



Strategic Planning Session Report

NASA Stennis Space Center, Applied Science Program

Gulf of Mexico Initiative

Session Convened on May 12, 2008
Biloxi, Mississippi

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Executive Summary

The NASA Applied Science Program Gulf of Mexico Initiative (GOMI) at Stennis Space Center (SSC) hosted a brief and successful Strategic Planning Workshop involving key members of the coastal management community. It was an opportunity to showcase the progress we have made and to collect feedback on a list of application focus areas that we propose to address over the next 5 years. The workshop was held in Biloxi, MS, on May 12, 2008, in conjunction with a meeting of the Northern Gulf Institute (NGI). There were 60 participants at the NASA workshop including high-level representatives from the following agencies

- National Oceanographic and Atmospheric Administration
- Naval Research Laboratory
- Naval Oceanographic Office
- Environmental Protection Agency
- United States Army Corp. of Engineers
- United States Department of Agriculture
- Minerals Management Service
- National Wildlife Service
- National Park Service National Park Service
- Sea Grant
- Northern Gulf Institute
- Gulf of Mexico Alliance

The first half of the workshop consisted of a program introduction, four project presentations, a report on our strategic planning process, and a live demonstration of the Coastal Online Assessment and Synthesis Tool. The second half of the workshop took the form of five break-out groups designed to have balanced representation from the different agencies.

The break-out session discussion focused on the following four proposed application focus areas:

- Regional Sediment Management and Wetland Restoration
- Water Quality and Nutrient Monitoring for Assessment of Ecosystem Health
- Climate Change
- Sea Level Change.

During the wrap-up, moderators summarized the key points discussed in their group. Generally the participants agreed that our proposed priority topics were in line with Gulf of Mexico needs. Some stakeholders recommended the addition of human health, natural hazards, homeland security, and habitat characterization. Others suggested that we combine climate change and sea level change. Stakeholders recommended a broadening of our geographic scope to include the Caribbean, deep-water zones, and upland watersheds. Guests expressed a need for time series data, forecast modeling, links to the Gulf of Mexico Coast Ocean Observing System, and identification of NASA's role in Integrated Ecosystem Assessment. Several participants were interested in partnering with NASA. We also received feedback on geographic priorities, COAST, NASA contributions, Gulf of Mexico needs, and other programmatic recommendations. At the conclusion, all guests were invited to attend our second Strategic Planning Workshop to be held in Corpus Christie, TX, on August 21, 2008, in combination with the GOMA conference.

1.0 Introduction

A Gulf of Mexico Initiative (GOMI) Strategic Planning Workshop was held in Biloxi, MS, on May 12, 2008. The workshop was designed to provide an introduction to NASA's new Gulf of Mexico Initiative and to collect feedback on a set of application focus areas that will form the core of the initiative over the next few years. This report describes the workshop, provides background on the requirements assessment performed, characterizes the participants, and summarizes the feedback received.

Mark Glorioso, Chief of NASA's Applied Research & Technology Program Office (ARTPO) at Stennis Space Center welcomed participants and gave an overview of the Gulf of Mexico Initiative. Ted Mason (ARTPO) reviewed the agenda, break-out objectives, and logistical aspects of the session. Brief presentations were then made by the principal investigators on the following four coastal projects:

Dr. Jean Ellis (S&TD): *Land-Use and Land-Cover Change from 1972-present around Mobile Bay, AL*

Dr. Jean Ellis (S&TD): *Mobile Bay Sediment Plume Mapping Using MODIS and VIIRS*

Bruce Spearing (S&TD): *Hypoxia Probability Mapping*

Joe Spruce (SSAI): *Use of NASA Satellite Data in Monitoring Gulf Coast Forest Conditions*

Craig Peterson from the Science & Technology Division (S&TD) gave a presentation on the Strategic Plan Status and the GOMI 2008 Coastal Requirements Assessment process. Richard Brown (SSAI) gave a demonstration of COAST (Coastal Online Assessment and Synthesis Tool).

The break-out session concluded with a summary report from the moderator of each group. Mark Glorioso closed the session with an invitation to the next GOMI workshop planned for August 2008 in Corpus Christi, TX.

This report includes handout materials provided during the workshop (see Appendix B1-B7) and also provides background on the derivation of the proposed application focus areas that are to become part of the GOMI Strategic Plan. These focus areas were discussed by each group during the break-out session. This report also provides a summary of the participant feedback collected during the group discussions. Both the input to the workshop (application focus areas) and the output of the workshop (stakeholder feedback) are presented in terms of the National Research Council Decadal Survey of 2007.

2.0 Background

This section describes the NASA GOMI 2008 Coastal Requirements Assessment. From this assessment, we derived the set of application focus areas which will become a key component of the 3-5 Year Strategic Plan. These application focus areas formed the basis for the break-out session discussions during the workshop. The four proposed application focus areas are listed in Appendix B-3.

2.1 The NASA GOMI 2008 Coastal Requirements Assessment

The GOMI 2008 Coastal Requirements Assessment consisted of a data collection phase and an analysis phase. Collection of user requirements was greatly facilitated by the leveraging of a parallel activity undertaken by NOAA (National Oceanographic and Atmospheric Administration) Sea Grant to identify priority research needs for the Gulf of Mexico through stakeholder input from the five states encompassing the Gulf. The Sea Grant Research Planning/Prioritization processes included the following activities:

- Review of 117 Strategic Plans

- Web-based Survey (1,582 responses, 571 comments)
- Five Workshops (278 attendees)
 - Focused on Ocean Research Priorities Plan six societal themes
 - Identified and prioritized specific research topics

The analysis phase of the GOMI 2008 Coastal Requirements Assessment was performed at Stennis and consisted of the following steps:

- Developed matrix of 410 topics from Sea Grant Research Planning Workshops
- Sorted/ranked research topics by “number of votes”
- Mapped research topics to GOMA priorities (new priorities being developed)
- Identified research topics having potential for NASA Stennis capabilities (i.e., NASA datasets, models, technical skills, application potential, etc.)
- Identified priority geographic locations (see Appendix C)
- Collected input from other conferences
- Collected input from GOMA planning efforts
- Identified Application Focus Areas and Subtopics
- Mapped Focus Areas to the Decadal Survey

2.2 GOMI Proposed Application Focus Areas and the GOMA Priority Issues

NASA’s Gulf of Mexico Initiative intends to support the work being performed by the Gulf of Mexico Alliance. GOMA has established the following six priority issue teams:

- Wetland and Coastal Conservation and Restoration
- Coastal Community Resilience
- Water Quality for Healthy Beaches and Shellfish Beds
- Reducing Nutrient Inputs to Coastal Ecosystems
- Habitat Characterization
- Education

The proposed application focus areas map directly to restoration, resilience, water quality, and nutrients. Indirectly, they also cover habitat characterization since most of the other elements contain an ecosystem component. Currently the focus areas do not contain an educational component.

2.3 GOMI Proposed Application Focus Areas and the Decadal Survey

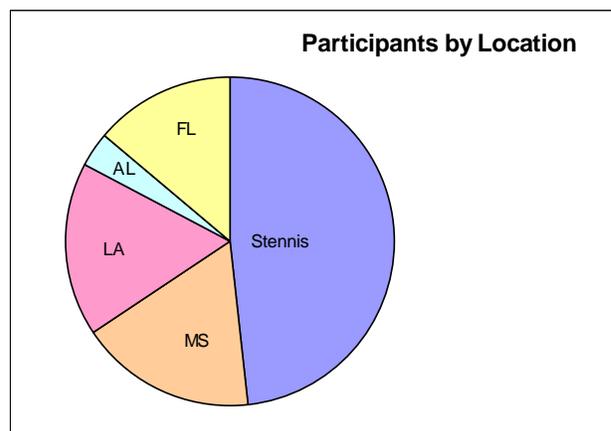
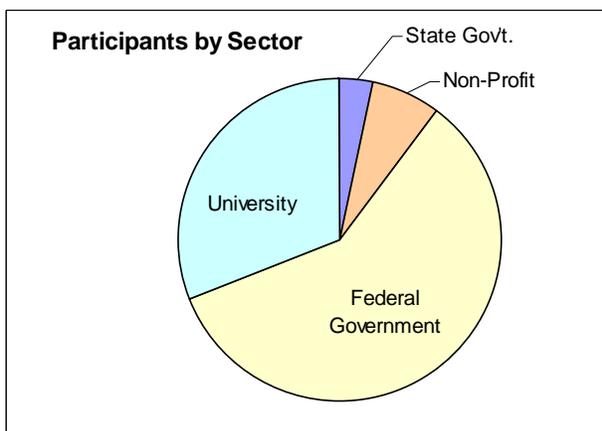
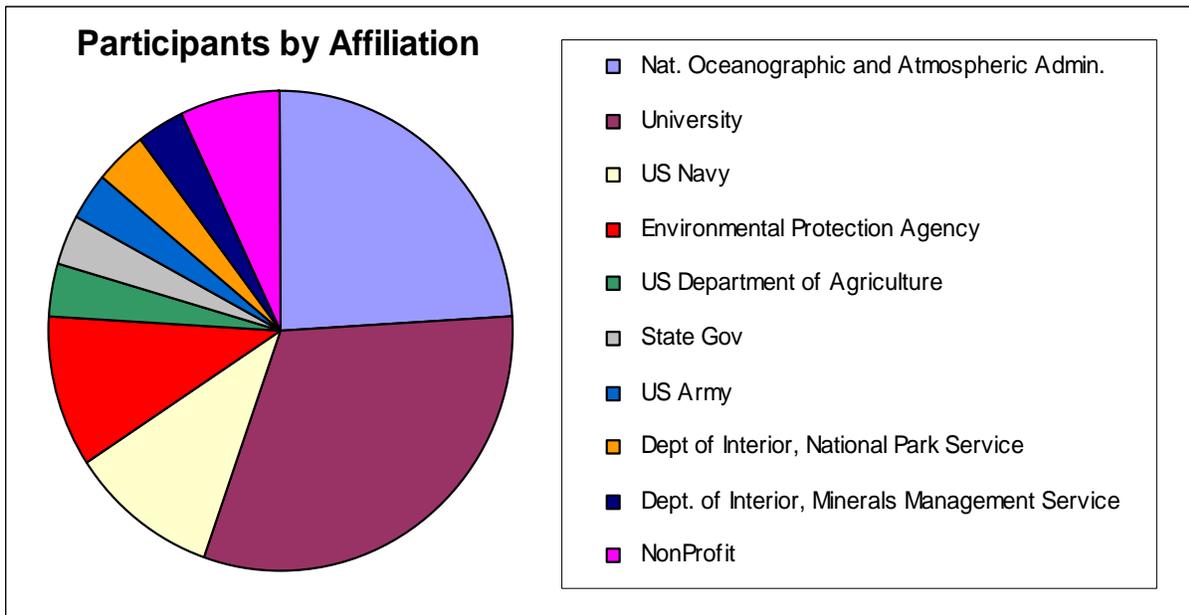
Table 1 shows that the GOMI proposed application focus areas are in alignment with the Decadal Survey.

Gulf of Mexico Initiative (GOMI) Proposed Application Focus Areas and the Decadal Survey Based on the GOMI 2008 Coastal Requirements Assessment Decadal Survey Categories →		Human health and security	Land-use change, ecosystem dynamics, biodiversity	Climate variability and change	Weather	Water resources and global hydrologic cycle	Solid Earth, hazards, natural resources and dynamics
Regional Sediment Management and Wetland Restoration							
	Assess the relationship between regional sediment management and coastal water quality		X			X	
	Assess the impact of changing sediment loads on coastal habitats		X				
	Assess the effects of river diversion on regional sediment management, wetland restoration, existing recreational use, water quality, and habitat function		X			X	
	Monitor wetland restoration efforts		X				
Climate Change							
	Monitor and understand climate-induced changes in ecosystems and habitats (land-use and land-cover change)		X	X			
	Assess the impact of changing hydrologic conditions			X		X	X
	Relate climate change to the pattern and/or distribution of freshwater inflows and ecosystems		X	X		X	
	Model and monitor the impacts of storm surge				X		
	Assess the Gulf of Mexico carbon cycle trends and potential impacts to current Gulf ecosystem functions		X				
	Assess the potentially changing oceanic circulation patterns			X		X	
Sea Level Change							
	Monitor and understand the effect of sea level change on ecosystems		X	X		X	
	Monitor coastline and barrier island change using long-term, low/medium resolution imagery		X				
	Model and monitor salt water intrusion					X	X
Water Quality and Nutrient Monitoring for Assessment of Ecosystem Health							
	Monitor and assess the impacts of nutrients and freshwater fluxes on ecosystem health and function		X			X	
	Monitor and model non-point source pollution	X				X	
	Assess freshwater requirements for healthy marsh ecosystems		X			X	
	Monitor and forecast harmful algal blooms	X				X	
	Model, assess, and predict hypoxia					X	
	Monitor the changing volumes of major Gulf of Mexico rivers		X			X	
	Assess the impact of urbanization on water quality, nutrients, and ecosystem health		X			X	

Table 1. Proposed application focus areas mapped to the Decadal Survey categories.

3.0 Workshop Participants

Fifty-nine high-level managers and scientist participated in the workshop, with about 40% having doctoral degrees. The list of participants included 4 members of the NASA Stennis Applied Science Program Steering Committee. Also present were 6 ranking members of the Gulf of Mexico Alliance and many members from the Northern Gulf institute, including 15 members of the Advisory Council and Council of Fellows. Other characteristics of the group are illustrated in figures 1-3.



4.0 Break-Out Session Feedback

4.1 Feedback Specific to the Application Focus Areas

During the workshop we received feedback on the GOMI proposed focus areas. Generally the participants were in agreement that the proposed focus areas were on target with Gulf of Mexico needs. Participants also made recommendations on how the focus areas could be improved by adding some items or by reorganizing the list. Comments specific to the focus areas are summarized below (in italics) and grouped to show alignment with the main topics of the Decadal Survey report.

1) Decadal Survey: Human Health and Security

- *Add water quality impacts on human health (chemicals, pathogens)*
- *Should address Homeland security issues*

2) Decadal Survey: Land-Use Change, Ecosystem Dynamics, and Biodiversity

- *Need for extensive datasets (impervious surfaces, historical baseline data, upland watershed LULC (land use land cover), storm damage assessment, time series analysis)*
- *NASA could do monitoring (wetland restoration, large marine mammal habitats)*
- *Measure impact of coastal development on ecosystems*
- *Get involved with the Integrated Ecosystem Assessment (IEA)*
- *Agreed that regional sediment management is important – especially with future improvements to the Panama Canal (larger ships requiring more dredging)*
- *Elevate habitat to a major theme*
- *The assessment land use land cover change over multiple decades is good work for NASA to do*
- *It would be good to expand the Mobile Bay LULC change assessment effort so that it is relevant to broadly defined watersheds*

3) Decadal Survey: Climate Variability and Change

- *Agreement on importance of sea level rise impacts on human and natural communities*
- *Agreement on need to understand how changes in fresh water affect ecosystems*
- *Confirmation on the need to detect salt water intrusion*
- *Very important to consider how changing oceanic circulation will affect the Gulf*
- *Combine sea level change and climate change*
- *The “sea-level change” topic needs to be more focused*

4) Decadal Survey: Water Resources and the Global Hydrologic Cycle

- *Expanded scope to include inputs from the Caribbean Sea, Sahara Desert, and upland watersheds (sediments, nutrients, carbon); also deepwater*
- *Consider how systems will be affected as the Gulf becomes more acidic*
- *Develop hypoxia predictors*

5) Decadal Survey: Weather

- *Include Resiliency to coastal hazards (hurricanes, storm surge)*

6) Decadal Survey: Solid Earth

- *None*

4.2 Feedback Specific to the Coastal Online Assessment and Synthesis Tool

- *It would be helpful for COAST to integrate analytical tools*
- *Interested in having a COAST demonstration for the technical folks at Naval Oceanographic Office*
- *Don't oversell COAST as Decision Support System or Decision Support Tool to people*

4.3 Feedback on Geographic Priorities

- *Two options regarding geography*
 - *Focus on "hot spots" (like Mobile Bay), this will be less robust, but more focused, detailed, or focus on area you can make a difference*
 - *Or work across several areas that typify dynamic range, this will be more robust, but yield less detailed conclusions*
- *Mobile Bay Hypoxia*
- *LA Oyster beds in Federal waters, noxious algal blooms*
- *Tampa Bay*
- *3 NOAA Regions*

4.4 Feedback on Partnerships

- *Partner with groups who do outreach; NASA needs to be actively involved*
- *Prediction – Navy, NOAA*
- *Minerals Management Service*
- *Department of the Interior*
- *Oil companies may be looking to partner*

4.5 Feedback on What NASA Can Do

- *Stennis is structured to contribute to Verification and Validation, reflectance, characterization*
- *There is a need for time series data (which Stennis can do)*
- *NASA data and models can help assess how large scale processes affect small scale cycles/phenomenon*

4.6 Feedback on What the GOM Needs

- *Need for integrated approach: physical, chemical, biological data in numerical model framework, with uncertainties*
- *Need for continuous large-scale monitoring – tied to smaller scales*
- *There needs to be a means to integrate in-situ, low earth (aircraft/unmanned aerial vehicle), and satellite data in a meaningful way*
- *GOM is a good laboratory for V&V work in assessing models and observational data*

4.7 Other Recommendations for the Program

- *Link closer to Gulf of Mexico Coast Ocean Observing System (GCOOS)*
- *Projects should include socio-economic component*

- *Try to identify a specific high cost economic environmental problem and focus work in area with highest dollar return from efforts*
- *Narrow down suitable work topics to ½ dozen application areas*

5.0 Conclusions

Overall, participant feedback was positive and supportive. We successfully involved the coastal community in our program, elevating awareness, building confidence, making contacts, attracting partners, and benefiting from the collective wisdom of the stakeholders. The participants were in general agreement with our strategy to utilize data collected during the Sea Grant Research Planning process. This strategy enabled NASA to understand priorities and user requirements while saving the agency considerable time and cost. There was also general agreement that the application focus areas were on target with Gulf of Mexico needs, although some refinement was needed.

Some stakeholders recommended a narrower focus on fewer topics, while others called for a broadening of our scope. One stakeholder thought that our focus areas were too generalized. Participants recommended that the following topics be added to our list of application focus areas:

- Need to address human factors (health, socioeconomic, anthropogenic)
- Desire for security and resiliency to hazards and disasters
- Importance of doing habitat characterization

Predominant themes during the break out session included the following:

- Concern about climate change
- Importance of watershed-level assessments
- Problem of overlap and duplication between different groups working on Gulf issues
- Challenges related to remote sensing in coastal zones and issues of scale

A follow-up Strategic Planning Workshop is planned for August 21, 2008, in Corpus Christi, TX. This workshop is being held in conjunction with a GOMA conference and we are expecting a larger turnout with more representation at the state level. In that workshop, we will again present the status of our program/projects and we will collect feedback on different aspects of our draft 3-5 Year Strategic Plan.

Appendix A. Acronyms

<u>Acronym</u>	<u>Definition</u>
ARTPO	Applied Research and Technology Project Office (NASA Stennis Applied Science Program)
COAST	Coastal Online Assessment and Synthesis Tool
EPA	Environmental Protection Agency
GCOOS	Gulf of Mexico Coast Ocean Observing System
GOMA	Gulf of Mexico Alliance
GOMI	Gulf of Mexico Initiative (NASA Stennis Applied Science Program)
IEA	Integrated Ecosystem Assessment
LULC	land use land cover
NASA	National Aeronautics and Space Administration
NAVOCEANO	Naval Oceanographic Office
NGI	Northern Gulf Institute
NOAA	National Oceanographic and Atmospheric Administration
NPS	National Park Service
NRL	Naval Research Laboratory
NWS	National Wildlife Service
SSAI	Science Systems and Applications, Inc.
SSC	Stennis Space Center
S&TD	Science and Technology Division (NASA Stennis Applied Science Program)
USACE	United States Army Corp. of Engineers
USDA	United States Department of Agriculture

Appendix B. Workshop Materials

B.1. List of Participants

SSC Applied Science Coastal Program

Strategic Planning Session - May 12, 2008, Biloxi, MS

#	LastName	FirstName	Title	City	State	Phone	Job Title	Affiliation
1	Alexander	Timothy	Mr.	Chevy Chase	MD	(301)986-8686	Liaison	GeoResources Institute
2	Allee	Rebecca	Dr.	Stennis Space Center	MS	(228)688-1701	Sr. Scientist	NOAA Gulf Coast Svc. Ctr.
3	Armstrong	Duane	Mr.	Stennis Space Center	MS	(228)688-2180		NASA/Stennis
4	Arnone	Robert	Mr.	Stennis Space Center	MS	(228)688-5268	Oceanography	NRL
5	Bailey	John	Mr.	Stennis Space Center	MS	(228)688-1660	Chief, Science & Technology Div.	NASA/S&TD Chief
6	Bass	Phil	Mr.	Stennis Space Center	MS	(228)688-2356	State Policy Coordinator	EPA/Gulf of Mexico Prog
7	Beard	Russ	Mr.	Stennis Space Center	MS	(228)688-3026	Director	NOAA, NCDDC
8	Beattie	Christopher	Dr.	Stennis Space Center	MS	(228)688-1502	Research Scientist	NASA/Virginia Tech
9	Blonski	Slawomir	Dr.	Stennis Space Center	MS	(228)688-1944	Chief Scientist	SSAI
10	Brown	Richard	Mr.	Stennis Space Center	MS	(228)688-1236	Applications Visualization Lead	SSAI
11	Carron	Michael	Dr.	Stennis Space Center	MS	(228)688-3228	Chief Scientist	NGI
13	Chassignet	Eric	Dr.	Tallahassee	FL	(850)644-4581	Professor & Director	FSU
14	Cowan	Jean	Dr.	Baton Rouge	LA	(225)578-7924		NOAA
15	Croom	Miles	Mr.	St. Petersburg	FL	(727)551-5739	Asst. Regional Administrator	NOAA
16	Dabney	Seth	Dr.	Oxford	MS	(662)232-2975	Research Agronomist	USDA-ARS
17	Davison	Todd	Mr.	Stennis Space Center	MS	(404)909-1787	Director	NOAA, Gulf Coast Services Ctr.
18	Dewar	William	Dr.	Tallahassee	FL	(850)644-4099	Professor & Chairman	FSU
19	Dumas	Joni Le'	Mrs.	Stennis Space Center	MS	(228)688-2074	Cost/Resource Scheduler	ARTPO
20	Ellis	Jean	Dr.	Stennis Space Center	MS	(228)688-1185	Research Scientist	NASA/Stennis
21	Epperson	Deborah	Dr.	New Orleans	LA	(504)736-3257	Biologist	Minerals Management Service
22	Fletcher	Rose	Ms.	Stennis Space Center	MS	(228)688-3622	Sr. Staff Scientist	SSAI
23	Thompson	Calvin	Mr.	Stennis Space Center	MS	(228)688-1880	Public Affairs	Public Affairs
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25	Glorioso	Mark	Mr.	Carriere	MS	(228)688-1940	Program Manager	NASA/Stennis
26	Gough	Edward	Mr.	Stennis Space Center	MS	(228)688-4189	Technical/Deputy Commander	CNMOC
28	Grant	Joseph	Dr.	Stennis Space Center	MS	(228)688-2103	Technical Mgr.	NASA/Stennis

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30	Hoselle	Karen	Ms.	Stennis Space Center	MS	(228)688-2751	Conference Coordinator	USM
31	Hughes	Bill	Mr.	Stennis Space Center	MS	(228)688-3001	Financial Analyst	USM
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33	Lewis	David	Dr.	Stennis Space Center	MS	(228)688-2509	Director	ITD
34	Lohrenz	Steven	Dr.	Stennis Space Center	MS	(228)688-3177	Professor	USM
35	Martinek	Charles	Mr.	Stennis Space Center	MS	(228)688-4205	Technical Director	Naval Oceanographic Office
36	Mason	Ted	Mr.	Stennis Space Center	MS	(228)688-2161	AST, Program Manager	NASA/Stennis
37	May	George	Dr.	Stennis Space Center	MS	(228)688-2509	President	ITD
38	McPherson	Terry	Mr.	Stennis Space Center	MS	(228)688-1918	Coastal Program Manager	NASA/Coastal Program Mgr.
39	Moorhead	Robert	Dr.	Mississippi State	MS	(662)325-2850	Deputy Director	GRI
40	Pahl	James	Dr.	Baton Rouge	LA	(225)342-2413	Coastal Resources Scientist	Louisiana Dept. of Natural Resources
41	Pair	Laura	Ms.	Stennis Space Center	MS	(228)688-1551	IT Support Deputy Chief, Science & Tech Div.	CSC NASA/Stennis
43	Peek	Anne	Ms.	Stennis Space Center	MS	(228)688-1148		NASA/Stennis
44	Peterson	Craig	Mr.	Stennis Space Center	MS	(228)688-1984	Sr. Research Scientist	NASA/Stennis
45	Reed	Dave	Mr.	Slidell	LA	(985)641-4343	Hydrologist in Charge	NWS Lower MS River Forecast Ctr.
46	Ritchie	Jay	Mr.	Stennis Space Center	MS	(228)688-3575	Social Sciences Coordinator	NGI
47	Ross	Kenton	Dr.	Stennis Space Center	MS	(228)688-1869	Program Manager	SSAI/SSC
48	Segura	Martha	Dr.	Lafayette	LA	(337)291-2113	Gulf Coast Network Coordinator	NPS
49	Shaw	David	Dr.	Mississippi State	MS	(662)325-9573	Director	GeoResources Institute
50	Spiering	Bruce	Dr.	Stennis Space Center	MS	(228)688-3588	Engineer	NASA/Stennis
51	Spruce	Joseph	Mr.	Stennis Space Center	MS	(228)688-3839	Sr. Scientist	SSAI
52	Stewart	Randy Frederick	Mr.	Stennis Space Center	MS	(228)688-2818	Engineer	SSAI
53	Sutter	"Buck"	Mr.	St. Petersburg	FL	(727)824-5301	Deputy Regional Administrator	NOAA
54	Swann	LaDon	Dr.	Ocean Springs	MS	(251)648-5877	Director	MS-AL Sea Grant Consortium
55	Tate	Steve	Mr.	Stennis Space Center	MS	(228)688-3610	Senior Member Technical Staff	SSAI
56	Woods	Glade	Mr.	Stennis Space Center	MS	(228)688-1103	NGI Co-Director	NGI Joint Airborne Lidar Bathymetry Tech Ctr., USACE
57	Wozencraft	Jennifer	Mrs.	Kiln	MS	(228)252-1101	Director	EPA Mobile Bay National Estuary Program
58	Yeager	David	Mr.	Mobile	AL	(251)431-6409	Director	EPA Gulf of Mexico Program
59	Griffith	Bryon	Mr.	Stennis Space Center	MS	(228)688-2711	Director	

B.2. Summary of Application Focus Areas

Derived from the NASA GOMI Coastal Requirements Assessment, 2008

Regional Sediment Management and Wetland Restoration

GOMA Priority Area: Wetland and Coastal Conservation and Restoration

- Assess the relationship between regional sediment management and coastal water quality
- Assess the impact of changing sediment loads on coastal habitats
- Assess the effects of river diversion on regional sediment management, wetland restoration, existing recreational use, water quality, and habitat function
- Monitor wetland restoration efforts

Climate Change

GOMA Priority Area: Coastal Community Resilience

- Monitor and understand climate induced changes in ecosystems and habitats (land-use and land-cover change)
- Assess the impact of changing hydrologic conditions
- Relate climate change to the pattern and/or distribution of freshwater inflows and ecosystems
- Model and monitor the impacts of storm surge
- Assess the Gulf of Mexico carbon cycle trends and potential impacts to current Gulf ecosystem functions
- Assess the potentially changing oceanic circulation patterns

Sea Level Change

GOMA Priority Area: Coastal Community Resilience

- Monitor and understand the effect of sea level change on ecosystems
- Monitor coastline and barrier island change using long-term, low/medium resolution imagery
- Model and monitor salt water intrusion

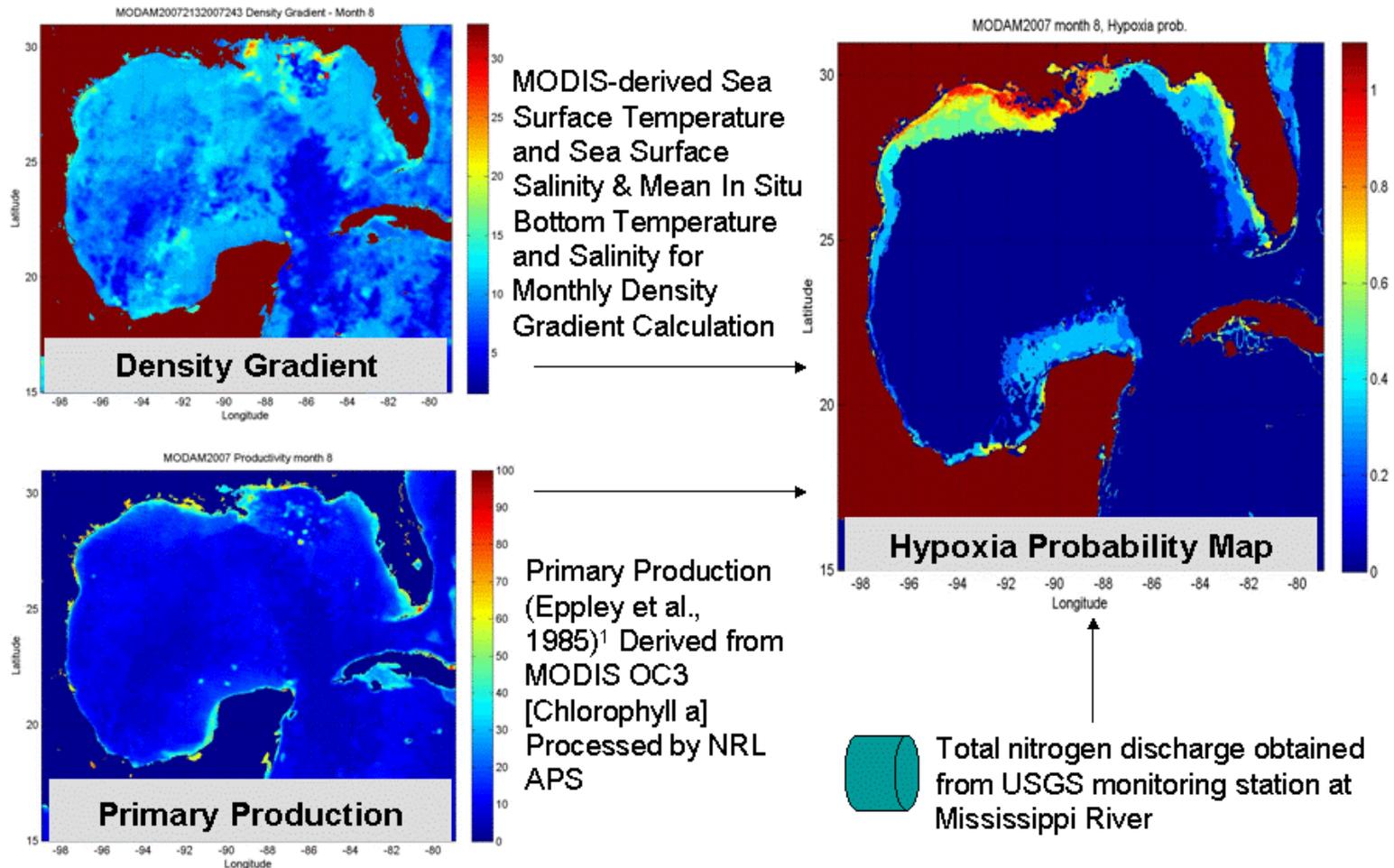
Water Quality and Nutrient Monitoring for Assessment of Ecosystem Health

GOMA Priority Areas: Water Quality for Healthy Beaches and Shellfish Beds, and Reducing Nutrient Inputs to Coastal Ecosystems

- Monitor and assess the impacts of nutrients and freshwater fluxes on ecosystem health and function
- Monitor and model non-point source pollution
- Assess freshwater requirements for healthy marsh ecosystems
- Monitor and forecast harmful algal blooms
- Model, assess and predict hypoxia
- Monitor the changing volumes of major Gulf of Mexico rivers
- Assess the impact of urbanization on water quality, nutrients and ecosystem health

B.3. NASA Stennis Applied Science Gulf of Mexico Initiative Project Slides (4 projects)

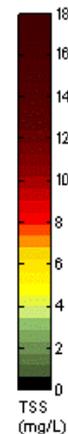
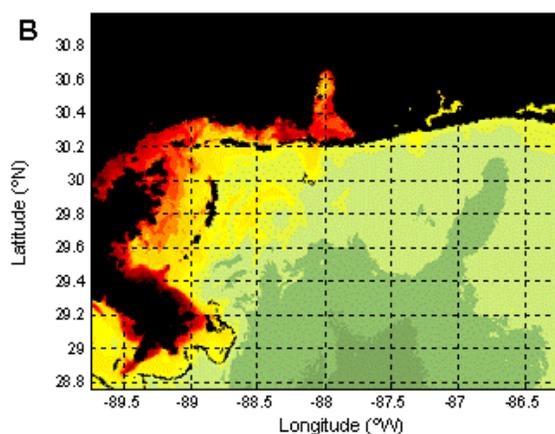
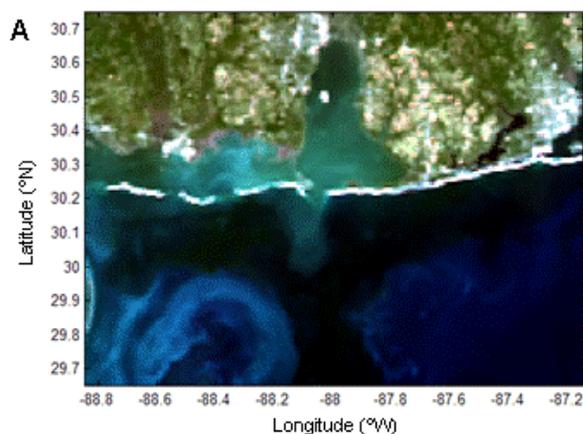
Hypoxia Probability Map



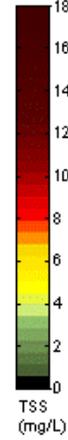
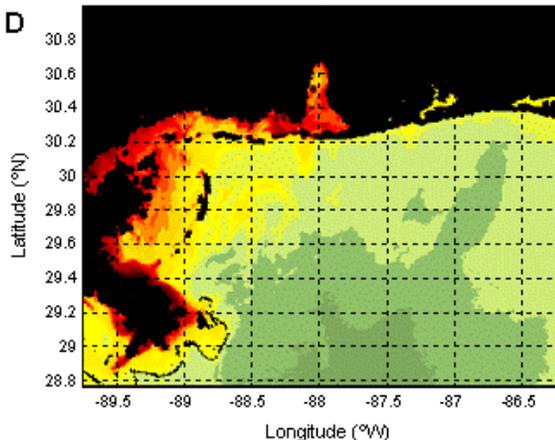
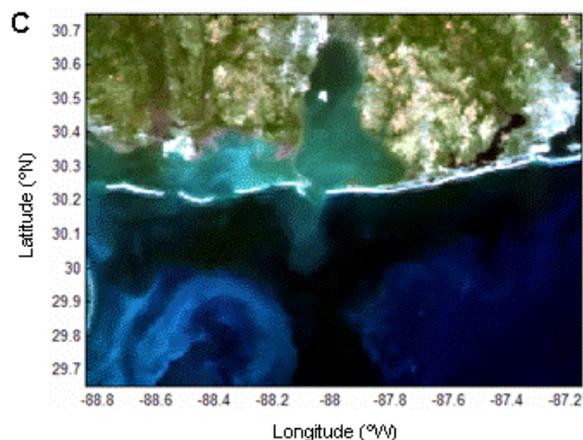
¹Eppley, R.W., E. Stewart, M.R. Abbott, and U. Heyman. 1985. Estimating ocean primary production from satellite chlorophyll. Introduction to regional differences and statistics for the southern California Bight. *Journal of Plankton Research* 7:57-70

Mobile Bay Sediment Plume Mapping Using MODIS and VIIRS

Purpose: Identify the Mobile Bay sediment plume using MODIS and simulated VIIRS data



MODIS images (A&B, 1000m, 9 Nov 2007) are calibrated and validated using in situ data collected in collaboration with Mississippi State University and Dauphin Island Sea Lab. VIIRS simulations (C&D, 750m, 9 Nov 2007) are based on MODIS data.



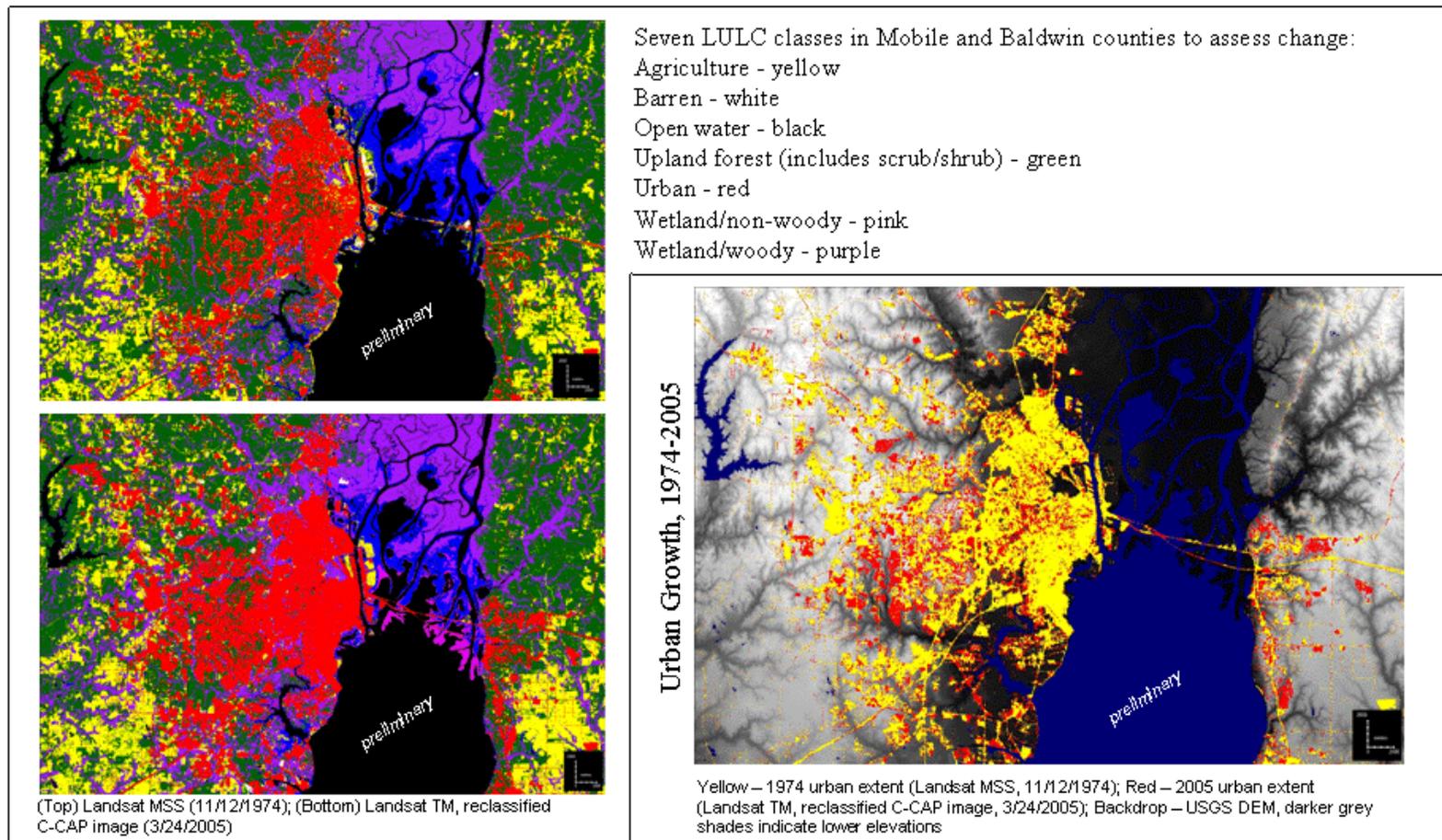
Chalky, white colored waters in A&C indicate higher total suspended sediments (TSS). Higher TSS is evidenced by darker red shades in B&D. TSS concentrations in excess of 8 mg/L are found inside Mobile Bay.

This project demonstrates VIIRS maybe used to detect TSS in coastal waters.

Project Leads: Jean Ellis (NASA, Stennis Space Center) and Maria Kalcic (SSAI, Stennis Space Center)

Gulf of Mexico Alliance Application Pilot: Land-Use and Land-Cover (LULC) Change from 1972-present around Mobile Bay, AL

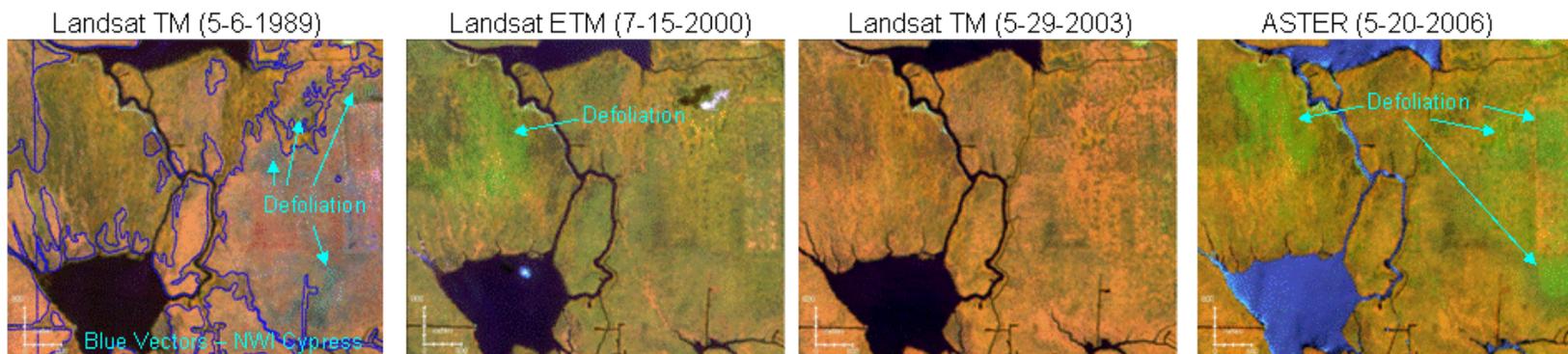
Purpose: Assess LULC changes of Mobile and Baldwin counties, AL for 1972-present



Project Leads: Jean Ellis (NASA, Stennis Space Center), Joseph Spruce (SSAI, Stennis Space Center), Terry McPherson (NASA, Stennis Space Center)

Use of NASA Satellite Data in Monitoring Gulf Coast Forest Conditions

- **Purpose - assess potential of Gulf Coast forest monitoring products derived from NASA satellite data**
 - Regional monitoring of forest damage from hurricanes
 - Stand specific monitoring of baldcypress forest (example below)
- **Satellite data - MODIS, Landsat, and ASTER**
- **Study areas - coastal Mississippi and Louisiana**
- **Status - acquiring and preparing needed data for preliminary products**
- **GOMA relevance - community resilience, wetland restoration, habitat characterization, and water quality management**



Project Leads: Joseph Spruce (SSAI, Stennis Space Center) and Joseph Grant (NASA, Stennis Space Center)

B.4. NASA Stennis Applied Science Gulf of Mexico Initiative Project Brochures (2 brochures)

Mapping the Data: Data sources and accessibility for COAST

Applicable sources of online data are being compiled and submitted for consideration for inclusion into the COAST project interface. Access methodologies of various types (WMS (Web Mapping Service), online data/product directory, FTP (file transfer protocol), KML (Keyhole Markup Language), OPENDaP, etc.) are being identified for each data source and appropriate tools are being tested for integration into COAST to allow flexible data input options.

Sources of data identified as useful for inclusion in COAST that are accessible through one of COAST's data inclusion tools (TVT, Image Overlay Tool, WMS to Layer Tool, KML Import) will be mapped and stored as accessible layers within the UI. Data access tools are being modified/created as needed to allow ease of mapping to the data as well as user control over class and temporal mapping of the data.

Sharing and Showing: Developing presentation formats within COAST

Techniques/tools are being developed to allow for manual and scripted presentations of data analysis sessions to be shared by users and also to allow for an easily shared collaborative capability within COAST. Initial efforts will focus on creating a capability similar to Dapple's (Geosoft) Worldwind-based "Export Scene" function that allows a project session state to be saved with all data layers, mappings, and viewshed in a single definition file. As an example, this small file could then be shared or posted online to allow a collaborative common reference between project principals.

Exploration and Testing: COAST as project data integrator for Coastal data

COAST capabilities are being tested/demonstrated with ongoing Hypoxia and Regional Sediment modeling studies data that has been identified for investigation and integration into COAST data layers. Modifications or additions to the COAST capability toolset for use with these projects will be identified, tested through user groups, and integrated if proven value added to the community. The SSC development team will also be investigating the possibility of including COAST project definition files as links from ARTPO Web site project description pages and hub sites. If proven feasible, this would take on a similar functionality to the KML Google Earth link schema that would launch a COAST viewer (after download) from the Web site for immediate online project data discovery by individuals. It is hoped that this functionality would provide a significant value-added capability for the current subject data user community.

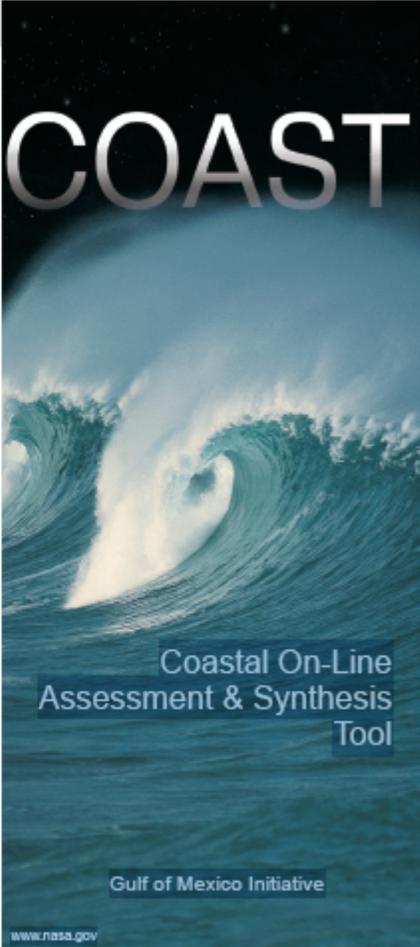
For more information please contact the following at Stennis Space Center:

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Phone: 228.688.1889
Email: William.D.Graham@nasa.gov

Craig Peterson
Phone: 228.688.1984
Email: Craig.A.Peterson@nasa.gov

Gulf of Mexico Initiative

National Aeronautics and Space Administration 



COAST

Coastal On-Line
Assessment & Synthesis
Tool

Gulf of Mexico Initiative

www.nasa.gov

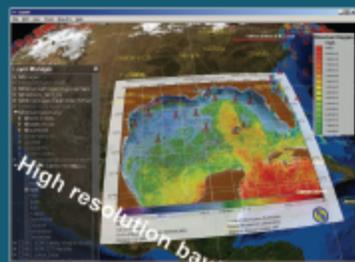
COAST: NASA OpenSource Heritage Leveraged for Scientific Insight

The Coastal Online Assessment and Synthesis Tool (COAST) geobrowser is being developed at NASA SSC for use in

integrating previously disparate NASA and other agency coastal data sets into a common desktop tool that will provide insightful new data visualization and analysis capabilities for the coastal researcher. COAST is built upon the immensely successful NASA opensource 3D geobrowser, Worldwind, developed at NASA Ames Research Center.

COAST also has integrated some of the value-added modifications and enhancements that have been implemented in the successful MSFC versioning of Worldwind, SERVIR-Viz. The NASA opensource heritage of COAST from Worldwind lends great userbase development leverage and usability due to the large international opensource developer community that has grown over the past several years.

COAST is being developed to make maximum use of open source data access, viewing, and data manipulation software tools for a low-cost, widely installable base of potential users upon completion of the initial COAST release. Because COAST is a developmental tool, subsequent changes/enhancements to its core capabilities will be reflected in regular incremental reports that coincide with major lifecycle modification points.



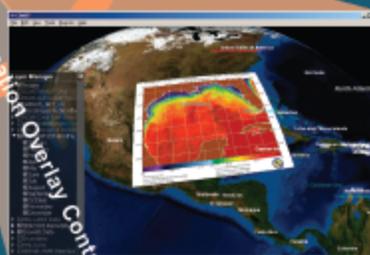
High resolution bay/estuarine/coastal data



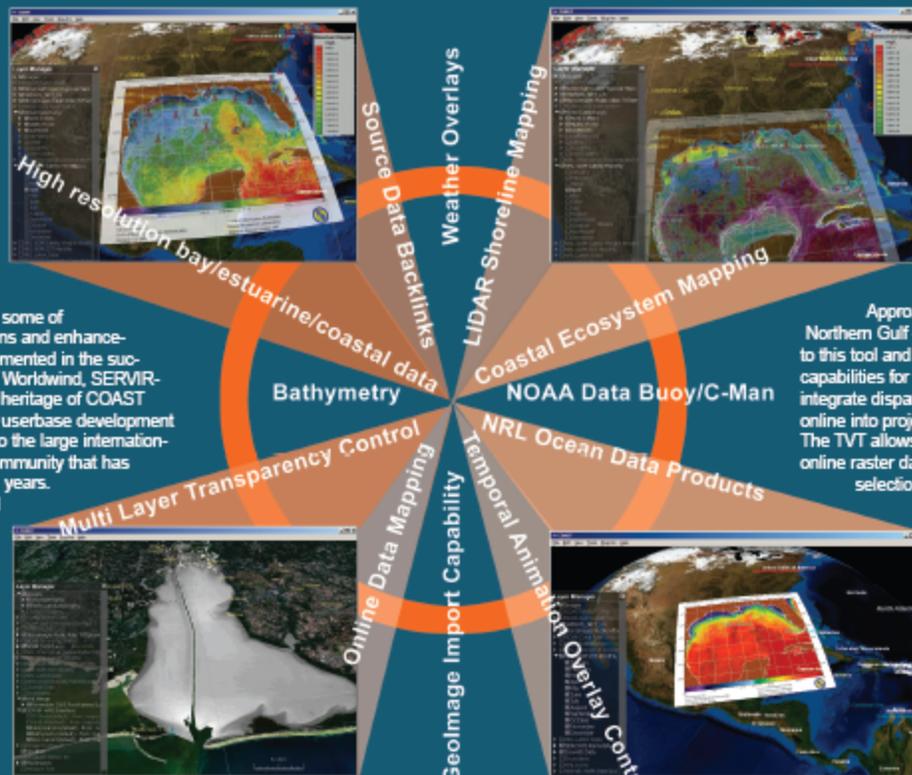
Weather Overlays



Bathymetry



NOAA Data Buoy/C-Man



Discovery and Fusion: User Interface and Additional Tools

An optimal user interface (UI) is being prototyped and tested by the SSC development team.

This interface will provide a user-friendly, yet data-robust and efficient means for users to discover, visually analyze, and access imagery and related data layers from within COAST and allow for linkage back to the raw data source if available online for further analysis outside of the UI. The interface will be built upon the initial developmental Temporal Visualization Tool (TVT) UI for COAST begun in the 2007 Integrated

Approach to Monitoring Hypoxia in the Northern Gulf of Mexico project. Modifications to this tool and others will be targeted to allow capabilities for users to connect to and map/integrate disparate datasets located locally and online into project sessions for COAST users. The TVT allows direct data listing of accessible online raster datasets and subsequent multi-selection, temporal overlay animation, and transparency control over the animated layer within COAST.

Initial efforts are focusing on smarter data access and sorting by classification and temporal range within the UI and also on developing techniques for establishing look-back connections to origin data to allow for direct linkage to external data analysis and processing tools from within COAST that are germane to the parent project.

California Ecological Forecasting Project Determining Coastal Upwelling Indices



Mexico Air Quality Project Tracking Pollutant Pathways



- ★ DEVELOP has awarded internship opportunities to students from across the nation since 1998
- ★ DEVELOP has extensive publications including press articles, abstracts, poster presentations, and radio interviews
- ★ DEVELOP has a national impact with projects, student participation, and leveraged resources
- ★ DEVELOP projects have been utilized by community policy and decision makers

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<http://develop.larc.nasa.gov>

National Aerospace and Space Administration
www.nasa.gov

NP-2008-03-69-LARC

National Aeronautics and Space Administration



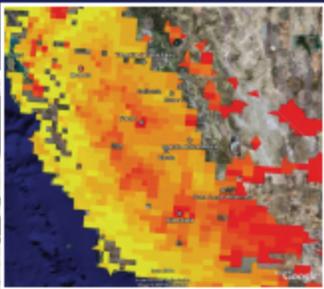
Community Benefits of Applied Sciences

DEVELOP

DEVELOP

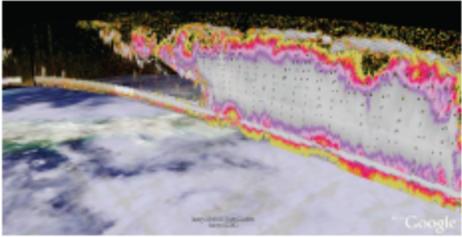
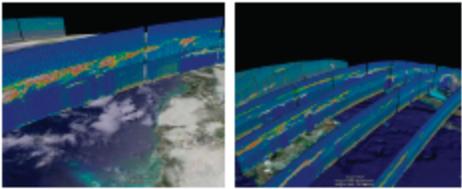
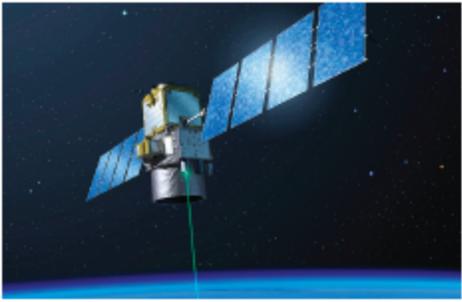
<http://science.hq.nasa.gov>

California Air Quality Project
Measuring Airborne Pollutants



CALIPSO Data Visualization Project

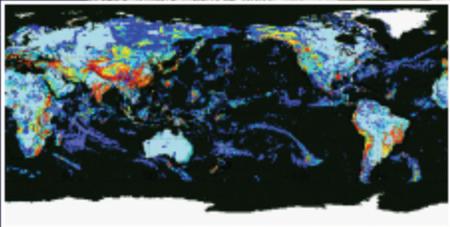
The DEVELOP CALIPSO Data Visualization team developed a multi-platform, deployable tool which enables the CALIPSO science team to visualize data recorded by CALIPSO's active lidar instrument, CALIOP in 3-D. The tool is composed of three sub-elements, the geometric parameter model, an image-rendering model, and a KML builder. The result was an effective CALIPSO visualization tool, which creates KML files that can be uploaded into Google Earth. Using this tool, researchers and the public can view scientific data concerning the Earth's atmosphere in a three dimensional format.

Community Benefits of Applied Sciences

The DEVELOP Program fosters human capital development to extend NASA Earth science research to local, state, and scientific communities. Advisors and mentors from NASA and partner organizations assist students to incorporate NASA science measurements and predictions into projects that address local policy and environmental concerns.

DEVELOP students initiate projects in response to community demands. A recent project example was to detect and map hurricane damage to identify forest fire risk in states along the U.S. Gulf Coast. NASA's ICESat Earth Observing System detected changes in forest canopy height indicating hurricane damage. Projects such as this enable students to build relevant work skills while increasing the collective understanding of complex environmental issues.



Global Disaster Management Project
Mapping Thermal Anomalies

DEVELOP is sponsored by NASA's Science Mission Directorate, Applied Sciences Program. DEVELOP activity is located at five NASA centers including Ames Research Center, Goddard Space Flight Center, Langley Research Center, Marshall Space Flight Center, and Stennis Space Center. Several regional locations also support DEVELOP nationwide activity.

Internship opportunities are available during the spring, summer, and fall. Applications are encouraged from high school, undergraduate, and graduate students with strong interests in science, technology, and policy.

Additional information about DEVELOP can be found at <http://develop.larc.nasa.gov>.

Gulf Coast Coastal Management Project



Assessing Hurricane Forest Damage

DEVELOP

<http://develop.larc.nasa.gov>

B.5. NASA Stennis Applied Science Gulf of Mexico Initiative, Mobile Bay Flyer

NASA EARTH SCIENCE

Gulf of Mexico Alliance Applications Pilot

A collaboration between NASA Applied Sciences Program and the Gulf of Mexico Alliance

In response to the U.S. Ocean Action Plan, representatives from thirteen federal agencies convened to form the Gulf of Mexico Regional Partnership Federal Workgroup to provide support to the Gulf of Mexico Alliance in addressing priority coastal and ocean issues facing the Gulf of Mexico region. Working through this Federal Workgroup, NASA will work to apply NASA remote sensing data products to regional management requirements defined by the Alliance partnership.

THE GULF OF MEXICO ALLIANCE

The Gulf of Mexico Alliance is a partnership of the five U.S. Gulf States – Alabama, Florida, Louisiana, Mississippi, and Texas – with the goal of significantly increasing regional collaboration to enhance the environmental and economic health of the Gulf of Mexico. The Alliance also works to facilitate collaboration with the six Mexican Gulf States. The Alliance has identified six priority issues that are regionally significant and can be effectively addressed through increased collaboration at state, local, and federal levels. These priorities represent a focus for initial action through the Alliance:

- Water quality for healthy beaches and shellfish beds;
- Wetland and coastal conservation and restoration;
- Coastal community resilience;
- Environmental education;
- Identification and characterization of Gulf habitats; and
- Reducing nutrient inputs to coastal ecosystems.

The five U.S. Gulf State Governors released the Governors' Action Plan for Healthy and Resilient Coasts in March 2006. The plan challenges the Alliance partnership to make tangible progress over 36 months on 73 specific activities, setting the stage for a long-term partnership that can address an expanded suite of issues, culminating in a healthier Gulf of Mexico ecosystem and economy.

FEDERAL SUPPORT TO THE ALLIANCE

The Bush Administration's U.S. Ocean Action Plan (USOAP) recognizes the leadership that the five U.S. Gulf States have demonstrated in forming the Alliance and identifying regional priorities, and calls for increased integration of resources, knowledge, and expertise to address these priorities. As a result, NOAA and EPA co-chair a thirteen agency Federal Workgroup to support Gulf State leadership and coordinate an integrated federal response to priority regional issues identified by the Alliance. As a member of this Federal Workgroup, NASA will work to apply NASA remote sensing data products to regional management requirements defined by the Alliance partnership.

PILOT OVERVIEW AND OUTCOMES

NASA Applied Sciences Program will research and develop specific applications of NASA remote sensing data products based on the requirements and input of state and local coastal resources managers. During the first year of this effort, NASA will work within the regional collaboration network of the Gulf of Mexico Alliance to evaluate the utility of NASA data products in enhancing the decision-support capabilities of coastal resource managers. Ultimately, NASA will lead the deployment of an Internet-based desktop capability to deliver to these managers NASA remote sensing data products in a decision-support tool. Recognizing that NASA is a research mission agency, it will be necessary for NASA's federal agency partners to transition the final pilot product to an operational capability and host the decision-support tool. NASA will work within the Gulf of Mexico Alliance Federal Workgroup to secure the necessary partnerships.

This effort will be piloted in the Mobile Bay and Weeks Bay, Alabama, and Grand Bay, Mississippi study area, preeminent examples of dynamic estuarine ecosystems in the northern Gulf of Mexico. In addition, Grand Bay and Weeks Bay are components of NOAA's National Estuarine Research Reserve System and Mobile Bay is a component of EPA's National Estuary Program. NASA will investigate, through future efforts, the transferability of pilot project products to the rest of the Gulf of Mexico region and other coastal regions of the U.S.

NASA will proactively coordinate with other related efforts in the Gulf of Mexico region and specifically in the study area, including:

- NASA's Gulf of Mexico Regional Collaborative (www.gomrc.org)
- USGS, USACE, and NOAA's Priority Habitat Information System, or PHINS (ecowatch.ncddc.noaa.gov/habid_public)
- NOAA's Integrated Ecosystem Assessment (IEA) in the Gulf of Mexico region, where NOAA seeks to improve the operational management of coastal and marine ecosystems by integrating physical, biological, and social information.

INITIAL MILESTONES

October 2007 to March 2008 – NASA and its Federal partners will conduct interviews to develop, evaluate, and validate candidate applications of NASA remote sensing data products to state and local coastal resource management requirements.

For More Information Please Contact Initial Federal Pilot Partners

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B.6. Satellite Information for Coastal Applications



NASA Satellite Utility: 2007 Core Mission Review

	CoMRP Ranking	NOAA	USGS	Navy	Other DOD
Aqua	Very High	Very High	Very High	Very High	Very High
<i>MODIS</i>	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>
<i>AIRS</i>	<i>Very High</i>	<i>Very High</i>	NA	<i>Very High</i>	<i>Very High</i>
<i>AMSR-E</i>	<i>Very High</i>	<i>High</i>	NA	<i>Very High</i>	<i>Very High</i>
<i>CERES</i>	NA	NA	NA	NA	NA
Terra	Very High	Very High	Very High	Very High	Very High
<i>MODIS</i>	<i>Very High</i>	<i>High</i>	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>
<i>ASTER</i>	<i>High</i>	NA	<i>High</i>	NA	<i>High</i>
<i>CERES</i>	NA	NA	NA	NA	NA
<i>MISR</i>	NA	NA	NA	NA	NA
<i>MOPITT</i>	NA	NA	NA	NA	NA
TRMM	Very High	High	Some Utility	Very High	Very High
QuikSCAT	Very High	Very High	NA	Very High	Very High
Jason	Very High	Very High	NA	Very High	High
CloudSat	High	Some Utility	NA	High	Very High
SORCE	High	High	NA	NA	High
GRACE	High	NA	NA	NA	High
ICESat	Some Utility	NA	Some Utility	NA	High
EO-1	Some Utility	NA	NA	NA	Very High
ACRIMSAT	NA	NA	NA	NA	NA



Jason-1

Ocean Surface Topography
Ocean Circulation

GRACE

Ocean Circulation

QuikSCAT

Wind speed and direction over the Earth's oceans

Terra and Aqua

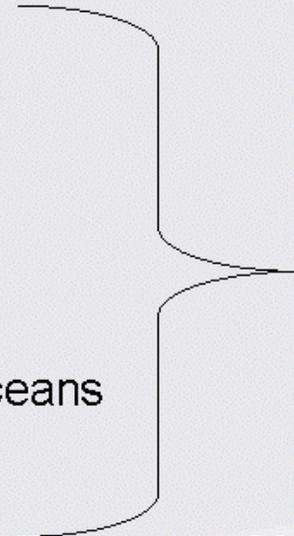
MODIS (harmful algal blooms, etc.)

NPP

VIIRS (harmful algal blooms, etc.)

OSTM

Ocean Surface Topography
Aquarius
Sea surface salinity





Decadal Survey Missions: Direct Coastal Applications

SMAP (Soil Moisture Active Passive) **2010-13**

- Algal Blooms
- Water-Borne Infectious Disease
- Surface water and ocean topography

SWOT (Surface Water/Ocean Topography)

- Ocean circulation
- Algal Blooms
- Water-Borne Infectious Disease
- Surface water and ocean topography

2013-16

GEO-CAPE (Geostationary Coastal and Air Pollution Events)

- Coastal Water Quality
- Algal Blooms
- Water-Borne Infectious Disease

ACE (Aerosol/Cloud/Ecosystem)

- Algal Blooms
- Water-Borne Infectious Disease

PATH (Precipitation and All-weather Temperature and Humidity)

- Algal Blooms
- Water-Borne Infectious Disease

2016-20

GRACE II

- Ocean Circulation
- Sea surface height



B.7. Missions and Models Booklets on CD-ROM



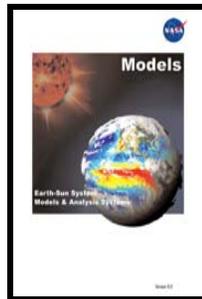
An electronic copy of this booklet is provided on the enclosed CD-ROM. This booklet provides reference information about Earth and Earth-Sun system models with a NASA affiliation. For the purposes of this booklet, a NASA affiliation is considered to be either a history of NASA funding or use of NASA science products.

Models in the booklet are categorized as "ESMF" (The Earth System Modeling Framework) or "other NASA-affiliated". These categories are further divided into NASA-led and partner-led subcategories. ESMF is a significant multi-agency effort (funded in part by NASA) to create a modeling framework that enhances interoperability among various Earth system models.



An electronic copy of this booklet is provided on the enclosed CD-ROM. This booklet provides reference information about Earth and Earth-Sun system spacecraft with a NASA affiliation.

Observation systems and missions listed here are categorized by Deployed NASA-Led Earth Missions; Deployed NASA-Led Solar Missions; NASA-Led Earth Missions In Development; NASA-Led Solar Missions In Development; Interagency Partnerships; Interagency Partnerships In Development; Interagency Partnerships In Development-Solar; International Partnerships; International Partnerships In Development; International Partnerships-Solar; International Partnerships In Development-Solar; and Commercial Partnerships.



Appendix C. Geographic Priorities

C.1. Specific Geographic Locations

- Red tide events in the West Florida Coast
- Dead zones off the mouth of the Mississippi River
- Understanding hypoxia on the LA and TX coast
- Arresting continuing land loss in TX, LA, MS
- Land subsidence (especially in Louisiana)
- Methods to reduce nutrient pollution from Mississippi and Atchafalaya rivers
- Mississippi's Pearl River (effect of dams)
- Change in drought/flood incidents (Mississippi River)
- Potential implications of a catastrophic diversion of the Mississippi River to the Atchafalaya River
- Diverting silt deposit away from continental shelf and redirecting this silt to the Mississippi Delta. More Mississippi river siphons to replenish the Delta.
- Dredging at the Head of Passes
- Potential impacts of oil exploration on eastern Gulf of Mexico communities
- Mountains in the Mexican portion of the Gulf, excessive nutrients, rich soils and sediments runoff from accelerated desertification of "Sierra Madre Oriental" mountain range due to deforestation
- Loss of mangrove forest in Mexico is accelerated for tourist developments and even justified by jobs creation and foreign investment. Campeche State government just recently got approval from SEMARNAT (? why) to throw down hundreds of hectares of mangroves for a tourist development (golf club and hotels greenlands!). Quintana Roo State another lost cause.
- Inner Continental Shelf of Louisiana and Texas Research on contaminant effects at hotspots (Patrick Bayou, Greens Bayou, San Jacinto River, Lavaca Bay, hotspots in Coastal Bend Bays, etc.)
- Gulf Loop Current

- Barataria-Terrebonne Estuary system
- Houston-Galveston metropolitan area
- Grand Island
- Sigsbee Escarpment; Pulley's Ridge
- Mississippi River Deltaic Plain
- Denitrification in the Atchafalaya Basin
- Bayou Lafourche
- Pearl River basin and its influence on the Mississippi Sound and Lake Borgne
- Big Bend of Florida

C.2. Non-Specific Geographic Locations

- Barrier Islands
- Bays
- Mangroves
- Coral reefs
- Marine Protected Areas
- Wetlands/marsh/estuaries
- Freshwater spring vents
- Threatened coastal landscapes and habitats
- Land use change within river basins associated with the Gulf.
- Upstream/headwater impacts on downstream/coastal water quality
- Desertification of some watersheds

- Oil platforms, oil production facilities
- Industrial Waste Dumping
- Power plants and Liquefied Natural Gas plants
- Landfills
- Desalination plants
- Wastewater treatment systems
- Developed areas
- Deep benthic boundary layers around the GOM
- Sea level rise
- Oceanographic anomalies
- Offshore aquaculture
- Ocean oscillations effects on the Gulf coast & eastern seaboard
- Sea Floor subsidence due to the extraction of oil and gas from the Gulf of Mexico
- Coastal margins monitoring program
- Effect of bridges built over marine estuaries
- Role of causeways in changing hydrology
- Marine debris
- Prehistoric and historic sites are threatened by rising sea levels
- Modeling of near-shore waters
- Shoreline change
- Navigational channels
- Working waterfronts