formation Along the Texas Coast

Stennis Space Center

Robert Hetland, Texas A&M University



Comparison of simulated and observed *K. brevis* surface concentrations at Port Aransas, TX in 2009. The model reproduces the trend of the surface concentrations, including the weak peak in August, the strong peak in mid-September, and the pulses in October.