

NORTHERN GULF INSTITUTE



NGI

NORTHERN GULF INSTITUTE
a NOAA cooperative institute





Northern Gulf Institute Research

The Northern Gulf Institute (NGI) is a National Oceanic and Atmospheric Administration (NOAA) Cooperative Institute, a partnership of six complementary academic institutions and NOAA addressing important national strategic research and education goals. Mississippi State University leads this collaboration, partnering with the University of Southern Mississippi, Louisiana State University, Florida State University, Alabama's Dauphin Island Sea Lab, the University of Alabama in Huntsville, and NOAA scientists at various laboratories and operational centers in the Gulf of Mexico region.

NGI develops, operates, and maintains an increasingly integrated research and transition program, the results of which raise awareness and understanding of the Gulf region. NGI has been recognized as critical and well positioned to provide baseline, current, and future science and outreach needs to the region. The necessity of such a role for NGI is acutely demonstrated by Gulf of Mexico catastrophes like Hurricane Katrina and the Deepwater Horizon incident.

Vision

NGI will be a regional leader providing integrative research and education to improve the resiliency and conservation of the Gulf of Mexico.

Mission

NGI conducts high-impact research and education programs in the Gulf of Mexico region focused on integration – integration of the land-coast-ocean-atmosphere continuum; integration of research to operations; and integration of individual organizational strengths into a holistic program. The program shall measurably contribute to the recovery and future health, safety, resilience and productivity of the region, through sustained research and applications in a geospatial and ecosystem context.

Research Themes

- Climate Change and Climate Variability Effects on Regional Ecosystems
- Coastal Hazards
- Ecosystem Management
- Effective and Efficient Data Management Systems Supporting a Data-driven Economy

Overseeing NGI Research

The NGI Program Office's strategic location at the Stennis Space Center, in Mississippi, facilitates close interactions with multiple NOAA activities and key stakeholder groups.

The NGI Council Members Represent:

- NOAA Oceanic and Atmospheric Research/Atlantic Oceanographic and Meteorological Laboratory
- NOAA National Environmental Satellite, Data & Information Service/National Centers for Environmental Information
- NOAA National Ocean Service
- NOAA National Weather Service Lower Mississippi River Center/National Data Buoy Center
- NOAA National Marine Fisheries Service
- NASA Stennis Space Center
- EPA Gulf of Mexico Program
- USGS Gulf Coast & Lower Mississippi Valley
- USDA National Sedimentation Lab
- United States Army Corps of Engineers
- National Park Service
- Gulf Coast Ecosystem Restoration Council
- Mississippi Department of Marine Resources
- Mississippi-Alabama Sea Grant Consortium
- Louisiana Sea Grant College
- Florida Sea Grant College Program
- The Nature Conservancy
- Grand Bay National Estuarine Research Reserve
- Gulf of Mexico Alliance
- The Harte Institute



Executive Summary of Important Research Activities



NGI develops, operates and maintains an integrated research and transition program, and the results raise awareness and understanding of the Gulf. NGI is recognized as critical and well positioned to provide baseline, current and future science and outreach needs to the region. Many of the research projects are providing new and improved tools and capabilities in support of NOAA's goals including Healthy Oceans, a Weather Ready Nation, and Resilient Communities are briefly summarized below.

- Analysis by FSU researchers of the stepped-frequency microwave radiometers (SFMR) wind-induced emissivity measurements collocated with dropsondes identified two distinct wind speed regimes for which the distribution was statistically different. It was found that the 10 to 20 m/s SFMR wind-induced emissivity measurements had a low bias compared to the modeled wind-induced emissivity, but no apparent storm relative azimuthal asymmetry. For the 20 m/s or greater SFMR wind-induced emissivity measurements, there was a storm relative azimuthal asymmetry identified.
- Research continues to produce fields of surface turbulent air-sea fluxes and the flux related variables (winds, SST, near surface air temperature, near surface humidity, and surface pressure) for use in global climate studies. The FSU winds (monthly averages of gridded winds over the tropical oceans) were produced and made available to a wide range of users such as ENSO and fisheries forecasters.
- The NOAA Office of Dissemination is evaluating the use and applications of NOAA Weather Radio All Hazards to determine user requirements to transform the current NOAA Weather Radio All Hazards broadcast network into a new integrated weather information distribution/dissemination system. The project team at the University of Alabama are currently conducting case studies of actual events to study modalities.
- Analyses of profiler and radar data continued to document the variability in low-level clouds, thermodynamics, and wind (wind shear) for cold-season tornado events. Ceilometer data were examined to determine cloud base height distributions and cloud cover fraction around tornadic storms (supercell vs. QLCS) to address the hypothesis that cloud fraction (cloud base height) tends to be high (low) for tornadoes in the Southeast.
- Activities of the U.S. Research Vessel Surface Meteorology Data Assembly Center (DAC) at the Florida State University (FSU) included continued implementation of the Shipboard Automated Meteorological and Oceanographic System (SAMOS) initiative (<http://samos.coaps.fsu.edu/>). The SAMOS initiative is focused on improving the quality of and access to surface marine meteorological and oceanographic data collected in situ by automated instrumentation on research vessels. This project ensures that the highest quality marine meteorological and near surface oceanographic data are collected by research vessels, primarily from the U.S. fleet, and that they are distributed and archived in a manner that makes the data accessible and useful to a diverse research and operational user community.
- Additional assessment of data from the National Buoy Data Center provided validation and case study analyses of NOAA experimental HWRF products such as HWRF- HYCOM, HEDAS, and basin-scale HWRF. Tropical cyclone-tornado research from a previously funded AOML grant provided leverage in the validation and analyses.
- An Interactive Sea Level Model (*GeoCoast*) has been developed. Lidar data collected in 2015 for the 3 coastal counties of Mississippi were used to develop a 10-ft resolution DEM (digital earth model) as a base for assessing the impact of sea level rise on the road network. A road centerline dataset, developed in an earlier MDEM (Mississippi Digital Earth Model) award, was merged with the elevation raster cells to transfer elevation measures to segments of the road centerline dataset.
- A web-based GIS (*GeoDawg*) has been developed with the general public in mind. Popular spatial datasets (e.g., census of population, economics) may be accessed with a collection of commonly used GIS tools.

Executive Summary of Important Research Activities

- Research on the endangered smalltooth sawfish continued and provided new insights into their mating grounds. During the reporting period, 12 large juveniles and adults of the endangered smalltooth sawfish were captured and tagged. This is the first time researchers have captured adult males and females together in the three different regions, during the same season. Interestingly, all three adults captured in Coot Bay showed very fresh signs of mating, with wounds and scars from rostral teeth on the dorsal and ventral surfaces. This is the first time that mating grounds have been verified. In addition to numerous news reports, the findings also were included in Shark Week broadcast on the Discovery Channel.
- Research continued with expanded water quality sampling in tributaries and estuaries in the Northern Gulf of Mexico. This research is creating a baseline trace element and strontium isotope map of primarily the Pearl River and also a few of the rivers draining into Lake Pontchartrain. This map will be used to better understand habitat use of Gulf sturgeon in the system and will be used in conjunction with data previously collected in the Alabama and Florida panhandle in the eastern NGOM.
- An evaluation of the applicability of using UAS for oil spill detection in the Gulf of Mexico is currently underway. The focus of this task is to use an ultraviolet light source to “excite” hydrocarbons associated with oil deposits on the sea surface.
- A proceeding report from the 6th Annual Hypoxia Research Coordination Workshop was completed, identifying the partners and mechanisms necessary to implement and sustain a Cooperative Hypoxic Zone Monitoring Program. The complete report is available at: <https://www.ncddc.noaa.gov/activities/healthy-oceans/gulf-hypoxia-stakeholders/workshop-2016/proceedings/>.
- An ongoing project with the objective to provide a range of realistic scenarios of future environmental changes in the northern GoM (including the shelf region) for the research community and fisheries resource managers continues to develop the regional ocean model (GOM8). GOM8 reproduces reasonably well main circulation and hydrographic patterns, such as the Loop Current, mesoscale eddies, hypoxic region over Texas and Louisiana shelves, SST, and surface chlorophyll for a comparison between model and satellite chlorophyll. Modeling of small and large plankton components allows a better representation of ecological processes in the coastal and oceanic domain. Seasonal variability of phytoplankton biomass shows significant regional differences across the northern GoM. The next phase of this project will be to obtain future projections over the 21st century of physical & biogeochemical processes in the northern GoM under a high and a medium-to-low CO₂ emission scenarios, using the model configured from task 1 and projected atmospheric fields from the Coupled Model Intercomparison Project phase-5 (CMIP5).
- The analysis of the Biscayne Bay water quality data indicated that following a significant bloom of a picophytoplankton (*Synechococcus*) in September of 2005, the oligotrophic system had shifted to a more phytoplankton dominated system than the benthic/submerged aquatic vegetation system that dominated prior to the 2005 bloom. Results of this analysis (with others ongoing) are being used to develop process studies for additional data collection that will be incorporated into a coupled hydrodynamic model for ecological assessments that will be used to inform watershed management and habitat restoration decisions.
- Calibration and validation of ocean products on NOAA VIIRS for monitoring oceans continues with several outcomes. As a result, new ocean products have been developed from the VIIRS orbital overlap and have been validated. Measurements of diurnal changes in ocean color in turbid coastal regions in the Gulf of Mexico were characterized using above water spectral radiometry. Protocols were developed for collection and processing of in situ



optical data used for ocean color calibration and validation. These included the IOP floating hyperpro and above water ASD instruments. Results of protocols and all data from the ocean color cruises were transitioned to NOAA and put into cruise reports. The WavCIS platform is transitioning daily data to NASA and NOAA for calibration and validation of the Ocean Color on VIIRS satellite. These data are being used for maintaining high quality VIIRS products.

- NGI staff supported the nascent development of a Coastal Ecosystem Data Assembly Center, investigating the development of innovative data management solutions to enhance NOAA's data management, visualization and dissemination capabilities.
- Data and scientific expertise were provided to GoMRI's data collections, and to the National Resource Damage Assessment Deep Water Horizon incident close out data collections.
- An enduring mapping center to address research and development needs that advance the science and practice of hydrography and cartography has been established at the University of Southern Mississippi. The research plan encompasses five thrusts (e.g. Sensors/Platforms, Positioning, Water Levels, Data Management, Data Portrayal). An initial effort included the use of Lidar data for several significant sections of the Northern Gulf Coast for comparison to shorelines depicted on existing charts.
- Comparative metagenomics methods are being utilized to indicate sites that are under pressure from anthropogenic sources. The technology includes the use of underwater autonomous vehicles to match the fidelity of ship-board sampling.
- NGI participated in the Bays and Bayous Conference and provided a display that included highlights of ongoing research.
- NGI developed a summary document of research activities that was included as a handout at the NOAA display at the State of the Gulf Summit, GOMA All Hands Meeting, and the Restore America's Estuaries Conference.
- Several NGI researchers serve on GOMA Priority Issue Teams. One example of the impact is that the GOMA Education and Engagement Team, on which Steve Ashby serves as a member of the steering committee, developed several collaborative projects with the NOAA Marine Debris Program.
- Collaboration with other partners included interactions with the Naval Research Laboratory, the National Aeronautics and Space Administration, the US Environmental Protection Agency, the US Fish and Wildlife Service, the Gulf of Mexico Alliance, The Nature Conservancy, Ocean Conservancy, Pacific Marine Environmental Laboratory, the Gulf Coast Ocean Observing System, and several national and international societies and academic consortiums, and several state and local resource management agencies.

NGI RESEARCH THEME: Coastal Hazards



Improving understanding of several significant coastal hazards is more crucial now than ever before. Coastal populations have grown exponentially over the past 30 years. In addition, the Gulf of Mexico is one of the most economically critical ecosystems in the Nation. Coastal hazards and public health and safety are major concerns to agencies responsible for the public good of coastal regions. Weather and ocean phenomena considered in the context of anthropogenic factors pose considerable resource sustainability, financial and safety threats to the Gulf coast region.

Research Theme Objectives

- Forecasting and valuing catastrophic natural events to coastal communities
- Assessment of localized hypoxia in shelf waters
- Address issues of oceans and public health
- Economic assessment of coastal hazards

The examples of projects include:

Further Refinements to Stepped-Frequency Microwave Radiometer Surface Wind Measurements in Hurricanes

Surface wind speed observations from stepped-frequency microwave radiometers (SFMR) are a primary tool for aircraft reconnaissance-based estimates of hurricane intensity and size, both of which are critical for forecasting coastal wind and water impacts from land-falling storms. Variations in sea state, radially and azimuthally within a hurricane with respect to storm center and motion, related to wind and wave directions can lead to errors in the SFMR wind speed retrieval algorithm at nadir. To enhance instrument capabilities, the surface wind and wave directional impacts must be understood and quantified in high wind conditions.

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National Weather Service Social Science Curriculum Delivery FY17

The goal of this project is to deliver a pilot series of a set of courses developed for a training program in social science applications to meteorologists and meteorology professionals. The program consists of 5 courses, 15 hours total. Training program students will learn how to interpret social science research, as well as conduct basic social science research in their field discipline. The courses are designed to provide training program students with an applied social science research overview, developed through each course of the program, culminating in a presentation with policy recommendations from their research. Laura Myers will be the social science SME working in collaboration with NOAA social scientists and the Office of the Chief Learning Officer (OCLO).

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Examination and Validation of Reconnaissance Field Program Data in Multiple HWRF Frameworks

The overarching goal is to perform validation and case study analyses of NOAA experimental HWRF products such as HWRF-HYCOM, HEDAS, and basin-scale HWRF. We also desired to leverage tropical cyclone-tornado research from a previously funded AOML grant.

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NOAA Weather Information and Dissemination All Hazards Stakeholder Needs Assessment Verification Project

The NOAA Office of Dissemination is evaluating the use and applications of NOAA Weather Radio All Hazards to determine user requirements to transform the current NOAA Weather Radio All Hazards broadcast network into a new integrated weather information distribution/dissemination system. A significant component of this evaluation involves stakeholder engagement at all levels of the weather enterprise. The SME/PI will provide high-level research and evaluation guidance and support to the Office of Dissemination (DIS) team for the specific engagement of stakeholders relevant to the evaluation of the NWR.

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Core Infrastructure Enhancements, Operations, and Preliminary Research Activities Supporting VORTEX-SE 2017 Field Campaign Activities - Phase 2: Operations and Research Supporting the VORTEX-SE 2017 Field Campaign

Project objectives and goals

- A. Conduct analysis of existing data relevant to VORTEX-SE science goals
- B. Acquire field measurements from the Mobile Alabama X-band (MAX) radar, Mobile Integrated Profiling System (MIPS), Mobile Doppler Lidar and Sounding System (MoDLS), Rapidly Deployable Atmospheric Profiling System (RaDAPS), and balloon soundings on events of interest prior to the VORTEX-SE field campaign.
- C. Participate in the design and execution of the VORTEX-SE field campaign for the period 7 March to 7 May 2017.
- D. Begin data quality control and analysis of data collected under items B and C.

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NGI RESEARCH THEME: Climate Change and Climate Variability Effects on Regional Ecosystems

NOAA's interest in the nation focusing targeted climate services at all scales will require unprecedented levels of coordination between all agencies. Within the U.S. extensive climate-related changes have already been documented. NGI will help promote research to address the impacts to the region from climate change.

Research Theme Objectives

- Impact of regional climate variability on watersheds and coastal activity
- Explore the impacts of event-scale forcing linked with climate variability
- Examine climate change impacts to fisheries ecosystems

The examples of projects include:

Climate Variability in Ocean Surface Turbulent Fluxes

FSU produces both monthly in situ based and hybrid satellite/numerical weather prediction (NWP) fields of surface winds (the 'FSU Winds') for the tropical Pacific and Indian Oceans. We are also developing a much higher quality surface flux product that assimilates satellite and in situ data. Our long-term monthly fields are well suited for seasonal to decadal studies. They are available in time for monthly updated ENSO forecasts, within eight days after the end of the month. The flux-related variables are useful for ocean forcing in models, testing coupled ocean/atmospheric models, ENSO forecasts, and for understanding some aspects of related climate variability.

The tasks pertain to the continued development/production of products and the dissemination of scientific results. We continue to routinely produce the operational FSU tropical Pacific and Indian Ocean products in compliance with GCOS climate principles.

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University of Southern Mississippi Mapping Center

The goal of this project is to establish an enduring mapping center to address research and development needs that advance the science and practice of hydrography and cartography. The research plan encompasses five thrusts (e.g. Sensors/Platforms, Positioning, Water Levels, Data Management, Data Portrayal) that capture the legislative visions of a mapping center.

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U.S. Research Vessel Surface Meteorology Data Assembly Center

The central activity of the U.S. Research Vessel Surface Meteorology Data Assembly Center (DAC) at the Florida State University (FSU) is the implementation of the Shipboard Automated Meteorological and Oceanographic System (SAMOS) initiative (<http://samos.coaps.fsu.edu/>). The SAMOS initiative focuses on improving the quality of and access to surface marine meteorological and oceanographic data collected in situ by automated instrumentation on research vessels.

Contact: Shawn Smith, Florida State University, smith@coaps.fsu.edu



Predicting the Impact of Anthropogenic Climate Change on Physical and Biogeochemical Processes in the Northern Gulf of Mexico – Part 2

The main objective of this project is to provide a range of realistic scenarios of future environmental changes in the northern GoM (including the shelf region) for the research community and fisheries resource managers. The first project task is to configure and validate a high-resolution ocean-biogeochemical model forced with historical environment conditions from 1979-2014. The second task is to obtain future projections over the XXI century of physical & biogeochemical processes in the northern GoM under a high and a medium-to-low CO₂ emission scenarios, using the model configured from task 1 and projected atmospheric fields from the Coupled Model Intercomparison Project phase-5 (CMIP5).

Contact: Frank Hernandez, University of Southern Mississippi, frank.hernandez@usm.edu

Calibration and Validation of Ocean Products on NOAA VIIRS for Monitoring Oceans

The activity is to establish the on-orbit calibration and validation of satellite ocean products for the VIIRS (Visible Infrared Imaging Radiometer Suite) on NOAA's Suomi National Polar – Orbiting Preparatory Project (S-NPP) satellite. The VIIRS sensor will be used aboard follow-on NOAA satellite missions, therefore it is important to determine calibration and validation procedures for the sensor which can be applied for future missions such as J1 is to be launched in 2018, J2 etc). The project is coordinating with NOAA, NASA, University, and Navy scientists and has demonstrated the capability for VIIRS ocean products to reach maturity within the JPSS program. As a member of NOAA's national JPSS calibration validation team for the United States, we coordinate with many team members for calibration of ocean satellite products.

Contact: Robert Arnone, University of Southern Mississippi, Robert.Arnone@usm.edu



NGI RESEARCH THEME: Ecosystem Management



The ecosystems in the Northern Gulf are the home to valuable fisheries, important recreational activities, and many commercial operations including fossil fuel extraction and coastal industries. The region needs more monitoring and basic information to support resource management. Fisheries ecosystem based management is a fundamental element in NOAA's Strategic Plan and a recommendation of the President's Commission on Ocean Policy as part of an overall strategy to protect, preserve and utilize our marine resources.

Research Theme Objectives

- Monitoring and assessment of coastal marine ecosystems in the Northern Gulf
- Ecosystem-based fisheries management
- Circulation modeling and observations for ecosystem management
- Coastal ecosystem resiliency

The examples of projects include:

Development of Trace Element and Strontium Isotope Water Chemistry Baseline Data for the Pearl River Watershed

The goal of this project is to develop a watershed map of trace element and strontium isotope water chemistry for the Pearl River Watershed. This goal will be accomplished through the following objectives:

- *Objective 1:* Collect water samples throughout the Pearl River Watershed and nearby watersheds flowing into Lake Pontchartrain, Louisiana.
- *Objective 2:* Analyze water samples for trace elements and strontium isotopes (i.e., ^{87}Sr and ^{86}Sr).
- *Objective 3:* Use data to develop a map of water chemistry in the Pearl River Watershed.

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Determination of Movement Patterns and Reproductive Status of Adult Smalltooth Sawfish

The primary goals of this project are to 1) investigate movements and migration of large juvenile and adult smalltooth sawfish (*Pristis pectinata*), particularly those captured in areas of elevated interaction with fisheries, using satellite and acoustic telemetry, 2) assess physiological stress in sawfish as a function of capture methods, and 3) use blood hormone cycling to determine reproductive timing and importance of aggregations sites to mating.

Contact: R. Dean Grubbs, Florida State University, dgrubbs@bio.fsu.edu

Hypoxia National Office Technical Assistance, Observations, Monitoring, and Coordination Project objectives and goals

- Advance the science underpinning management of the large annual hypoxic zone ("dead zone") in the northern Gulf of Mexico.
- Provide a forum for strengthening communication between physical, biological, and socioeconomic modelers of the Gulf of Mexico hypoxia and the Mississippi River diversions, and the users and stakeholders.
- Validate and refine key fisheries management and habitat conservation needs associated with ecosystem effects of hypoxia and large-scale river diversions in the Gulf of Mexico.
- Assess adaptive management needs for advancing ecosystem modeling of hypoxia and diversion effects on habitats and living resources in the northern Gulf of Mexico.

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Continuation of Comparative Metagenomics to Indicate Sites Under Anthropogenic Pressure:

Year 2 Project objectives and goals:

- 1) Determine the taxonomic composition, richness and structure of the primary bacterial members of the microbial consortia from specific sentinel coastal water sites from the Gulf of Mexico as determined by NGS bacterial community sequence profiling and community metagenomic analysis.
- 2) Determine the microbial diversity, relative abundance, and Core Microbiome structure of these Gulf of Mexico OSD GO sites from different Gulf of Mexico habitats.
- 3) Determine whether genetic sequences of specific pathogens, fecal indicators, or markers of microbial contaminants from land-based sources of pollution can be detected in the population of metagenomic sequences from NGS profiling at OSD sites, and if so in what relative abundance.
- 4) Determine whether genetic signatures of specific selected pathogens, fecal indicators, source tracking markers of LBSP microbial contaminants, or metabolic genetic signatures of other potential anthropogenic stress (i.e. such as genes for virulence factors, metabolism of volatile anthropogenic compounds, etc.) can be independently detected in the population of metatranscriptomic sequences from NGS profiling at OSD sites, and if so in what relative abundance. Determine whether there is a relationship between detection of these signatures and proximity to known sources of anthropogenic stress.

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AOML-NGI South Florida Water Quality Analyses

The initial focus of this project is to analyze the temporal and spatial distributions of water quality parameters (particularly nutrients and chlorophyll a) in south Florida coastal systems. NOAA/AOML and its partners have over 20-years of water quality measurements in south Florida coastal and marine waters along with about 20-years of canal loading data for various canals in south Florida.

While focusing on the potential sources of nutrients to south Florida coastal waters, this analysis should develop hypotheses that can be tested with process studies during year 2 of the project. These process studies can be undertaken as added studies that will augment the existing field program in south Florida (www.aoml.noaa.gov/sfp). The process studies should focus on enhancing our understanding of water quality dynamics by addressing key gaps in our knowledge regarding nutrient cycling or sources or emerging issues of concern. These emerging issues of concern could entail investigating potential sources for nutrients from shoreline activities with a high potential to cause disturbance to Biscayne Bay (e.g. Turkey Point Power Plant, South Dade Landfill, wastewater treatment facilities, etc.).

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NGI RESEARCH THEME:

Effective and Efficient Data Management Systems Supporting a Data-driven Economy



Research in this theme will investigate, develop and test innovative data stewardship solutions, enhancing NOAA's data management, visualization, and dissemination capabilities. This research will address gaps in data management capacity resulting from the development of new environmental data sensors and platforms, larger data volumes, and increased public demand for information.

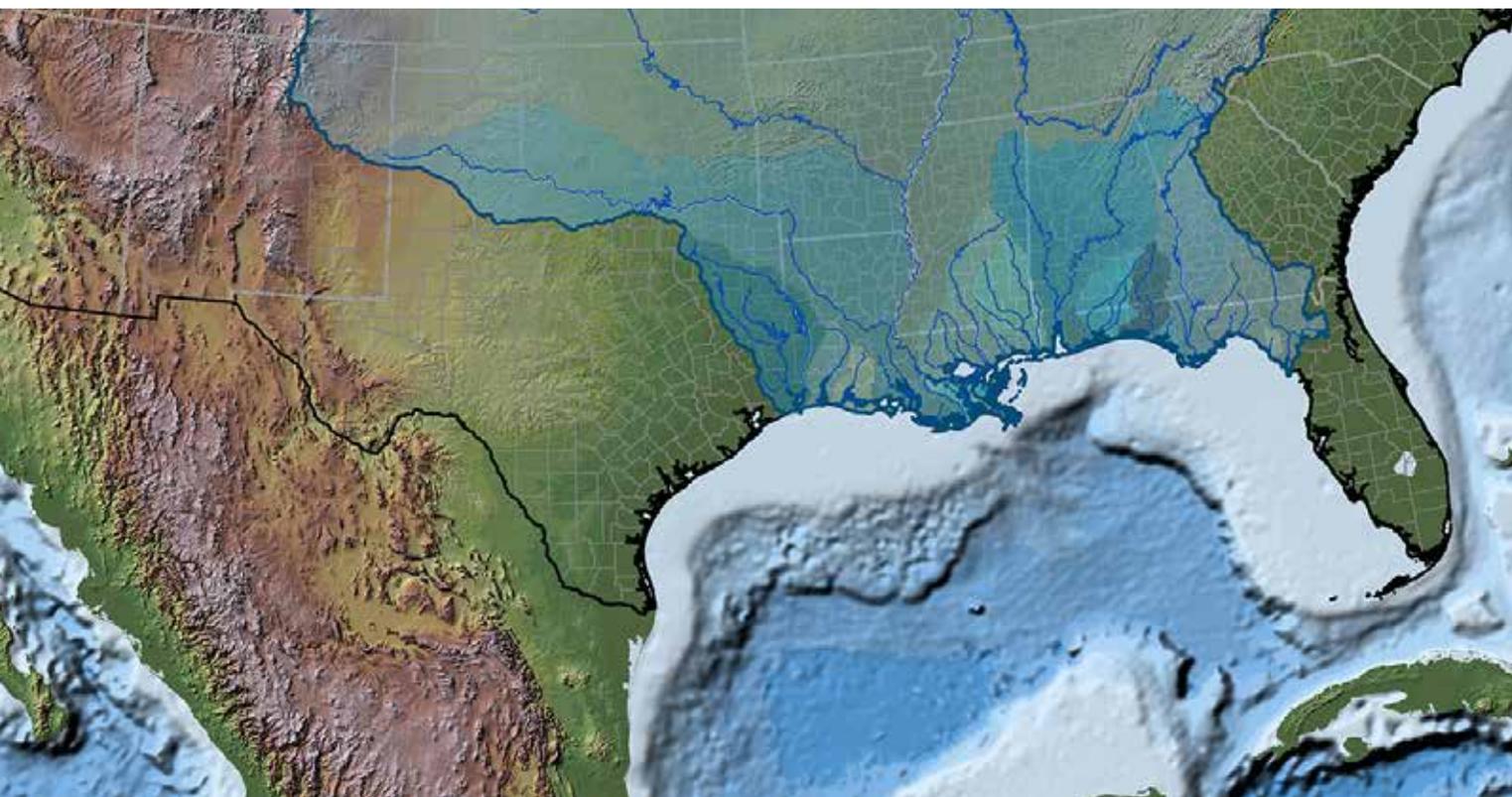
- Semantics-Driven Framework for Understanding Coastal/Ocean Data
- Geospatial Data Management Assessment and Strategic Planning
- Visualization Technologies, including exploitation of the Exploration Command Center

The examples of projects include:

Regional Geospatial Modeling Grant

The Regional Geospatial Modeling Grant was developed to promote geospatial technology to the public through: workforce training in geographic information systems (GIS) for government employees of Mississippi, as well the general public; develop web-based geospatial tools for public access; and the creation of new geospatial data for public consumption.

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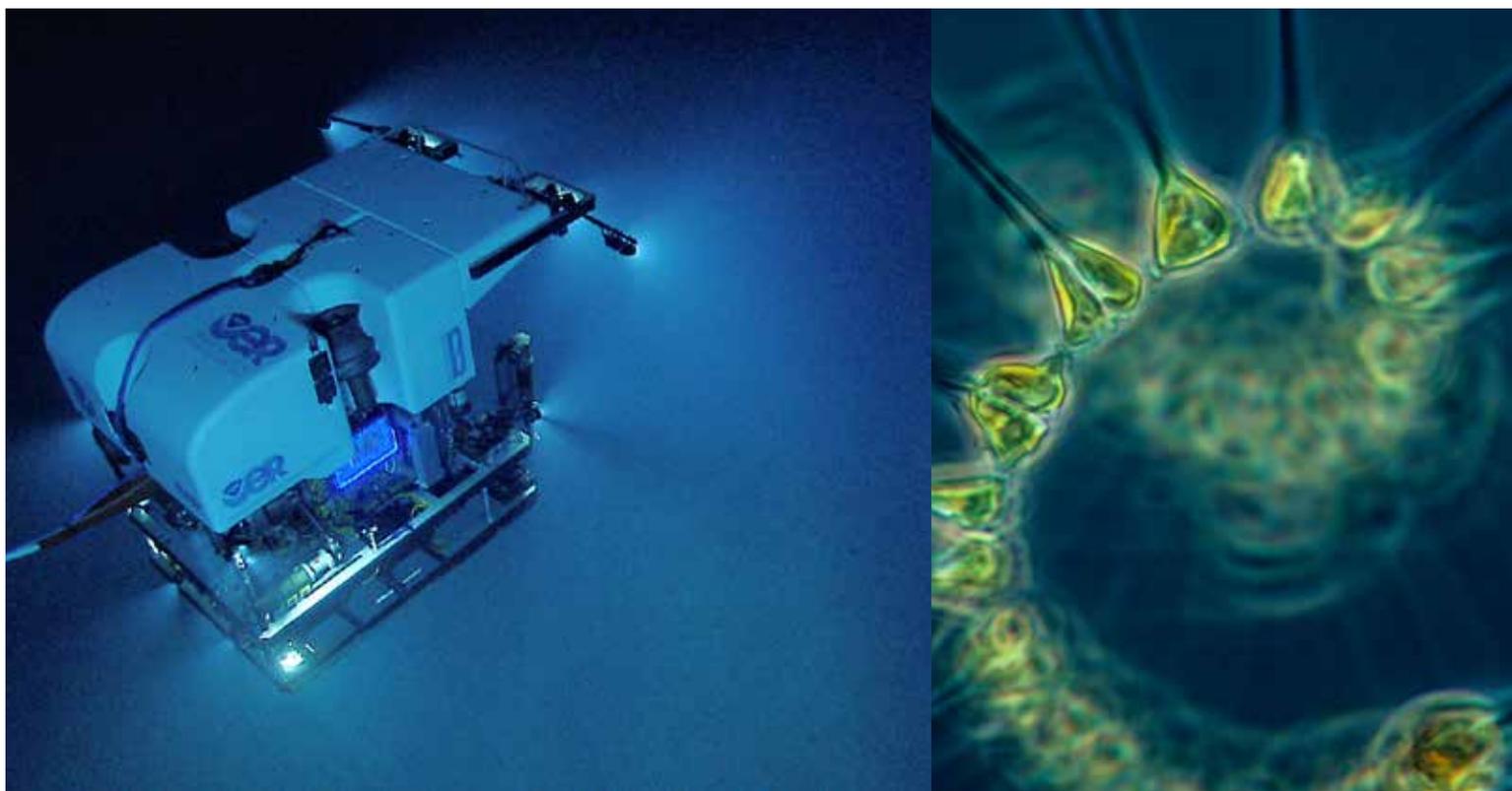
Continuation of Secure Archival Storage for NOAA/NMFS Preserved Specimens at USM's Plankton Archival Facilities

The National Marine Fisheries Service (NMFS) Pascagoula Labs of the Southeast Marine Fisheries Science Center routinely collects approximately 5,000 plankton and other biological samples per year. These samples are fixed and preserved in chemical solutions that are either flammable (ethanol above 70% v/v) or carcinogenic (formalin in seawater) and, therefore, must be stored in suitable enclosures for risk reduction to human health and safety.

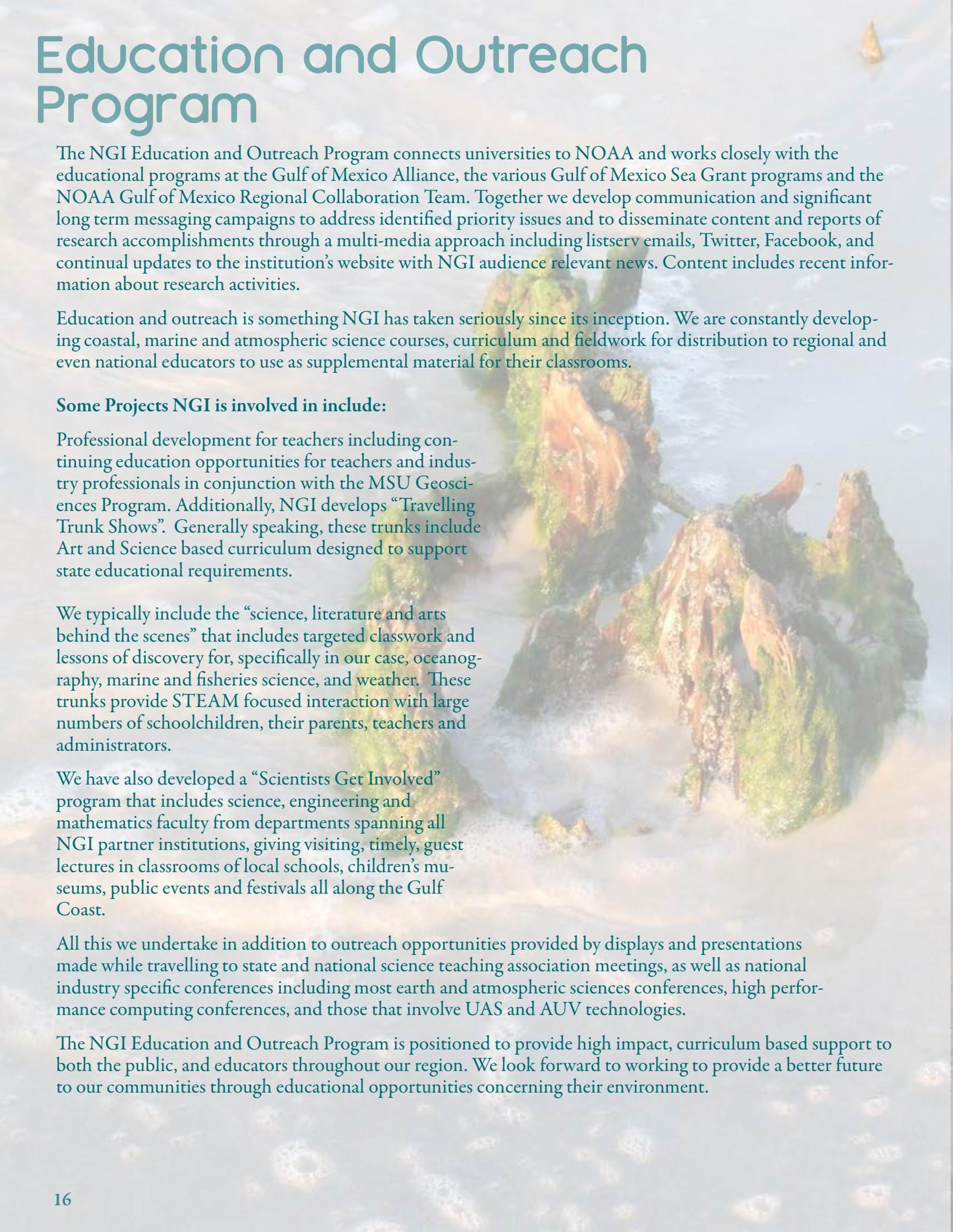
The John C. Stennis Space Center in Hancock County, Mississippi, owns 30 earthen-covered units that were originally built as ammunition storage bunkers for the U.S. Army. These 'bunkers' have been transferred to NASA, who, in turn, leases individual units to tenants with needs where their design is critical. In 2012, The University of Southern Mississippi took possession of one of the bunkers for the purpose of long-term storage of approximately 10,000 zooplankton samples stored in both ethanol and formalin. Additional space in this unit was made available to NMFS-Pascagoula, and approximately 20,000 additional samples were located to the unit.

The combination of earthen bunker for temperature regulation and explosion-proof electrical fixtures made the bunkers ideal for storage of hazardous preservatives. The bunker required minimal modification as steel shelving was donated by NASA and USM purchased safety equipment for the initial bunker. This included two fire extinguishers, a chemical spill kit, organic solvent filtering masks, eye protection, gloves, and aprons. USM provided secure archival storage for NMFS in two bunkers for the last four years. This proposal will continue the agreement for an additional year.

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Education and Outreach Program

An aerial photograph of a tropical island with lush green vegetation and a small boat in the clear blue water. The island is the central focus, with the water surrounding it. The text is overlaid on the image.

The NGI Education and Outreach Program connects universities to NOAA and works closely with the educational programs at the Gulf of Mexico Alliance, the various Gulf of Mexico Sea Grant programs and the NOAA Gulf of Mexico Regional Collaboration Team. Together we develop communication and significant long term messaging campaigns to address identified priority issues and to disseminate content and reports of research accomplishments through a multi-media approach including listserv emails, Twitter, Facebook, and continual updates to the institution's website with NGI audience relevant news. Content includes recent information about research activities.

Education and outreach is something NGI has taken seriously since its inception. We are constantly developing coastal, marine and atmospheric science courses, curriculum and fieldwork for distribution to regional and even national educators to use as supplemental material for their classrooms.

Some Projects NGI is involved in include:

Professional development for teachers including continuing education opportunities for teachers and industry professionals in conjunction with the MSU Geosciences Program. Additionally, NGI develops "Travelling Trunk Shows". Generally speaking, these trunks include Art and Science based curriculum designed to support state educational requirements.

We typically include the "science, literature and arts behind the scenes" that includes targeted classwork and lessons of discovery for, specifically in our case, oceanography, marine and fisheries science, and weather. These trunks provide STEAM focused interaction with large numbers of schoolchildren, their parents, teachers and administrators.

We have also developed a "Scientists Get Involved" program that includes science, engineering and mathematics faculty from departments spanning all NGI partner institutions, giving visiting, timely, guest lectures in classrooms of local schools, children's museums, public events and festivals all along the Gulf Coast.

All this we undertake in addition to outreach opportunities provided by displays and presentations made while travelling to state and national science teaching association meetings, as well as national industry specific conferences including most earth and atmospheric sciences conferences, high performance computing conferences, and those that involve UAS and AUV technologies.

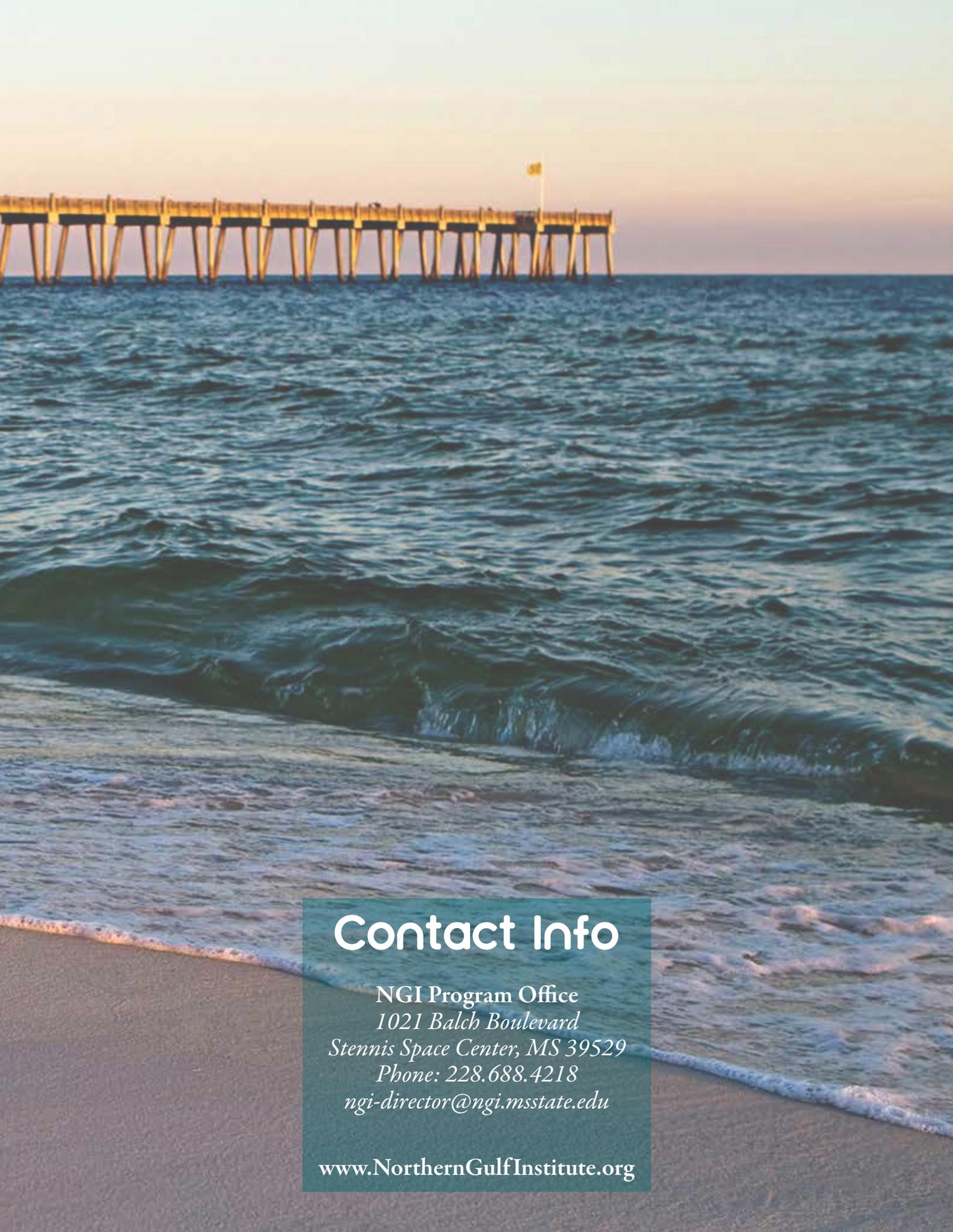
The NGI Education and Outreach Program is positioned to provide high impact, curriculum based support to both the public, and educators throughout our region. We look forward to working to provide a better future to our communities through educational opportunities concerning their environment.

The Council of Fellows

The Council of Fellows is composed of senior scientific/technical representatives from each NGI member academic institution, as well as the NOAA OAR CI Program Director. The Council is chaired by the NGI Director or designee. The Council of Fellows is the principal vehicle for NGI concept development, program strategy, annual research plans, peer review, resource allocation, research and technology coordination, and achieving the overarching goal of regional and disciplinary integration.

- Robert Moorhead, Ph.D., Mississippi State University (Chair, NGI Director)
- Steve Ashby, Ph.D., Mississippi State University (MSU Co-Director)
- Monty Graham, Ph.D., University of Southern Mississippi (USM Co-Director)
- Eric Chassignet, Ph.D., Florida State University
- Robert Twilley, Ph.D., Louisiana State University
- John Valentine, Ph.D., Dauphin Island Sea Lab
- Kevin Knupp, Ph.D., University of Alabama in Huntsville
- Robert Atlas, Ph.D., NOAA/AOML Director, NOAA NGI Lead Technical Program Manager
- Candice Jongsma, Ph.D., NOAA CI Program Director





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NORTHERN GULF INSTITUTE
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Academic Members



THE UNIVERSITY OF ALABAMA IN HUNTSVILLE



THE UNIVERSITY OF SOUTHERN MISSISSIPPI



MISSISSIPPI STATE UNIVERSITY

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