FLCOOS Consortium

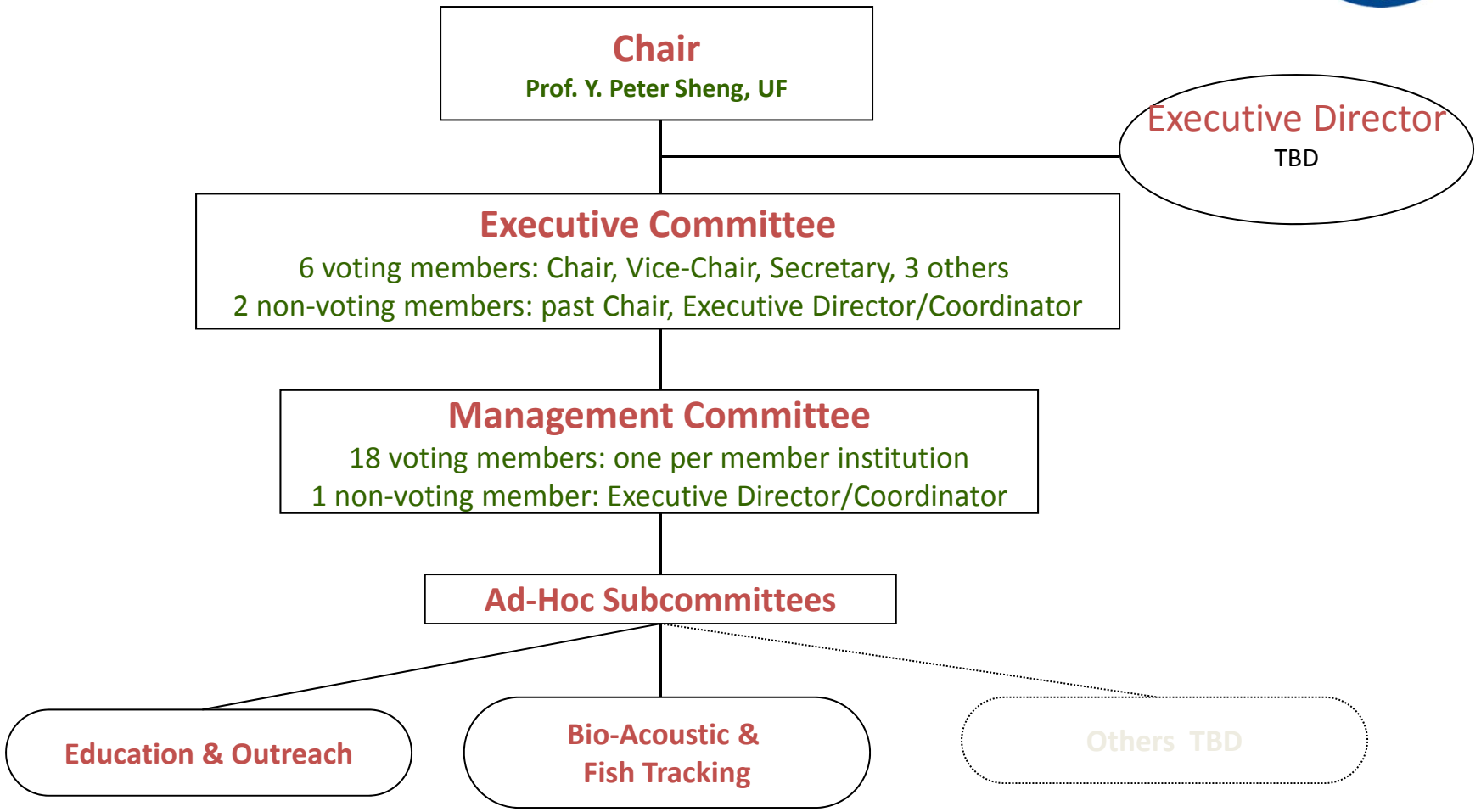
Chair: Peter Sheng, UF

pete@coastal.ufl.edu (352)-392-1436 Ext 1521

NWQMC, Pensacola, February 2, 2011

Happy Year of the Rabbit!

Florida Coastal Ocean Observing System (COOS) Consortium Organization



FLCOOS Consortium Formalized October 2006:
MOAs and By-Laws signed. Administered through FIO

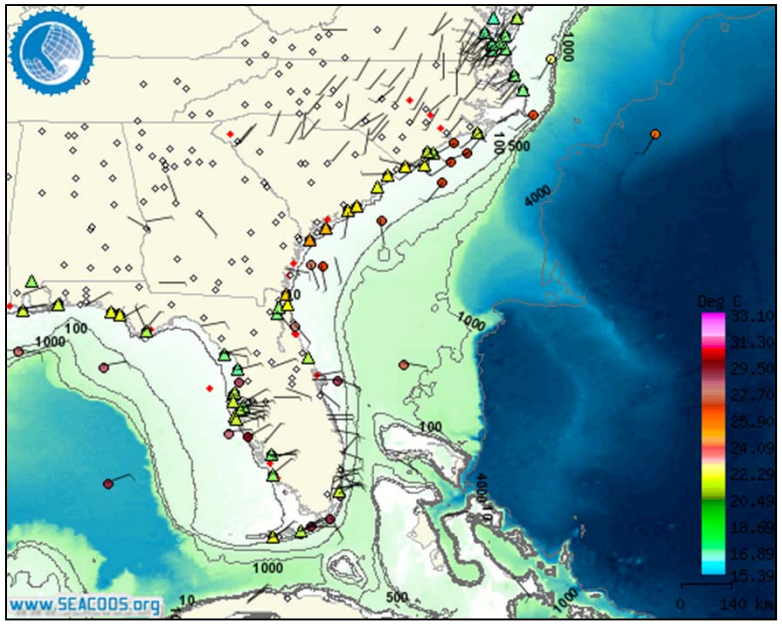
The Florida COOS Consortium Goals

1. To further the development and implementation of a sustained, interdisciplinary and integrated Coastal Ocean Observing System (from the watershed to the EEZ; covering estuarine. nearshore, coastal, and basin scales)

2. To improve communication between people in Florida who are interested in the marine and estuarine environments

These goals combine to form a coordinated approach to ocean observations in Florida so the interface with the State and two RAs is as productive as possible.

Florida fits into two Regions:

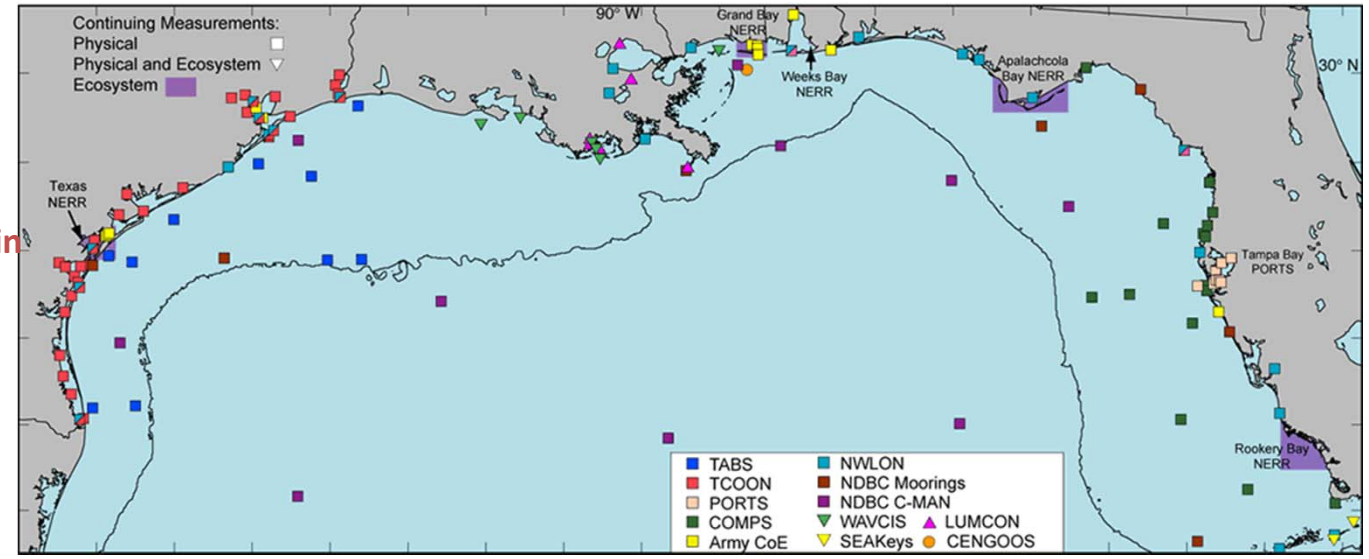


SECOORA

Interactive map showing real-time *in situ* observations: winds, sea level and sea temperature layers

GCOOS-RA

Static map of GCOOS domain showing real-time *in situ* observation locations

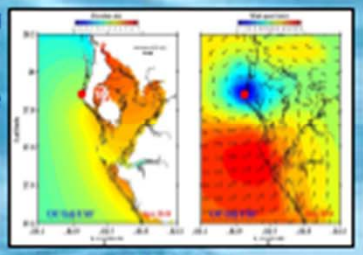


What are Coastal Ocean Observing Systems (COOS)?

A Coastal Ocean Observing System is a combination of instruments on buoys, satellites, ships, drifters and underwater vehicles, and radars that are used to make observations of the ocean. Computer models are also developed as part of the system and are used to understand and forecast the ocean environment.

This team is deploying a buoy using the Florida Institute of Oceanography vessel, the *R/V Suncoaster*. Instruments on the buoy measure ocean currents, meteorological conditions, water temperature and salinity. Image credit: University of South Florida.

The instruments measure physical (e.g. water temperature), chemical (e.g. nutrients), biological (e.g. harmful algal blooms), and geological (e.g. sediment transport) conditions. The data are used to help people who rely on and are affected by the marine environment.



Computer models are used to understand and forecast the ocean environment. This model shows what the storm surge might be in Tampa Bay for a Category 4 hurricane making landfall as a Category 2 storm. Image credit: University of South Florida.

How does Florida's COOS work for Florida?

In 2005, the Florida Legislature formed the Florida Oceans and Coastal Resources Council to advise them on coastal and ocean water issues. In 2006, the Council identified important research categories that require ocean-related information. Each of these categories benefits from the data collected by Coastal Ocean Observing Systems for Florida, which extend from the estuaries out to the shelf break. Some components of COOS that would be useful in each category are shown here:

Florida's Coastal Ocean Observing Systems

Ecosystem Monitoring and Assessment
Real-time moorings with physical, chemical and new biological sensors and satellite remote sensing

Modeling Systems
Regional and coastal models provide boundary conditions for other models

Water Quality
Physical, chemical and new biological sensors along the coast and in the ocean

Aquaculture
Satellite remote sensing, radars, moored physical and chemical sensors

Habitat Mapping and Characterization
AUV and ship transects carrying sonar and underwater cameras

Understanding Effects from Climate Change
Sea level, temperature and other meteorological observations, all platforms

Living Marine Resources
Satellite remote sensing, radars, acoustic tracking, moored physical and chemical sensors, and models

Watershed and Freshwater Flow
Physical and chemical observations on moorings and towers in estuaries

Public Health Issues
Physical and chemical coastal and ocean observations and models

Harmful Algal Blooms
Real-time moorings with physical, chemical, and biological sensors, radars, satellites, and models

Measuring Coastal Economies and Assessing Human Impacts on Resources
Physical coastal and ocean observations, radars, satellites, meteorological observations, and models

How important is Florida's Coastal Ocean?

Florida has the second longest coastline in the United States and 77% of Florida's population live in coastal counties. An additional 22 million visitors enjoy Florida's coasts every year. A substantial portion of Florida's economy depends on its coastal and ocean waters. For example, the coastal counties generate $402 billion, commercial fisheries generate $177 million, and beach tourism generates $19.2 billion.

(Source: Florida's Ocean and Coastal Economies, published by the National Ocean Economics Program)

What has FLCOOS accomplished?

- Now has 18 member institutions
- Strongly engaged in both SECOORA and GCOOS
- Conducted numerous FLCOOS Caucuses throughout Florida
- Collectively authored the Florida COOS White Paper in January 2006 to define what should be undertaken in Florida's best interests
- Developed a strategic plan in 2008
- Conducted research in support FOCRC's research plan in 2007-2008
- Several members participated in DWH Oil Spill Response in 2010
- FLCOOS submitted an integrated proposal to FIO's oil spill research

FLCOOS Developments with $1.25M: FY 2007/2008

Florida-Wide

- Large-scale ocean-atmosphere model
- Remote Sensing
- FLCOOS Operations:
  - Operating Costs
  - Data Management
  - Workshop support
  - Outreach

North-West Florida

- Add nutrient sensor in real-time

South Florida

- Begin acoustic line planning

South-East Florida

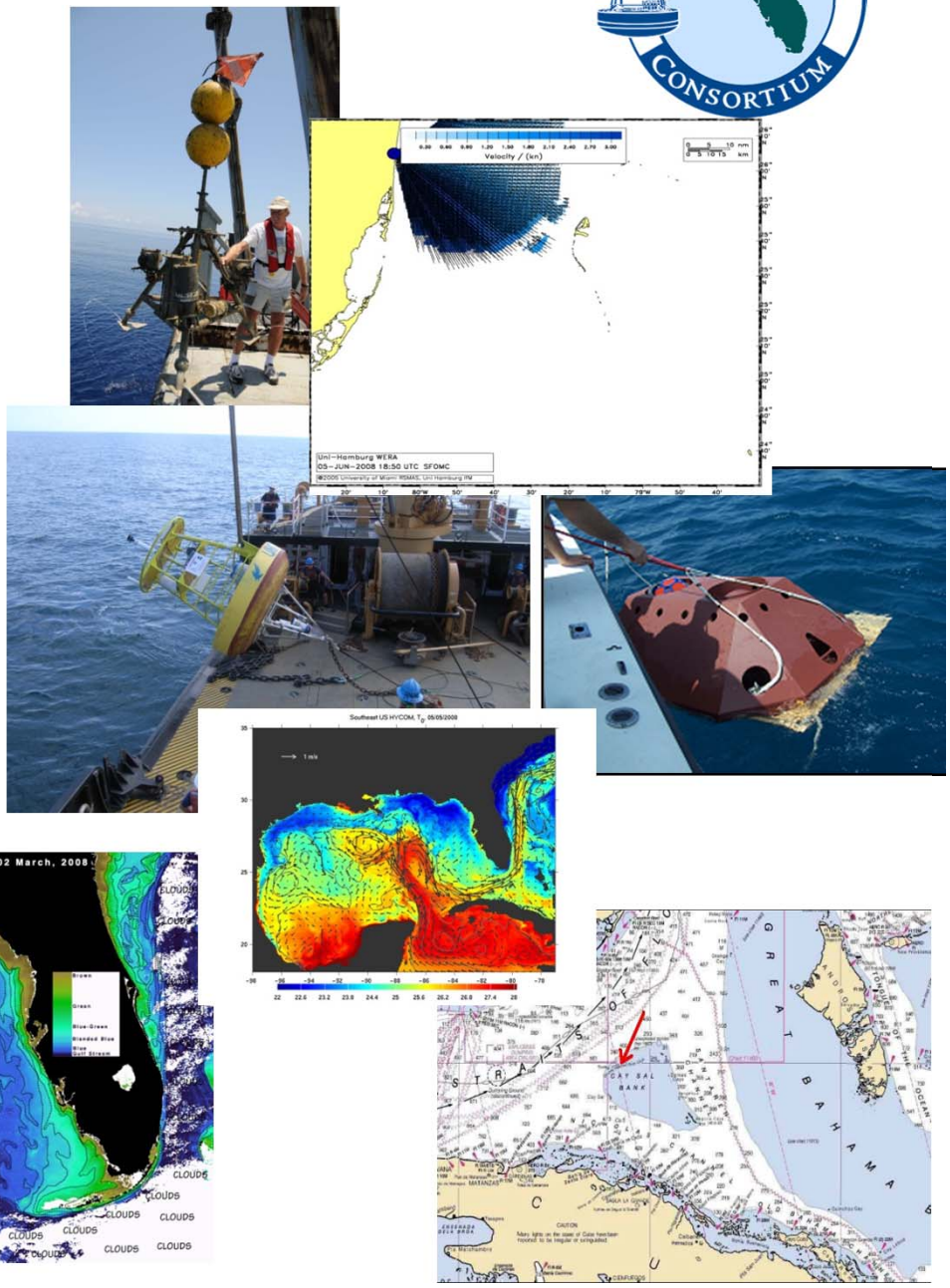
- Extend South Florida HF Radar footprint

Central-East Florida

- New moorings

North-East Florida

- New mooring
- High resolution model development



FLCOOS Developments with $1.25M: FY 2007/2008

Florida-Wide

- Large-scale ocean-atmosphere model
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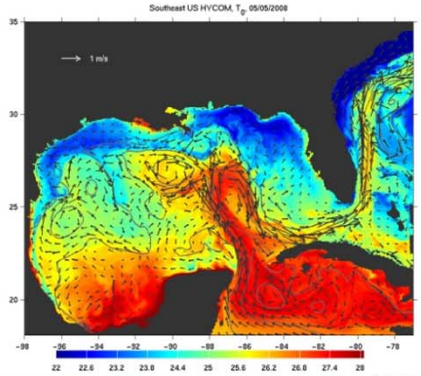
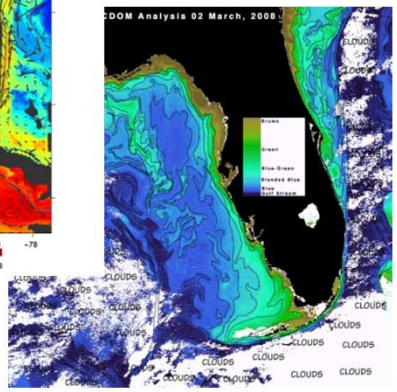
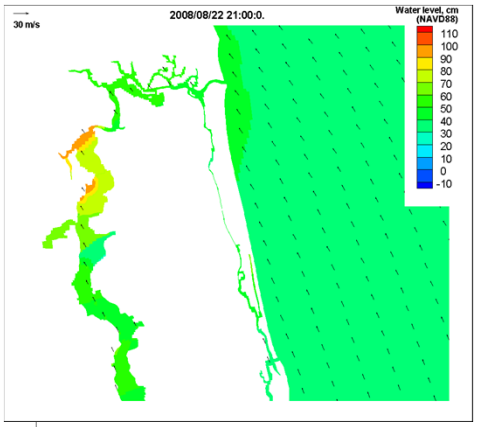
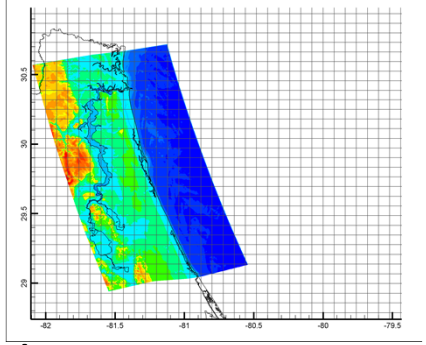




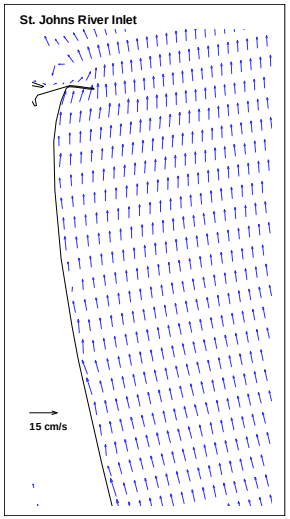
North-East Florida

- New mooring
- High resolution model forecasting

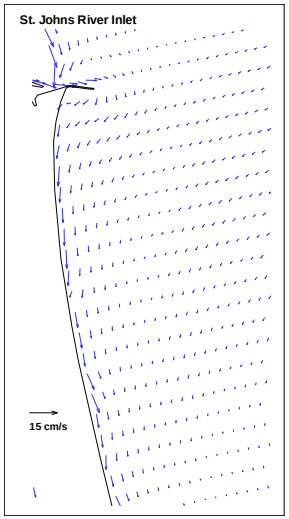




Tropical Storm Fay - Inundation and Salinity



May 8, 2008



May 12, 2008

Contact: Prof. Pat Welsh, UNF

Contact:
Prof. Y. Peter Sheng, UF

FLCOOS 2010-2012 Plan

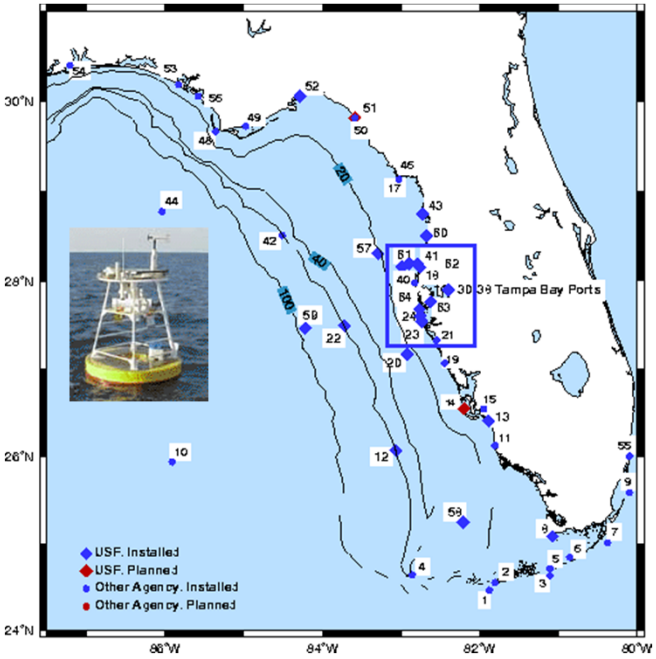
- Sustain critical existing assets - sensors, models, and data management

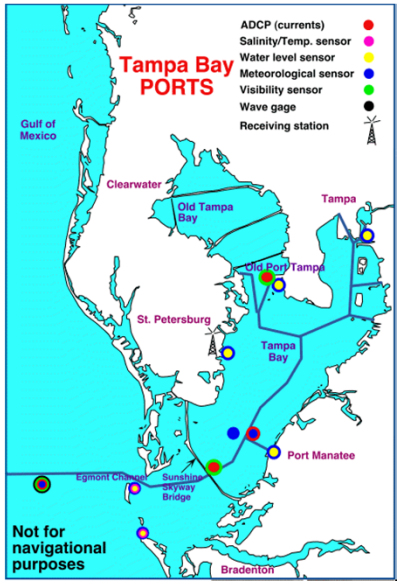
- Observations:
  - Begin physical *in situ surface and sub-surface observations in data-sparse regions such as the Florida Panhandle and the northeast Florida coast*
  - Test and deploy suitable chemical & biological sensors
  - Provide high-resolution satellite information and develop near-shore satellite capabilities

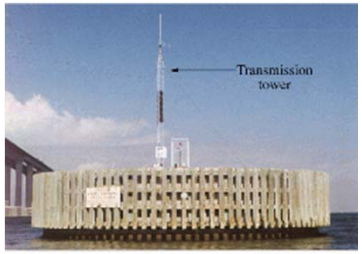
- Models:
  - Continue to plan, support and develop scientifically justifiable models from large-scale to shelf, coastal and estuarine-scale
  - Continue to support and adapt scientifically robust models for specific applications - coastal inundation, oil spill, water quality, climate change impact, fishery management

- Data Management:
  - Provide accessibility to archived data
  - Continue to participate in regional and state data management activities
  - Provide easy accessibility to all FLCOOS data and data products

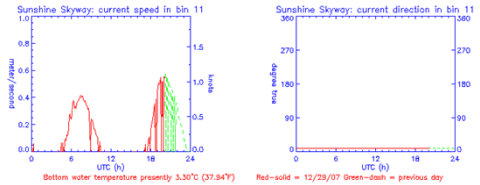
PORTS & COMPS Coastal and Off-Shore stations:







ADCP transmission tower near the Sunshine Skyway Bridge



COMPS-C10-5 Day Graphics Page 1 of 2

COMPS--C10 Page 1 of 3

COMPS Station

C10

Station ID	C10	Latitude	27° 10.152' N
Station Type	Offshore Buoy	Longitude	82° 55.552' W
Responsible Agency	USF		

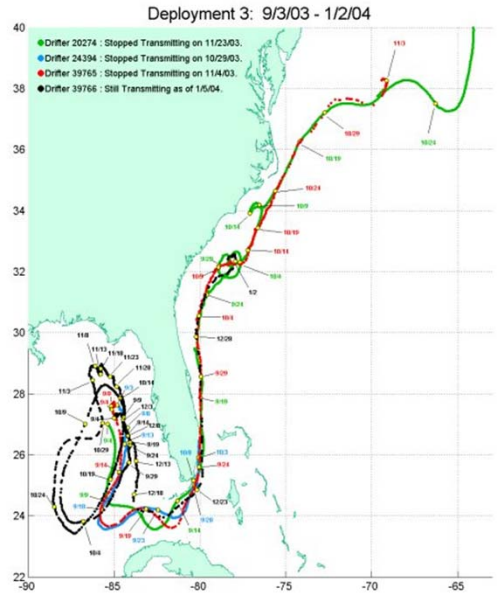
Site Notes Mooring located at 27° 10.100' N, 82° 55.635' W (27.168° N, 82.928° W) a distance 20 miles offshore of New Pass inlet (Sarasota) in a water depth of 80 feet.
►Station photos
►Buoy Deployment and Service history
WARNING!!! Wind data are not available at this time. Please check back later. Sorry for any inconvenience.

Latest Observations
Data is updated hourly with three meteorological, temperature and salinity measurements and one adcp measurement made during past hour. Time reported is UTC (Coordinated Universal Time); subtract 5 hours for EST, subtract 4 hours for EDT.
Provisional data - not quality-controlled - use at your own risk - see disclaimer.

Meteorological Data

Date	12-29-07		12-29-07	12-29-07
Time	20:00:00		19:40:00	19:20:00
Wind Speed	4.87 ms^{-1}	9.46 knots	5.21 ms^{-1}	4.64 ms^{-1}
Wind Direction	161 ° True	161 ° True	177 ° True	173 ° True
Wind Gusts	5.3 ms^{-1}	10.30 knots	5.6 ms^{-1}	5.2 ms^{-1}
Air Temp	21.07 °C	69.93 °F	21.07 °C	21.13 °C
Sea Surface Temp	22.80 °C	73.04 °F	22.80 °C	22.80 °C
Barometric Pressure	1018.5 mbar	30.08 in Hg	1018.6 mbar	1018.7 mbar

http://comps1.marine.usf.edu/C10/index.shtml 12/29/2007

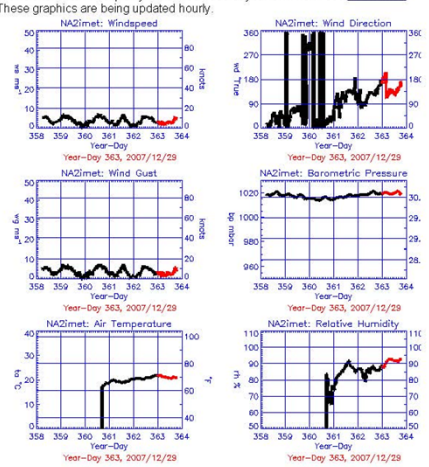


Piney Point Treated Waste Water Disposal: Drifter Buoy Analysis

COMPS Station

C10 Buoy: 5 Day Graphics

Provisional data - not quality-controlled - use at your own risk - see disclaimer.
These graphics are being updated hourly.



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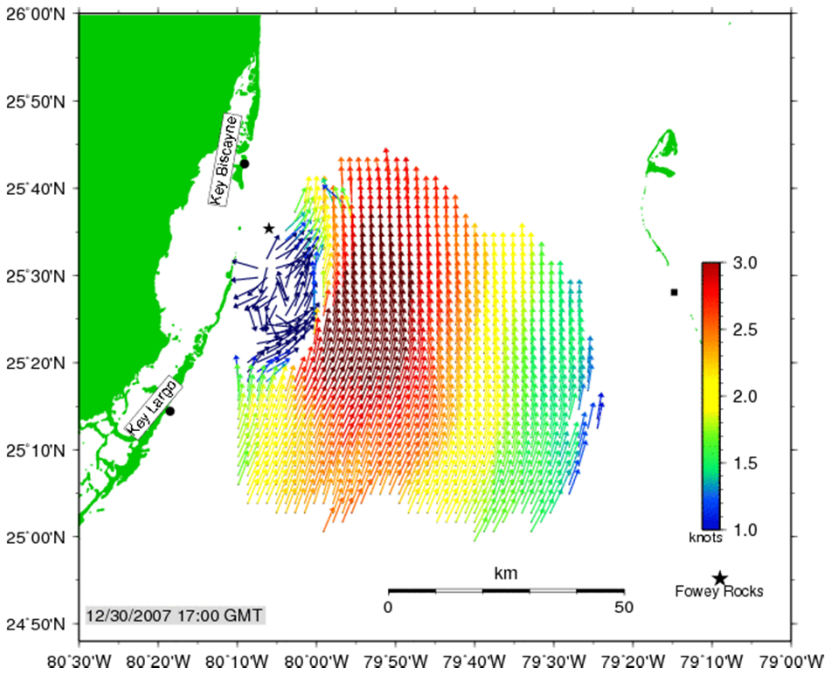
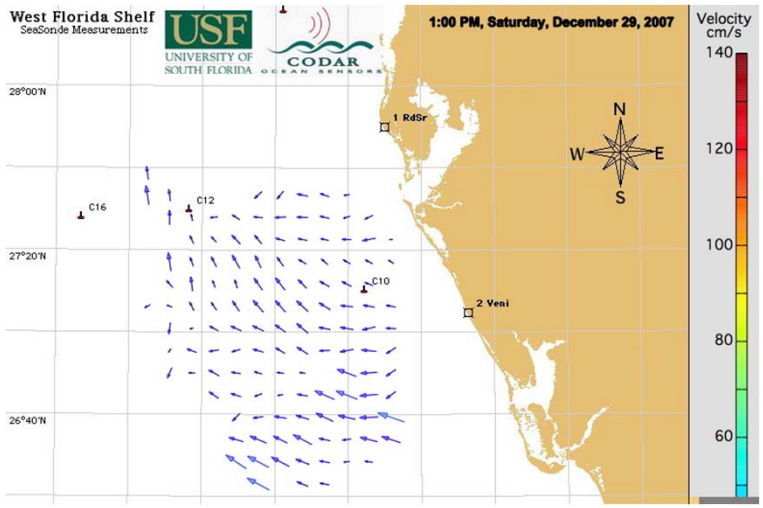
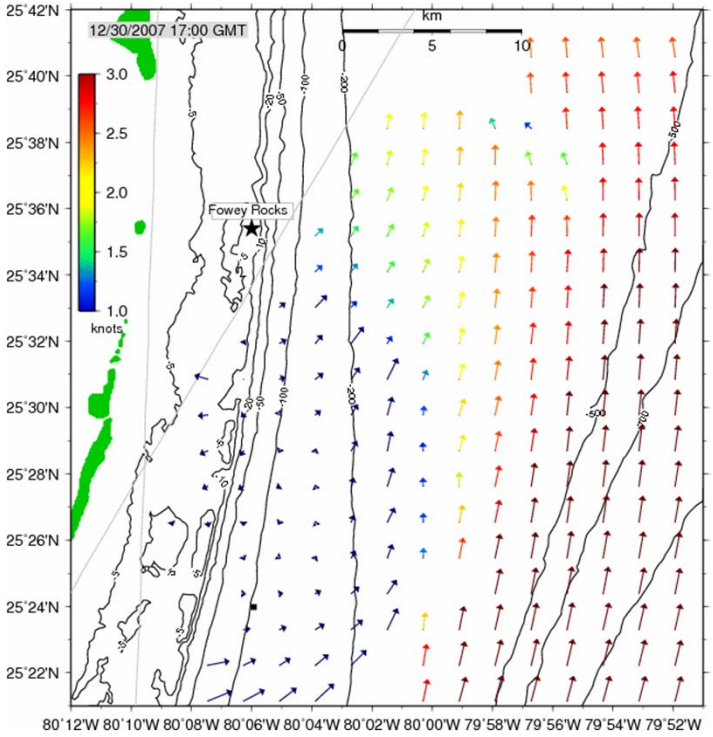
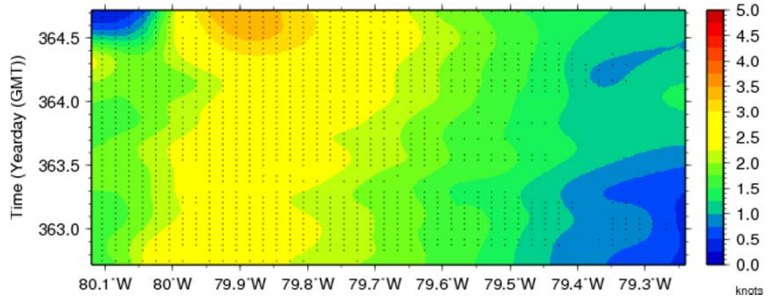




USF, MML, Rutgers, CODAR, FMRI, & local counties and towns

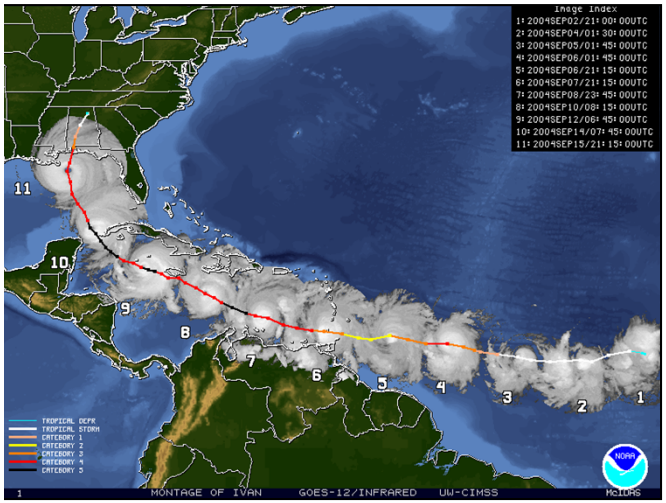
Miami HF Radar –
Including in-shore zoom

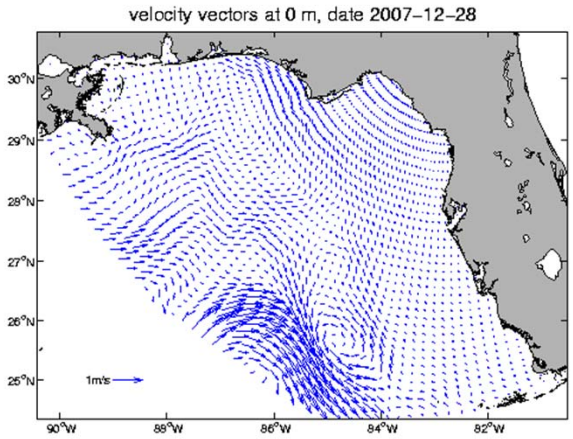




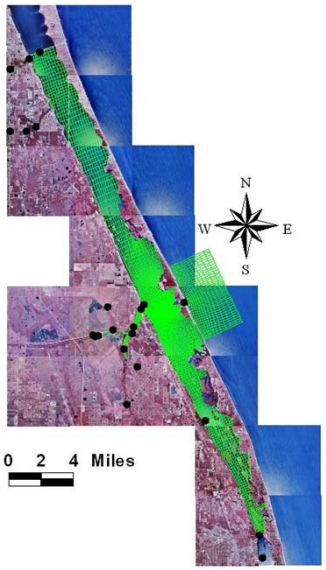
Coastal and Estuarine Models

Sheng et al., 2010



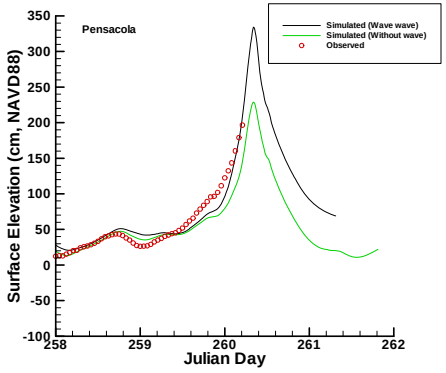


USF – West Florida Shelf Model



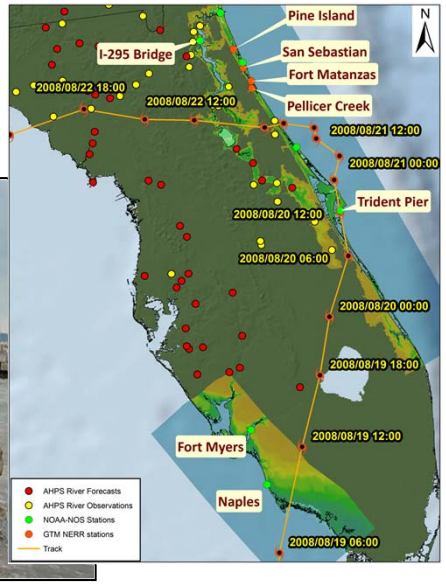
FIT – Sebastian Inlet Model

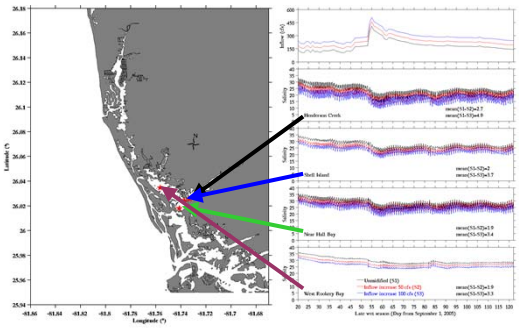
UF – Storm Surge and Baroclinic Circulation Forecasting System (Sheng and Paramygin, 2010)



UF – Apalachicola Bay, Charlotte Harbor, GTM, IRL

Estuarine Circulation, Hypoxia, Water Quality, Oyster Population





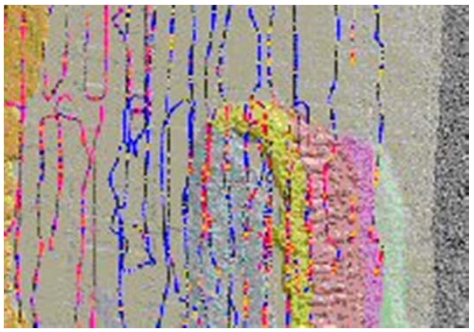
USF – Rookery Bay Model

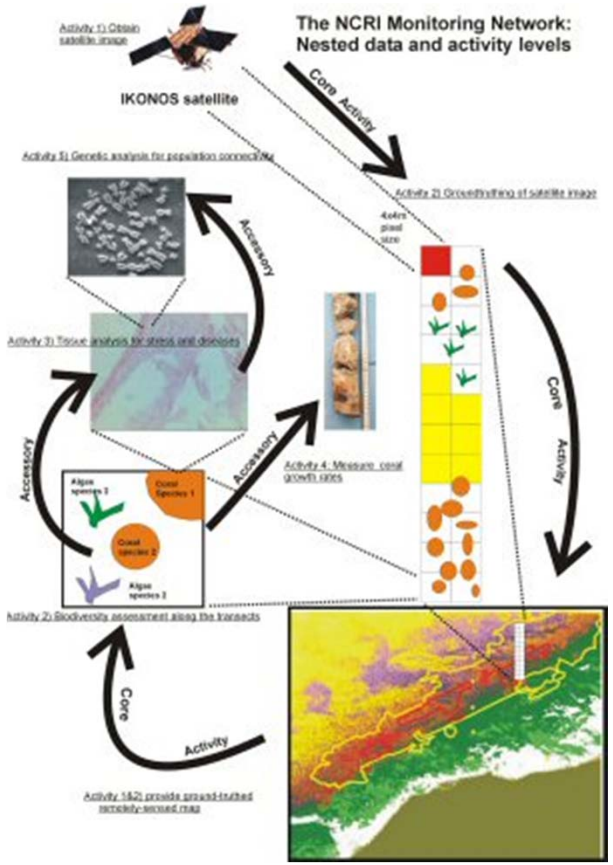
FISHERIES & CORALS

Oyster Reef restoration – FGCU

Corals:
NSU – National Coral Reef Institute Monitoring Network

This is available to researchers via ftp (investigations on coral skeletal density): Coral X-radiograph Densitometry System (CoralXDS+),



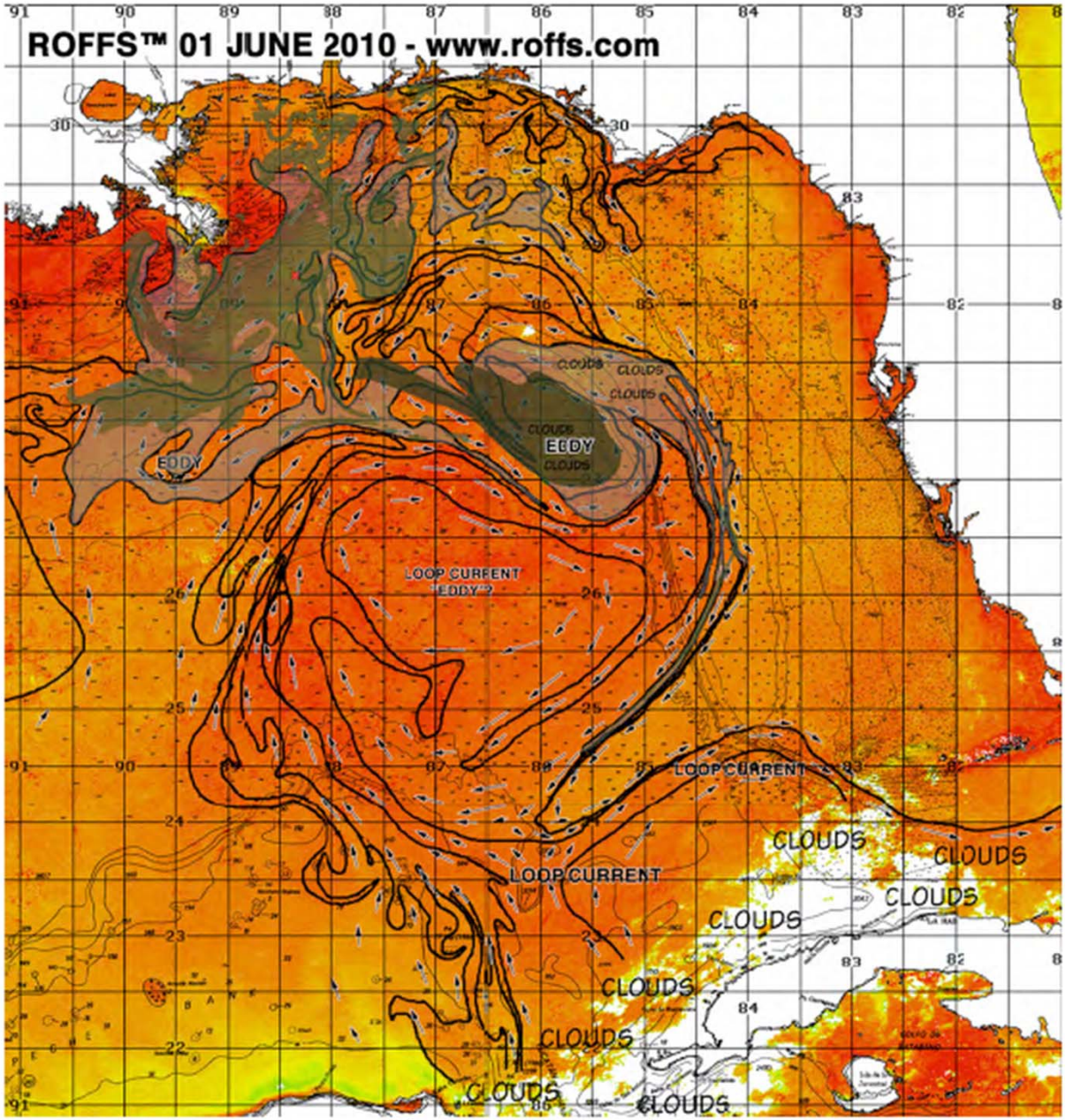


Coral work also being done at RSMAS, HBOI, Mote

NOAA's Coral Warning system done in collaboration with, and uses data from FLCOOS institutions

Corals

NSU – National Coral Reef Institute – mapping of corals *acoustic ground discrimination data are displayed over expert-classified LADS bathymetry (1),*


ROFFS™ 01 JUNE 2010 - www.roffs.com
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UWF (Dick Snyder & Wade Jeffrey)

- we will be sampling these stations, every 5 miles along each transect, shoreline out to ~50-70 fathoms, about once a month for at least a year. CTD pic credit Wade Jeffrey, others are mine.

UF (Shirley Baker)

- http://shellfish.ifas.ufl.edu/water_quality.html

- Monitoring Stations

In the current project, water quality monitoring stations are being operated at five shellfish aquaculture lease areas. These include: Alligator Harbor in Franklin County, Dog Island near Cedar Key in Levy County, Gulf Jackson near Cedar Key in Levy County, Horseshoe Beach in Dixie County, and Indian River near Sebastian in Indian River County.

- Monitoring Equipment

The water quality information is collected using Yellow Springs Instruments (YSI 6600-V2) monitoring probes, which measure water temperature, salinity, dissolved oxygen, turbidity, and depth. In addition, Campbell Scientific weather stations (Vaisala WXT510) monitor wind speed and direction, relative humidity, barometric pressure, and air temperature. These parameters are measured every half hour, 24-hours a day, seven days a week. Every two hours the measurements are posted to a website via internet connection to computers in Tallahassee. The stations undergo regular maintenance by FDACS Division of Aquaculture staff.

- **Also Tom Frazer's group in Fishery Program**

UF (Ed Phlips)

- We have an on-going research program with the Apalachicola National Estuarine Research Reserve on water quality and plankton dynamics. The study involves 12 sites in the bay and one site in the Gulf just outside the bay. The water chemistry and chlorophyll data set extends back to 2002. Over the past three years we added a phytoplankton composition study, which is being worked up as a dissertation. During the last three years we have also archived zooplankton samples, but we do not have funds to analyze the samples.
- We also have a phytoplankton collection effort going on in Choctawatchee Bay, but we are still working on a funding agreement for analysis.

Mote Marine Laboratory (Kellie Dixon)

- We are conducting Sarasota County's Ambient Monitoring Program in
- Sarasota Bay, Roberts Bay, Little Sarasota Bay, Blackburn Bay, and Lemon Bay for inorganic and total N and P series, BOD, chlorophyll, color, turbidity, and physical parameters (salinity, temperature, pH, light attenuation). Instruments used are Hydrolab Minisondes.

- In coastal waters we are conducting transects offshore on ~ every 6 weeks for the State-funded cooperative (with FFWCC) red tide studies.
- We collect surface and bottom samples for dissolved inorganic and total N and P, particulate C, N, and P, urea, silicates, phytoplankton pigments including chlorophyll, CDOM absorption and fluorescence, K. brevis toxins. In situ physical data are collected with SeaBird CTD and thermosalinograph.

FGCU (Volety Aswani)

- continuous water quality monitoring station (YSI 6600) at the Vester Marine Field Station in Bonita Springs. We measure Temp, Sal/conductivity, DO, Turbidity, Chl a in Estero Bay (www.fgcu.edu/vestermarine). getting ready to deply 5 YSIs along the Caloosahatchee estuary axis (lower portion).

UCF

Stormwater Academy - http://stormwater.ucf.edu/

The National Academies are pleased to announce the release of a new report.

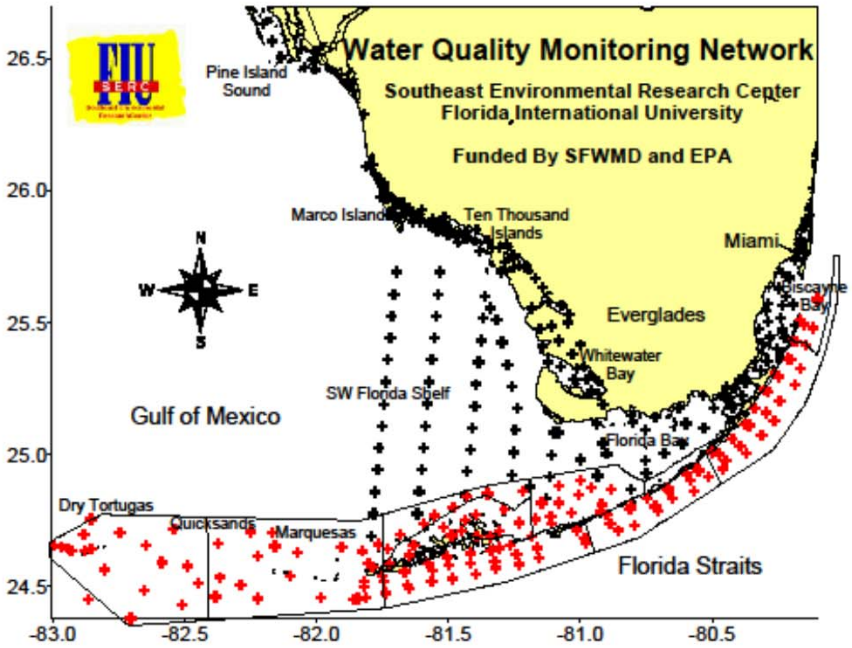
- Letter Report Assessing the USGS National Water Quality Assessment Program's Science Plan
- The U.S. Geological Survey's National Water Quality Assessment (NAWQA) Program is poised to expand its current, nationally recognized role in monitoring water quality to the ability to forecast likely future conditions, according to a National Research Council report. The Program's plan to assess the dynamics of changes in water quality would tailor water sampling frequency and location to known events, such as the wet or dry spells associated with El Nino/La Nina, to reveal the source of trends in water quality. **This dynamic strategy would make possible the forecasting of future trends of pollutants under different scenarios of land use, climate, and resource management, according to the report.**

Water Quality Modeling

- UF (Peter Sheng)
  - Indian River Lagoon (Hydrodynamics, WQ, DO, etc.)
  - Charlotte Harbor (Hydrodynamics, Hypoxia, WQ, Storm Surge, Inundation)
  - Apalachicola Bay (Hydrodynamics, Salinity, Oyster, Storm Surge, Inundation)
  - Tampa Bay (Hydrodynamics, Salinity, WQ)
  - Pensacola Bay (Circulation, Storm Surge, Inundation)
  - **Would like to extend WQ/Hypoxia modeling to Pensacola Bay, Choctawatchee Bay, and Apalachicola Bay, including shelf waters**

FIU – SERC

Joseph Boyer



The Southeast Environmental Research Center at Florida International University operates a network of 330 fixed sampling sites distributed throughout the estuarine and coastal ecosystems of South Florida (serc.fiu.edu/wqmnetwork/). The purpose of this network is to address concerns in regional water quality which cross and overlap separate political boundaries. Past funding came from different sources with individual programs being added as funding became available. Biscayne Bay, Florida Bay, Whitewater Bay, and Ten Thousand Islands are sampled monthly while the Florida Keys National Marine Sanctuary (FKNMS) and the Southwest Shelf are sampled quarterly. Due to funding constraints, only the FKNMS and Shelf are currently active (EPA funding). The SFWMD operates bay sampling at a reduced spatial scale.

Variables currently being measured include temperature, salinity, dissolved oxygen, ammonium, nitrate, nitrite, total organic nitrogen, soluble reactive phosphorus, total phosphorus, total organic carbon, chlorophyll *a*, turbidity, and light extinction. One of the products is a quasi-synoptic "big picture" of nutrient and phytoplankton biomass distributions over the South Florida coastal waters. The SERC Network continues to provide managers and research scientists with data and interpretation of large spatial and temporal trends in water quality across South Florida coastal waters.

Seek Research Opportunities

- Continue to seek funding through SECOORA and GCOOS to support integrated COOS activities in Florida
- Leverage FLCOOS member institution's strengths in estuarine and nearshore waters, contribute to **oil spill impact and restoration research** to be funded through BP/GOMA and other federal/state agencies, to protect Florida's vulnerable estuarine and coastal ecosystem
- Support National Water Quality Modeling and Forecasting activities
- Work with FDEP and USEPA to assist the development of **numerical water quality targets in Florida's estuaries**
- Continue the development of **renewable ocean energy**
- Develop **improved storm surge forecasting system and improved coastal inundation maps**
- **Support EPA's initiative to develop adaptation strategy for climate impact on water quality**

Summary

- FLCOOS Consortium will:

- **Develop a cohesive and scientifically defensible integrated observing and predicting system throughout Florida waters (from the estuary to the EEZ).**
- **Provide integration and leadership in the ocean and coastal resources related research undertaken in the state's marine and estuarine environments.**
- **Provide an integrated infrastructure off which many different objectives could be achieved.**
- **Develop and strengthen coordination with State agencies, Regional Associations (SECOORA and GCOOS), other stakeholders interested in Florida's natural resources, and other federal and international programs.**
- **Continue to host open community informational caucuses.**
- **Consortium members will work together as a public-private partnership.**
- **Engage more stakeholders in Florida and increase membership.**