

# The Portal

Official Newsletter of the Northern Gulf Institute

Winter 2009

## NGI "OUTSTANDING" AT FIVE-YEAR PROGRAM REVIEW

Scientists conduct rigorous evaluation

Efforts to promote regional science collaborations that address specific problems of importance to NOAA are likely to become more common... Many elements of the NGI serve as a role model for these developments.

The review panel unanimously agrees that the NGI should be continued, and we rank NGI as "outstanding" based on guidelines provided by NOAA OAR CI.

- Science Review Panel

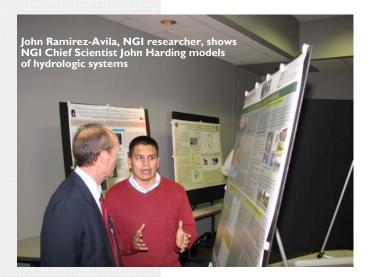
In early October 2009, a distinguished panel of scientists operating under the auspices of the NOAA Science Advisory Board conducted an external review of NGI research, education, and outreach programs. Areas highlighted as particularly successful include strong collaborations with a breadth of research activities, management of the



proposal process that promotes quality competition, and education and outreach efforts that build on existing programs with proven records of success. The panel's recommendations centered on growth and planning for NGI's future: brand and promote the visibility of NGI, create more multi-university collaborations, use a tenyear period for strategic thinking, seek larger-scale funding, and develop metrics that demonstrate success.







(Continued from page 1)

Dr. Mark Keenum, President of MSU, opened the review with welcoming remarks. The assembled NGI team, partners, and NOAA leadership demonstrated their collegial spirit and collaborative work in their presentations and in-depth discussions with the review



panel. Members of the NGI Council of Fellows presented accomplishments and on-going research activities within the four NGI Themes: Ecosystem Management, Geospatial Data Integration and Visualization, Coastal Hazards, and Climate Change and Climate Variability

#### Review Panel Scientists at NGI's Five-Year Review:

- Dr. Eric J. Barron, Director National Center for Atmospheric Research
- Dr. Bonnie Ponwith, Director of Science and Research, NOAA Fisheries Service, Southeast Fisheries Science Center
- Dr. Deana Erdner, Assistant Professor, University of Texas Marine Science Institute
- Dr. Robert Diaz, Professor of Marine Science, Virginia Institute of Marine Science,
   College of William and Mary

#### NOAA Leadership at NGI's Five-Year Review:

- Dr. John Cortinas, Oceanic and Atmospheric Research
- Buck Sutter, National Marine Fisheries Service
- Todd Davison, Gulf Coast Services Center
- Russ Beard, National Coastal Data Development Center
- Dr. Julien Lartigue, NOAA NGI Science Coordinator

Effects on Regional Ecosystems. Also featured was NGI's integrated Education and Outreach Program. Post-doctoral and student researchers discussed their NGI

experiences with the reviewers and shared their research in a poster session.

The NOAA NGI Science Coordinator, Dr. Julien Lartigue, spoke about accomplishments and challenges in the context of the multi-university structure and logistics with NOAA research laboratories.

The reviewers had a panel discussion with key NGI partners that included representatives from the Gulf of Mexico Alliance, the Sea Grant Gulf of Mexico Research Plan, and the EPA Gulf of Mexico Program. The panel concluded with a discussion with member universities.

### NGI MAKES BIG SPLASH AT OCEANS '09 CONFERENCE

World's leading conference and exhibition on marine science, technology, and engineering

NGI established a significant presence at this year's Marine Technology Society/IEEE OCEANS '09 Conference held in late October at the Biloxi Coast Coliseum and Convention Center. The conference drew a crowd of over 1,500 with 375 technical paper presentations. Regional media covered the event and highlighted NGI research and activities.

#### NGI did a fabulous job branding to a great audience.

 Ed Gough, Technical Director, OCEANS '09 and Technical Deputy Director, Naval Meteorology and Oceanography Command

NGI researchers presented in the technical sessions and supported the high school activities at the conference. The prominent and eye-catching NGI exhibit, designed and produced by the HPC Publishing Group at Mississippi State University, drew many attendees and provided an inviting setting for researchers and staff to share the fruits of three years of NGI research and to introduce themselves to the marine science, technology, and engineering community. The numerous visitors provided an excellent opportunity to introduce NGI and explore opportunities and partnerships. NGI provided additional support as a Conference Bag Sponsor, with the NGI logo prominently displayed on the conference bag received by registrants.

The conference theme was "Marine Technology for our Future: Global and Local Challenges" which reflected the focus of the OCEANS community: act locally to help globally. The OCEANS Committee selected four local topics of global interest, with sessions on Operational







Oceanography, Coastal Restoration, Ocean Observing Systems and Lessons Learned from Recent Hurricanes to augment traditional topic areas and to highlight recent issues, concerns, and solutions that extend around the globe. The committee also recognized the Mississippi Gulf Coast as having the largest population of oceanographers in the world represented by various entities to include federal agencies, large contractors, small businesses, state and local government agencies, and other

industries. Additional information about the OCEANS '09 conference can be found at www.oceans09mtsieeebiloxi.org or at www.mtsociety.org/conferences/Ocean.aspx.



#### **Media Coverage OCEANS '09**

Mississippi Public Radio spoke with David Shaw, former Director of NGI, about the sustainability of the Gulf of Mexico. MPR also interviewed Bryon Griffith, Director of the EPA Gulf of Mexico Program, who spoke about the Gulf of Mexico as an energy and fishery source and an economic engine with seven large ports. To listen, please go to www.northerngulfinstitute.org/home/MPB\_David\_Shaw.mp3.

Mississippi Gulf Coast WLOX TV aired an in-depth interview with David Shaw who explained the importance of oceans health, nutrient management, coastal preparation for future hurricanes, and hypoxia in the Gulf of Mexico. To view, please go to www.northerngulfinstitute.org/home/WLOX\_David\_Shaw.flv.

#### NGI Presentations at OCEANS '09 Technical Sessions:

Inundation Modeling - Pat Fitzpatrick "A Proposed New Storm Surge Scale"

Hyperspectral Observations - Steve Lohrenz
"Hyperspectral Remote Sensing of Water
Mass Properties in a River-Influenced
Coastal Region"

US IOOS and OOI in Action - Stephan Howden "The Central Gulf of Mexico Ocean Observing System: Development, Resiliency and Lessons Learned"

Hypoxia: The Dead Zone - Dubravko Justic
"Application of Unstructured-Grid Finite
Volume Coastal Ocean Model for the Gulf
of Mexico Hypoxic Zone"

Data and Visualization - Keqin Wu "Using FLOWVIS Techniques to Study Ocean Flows;" Derek Irby "Improving the Understanding of Hurricanes: Visualizing Storm Surge;" and Philip Amburn "Geospatial Visualization using Hardware Accelerated Real-Time Volume Rendering"

### NGI SUPPORTS OCEANS '09 HIGH SCHOOL ACTIVITIES

Pre-conference activities engage students

NGI assisted with the OCEANS '09 high school activities as MTS/IEEE members shared their expertise with students to inspire them to consider careers in marine technology. Six classes of over 150 students from the Gulf Coast participated in a hands-on emergency man-



agement simulation, "e-Missions Operation Montserrat," developed by the NASA Challenger Center. Students turned simulated satellite data into real-time information as a volcano erupted on a Caribbean island while a Category 3 hurricane approached. They divided into teams and tracked the volcano, hurricane, evacuation and communication activities (see www.emissioncontrolcenter.com for more information about this event).



The Marine Advanced Technology Education Center hosted "ROV-in-a-Bag" and let students assemble and fly simple ROVs in two pools. Sharon Walker of the J. L. Scott Marine Education Center led a fish dissection activity for the students. The Naval Oceanographic Office from Stennis Space Center brought a specially-outfitted personal watercraft used for near shore hydrographic survey for students to learn about its functions and use.

# STUDENT SPOTLIGHT: NGI FSU DOCTORAL STUDENT RECEIVES SEA GRANT MARINE SCIENCE AWARD



Austin Todd, a Ph.D. student in oceanography at Florida State University's Center for Ocean-Atmospheric Prediction Studies working on NGI research, is the recipient of the first Guy Harvey Excellence Award in Marine Science. The award is administered by the Florida Sea Grant College Program and recognizes undergraduate and graduate students enrolled full time at Florida Institutions of Higher Education who are conducting work related to improving our renewable, finite marine resources through science. The \$2,000 award will be used to support Todd's research in understanding the physical mechanisms responsible for the onshore transport of gag grouper larvae from spawning grounds near the northeastern Gulf of Mexico continental shelf break to sea grass beds along the coast of the Florida Big Bend.

## RESEARCH SPOTLIGHT: NGI STUDIES OCEAN PROCESSES THAT IMPACT FISH POPULATIONS

Gag grouper in FL Big Bend Region is focus of research

The Florida Big Bend Region (BBR) in the northeastern Gulf of Mexico supports fish populations that are important both ecologically and economically, yet it is one of the least studied regions in the Gulf. The BBR is home to a variety of habitats that support finfish populations including estuarine, sea grass, and hard bottom reef systems from the coast to the outer edge of the wide shelf. Several important fish species depend on these different habitats at various times during their life cycle.



NGI researchers at Florida State University, in collaboration with the NOAA National Marine Fisheries Service (Panama City), are working to better understand the physical oceanographic and atmospheric environment of the BBR and its impacts on regional

ecosystems and fish populations. Better knowledge of onshore transport processes may lead to improved stock assessments and management of fisheries. The existence and variability of onshore transport mechanisms may, in part, explain the large variability in larvae recruitment which leads to variations in adult fish populations.

Gag grouper (Mycteroperca microlepis) adults inhabit hard bottom reefs over the inner and middle shelf throughout most of the year. During the winter, the gag grouper migrate offshore to spawn on reefs along the outer edge of the continental shelf (70-90 meters deep). After a one or two month pelagic larval phase on the shelf, gag grouper larvae settle in sea grass habitats close to shore where their abundance can vary as much as 200-fold. The mechanism by which the larvae are transported to the near shore sea grass beds is not yet understood. Researchers are using a combination of numerical modeling and observation to identify and characterize the mechanism that helps the larvae migrate to the sea grass nursery habitat. The potential interactions between various physical processes and circulation patterns with larval behavior are the focus



of researchers' investigation. For more information about this research, please contact Steve Morey at smorey@coaps.fsu.edu.

## NOAA-NGI DIVERSITY INTERNSHIP PROGRAM 2010

Summer research opportunities for undergraduate and graduate students

NOAA and NGI invite undergraduate and graduate students to spend ten weeks this summer in an internship that provides opportunities to explore career fields in coastal science, fisheries management, climate change, ecosystem management, and socio-economic data analysis and to support research activities. Students in scientific disciplines (physical, biological, environmental) and in social sciences (economics, anthropology, communications, sociology, psychology) and

those studying education are eligible to apply. Students from communities in the northern Gulf of Mexico region and from populations underrepresented in the NOAA workforce are strongly encouraged to apply.



Interns will receive a stipend to help cover living expenses and travel.

The NOAA-NGI Diversity Internship Program focuses on the foundations of quality scientific data. NOAA collects a wealth of scientific data; and interns will learn how to access, manipulate, produce, and interpret data and metadata. Student interns will work with scientists and experts at research institutions and laboratories to make the data usable by management agencies or the public. NOAA, NGI scientists, and subject-matter experts from the National Coastal Data Development Center will serve as mentors and facilitate intern research. Application materials are due March 17, 2010 or until all positions are filled. For more information please go to http://ngi-internship.disl.org or contact Ms. Nowlin at rnowlin@disl.org.

## NGI EDUCATOR WORKSHOP 2010: REGIONAL ISSUES IN THE GULF OF MEXICO

Professional development for formal and informal educators

Researchers with NGI at their partner institution, the Dauphin Island Sea Lab, will conduct a summer workshop from July 6 – 9, 2010, for K-12 formal and informal educators interested in learning about the Gulf of Mexico. Through lectures, discussions, field excursions, and classroom activities, educators will learn about the Gulf and issues confronting its health such as hypoxia, hurricanes, algae blooms, and climate change.

NGI considers education an integral and important part of their mission. By providing this free workshop, NGI supports the incorporation of its research into classrooms, environmental education centers, and free-choice learning environments. Continuing education credits as well as graduate credit can be earned. Registration deadline is June 18, 2010. For an application and information, please go to http://dhp.disl.org/teachertraining.htm or contact Sara Johnson at sejohnson@disl.org or (251) 861-7515.

NGI HELPS KIDS "GET WET AND MUDDY",

Local students participate in Project WetKids

NGI and the Director for Project WetKids from the University of Southern Mississippi teamed up to give middle school students from the Pascagoula School District a day of hands-on environmental education at the Dauphin Island Sea Lab (DISL). The students

learned about watersheds, human water use, pollution sources, marine life, and marshes at the DISL's Estuarium. Students also saw active research conducted at the lab.

Project WetKids, funded by the National Science Foundation, is primarily an after school program that focuses on environmental education, but it also has weekend and summer events. Visit www.projectwetkids.net for more information or contact its local director, Dr. Julie Cwikla at julie.cwikla@usm.edu.

DISL Estuarium provides hands-on experiences



The Estuarium provided the students a chance to observe living fish, octopus, and other creatures from the Gulf of Mexico. Education personnel at the Estuarium engaged students in activities that encouraged them to be good stewards of our environment.

Ms. Nancy Price
 Science Teacher, Pascagoula High School
 and WetKids Instructor



#### NGI ADVISORY COUNCIL CONVENES IN BILOXI

Regional Stakeholders help chart NGI's course

The NGI Advisory Council met after the OCEANS 09 conference, to provide feedback and recommendations for the NGI Program Office and Council of Fellows. John Dunnigan, former Assistant Administrator of NOAA's Office of Ocean Service, attended as a guest speaker and provided insight on the following NOAA priority issues:

Marine Spatial Planning – demand for space; mapping to support maritime transportation

Climate Change – impacts for specific places

Ocean Policy Task Force – will generate research themes

Economics, Social Science – underinvested; understand motivation for better behavior

Information – products that people can use

Other – collaboration, leveraging, ecosystem-based management, air quality

Following a question and answer session with Dunnigan, the Advisory Council's discussion resulted in recommendations to NGI that included developing a longrange strategic plan with outcome metrics, taking science to operations, facilitating communication about ongoing research, and incorporating "hot" issues in research and activities. The NGI Program Office and Council of Fellows extend thanks to those present at the Advisory Council meeting for their thoughtful deliberations and recommendations.

## NGI COUNCIL OF FELLOWS CONVENES AT DAUPHIN ISLAND

Shelby Fisheries Center hosts winter meeting

The NGI Program Office staff and Research Fellows gathered in mid-December with NOAA partners to discuss NGI and plan for the future. Several recent key events – Executive and Advisory Council meetings and NGI's Five-Year Review – provided the Fellows with meaningful information on which to build forward-looking discussions.

One of the review recommendations to NGI was to develop a long-term, ten-year strategic plan to include outcome/impact metrics. This topic led to a discussion about core elements of NGI: identity, purpose, research focus, selection and feasibility of attaining long-

term goals, collaboration, and funding. NGI and its Council of Fellows are revising the vision and mission of NGI so that next steps can be taken to develop a strategic plan that effectively guides decision making and action for the next ten years. The meeting also covered a social sciences gap analysis, administration of current and future research projects, publishing and publicity, grant development, NOAA-NGI Diversity Internship Program, and planning for the Fourth Annual NGI Conference.

## WISDOM WIND TRACKING PROGRAM CONTINUES

NGI students conduct training and operational launches

Students from Mississippi State University launched Weather In-Situ Deployment Optimization Method (WISDOM) balloons from Waveland and Starkville, MS. These 2 launches were only a small part of the complete deployment of wind tracking balloons for the 2009 hurricane season. The Waveland launch was part of a 2009 WISDOM training workshop held at Stennis



Space Center by NOAA and NGI. The Starkville launch was in response to a then newly-developed tropical storm, Ida. Other launch sites for Tropical Storm Ida were from Puerto Rico and Florida. NOAA and NGI researchers monitored Tropical Storm Ida's progress

overnight and for several days following. The balloons can be tracked real-time through an on-line map produced by MSU's Geosystems Research Institute available on the NGI website at www.northerngulfinstitute.org.

The WISDOM research program, developed at NOAA's office of Oceanic and Atmospheric Research seeks, ultimately, to save lives by improving hurricane forecast time three-to-seven days before a storm's



landfall. Currently, wind and atmospheric data in areas of the Atlantic basin are poorly observed. The WISDOM system uses small super-pressure balloons and small (100 gram) electronics that have over-the-horizon Global Positioning System and satellite radio communications capabilities. The concept is that large numbers of WISDOM balloons with the GPS payload are released to collect data to optimize weather predictions for hurricanes.

WISDOM is a cooperative effort between NOAA's National Oceanic and Atmospheric Administration, Department of Homeland Security, U.S. Air Force, and NGI. Twenty-five students from Mississippi State University, Texas A&M University, and the University of Miami are involved in the current project. Televised coverage of the August 25<sup>th</sup> launch is available at the NGI website www.northerngulfinstitute.org.

## GULF OF MEXICO ALLIANCE ALL-HANDS MEETING

NGI supports Governors' Action Plan II Workshop

In early fall, participants in the Implementation and Integration Workshop for the Governors' Action Plan II gathered in Mobile, AL, to take next steps in addressing priority issues that affect the Gulf of Mexico region.

Researchers from NGI have been supporting this effort from the initial development of the first Governor's Action Plan.

An opening plenary session included presentations on a Model Alliance Community (Naples, FL), Mexico's Red Tide Initiative (from Mexican delegates), Public Awareness Campaign Strategy, a Gulf of Mexico Report Card, and a Decentralized Data Management Plan. Six Priority Issue Teams met for two days in working groups and addressed these topic areas: 1) Coastal Community Resilience, 2) Ecosystem Integration and Assessment, 3) Environmental Education Network, 4) Habitat Conservation and Restoration, 5) Managing Nutrient Inputs and Reducing Impacts, and 6) Water Quality. Following the closing plenary of the Gulf of Mexico Alliance's All-Hands meeting, a NOAA Stakeholder Forum gath-



ered to discuss long-term issues and trends through 2035, and to identify elements that should be incorporated from the Governors' Action Plan II into their revised strategic plan.

#### NGI FACILITATES SEA LEVEL RISE WORKSHOP

Stakeholder collaboration to address NERR needs

National Estuarine Research Reserves (NERR) from around the Gulf and supporting partners gathered in Spanish Fort, AL in September to discuss the management needs of NERRs in response to sea level rise. Researchers from NGI, NOAA, the University of South Alabama, Mississippi State University, and Dauphin Island Sea Lab joined with managers from the Alabama Department of Conservation and Natural Resources, Corps of Engineers, and Apalachicola Bay, Grand Bay, and Weeks Bay NERR to define issues and needs. This

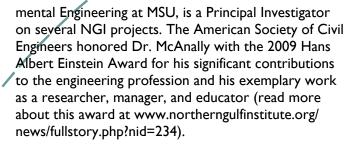
workshop was the beginning of the process to design tools useful for coastal resource managers. NGI thanks all workshop participants in the effort to merge science and management in creating useful tools that meet real needs arising from sea level rise impacts.

#### **NEW YEAR, NEW LEADERSHIP**

Carron and McAnally at NGI

The new year brought leadership changes to NGI. In January 2010, Dr. Mike Carron took the helm as Acting Director of NGI, and Dr. William "Bill" McAnally joined the administrative team as Co-Director and NGI Fellow for Mississippi State University (MSU). This followed Dr. David Shaw, former Director of NGI, accepting the position of Vice President of Research and Economic Development for MSU in December 2009.

Dr. Carron and Dr. McAnally bring extensive NGI experience to their positions. Since joining NGI, Dr. Carron has served as Chief Scientist and Co-Director. Dr. McAnally, a Research Professor of Civil and Environ-



Moorhead at MSU's Geosystems Research Institute

Another administrative change that followed Dr. Shaw's new appointment is Dr. Robert Moorhead's promotion to Director of GRI, a member of the High Performance Computing Collaboratory at MSU and NGI's affiliated institute. Dr. Moorhead, an NGI researcher and a Distinguished Professor of Electrical and Computer Engineering previously served as GRI's Deputy Director. He has been actively involved as Principal Investigator on numerous NGI research projects that utilize geospatial data and visualization tools. For more information about GRI and Dr. Moorhead, go to www.gri.msstate.edu.



The Renaissance Riverview Plaza Hotel 64 South Water Street, Mobile, AL 36602 Watch for details at NGI website at www.northerngulfinstitute.edu

### STUDENT POSTER CONTEST AT 4TH ANNUAL NGI CONFERENCE

**Contestants:** Any graduate student working on NGI-funded research at MSU, USM, FSU, LSU or DISL is invited to enter.

**Deadline:** The on-line entry form must be submitted by **April 5, 2010**. See the Conference Page link on the NGI website www.northerngulfinstitute.org. Late entries cannot be accepted.

**Requirements:** The student must be registered for and in attendance at the 4th Annual NGI conference (May 18-20, 2010 in Mobile, AL). Contestants must have conducted the NGI-funded research featured on the poster. Each student may submit only one poster.



Contestants must accompany their poster for a designated time period at the NGI conference. See Conference Agenda (on the NGI website) for timelines relating to poster display and required presence. Maximum size for posters is 4 feet wide by 4 feet tall. Easels and foam board will be provided for display at conference.

**Judging:** Presentations are judged and scored in seven areas:

Justification, statement of objectives, and summary of results

Visual aids

Voice, language, and physical manner

Originality

Materials and methods

Results and conclusions

Explanation of relevance to northern Gulf of Mexico issues (the "so what" factor)

For more information about the Student Poster Contest, please contact: Joby Prince, joby@ngi.msstate.edu.

## PHOTO CONTEST AT THE 4<sup>TH</sup> ANNUAL NGI CONFERENCE

Contestants: Any researcher, associate, graduate or undergraduate student working on NGI-funded research at MSU, USM, FSU, LSU, DISL or NOAA is invited to submit their original photography to be judged and win prizes.

**Deadline:** Photos must be submitted by **April 14**, **2010.** See the Conference Page link on the NGI website www.northerngulfinstitute.org.

Requirements: photos are required to be unedited originals in JPG or TIFF format, with a minimum of 300 dpi or 5 MP. Photographs should be collected in the geographic area as determined by the NGI focus area: the northern Gulf of Mexico, from the Sabine River on the west to the Suwannee River on the east. Include scientific names for any flora or fauna represented in the photographs.

**Categories**: contestants may submit up to 2 entries in each of the following categories:

NGI Research Activities (photos of NGI people in action doing their research)
Landscapes and Seascapes
Flora and Fauna
Coastal Activities

For entry forms and details, please see the Conference Page link on the NGI website www.northerngulfinstitute.org.

#### SUBMIT TO FUTURE ISSUES OF THE Newsletter:

We invite you to send any newsworthy items to be included in upcoming issues. Please send your submissions to: newsletter@NorthernGulfInstitute.org. We encourage you to include any photographs or images with your articles to make them more interesting.

#### Subscribe to the NGI Listserve:

To subscribe to the NGI mailing list, submit "subscribe ngi" in the text body of a message to: <a href="majordomo@NorthernGulfInstitute.org">majordomo@NorthernGulfInstitute.org</a> with no subject indicated.

#### NGI MEETS WITH NOAA DIRECTOR

Dr. Jane Lubchenco and NGI discuss NOAA priority issues

In the National Data Buoy Center at Stennis Space Center, NGI program staff and researchers joined regional NOAA staff and key partners to welcome NOAA Administrator, Dr. Jane Lubchenco, and hear her describe NOAA's role in meeting national needs. Dr. Lubchenco highlighted the White House involvement in steering NOAA direction and the important role that the Stennis-based staff have in addressing critical NOAA goals. These include sustaining healthy environments to support a healthy economy and actively participating in the recent activities of the Ocean Policy Task Force. After she spoke to the audience, Dr. Lubchenco personally visited with individual groups, including NGI, engaging staff regarding their specific contributions, challenges, needs, and direction.

Dr. Julian Lartigue, NOAA NGI Science Coordinator, and Dr. Mike Carron, Acting Director of NGI, described the unique collaborative structure of NGI and its recent activities, including NGI's successful Five-Year Review by the Science Advisory Board. Dr. Lubchenco asked pointed questions and provided affirmative responses as the group discussed NGI's research themes

and NOAA interests in the northern Gulf of Mexico. NGI researchers and staff detailed project and activity information that address areas Dr. Lubchenco considered of particular importance to NOAA. Dr. Steve Lohrenz, NGI Fellow from the University of Southern Mississippi (USM), along with Dr. John Harding, NGI Chief Scientist, Dr. Lartigue, and Retired Rear Admiral Ken Barbor, Director of USM Hydrographic Science Research Center, discussed specific research performed at the NGI Partner Institutions.



These efforts bridge the information gap of regional environmental monitoring and biological processes that influence regional-scale ecosystems in the northern Gulf of Mexico – a research area in which Dr. Lubchenco said needed particular attention.



Subsequent to the NOAA assembly, Dr. Harding accompanied Dr. Lubchenco on her tour of the Naval Oceanographic Office. Discussions covered a broad range of NOAA/Navy areas of cooperation including NOAA/ Navy data sharing via the NGI/ NCDDC Ecosystem Data Assembly Center (EDAC).

