



NOAA Satellite and Information Service

National Environmental Satellite, Data, and Information Service (NESDIS)



NOAA-NASA Workshop, 3-5 May 2006, Monterey, CA

An Ecosystem Approach to Management (EAM)

Russ Beard, Director Ecosystem and Liaison Office
NOAA's National Coastal Data Development Center
(NCDDC), Stennis Space Center





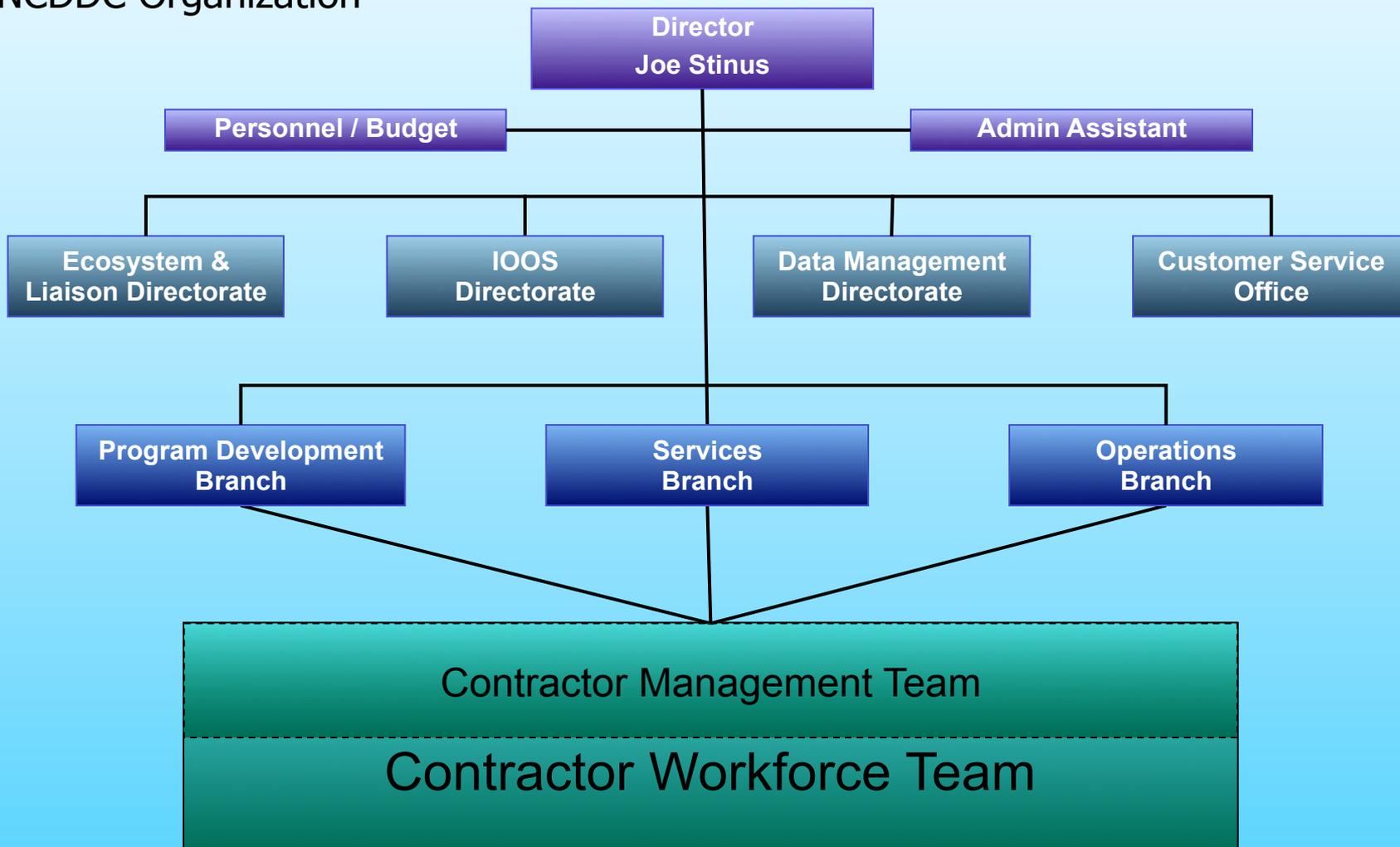
NCDDC: Location

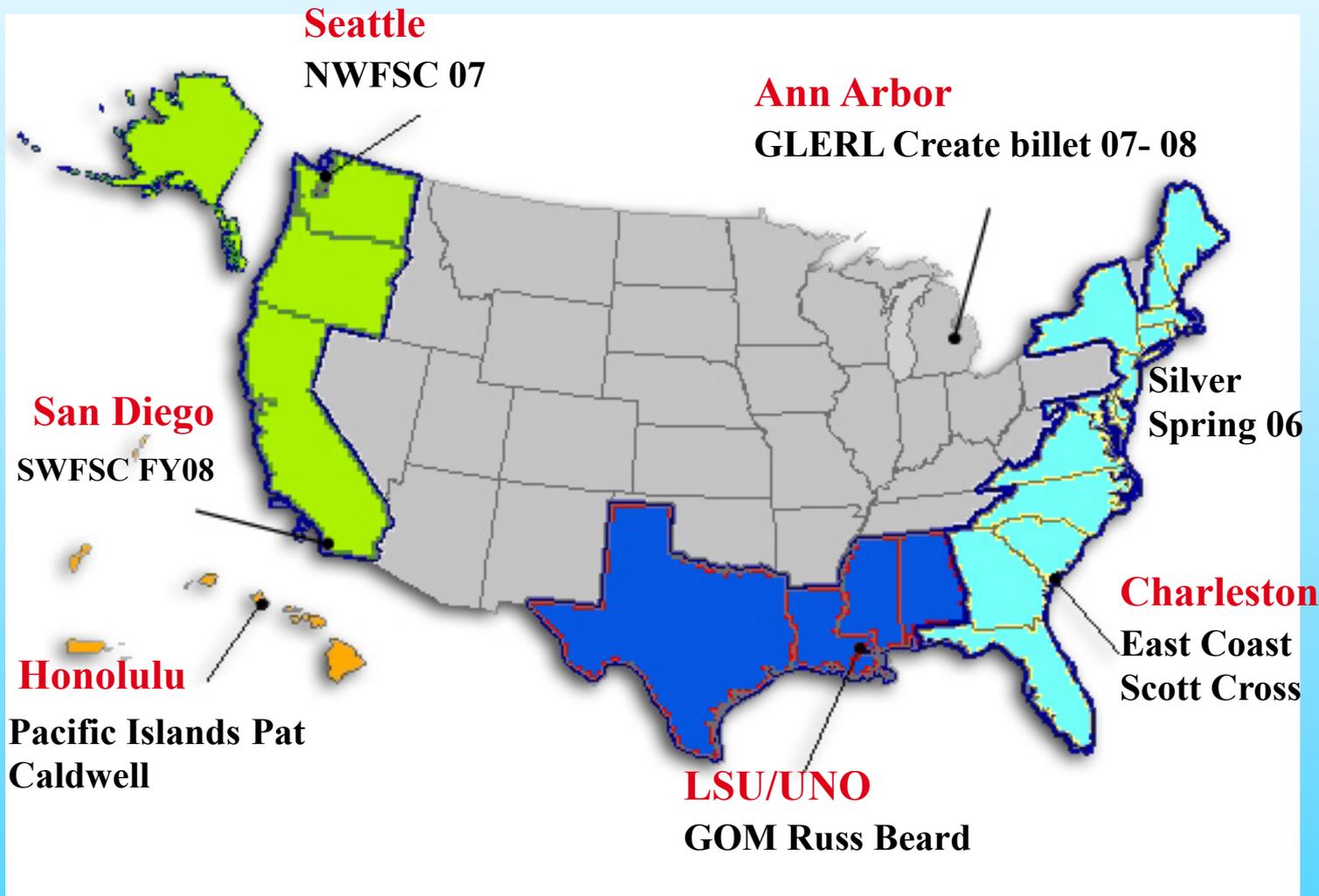
- Located at the Stennis Space Center, Mississippi
 - A unique ‘Federal City’
 - Home to more than 40 Federal & State Agencies
 - NOAA
 - NWS, NMFS, NESDIS, NOS
 - NASA, Navy, Coast Guard
 - EPA, USGS
 - Contractors & Vendors
 - Small Business Incubator’ s
 - Universities
 - Future site of the new NOAA OAR Cooperative Institute.





NCDDC Organization







NOAA Satellite and Information Service

National Environmental Satellite, Data, and Information Service (NESDIS)



Moving NOAA towards a Functional Ecosystem Approach to Management

Workshop Summary and Initial Action Plan December 2005

Seven Actions Developed



Action 1

EAM In-reach: Build internal awareness and support for EAM, with the endpoint of a common understanding of EAM, and eventually, establishing a new way of doing business at NOAA

Action 2

Establish an expert EAM Team at NOAA

Action 3

Establish an EAM-dedicated regional NOAA presence*

Action 4

EAM Team: Develop guidance and processes to support EAM implementation – regional approaches, stakeholder analysis, and issue identification*

Action 5

Build awareness, support, and a “directive” for EAM from NOAA leadership

Action 6

Engage federal agency partners on EAM issues and a management framework*

Action 7

Develop an EAM-dedicated data management, analysis, and visualization capability at NOAA*

*** Today’ s focus addresses Actions 3-4, and 6-7**



EOP FY2008 PBA Best Program Alternative – Integrated Ecosystem Data Management

“This proposal recommends that the GOM serve as a regional demonstration for a Large Marine Ecosystem (LME) in which to implement and build off existing integration efforts.” FY08 EOP PBA

- Standard Metadata system needs
- Regional/National Data Archive System
- Technology Refreshment
- Data Information System Interoperability
- Information access & dissemination
- S&T IT architecture upgrade and maintenance



Regional Ecosystem Concept- Beta Website

- Purpose is to provide access to data for delineation of the regional ecosystem and integrated data management:
 - Ecosystem Programs Data
 - Environmental Indicators/Projects
 - Regional Observing Systems Data
 - GIS Mapping
 - Data Search
 - Other Links
 - Feedback
- Initial Data Sets: Fisheries and Water Quality

<https://test.ncddc.noaa.gov/CMECS>

Partners- Southeast Fisheries Science Center, MDMR, NRL, NASA ASP, EPA GOMP, MDEQ, NMFS/CSC technical advisor (Dr Becky Allee)



Ecosystem Programs

- Provides entry point into the Ecosystem Goal Team Web Site &
- Entry points into the 9 Ecosystem Goal Program web sites

NOAA

REGIONAL ECOSYSTEMS

you are here: home » ecosystem programs

- Home
- Ecosystem Programs
- Environmental Indicators/Projects
- Regional Observing Systems
- GIS Mapping
- Data Search
- Contact US
- Other Links...

Ecosystem Goal Team web site provides access to its mission statement, regional ecosystem locations, ecosystems programs, budget requests.... [To Learn more...](#)

Aquaculture Program
The Aquaculture Program is a matrix-managed, multi-line office program established in 2003 to develop a science and technology based regulatory framework for a well-managed and productive.... [To Learn More](#)

Coastal & Marine Resources
The Coastal and Marine Resources Program (CMRP) helps federal, state, local, and international managers to protect, restore, and use coastal ecosystem services. CMRP promotes a comprehensive approach to balance.... [To Learn More](#)

Corals
NOAA has significant responsibilities to conserve and manage coral reef resources as outlined in legal and administrative mandates and international treaties. NOAA works closely with other Federal agencies, state and territory... [To Learn More](#)

Ecosystem Observations
NOAA's Ecosystem Observation Program (EOP) is designed to be a coastal and oceanic ecological observing system that supports the programs in the Ecosystem Goal. It provides information on ... [To Learn More](#)

noaa.gov:9801/COOS



Environmental Indicators/Projects



you are here: [home](#) » [environmental indicators/projects](#)

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- Environmental Indicators/Projects
- Regional Observing Systems
- GIS Mapping
- Data Search
- Contact US
- Other Links...

KATRINA Impact Assessment

The Katrina Impact Assessment Project is a cooperative effort whose objective is to assess and monitor the environmental and physical impact of Hurricane Katrina on the ecosystems and infrastructure of the Mississippi Gulf Coast.

[To learn more...](#)

Gulf of Mexico HYPOXIA Watch

Hypoxia watch uses near-real-time shipboard measurements of bottom dissolved oxygen to develop Internet advisories on anoxic and hypoxic conditions in the western and north-central Gulf of Mexico.

[To learn more...](#)

HABSOS

The Harmful Algal Blooms Observing System demonstrates an online, integrated information system for managing HAB data, events, and effects.

[To learn more...](#)

COASTAL OCEAN OBSERVING SYSTEMS COOS

The Coastal Ocean Observing System provides access to a collection of real-time and recent weather, oceanographic, water-level and stream gauge observations.

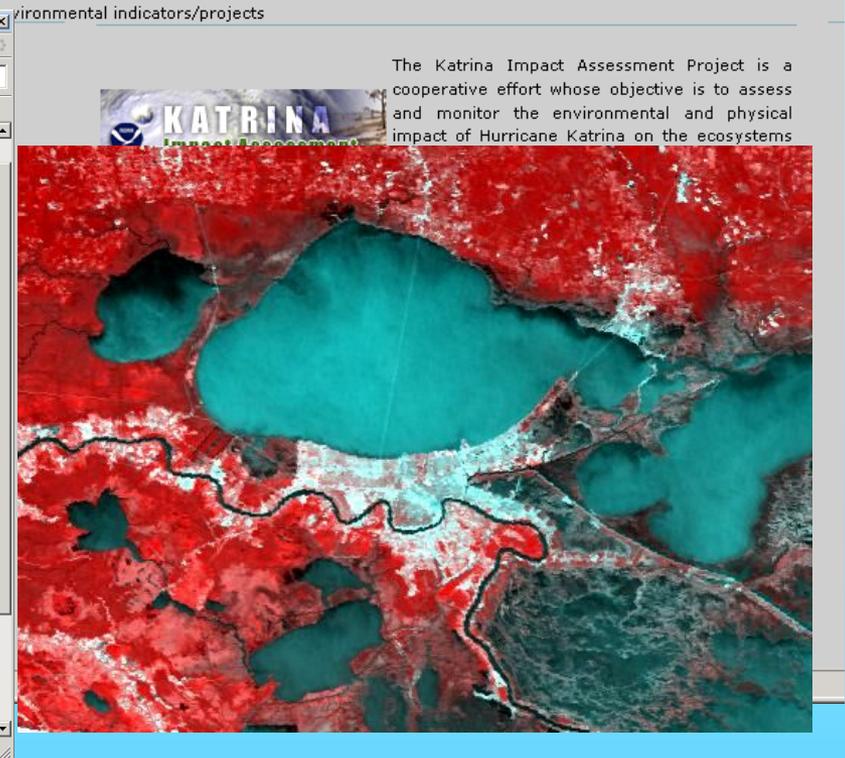
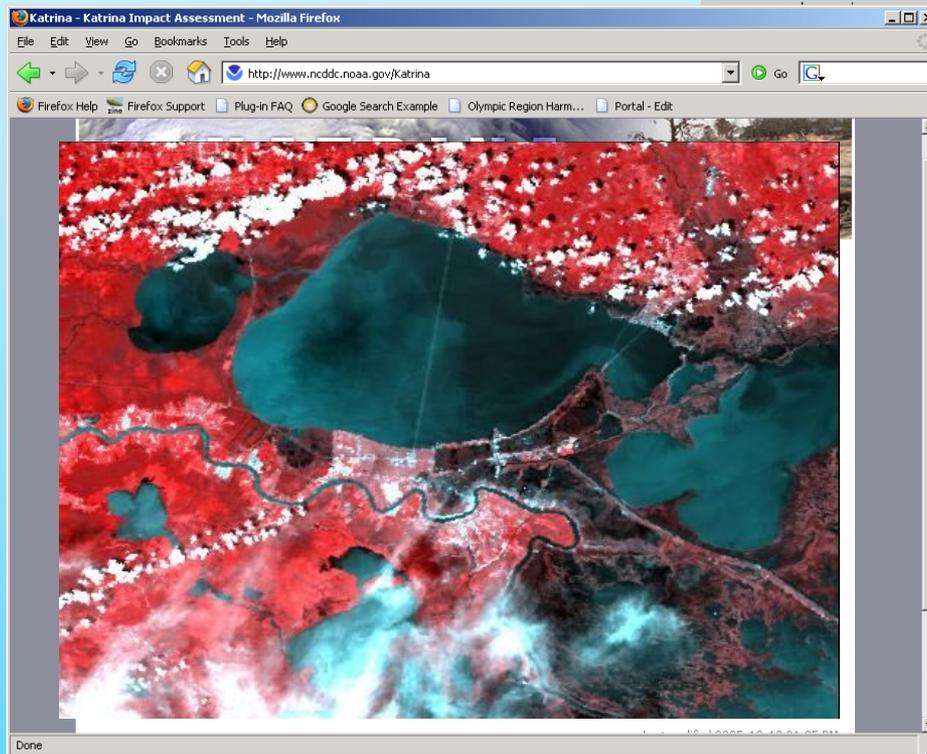
[To learn more...](#)

- Provides access to specific projects developed to assist/inform users of specific environmental indicators or programs



Link to ...Katrina Impact Assessment Post-Katrina Turbidity Product (NASA ASD)

Environmental Indicators/Projects



Aqua false color 7 Sep – light plumes TSM

Terra 24 Oct post-front re-suspended sediment



Regional Observing Systems

Provides access to Regional Observing Systems Data Nodes and Websites

- Gulf of Mexico Coastal Ocean Observing Systems (GCOOS)
- EOP Observing Systems
- COOS (NCDDC)

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Data Search
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Other Links...

GCOOS
Many organizations and individuals are concerned with sustained observations and/or products and services based on such observations from the estuaries and Exclusive Economic Zone of the Gulf of Mexico. [Learn More](#)

Ecosystem Observation Systems
Ecosystem Observation Systems provide Internet access to observational data collected in and around the U.S. coast lines... [To Learn More](#)

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noaa.gov:9801/COOS



Regional Observing Systems (GCOOS)

GCOOS Members

- TABS
- TCOON
- PORTS
- COMPS
- Army COE
- WAVCIS
- LUMCON
- NWLON
- NDBC Moorings
- NDBC C-Man
- WAVCIS/LUMCON
- SEAKeys

NOAA REGIONAL ECOSYSTEMS

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Continuing Measurements: Physical and Ecosystem Ecosystem

Map Legend:

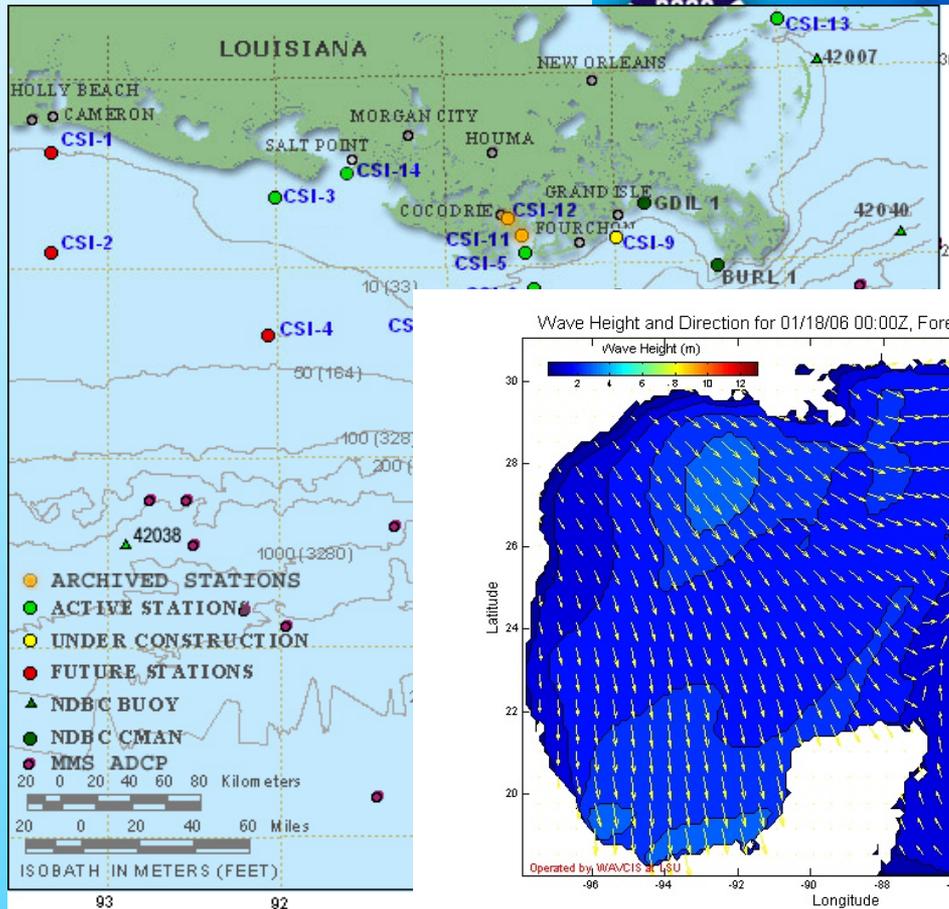
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- LUMCON
- NWLON
- NDBC Moorings
- NDBC C-MAN
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- SEAKeys

Map Labels: Mexico Coastal PORTS, Long Key Estuary Assessment Group, Vero Beach YACHT, Tampa Bay NDBM, Central Bay PORTS, Mosquito Bay NDBM

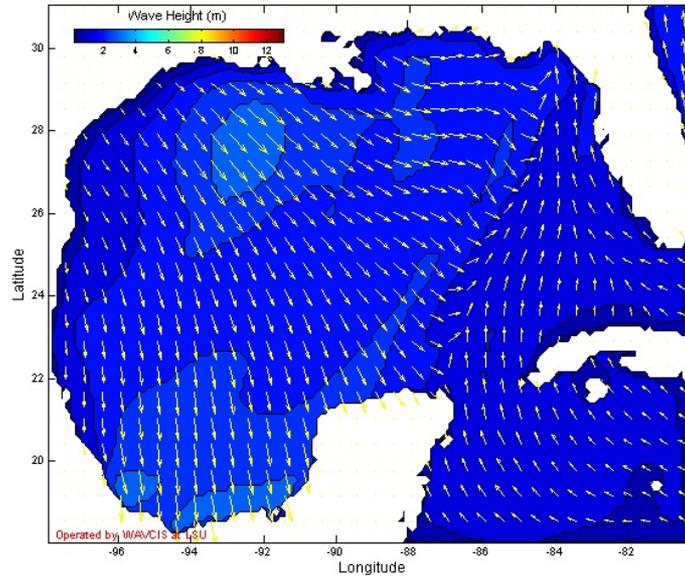
oaa.gov:9801/COOS



Regional Observing Systems WAVCIS



Wave Height and Direction for 01/18/06 00:00Z, Forecasted at 01/18/06 00:00Z



programs

GCOOS

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EGT & Ecosystem Observing Systems

- Provide discovery and access to the following data nodes:
- Economic and Sociocultural
- National Observer Program
- Fish Surveys
- Commercial and Recreational Fish Statistics
- Ecosystem Surveys
- Protected Resources
- National Status & Trends
- Passive Acoustics Observing System
- Coral
- National Estuarine Research Reserve System-wide Monitoring Program
- National Marine Sanctuaries Monitoring Program

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Economic and Sociocultural
The NOAA Fisheries Economics and Social Sciences Program supports an ecosystem-based approach for managing the Nation's living marine resources. Within this context, the Program [To Learn More](#)

National Observer Program
The National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) deploys fishery observers to collect... [To Learn More](#)

Fish Surveys
The Assessment and Monitoring Division supports at-sea resource surveys, stock assessments, fisheries observer programs, and cooperative... [To Learn More](#)

Commercial and Recreational Fish Statistics
The Fisheries Statistics Division collects data and coordinates information and research programs to support the science ... [To Learn More](#)



Data Search

Data searching capabilities will be provided using one of three methods:

- “Google” type search
- Refined search – CMECS Model
- Map Search

Initial development will be based off of the 1st 3 levels from the Coastal/Marine Ecological Classification Standard (CMECS)

NOAA REGIONAL ECOSYSTEMS

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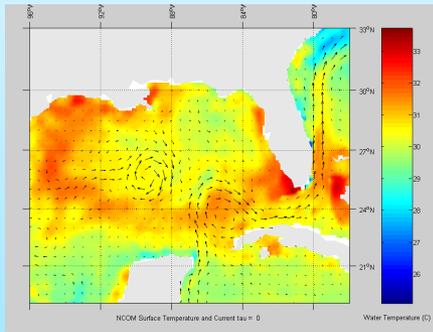
Regional Ecosystems of the United States and Linked Watersheds

Chukchi Sea, Beaufort Sea, East Bering, LME's of the U.S., Gulf of Alaska, California Current, Insular Pacific-Hawaiian, Northeast U.S. Continental Shelf, Southeast U.S. Continental Shelf, Gulf of Mexico, Caribbean Sea

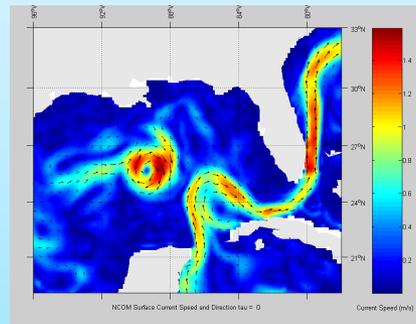
Google Search Search



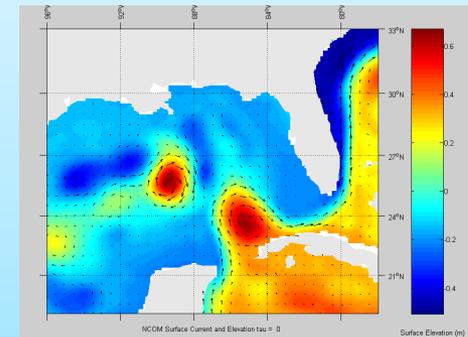
EOP DMA for Modeling – Global Navy Coastal Ocean Model (G-NCOM) Dissemination



NCOM Surface temperature and current



NCOM surface current speed and direction



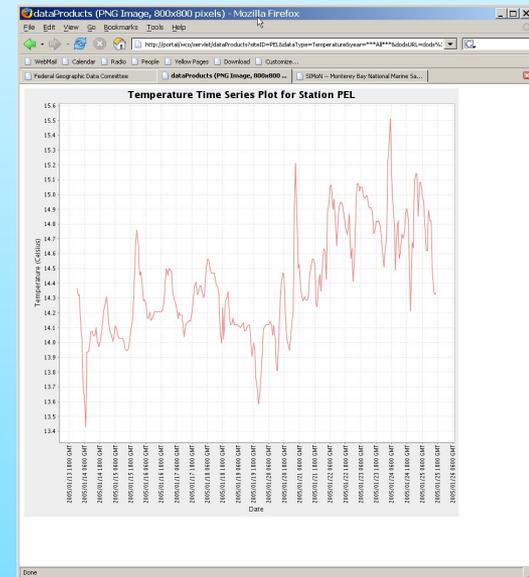
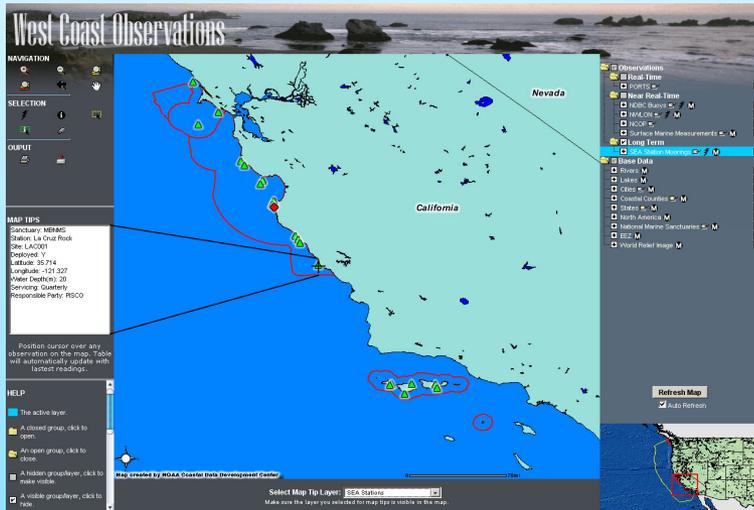
NCOM surface current and elevation

- Under evaluation by modelers at UM. Provides boundary conditions for coastal models SE USA and Gulf of Alaska (UW, TAMU, UNC, & WH)
- Supports USCG Search and Rescue Ops (SAROP). Surface current fields are input to the Environmental Data Server (EDS) at USCG SAROPS



NMSP West Coast Observation (WCO) Project

Partners: PISCO, SIMoN, NODC, and NCDDC



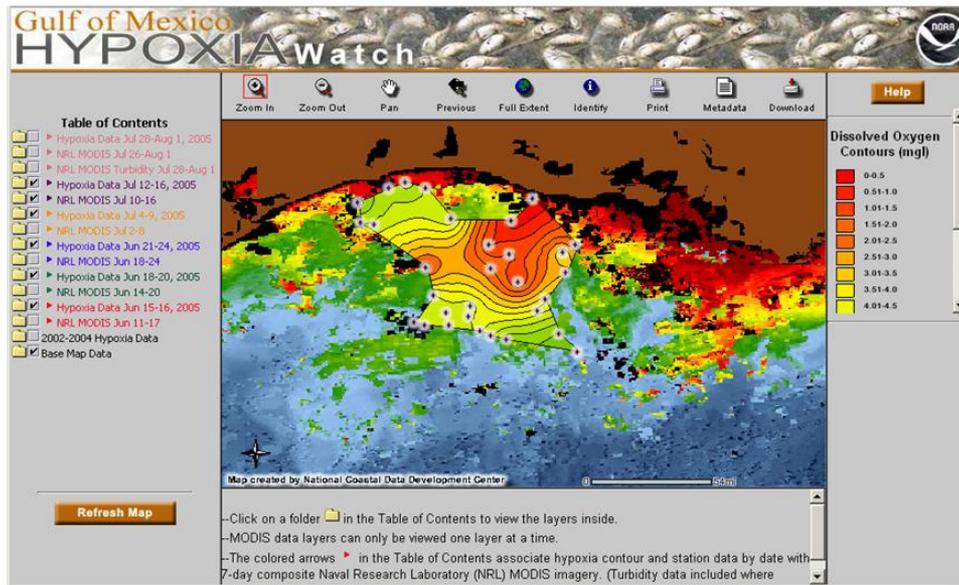
Automated process by which native ASCII data is converted to NetCDF (COARDS) profile. EML metadata records converted to FGDC and transferred to NODC and posted to multiple search locations.

Data Access Webapp searches the available data on a OPeNDAP server. Create statistics, plots, and download data

CRMP, Habitat, EOP, ERP,
Corals, & Fisheries
Management



EOP NMFS Hypoxia Website 05 Season- Planning for 06



- ArcIMS upgrade from FY04
- Links to SEAMAP, NMFS, NCDDC, CoastWatch, & RV Oregon II, LUMCON
- MODIS 7 Day composite
- Extract ship flow-through data, e.g., turbidity, S, & Chl
- DO contour maps



An EAM Business Plan

- **2004 NASA REASoN Award to NRL (partners NASA ASP, NOAA NESDIS/NOS, and ACT)**
- **Discussions were held in 2004 with local stakeholders on what products and services were needed**
- **Signed MOA between NOAA NESDIS and the Mississippi Department of Marine Resources (MDMR) for products, information, and services related to NASA's Terra (EOS AM) and Aqua (EOS PM) Moderate Resolution Imaging Spectroradiometer (MODIS) developed by NRL**
- **Validate the Business Plan and expand effort to LA, AL, TX and FL**



National Oceanic and Atmospheric Administration

Mississippi Partners

MS Department of Marine Resources

- *Gulf States Marine Fisheries Commission*
- *MS Department of Health*
- *MS Department of Environmental Health*
- *Gulf Coast Research Lab (USM)*
- *MS Civil Defense, MS Department Wildlife, Fisheries, and Parks*

Improved EAM Through New Observations – MODIS Terra and Aqua Scan Sensors & Model Output for HABS Events

Products

Optical- Absorption
& Backscattering

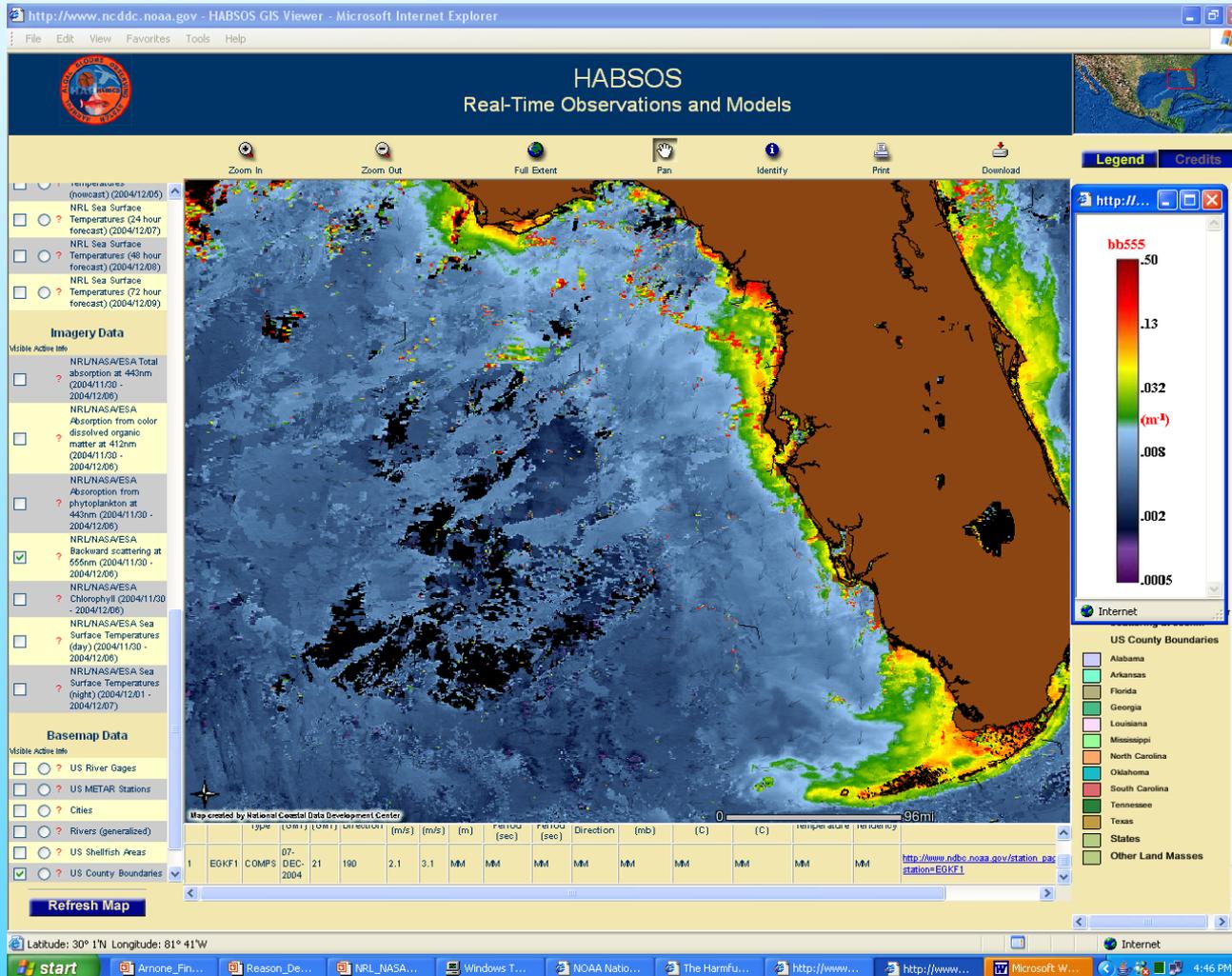
Bio/Phys- Turbidity,
Chlorophyll, SST

Models- 6 Km
resolution

T, S, tidal and
surface currents, sea
surface heights

- 48 forecasts

MODIS PM
7-Day
For Chlorophyll-a
(mg/m³)





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National Environmental Satellite, Data, and Information Service (NESDIS)



The Mississippi Department of Marine Resources
Managing Your Marine Resources Today for a Sound Tomorrow.

Table of Contents

Available Layers

- USGS River Gages
- Weather Observations - Marine
- Weather Observations - Land
- Major Cities
- Major Roads
- Coastal Rivers and Streams
- US States
- US Counties
- US Shaded Relief

Add Image To Map:

None/Remove Selected

Beam Attenuation-Turbidity (AM)

Beam Attenuation-Turbidity (PM)

Backscattering Anomaly at 551nm (AM)

For What Date:

30-Apr-2006

29-Apr-2006

28-Apr-2006

27-Apr-2006

Refresh Map

Beam Attenuation - Turbidity

0.05 0.13 0.32 0.79 2.0 5.0
inverse meters

Red signifies areas with a high concentration of suspended sediments. Purple signifies areas with a low concentration of suspended sediments. Black and white indicate areas of no data. Click [here](#) for more details.

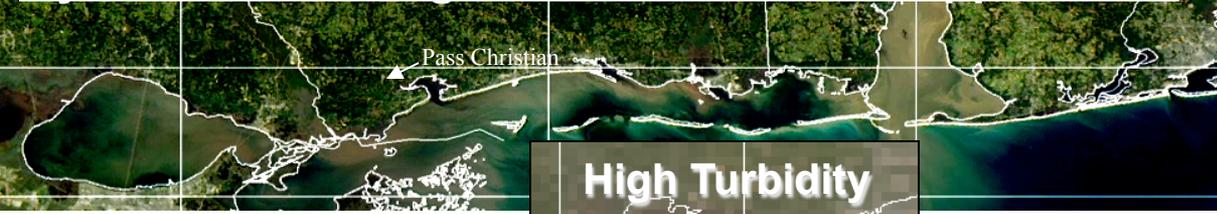
Accessing REASoN Products via NCDDC ArcIMS websites

www.ncddc.noaa.gov/website/MS_DMR/viewer.htm

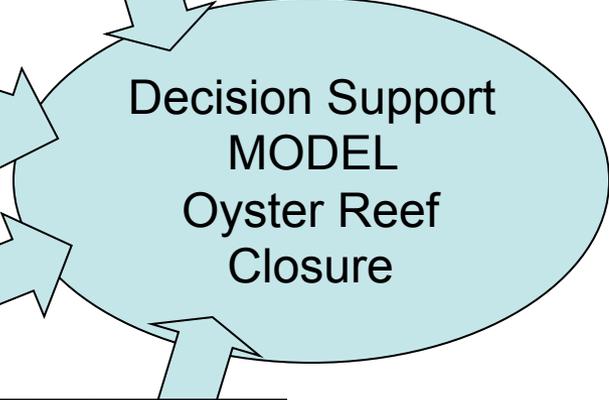
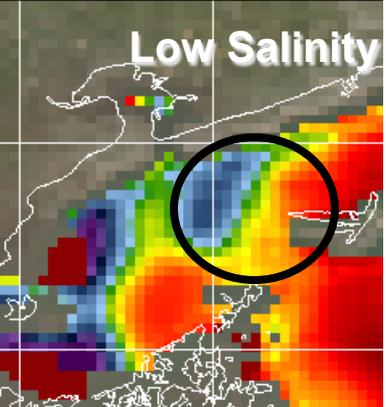
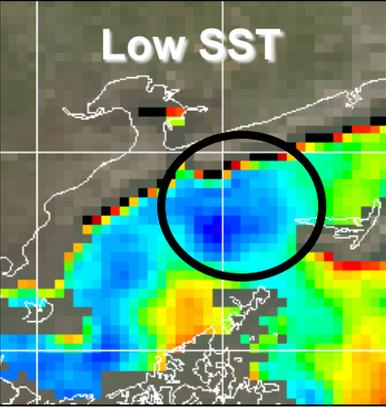
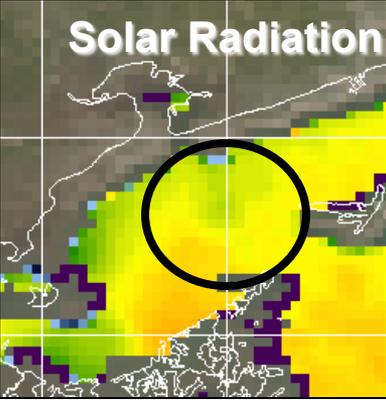
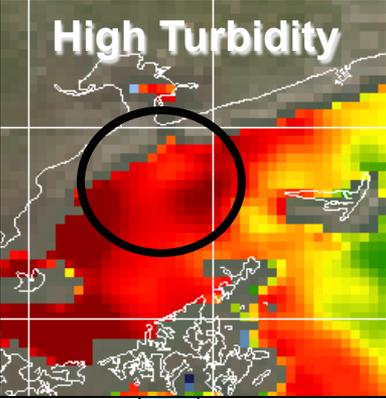
Oyster Reef Management in the Mississippi Sound



Mississippi
Department of Marine Resources /
NOAA/Naval Research Laboratory



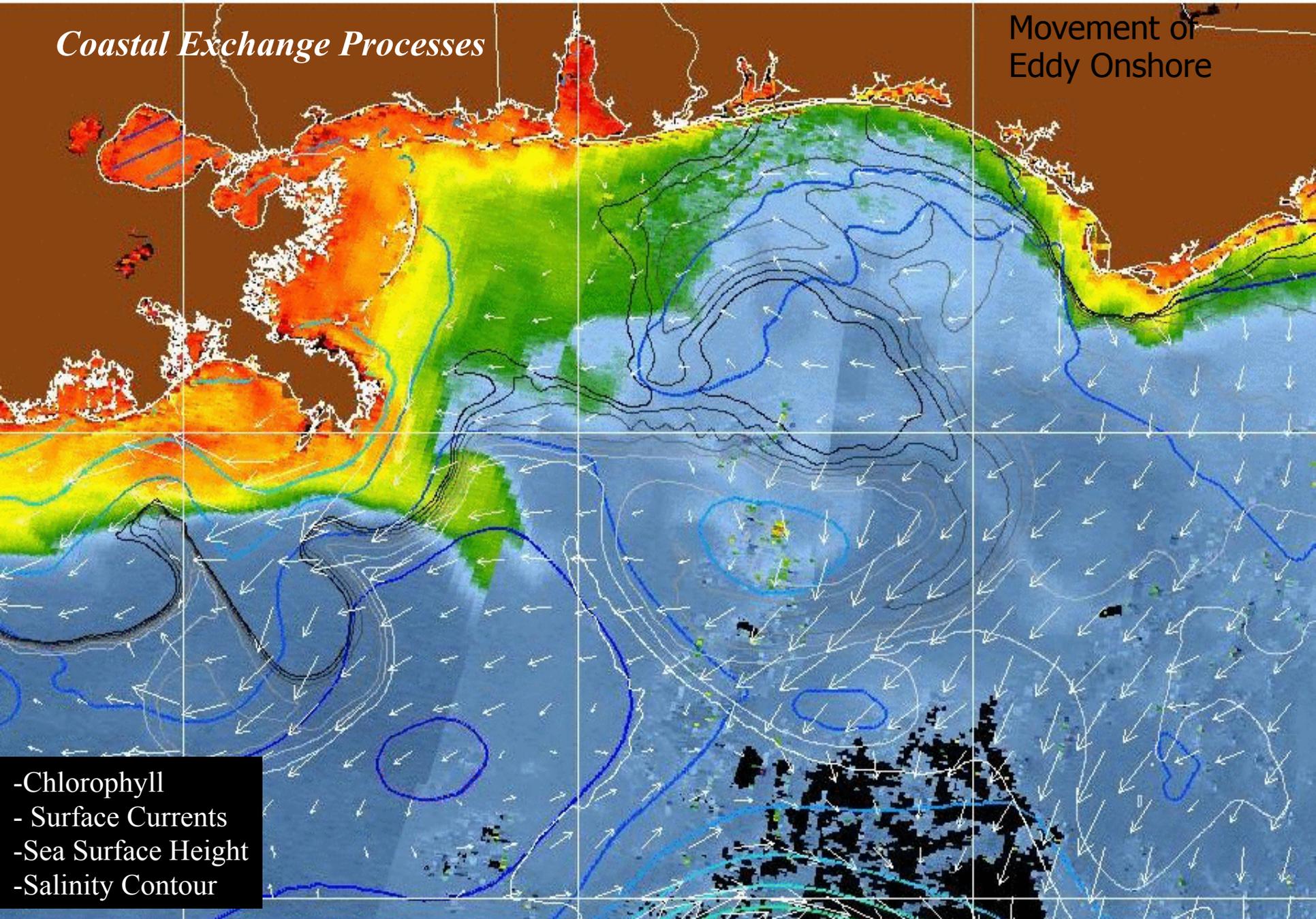
MODIS Products
Used for Managing
Coastal Resources



- High levels of fecal coliform can contaminate or indicate contaminated oysters requiring DMR officials to close the oyster reefs
- Fecal coliform die-off rates and predictions of concentration can be correlated to relative solar radiation, cloud cover, SST, river runoff (turbidity) and salinity.
- NRL Stennis is providing MODIS derived estimates of solar radiation, SST, and turbidity as well as salinity estimates
- NOAA NCDDC provides these data to Mississippi DMR for use in their fecal coliform decision tools.

Coastal Exchange Processes

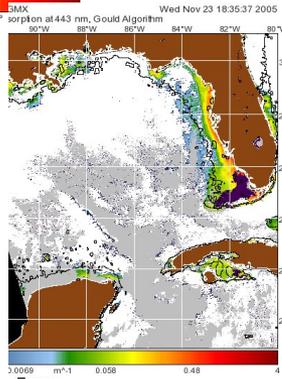
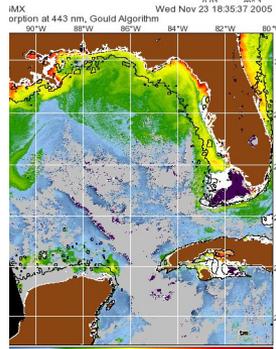
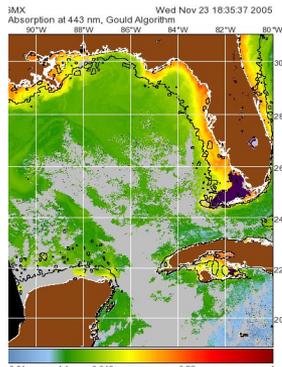
Movement of
Eddy Onshore



- Chlorophyll
- Surface Currents
- Sea Surface Height
- Salinity Contour

SeaWiFS Chl 05/03/2004

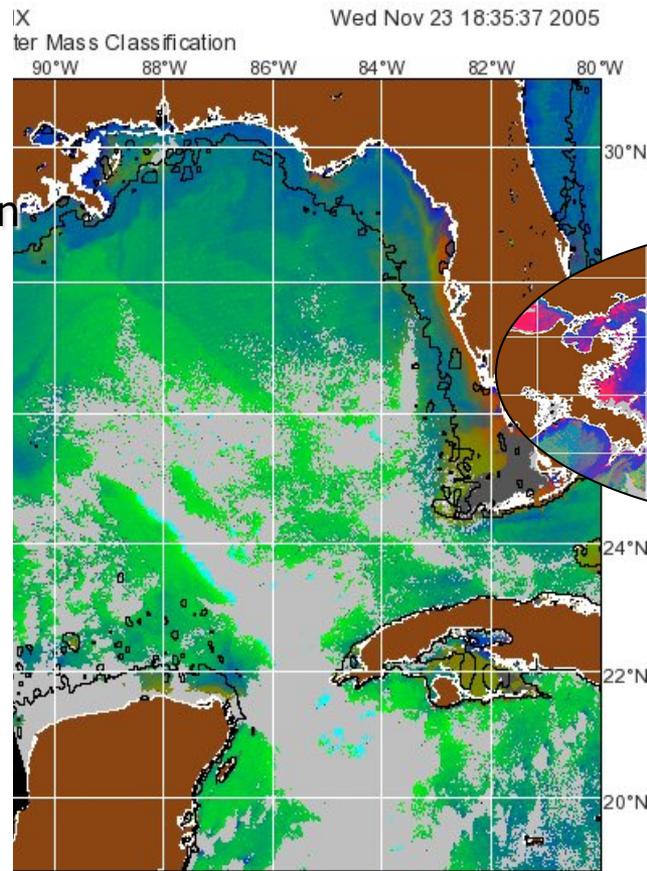
Identifying Coastal Processes Using IOP – Absorption Budget Water Mass Classification



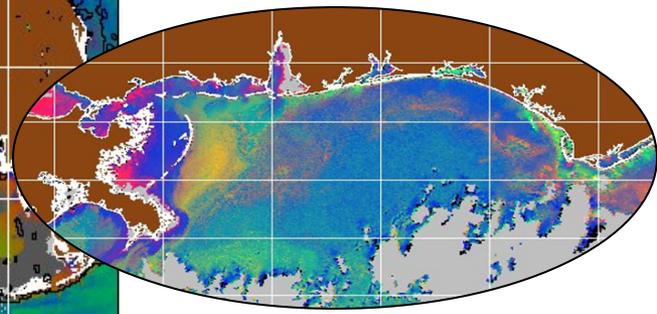
Phytoplankton
Absorption
(green)

CDOM
Absorption
(blue)

Detrital
Absorption
(red)
Organic/ Inorganic



Open Ocean and
Coastal Water
Processes are different

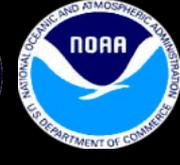
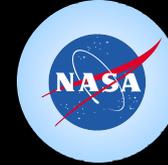


Controlling
Absorption Processes
-CDOM
-Phytoplankton
-Detritus

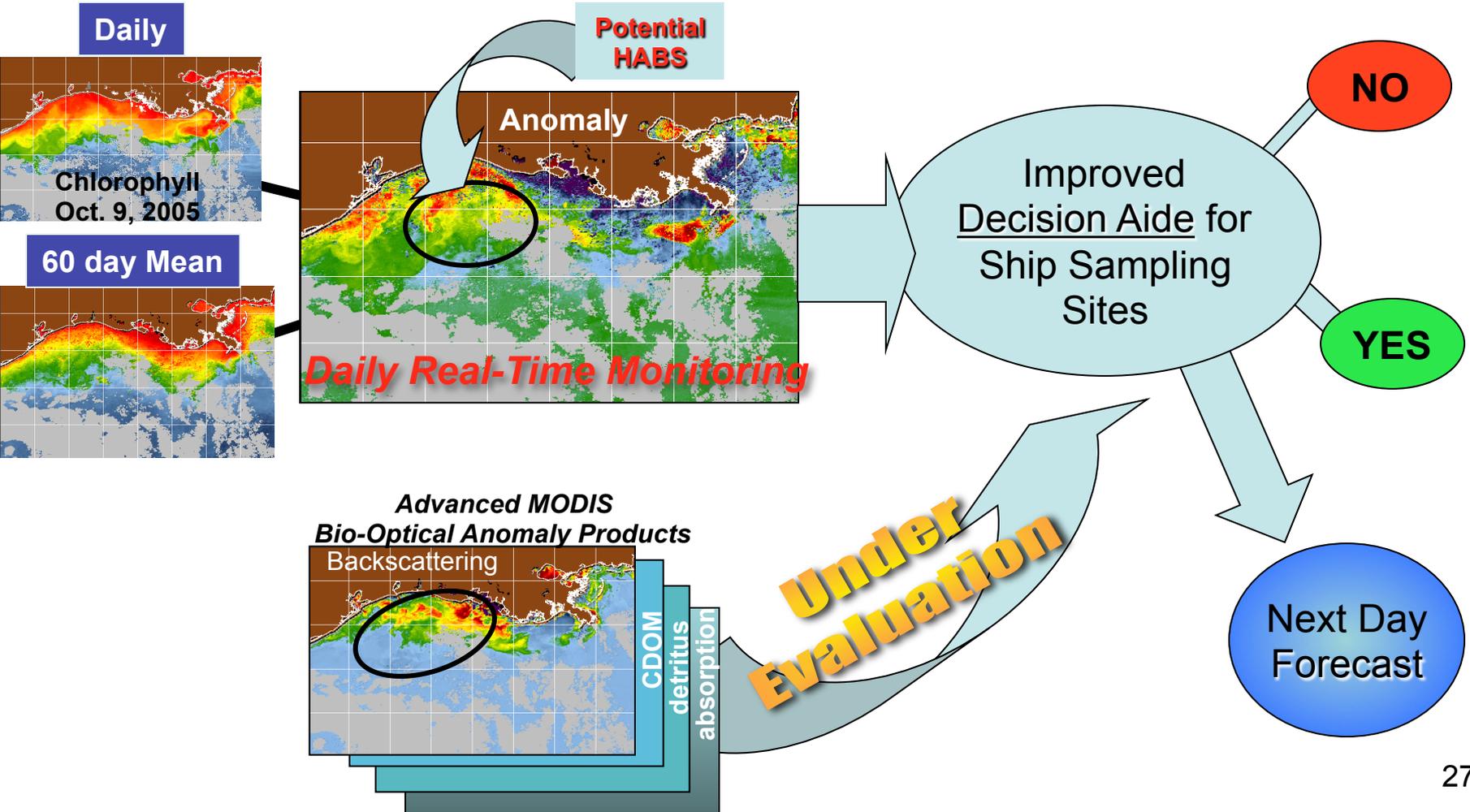
Inputs to ²⁶
bio-physical models

Harmful Algal Bloom (HAB) Monitoring

Targeting - Possible HARMFUL from non-HARMFUL ALGAL
Supporting Ship Sampling regions measurement programs
Assessing Size, Location and Movement of "Bloom"

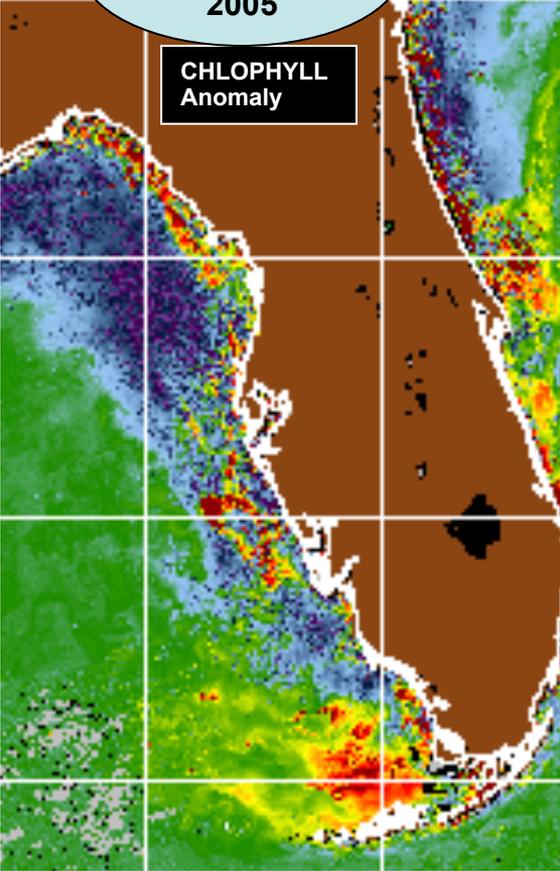


MODIS PRODUCTS





MODIS - Aqua
Nov. 07,
2005

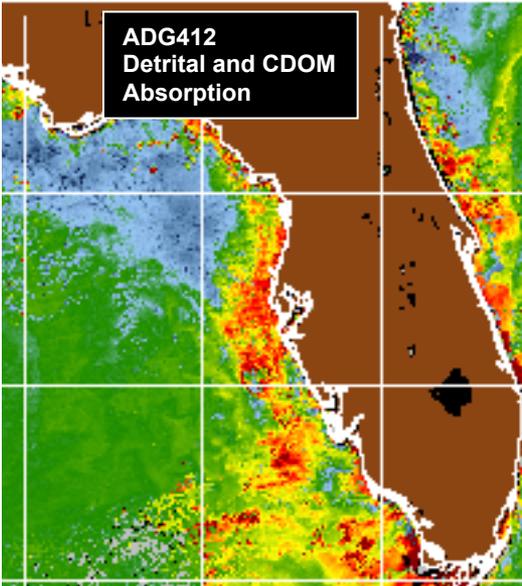
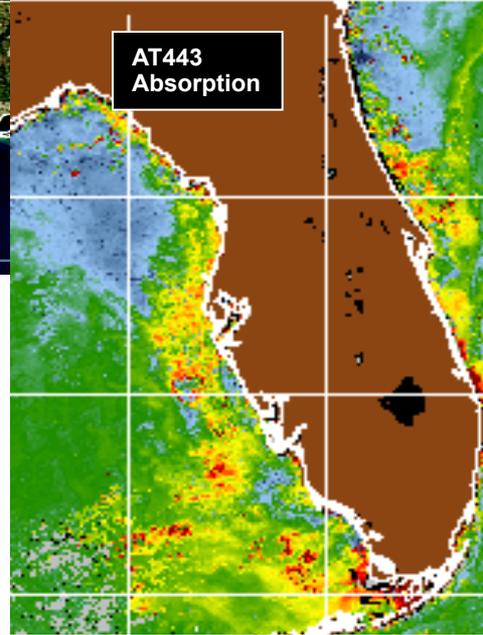
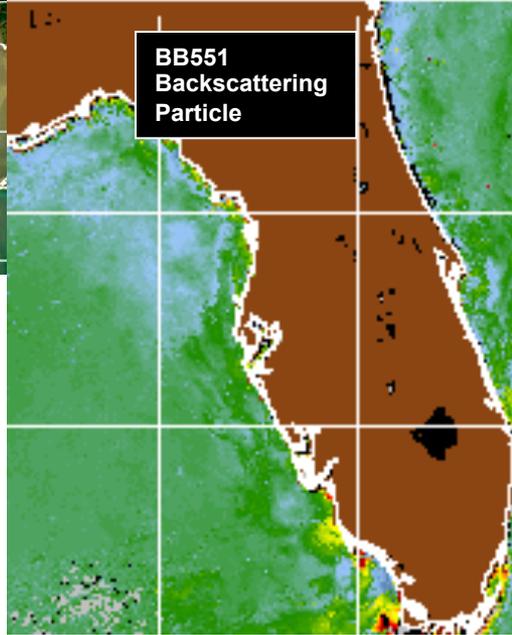


New
Capability

Anomaly
Fields

-Scattering
-Absorption
- CDOM

Present
Chlorophyll
Anomaly Product



The absorption to scattering ratio (Single Scattering Omega) is linked to species identification.

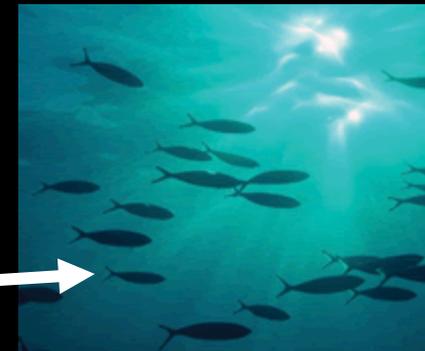
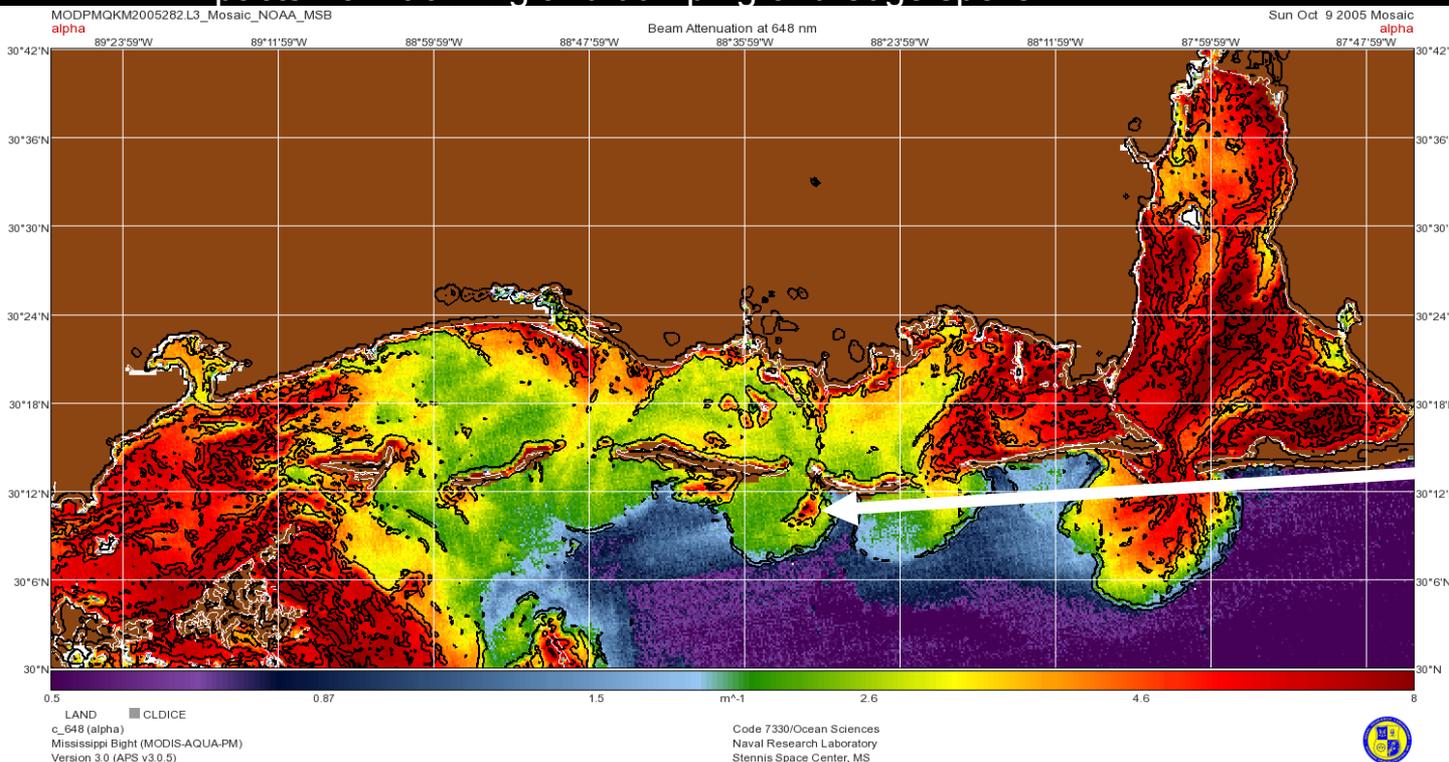
Requires evaluation with Cell Counts (with R. Stumpf).

Products available in OPEN DAP.

Locating Turbidity fronts in the Mississippi Sound

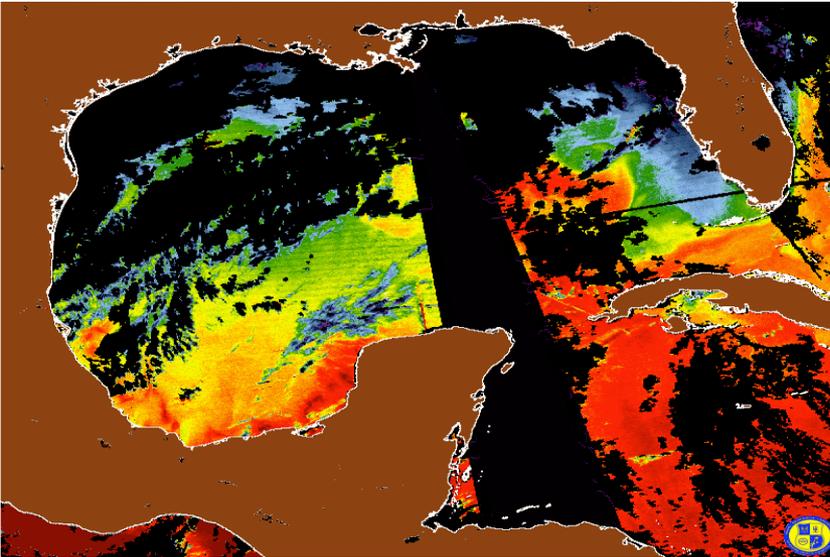


- DMR sampling and monitoring efforts benefit from locating and tracking turbidity fronts in the Mississippi Sound
 - Estuarine-dependent and coastal fish species production is enhanced in the vicinity of riverine discharges
 - Larval fish densities are highest at the associated turbidity fronts
- Additionally, tracking overall turbidity in Mississippi Sound is important for monitoring the health of submerged aquatic vegetation (SAV) such as sea grasses
 - Large areas (some estimates as much as 60% of the total area) of SAV have been lost in Mississippi Sound in the past 30 years
 - SAV provides critical habitat for many recreational and commercial fish species
 - DMR monitors sediment fall-out areas for changing patterns of deposition and possible impacts from trawling and dumping of dredge spoils



School of fish on clear side of turbidity front in Mississippi Sound

Enhanced SST Product Combining Model and MODIS SST

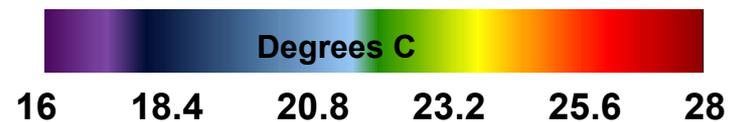
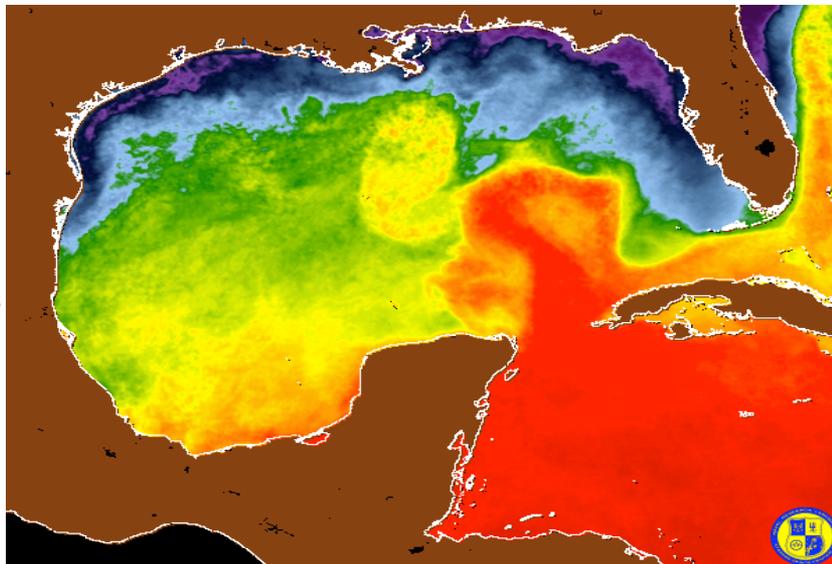


Daily
MODIS

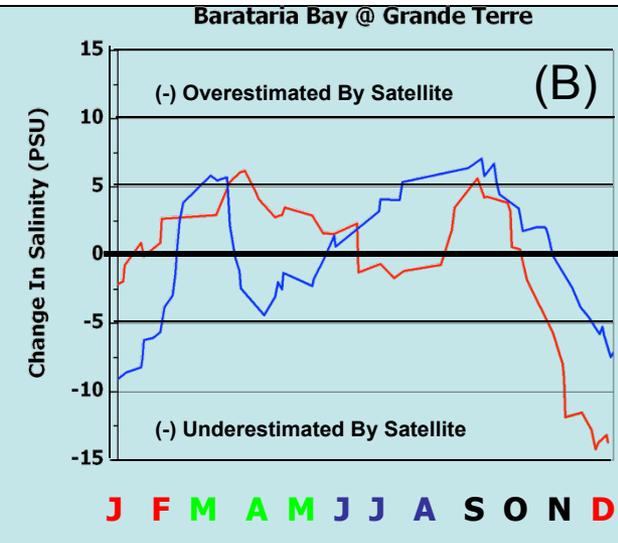
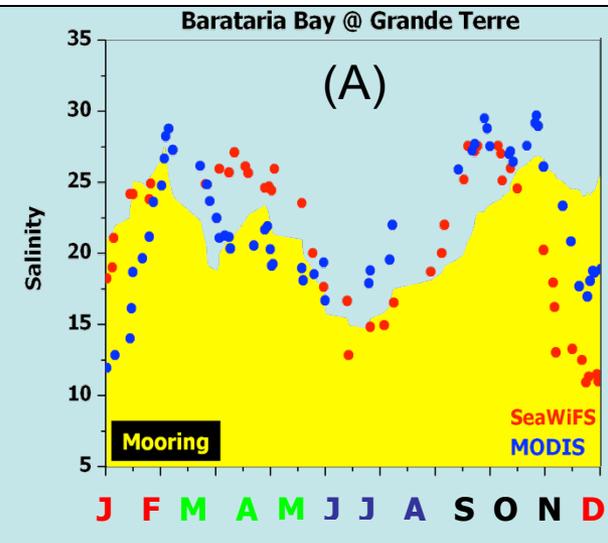
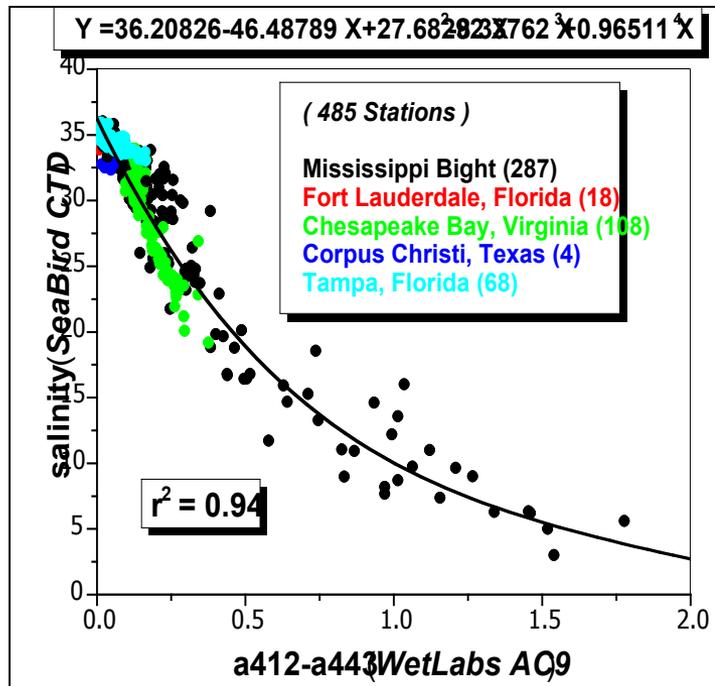
- Removed Clouds
- MODIS derived SST is integrated with AVHRR analyses
- **Benefits:**
 - Increases SST data available for the analysis (spatial coverage of satellite data)
 - Resulting field at higher resolution than operational SST products

Mar. 10,
2006

Composite
SST



Using Ocean Color Imagery to Monitor Salinity in the Northern Gulf of Mexico –



(A) For *Barataria Bay* Buoy, the derived salinities are estimated within 6 PSU's between February and November and up to 15 PSU's for December and January.

(B) The satellite derived values are underestimated in the fall and winter months and overestimated the majority of the time in the spring and summer.

(Ladner et al., 2006 – Ocean Science)



Seasonal Trends in Satellite Derived Salinity

Fall

Winter

2003

Spring

Summer

Salinity (PSU)

15

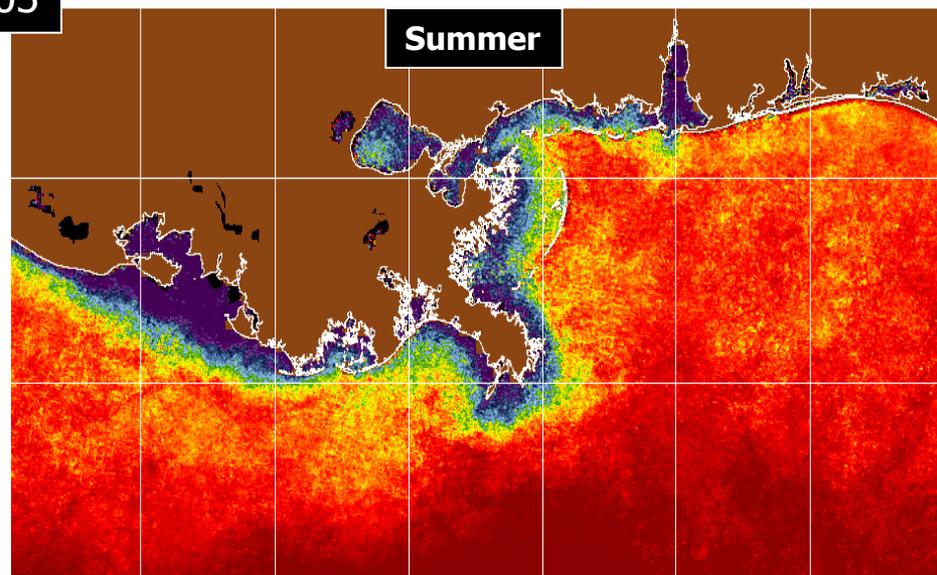
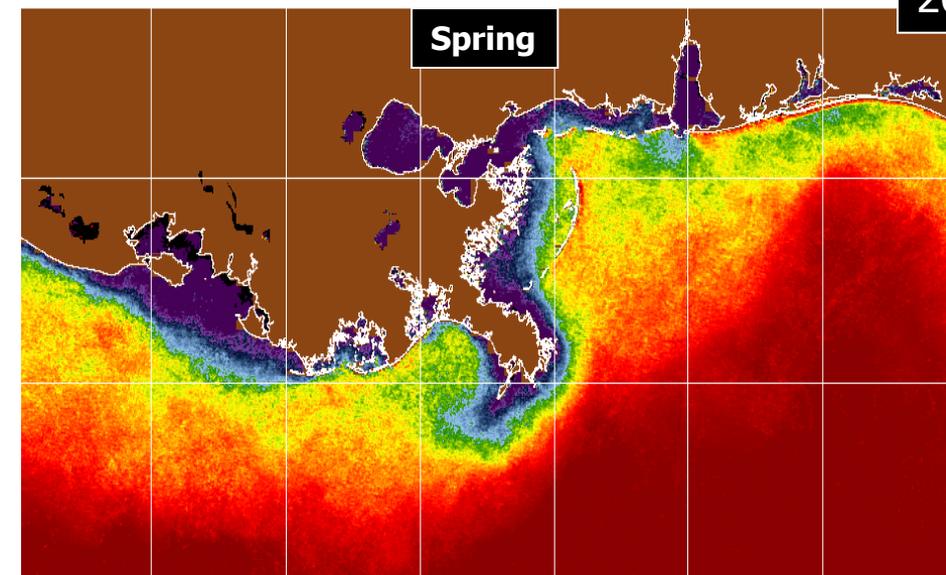
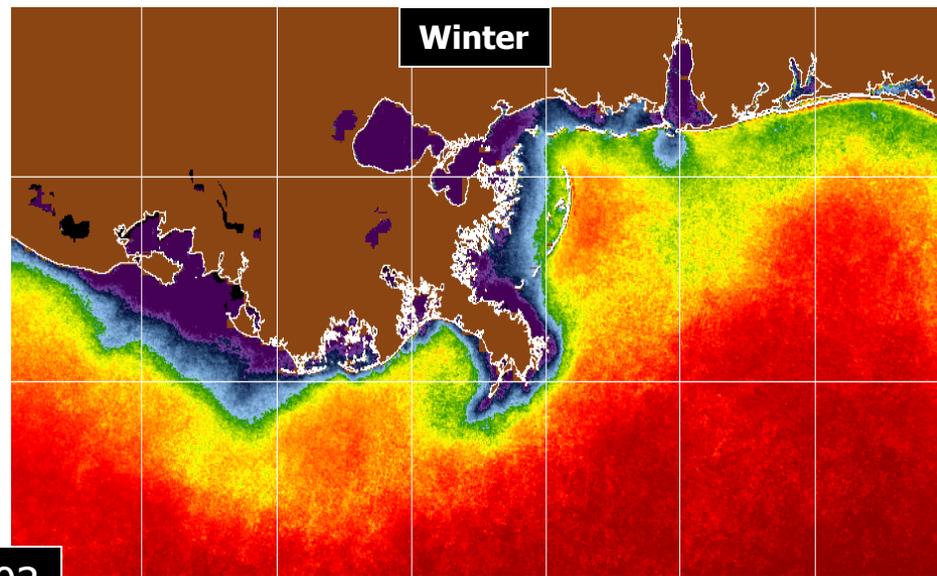
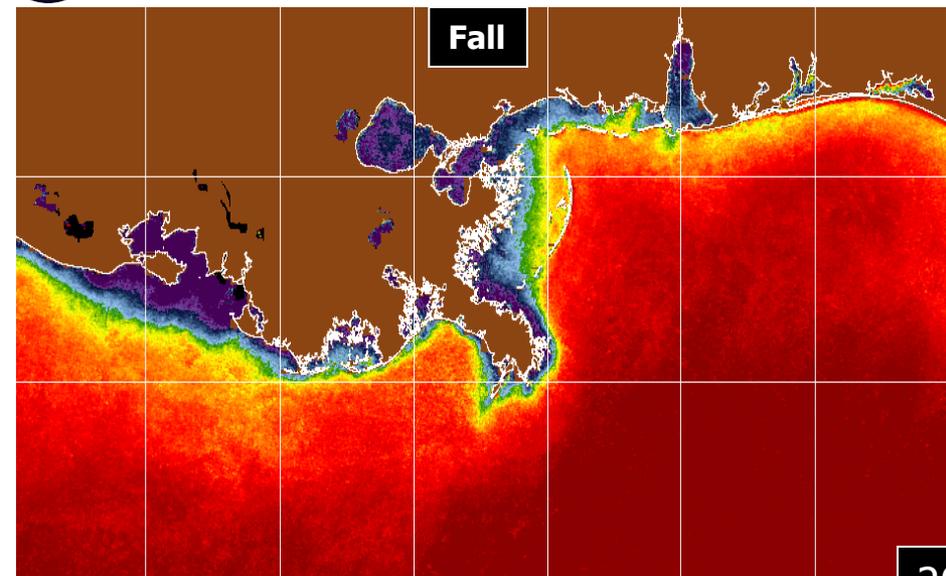
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MODIS – 250m Product Applications - Terra and Aqua

Rigolets

Sept 13, 2005

Software developed and provided to Goddard For SeaDAS release. Atmospheric Corrected

Lake Ponchatrain - Impact Following the Katrina

Following the dispersion of the “turbidity” zone
In the Lake Center.

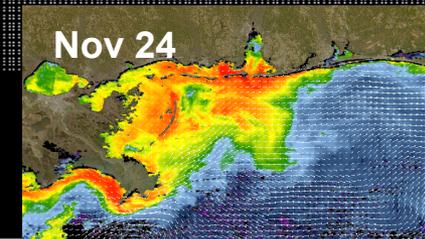
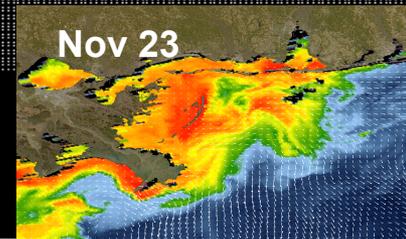
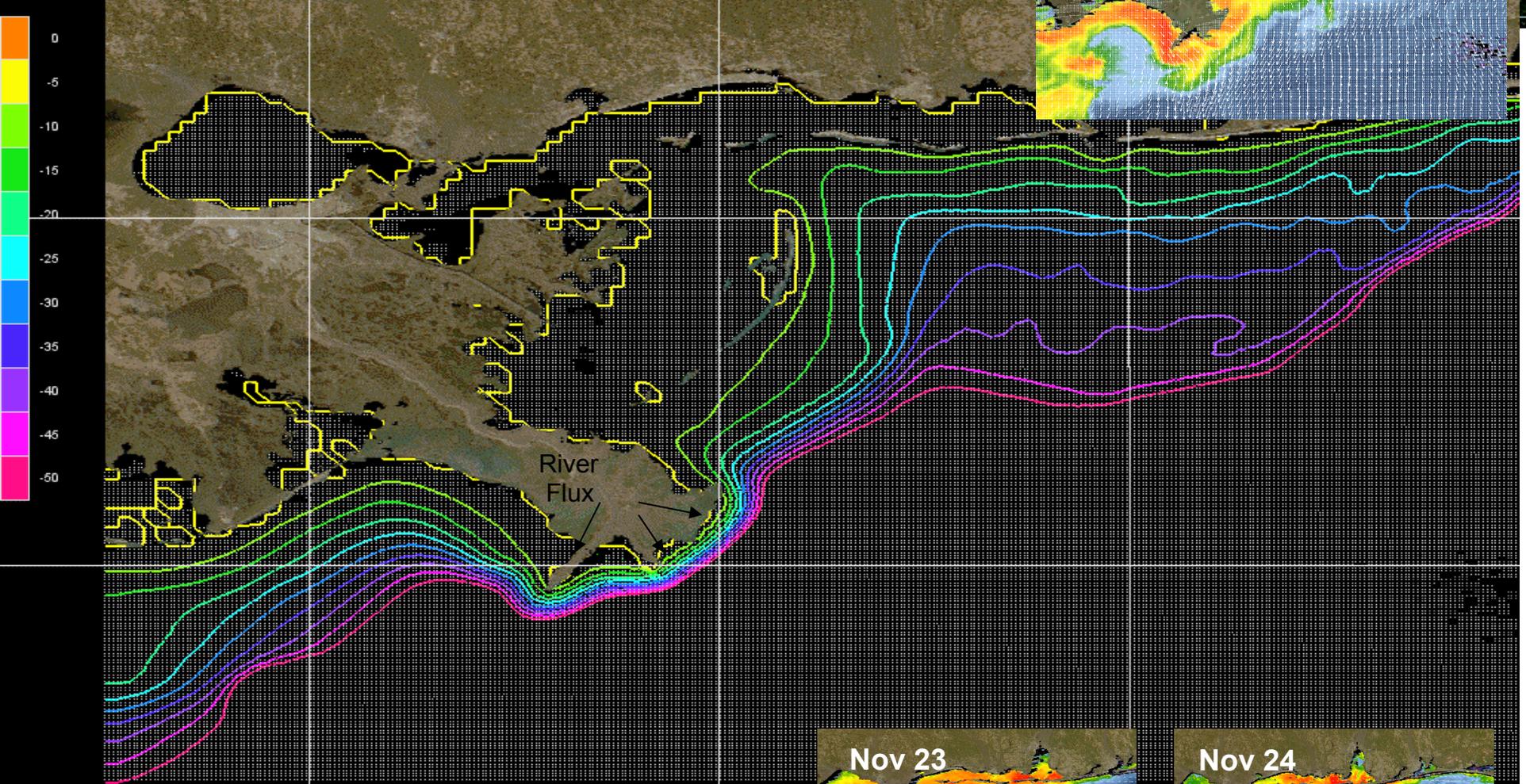
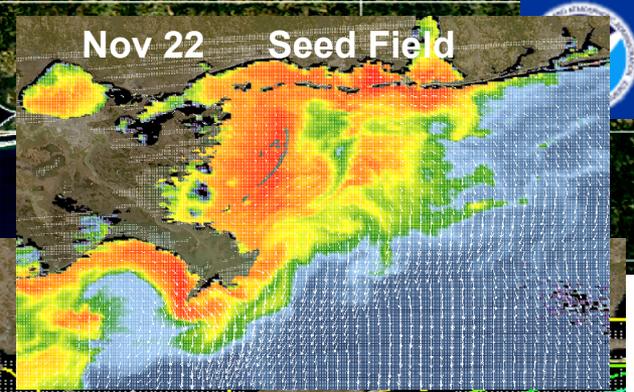
- Changes in the Western Lake
- Discharge of the Plume through the Rigolets
- Rigolets connects the Lake with MS Sound and
- shelf circulation

MODIS Terra (beam attenuation coefficient)
 (“turbidity”)
 With PC Tides

Sept 12, 2005

Sept 7, 2005

Forecasting the MODIS Particles. (Animated)
Advection of the Nov 22 backscattering image
-NEGOM- surface currents
hourly prediction (2 hour Step)



Nov22 - 00gmt → Nov 24 - 00gmt

November 22, 2005 - 00:00:00



Metrics

- **NOAA's National Coastal Data Development Center (NCDDC) is the most regular and largest volume user of the NRL server**
 - **NCDDC supports several interfaces to NRL Data** (*e.g. Katrina Impact Assessment, Mississippi Department of Marine Resources, and the HABSOS sites – <http://ncddc.noaa.gov>*)
 - **FGDC compliant metadata available for product or product family on NRL's OpenDAP server for use by NCDDC**
 - **Data is provided in geolocated format for use in GIS web-based systems and distributed thru NCDDC IMS sites**
- **Other government users of the server included USCG, USJFCOM, and National Data Buoy Center (NOAA/NWS)**



NOAA Satellite and Information Service

National Environmental Satellite, Data, and Information Service (NESDIS)



Questions??

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