



NASA Applied Sciences: Coastal Management

***Terry McPherson
Callie M. Hall***

Applied Sciences Program

Decision Support through Earth Science Results

Earth System Science



Sun- Earth
Connection

Climate Variability
and Change

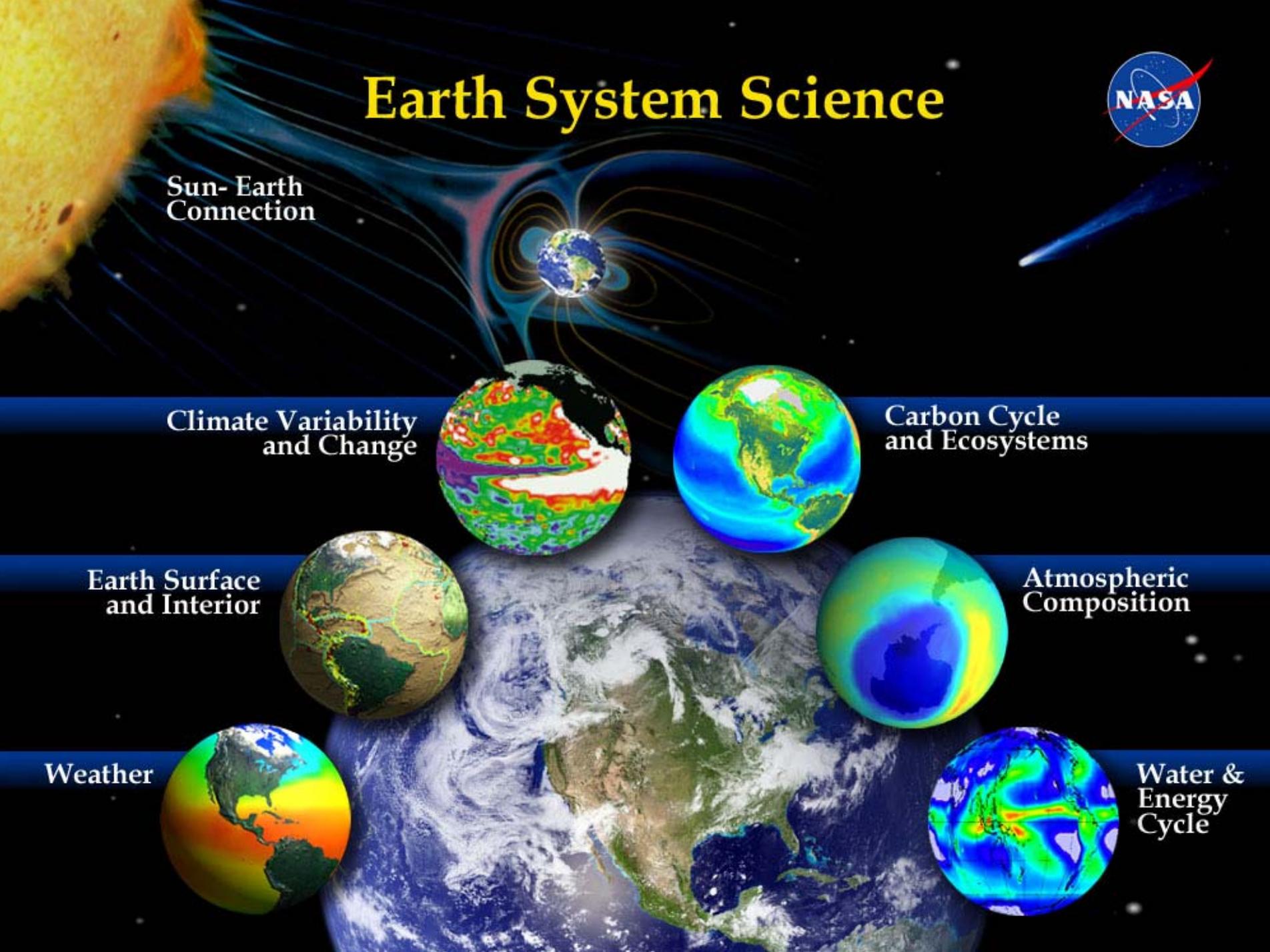
Carbon Cycle
and Ecosystems

Earth Surface
and Interior

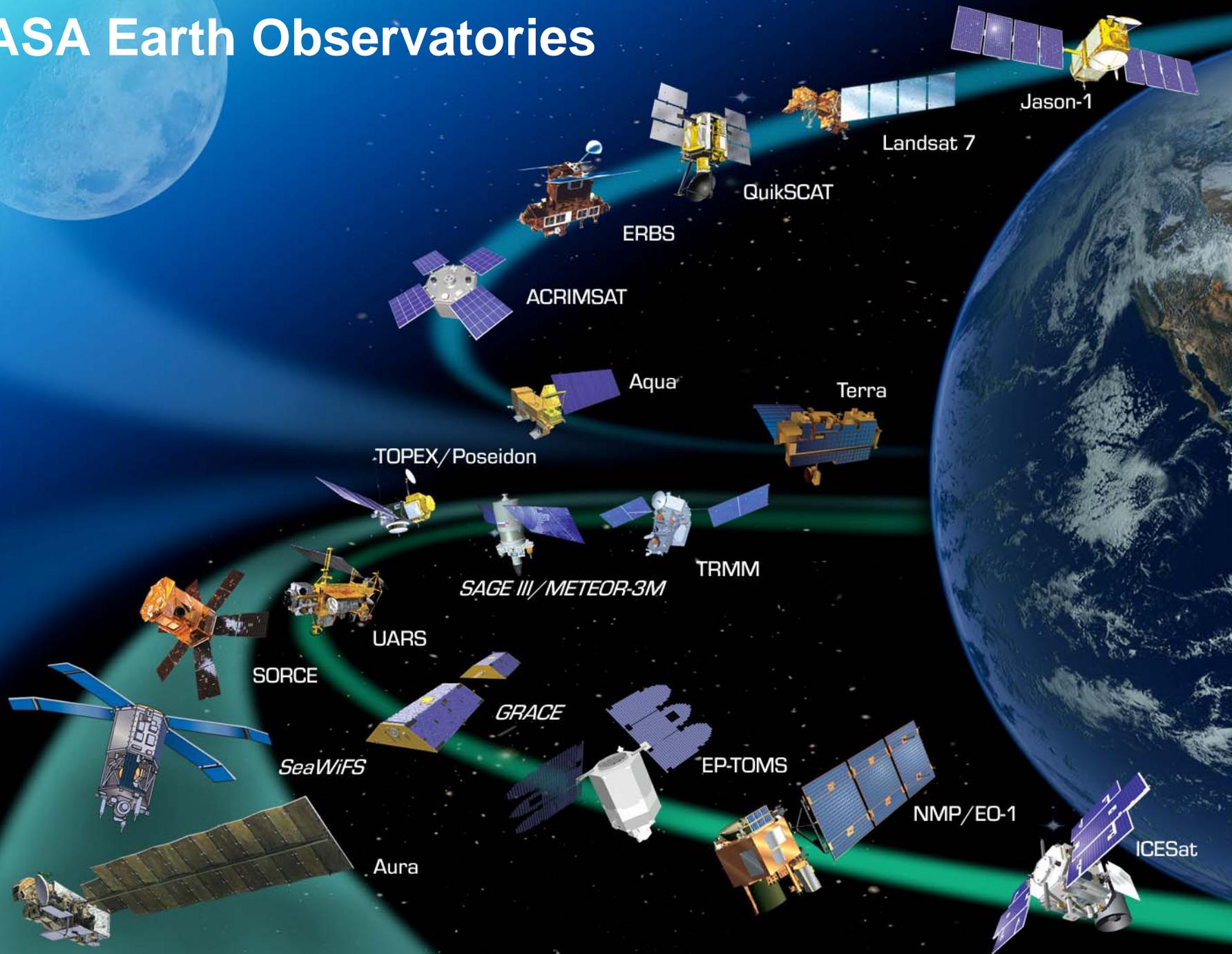
Atmospheric
Composition

Weather

Water &
Energy
Cycle

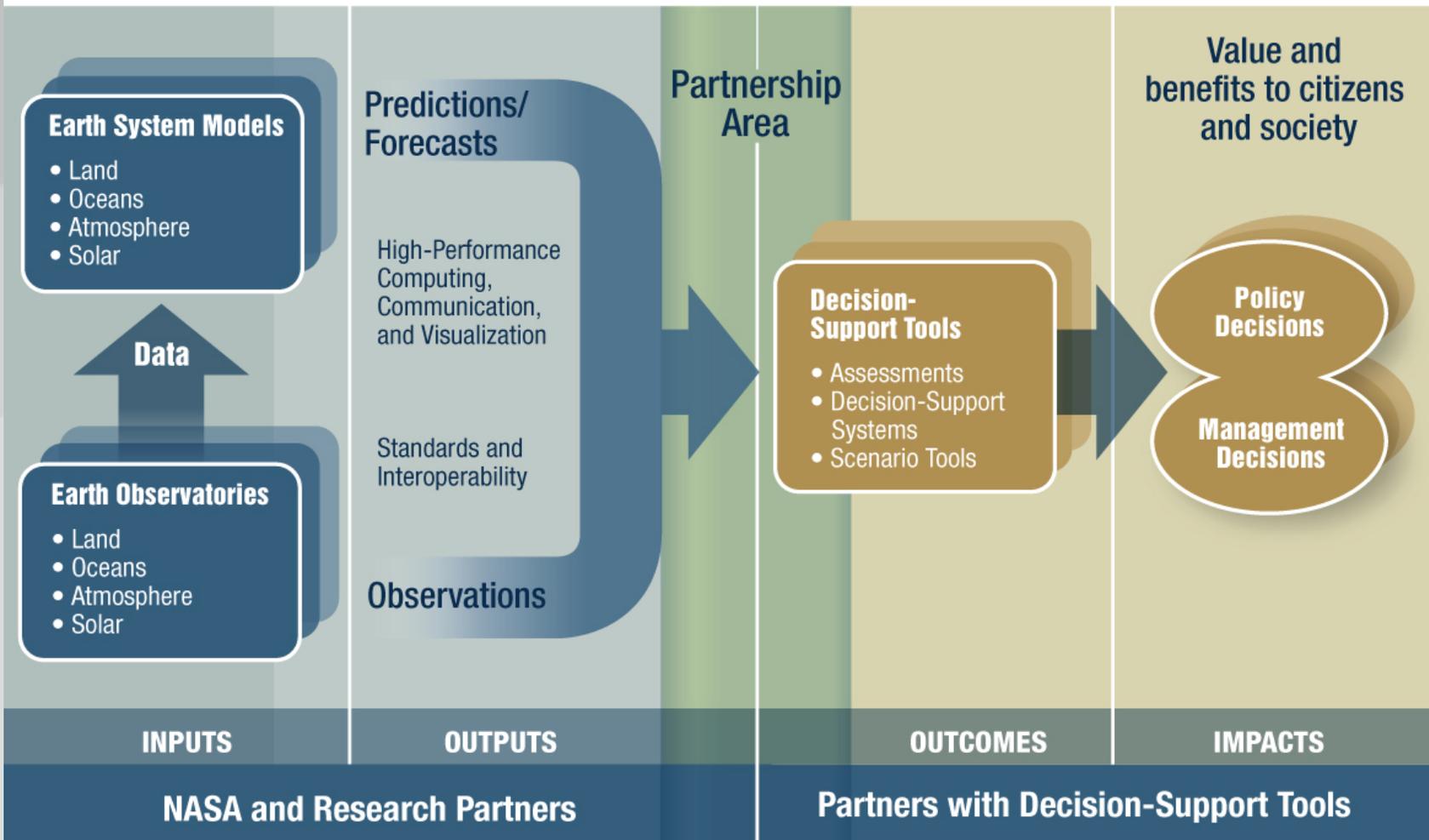


NASA Earth Observatories



Integrating Knowledge, Capacity and Systems into Solutions

Applied Sciences Program Approach to Integrated System Solutions



Applications of National Priority



Agricultural Efficiency



Air Quality



Aviation



Carbon Management



Coastal Management



Disaster Management



Ecological Forecasting



Energy Management



Homeland Security



Invasive Species



Public Health



Water Management

Operational HAB Forecasts

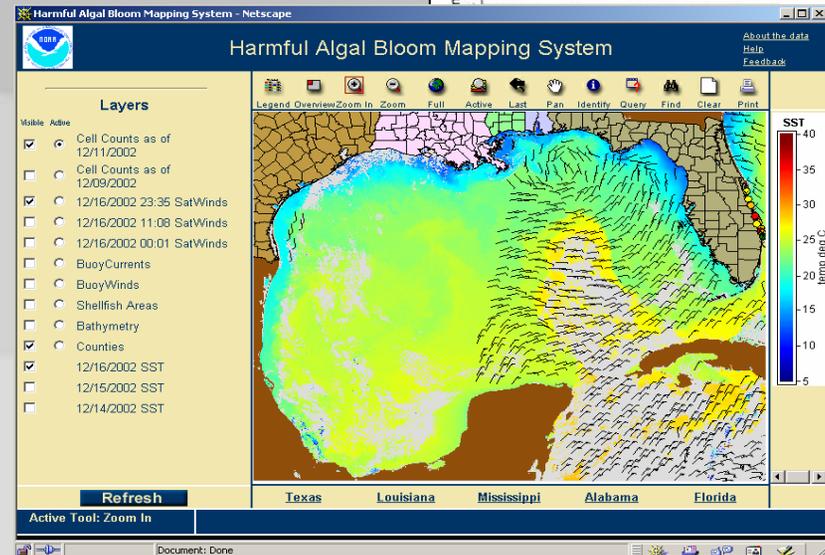
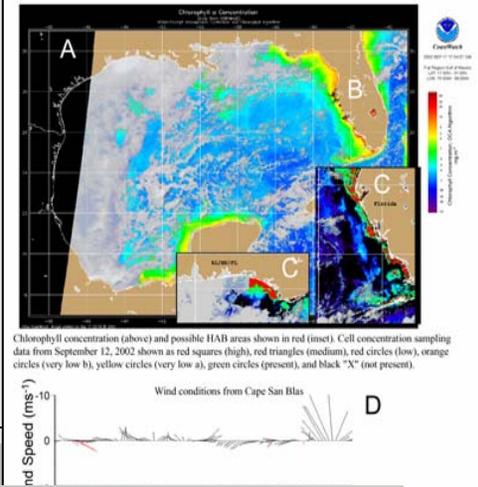


HAB Bulletin and HAB Mapping System

- NOAA developed and operated
- HAB Bulletin: Notification of change in conditions via e-mail
- HAB Mapping System: Constant supply of information. Internet-based mapping.
- Provide real-time data for event response and analyzed data with interpretation
- Primary audience: Fisheries managers, public health officials, local governments
- NOAA utilizes products derived from NASA QuikScat & SeaWiFS; data from MODIS.
 - ocean color
 - primary productivity
 - chlorophyll
 - ocean winds

Warning Time	Management Options
seasonal	re-allocate resources alter monitoring schedules change harvesting policy
week – 3 days	alter monitoring schedules change harvesting policy alert businesses <u>prepare</u> for clean-up
24 hours	alter monitoring schedules alert businesses <u>prepare</u> for clean-up
none	extensive testing of harvested products initiate public health warnings divert resources to monitoring and clean-up

NOAA HAB Bulletin

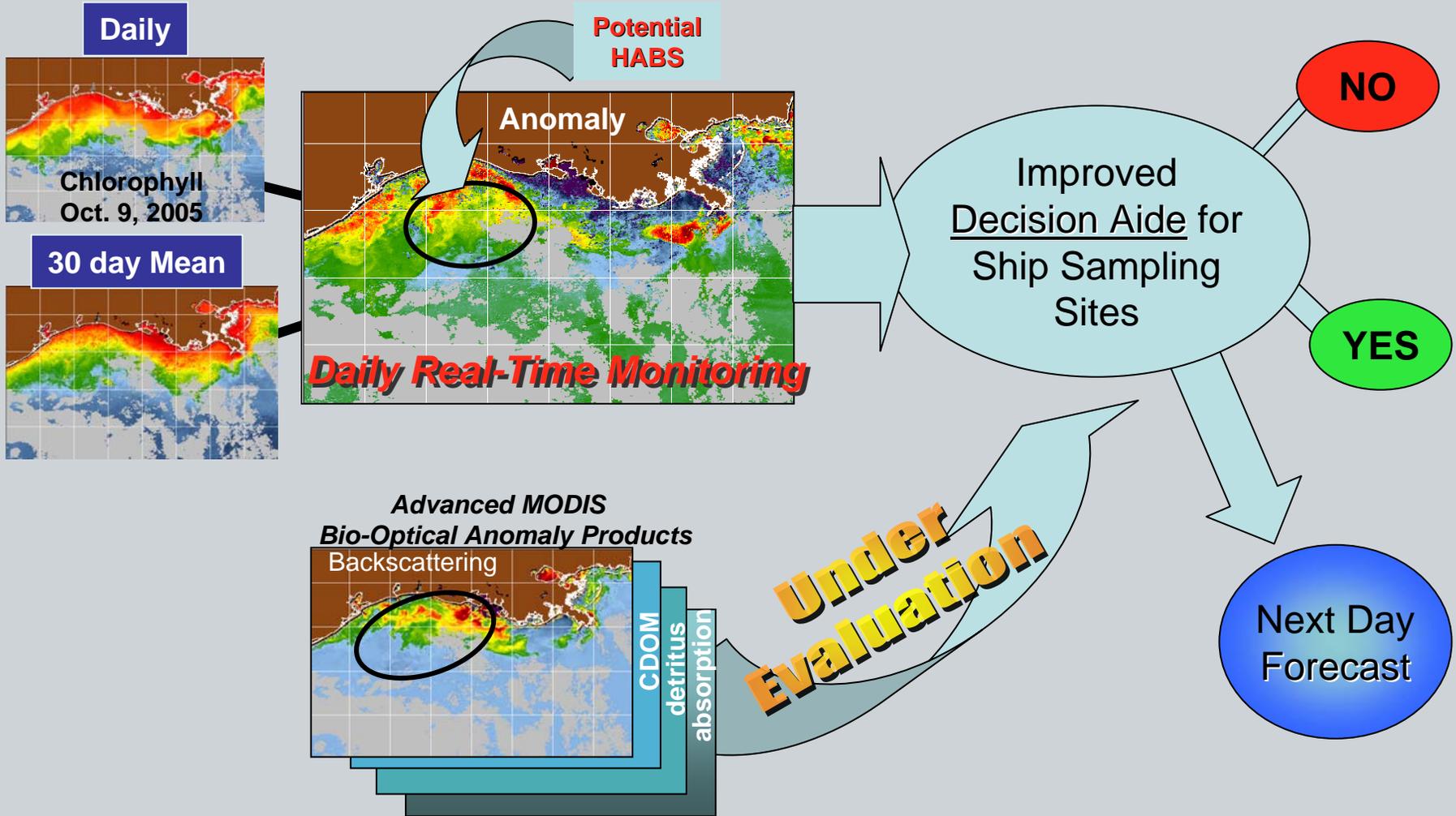


Harmful Algal Bloom (HAB) Monitoring

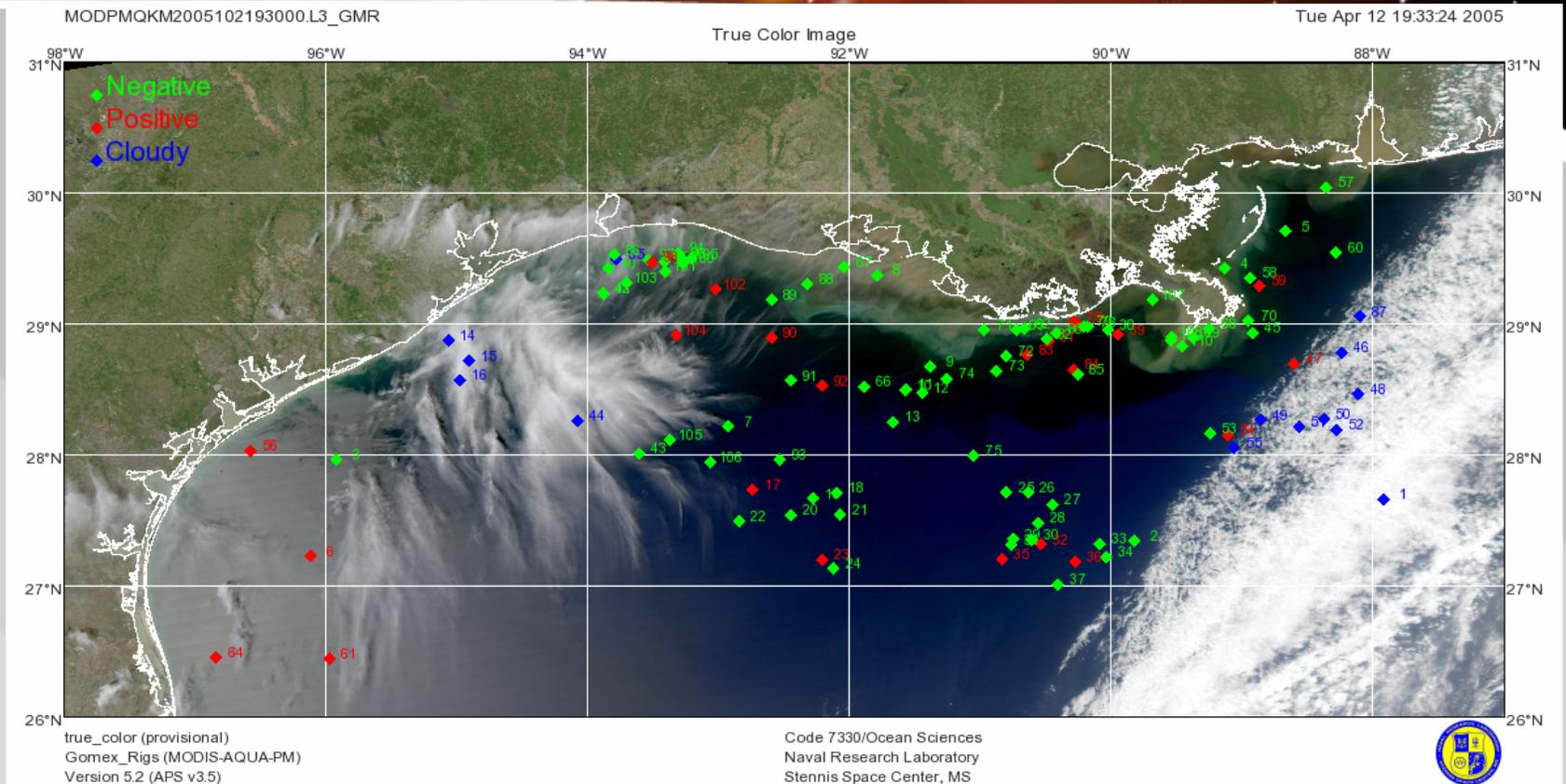


Targeting - Possible HARMFUL from non-HARMFUL ALGAL
Supporting Ship Sampling regions measurement programs
Assessing Size, Location and Movement of "Bloom"

MODIS PRODUCTS



MODIS Products to Improve Monitoring of Gas Flarings from Oil Rigs



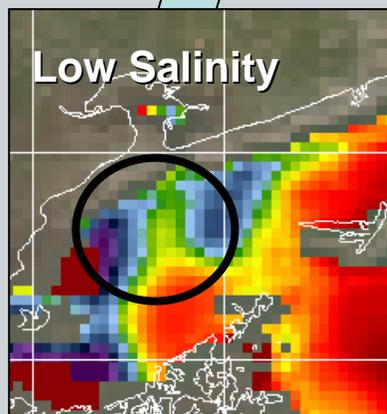
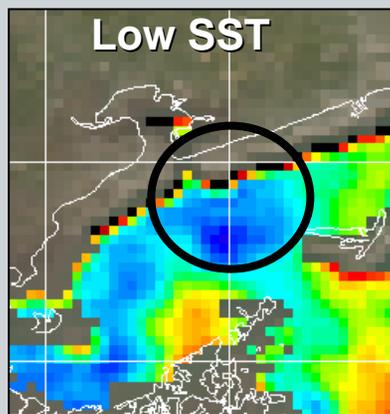
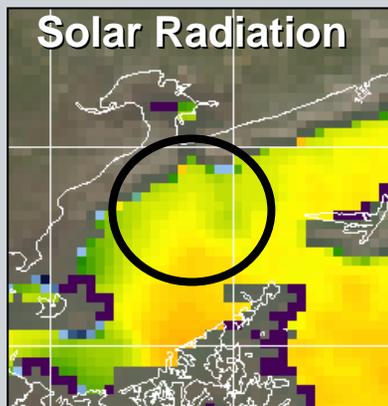
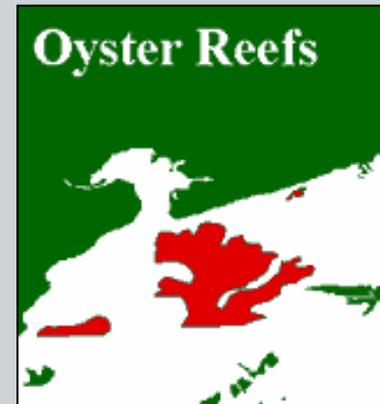
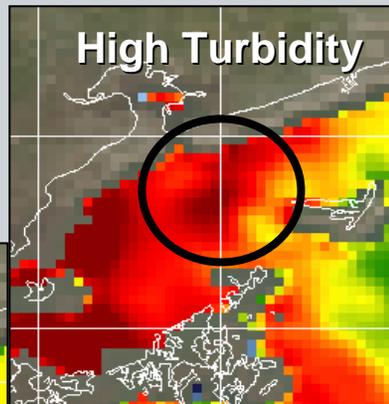
- **Positive** = flaring rigs; **negative** = no flaring; **cloudy** = no info due to clouds
- Flarings located via new algorithm that utilizes 4 reflective and 2 infrared MODIS channels

Principal Investigator: Sonia Gallegos, Naval Research Laboratory

Oyster Reef Management in the Mississippi Sound

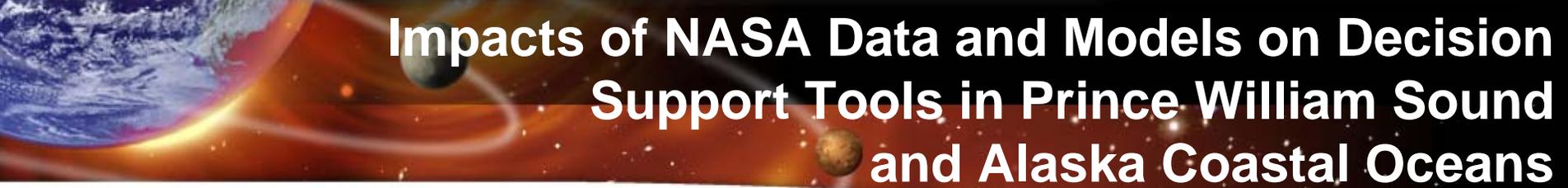


MODIS Products
Used for Managing
Coastal Resources



Decision Support
MODEL
Oyster Reef
Closure

- DMR officials close oyster reefs at high fecal coliform levels
- Fecal coliform correlated to relative solar radiation, cloud cover, SST, river runoff (turbidity) and salinity
- NRL Stennis provides MODIS-derived solar radiation, SST, turbidity, salinity products to NOAA/NCDDC
- NOAA/NCDDC provides these data to Mississippi DMR for use in their fecal coliform decision tools for oyster reefs



Impacts of NASA Data and Models on Decision Support Tools in Prince William Sound and Alaska Coastal Oceans

- Objective: provide NOAA Office of Response and Restoration (ORR) with NASA data and model output to augment decision-making capabilities for oil spill response
- Several field exercises in 2007 to validate NASA input to regional ocean modeling system and to establish data and model output management, transfer, access, analysis, and visualization capabilities
- Project team works with Alaska Ocean Observing System (www.aoot.org) as the portal through which NOAA ORR will access model forecasts and field data

Principal Investigator: Stephen Okkonen, University of Alaska–Fairbanks



A Gulf Coast Monitoring and Hazards Decision Support Tool – Enhancements Using NASA Earth Science Products, Data, and Models

- Objective: enhance LSU Wave-Current-Surge Information System (WAVCIS) with NDBC buoy data from Louisiana and Texas and with NASA Earth science products and data
- Proposed NASA input will include
 - 1) Winds from *Seawinds/QuickSCAT*
 - 2) Sea surface temperature; total suspended matter, chlorophyll, and colored dissolved organic matter concentrations; and reflectance data from *MODIS (Terra and Aqua)*
 - 3) Sea surface height from *Jason-1*
 - 4) Navy Coastal Ocean Model (NCOM) will be used to derive 3-D ocean currents, temperature, salinity and sea level variations
- Project will develop web site with integrated GIS and database capabilities

Principal Investigator: Eurico D'Sa, Louisiana State University

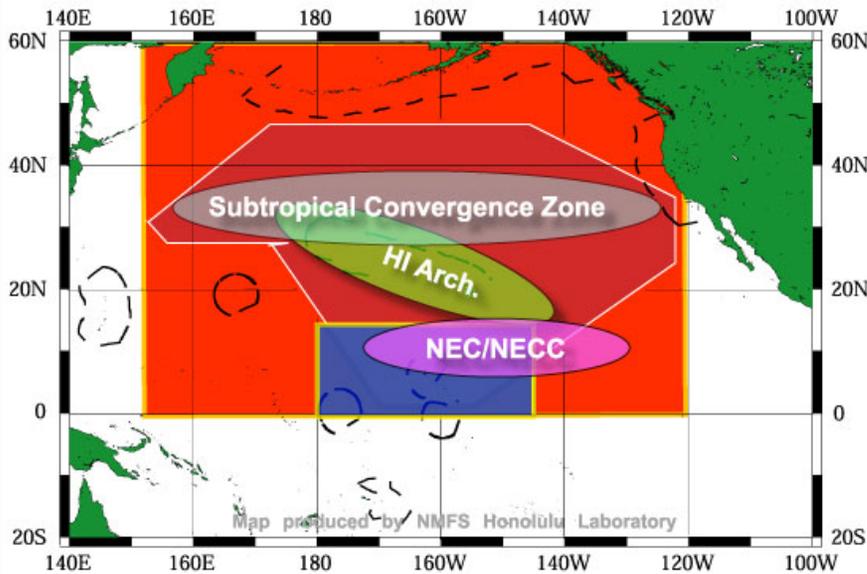
Pacific Fisheries Management



Modifying area closures to reduce interactions with protected species

Hawai'i Longline Fisheries Closure

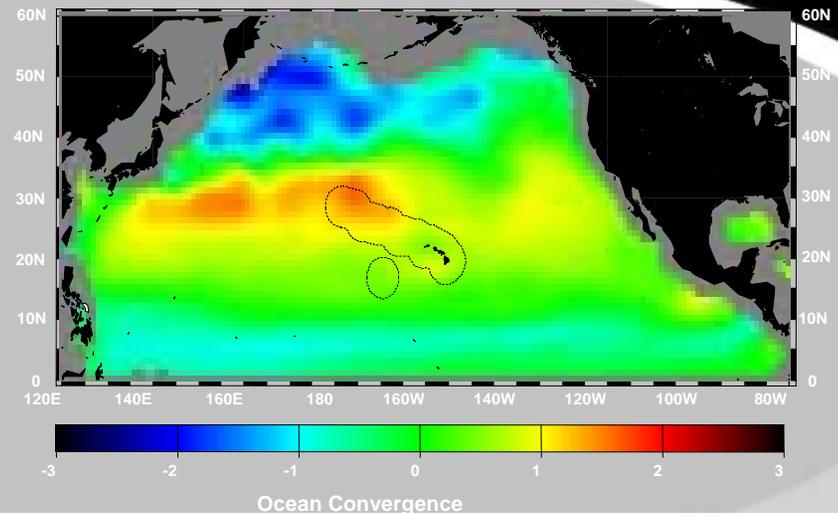
By Federal District Court Order March 31, 2001



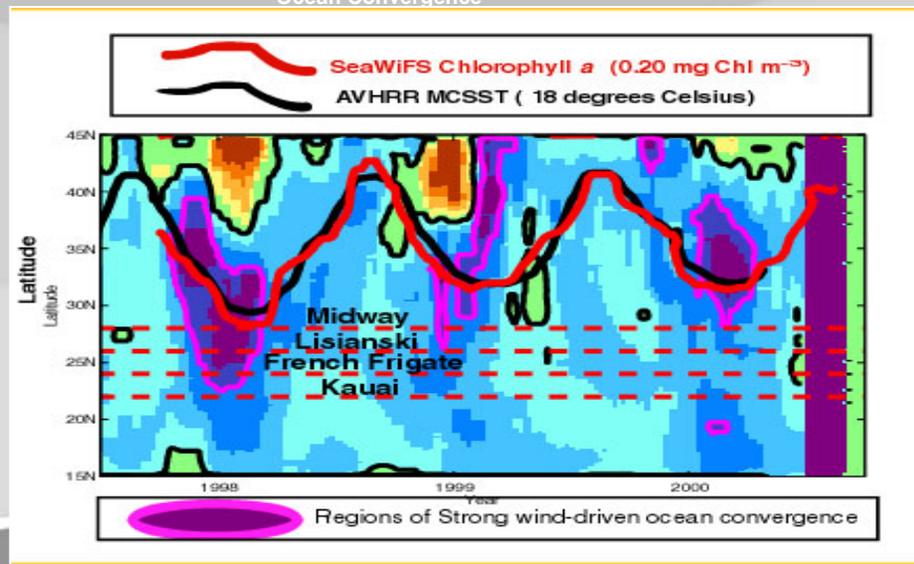
Map produced by NMFS Honolulu Laboratory

- Year-round closure of Swordfish fishery
- April - May closure of Tuna fishery
- Spatial extent of Hawai'i longline sets, 1990 - 1999

Mean Convergence

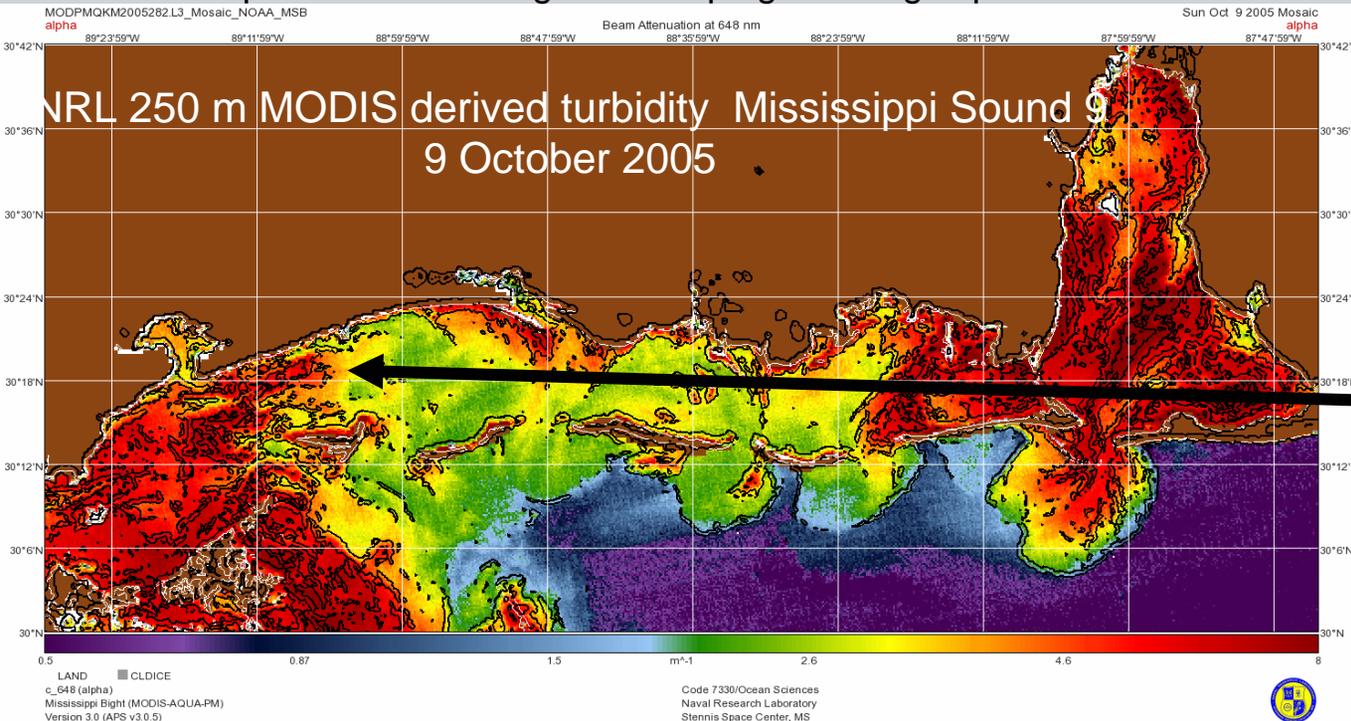


Ocean Convergence



Locating Turbidity Fronts in the Mississippi Sound

- **MODIS Products Providing Decisions for health of Sea Grasses / Fishstock Assessment**
- 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 seagrasses
 - 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



DMR – Decisions
Ship Sampling Strategy
Adaptive Sampling



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



Current and Future Solicitations

Decisions CAN (Awarded 6/05) Runs FY05-FY08

ROSES 2005 (Selections 8/06) Runs FY06-FY09

ROSES 2006 No solicitation planned

ROSES 2007 (Awards 10/07) Runs FY08-FY10

ROSES 2008 (Awards 10/08) Runs FY09-FY11

ROSES 2009 (Awards 10/09) Runs FY10-FY12

ROSES 2010 (Awards 10/10) Runs FY11-FY13

<http://nspires.nasaprs.com/>

Contact Information:

Terry McPherson

228.688.1918 Terry.R.McPherson@nasa.gov

Callie Hall

228.688.2360 Callie.M.Hall@nasa.gov

Websites:

<http://science.hq.nasa.gov/earth-sun/applications/>

<http://aiwg.gsfc.nasa.gov/>