

U.S. COMMISSION ON OCEAN POLICY



Reports of Site Visits Associated with the Gulf of Mexico Regional Meeting Port of New Orleans, New Orleans, Louisiana March 7, 2002

Background/Area of Site Visits

On February 19, and March 6, 2002, the U.S. Commission on Ocean Policy held site visits in association with the Commission's Gulf of Mexico Regional public meeting. The February 19 site visit was held at Texas A&M University (TAMU) in College Station, Texas. The other two site visits were held simultaneously on March 6, on the Ocean Confidence Oil Rig in the Gulf of Mexico, and at the Naval Oceanographic Office in Mississippi.

Texas A&M University, College Station, Texas

Navy Oceanographic Office (NAVOCEANO), Stennis Space Center, Mississippi

Ocean Confidence Oil Rig, Gulf of Mexico

Texas A&M University Site Visit

Held in conjunction with the university's 125th Anniversary Celebration Symposium, *Sustainable Gulf of Mexico: Research, Technology and Observations 1950-2050*, the Texas A&M site visit drew approximately 250 people. As part of the overall symposium proceedings, three Commissioners -- Dr. James M. Coleman, Vice Admiral Paul G. Gaffney II, USN, and Dr. Frank Muller-Karger -- each gave presentations.

Commissioners Participating in the Texas A&M Site Visit:

Dr. James M. Coleman
Vice Admiral Paul G. Gaffney II, USN
Dr. Frank Muller-Karger
Mr. Paul Kelly
Mr. Larry Dickerson
Mr. Ed Rasmuson

Commission Staff:

Mr. Ken Turgeon

Presentations

- Dr. James P. Ray, Manager, Environmental Sciences, Equilon Enterprises, LLC
- New Biological Discoveries in the Gulf of Mexico

Dr. Ray pointed out the important role that the biological sciences play in proper management of the oceans and in the future exploration of the deep waters of the Gulf of Mexico. He indicated that we know very little about the life cycles of the five species of threatened and endangered species of turtles that live in the Gulf of Mexico. He talked about the rich biological diversity in the Gulf, focusing on the discovery of chemosynthetic communities, the new species of polychaete worm found living on methane hydrates and the abundance and variety of marine mammals which was previously unknown. He stressed that more research was needed to better understand and protect the Gulf biota, especially the marine ecosystems of the Gulf of Mexico Basin. He pointed out that as human activities continue to impinge on these deep water habitats, there is an ever-growing need to have adequate scientific information so that these activities and resources can be properly managed. He raised two key points. The first was that the nation needs to make a long-term financial commitment to acquiring the needed scientific information. The second was that the United States needs a focused national energy plan within which the various government ocean agencies must work cooperatively to support the long-term energy mission. In closing he recommended that greater funding be provided to the federal agencies which fund marine ecosystem research.

- Dr. William Bryant, Professor of Oceanography, TAMU – Deep Water Geologic Hazards in the Gulf of Mexico

Dr. Bryant illustrated via slides and video the various geologic hazards that occur in the deep waters of the Gulf of Mexico, especially in those areas that are currently being explored for oil and gas resources. One major hazard that has been identified by recent discoveries is the "erosional furrows" that are formed at numerous sites along the Sigsbee Scarp in regions where oil exploration is taking place. These furrows are forming at the present time and are caused by extreme currents in excess of two knots that basically flow along the bottom of the Gulf Basin. Such currents could have detrimental effects on sea-floor production systems and pipelines. The furrows tend to run in an east-west direction and are up to hundreds of kilometers in length. Some of the furrows are quite large, measuring 20-30 meters wide and six to eight meters deep. He recommended that greater funding be provided to the Environmental Studies Program of the Minerals Management Service to conduct further studies of these types of geohazards in the Gulf of Mexico.

- Dr. Worth Nowlin, Jr., Professor of Oceanography, TAMU – Gulf of Mexico Components of an Ocean Observing System

Dr. Nowlin noted that two modules of the U.S. Global Ocean Observing System (GOOS) are being designed. The first is an open ocean module designed to monitor, predict and understand marine surface conditions and climate variability. The second is a coastal module designed to sustain healthy marine ecosystems, promote safe and efficient marine operations, enhance national security and predict and mitigate against coastal hazards. He also described the state of several of the 20 or so ocean and coastal observing systems that exist in the U.S. portion of the Gulf of Mexico. He indicated that each of these are separate entities and have been funded by various

methods, but none of the sponsors has the extended funding needed to maintain these systems for any length of time. The actions that are necessary to carry out such an ocean and coastal observing system include:

- Establish data and information management systems.
- Implement sharing of model code and output.
- Complete inventory of existing operational components.
- Determine needs of regional users; prepare initial design for implementation.
- Augment existing systems.
- Evaluate, complete, improve and refine needed sensors.

Nowlin recommended that the Commission fully support the development of a national observing system and provide a permanent source of funding for the systems. He noted that the National Oceanographic Partnership Program's Ocean.US office will fill the role of a one-stop shopping clearinghouse for ocean observing system data and information and that a national interface among the regional ocean observing system's is needed.

- Mr. Spencer Reid, Texas General Land Office – Texas General Land Office and Emerging Coastal Issues

Mr. Reid described the major programs that exist in Texas that deal with coastal issues, including:

- Texas Coastal Management Program – reviews federal and state agency actions for consistency; provides permitting assistance, and addresses coastal non-point source pollution;
- Coastal Impact Assistance Program – reviews impacts to coastal natural resources and communities due to offshore oil and gas exploration;
- Beach Environment Assessment – Beach Watch program monitors water quality at 13 popular Gulf beaches;
- Natural Resources Damage Assessment – assess injuries to natural resources for unauthorized discharge of hazardous substances and pursues claims for compensation;
- Coastal Erosion Planning & Response Act – Texas appropriated \$30 million in two cycles to support erosion response projects and studies;
- Oil Spill Prevention and Response – includes the TABS (Texas Automated Buoy System) and its role in oil spill response.

Reid noted that as the steward of state-owned lands, the Texas General Land Office, is responsible for management of the 367 miles of Texas coastline from the vegetation line on the beach to 10.3 miles into the Gulf of Mexico, as well as millions of acres of submerged land in the coastal bays. He recommended funding of the national coastal observing system by showing the value of the existing systems to management of the coastal zone and coastal resources in Texas.

- Mr. A. R. "Babe" Schwartz, attorney and former State Senator – The Texas Sea Grant College Program

Mr. Schwartz described the operation of the Texas Sea Grant program, one of the first such programs funded in the country. He illustrated numerous examples of applied research that have been beneficial to the state of Texas, and claimed that one of the major successes of the program has been the outreach program for the

coastal population. He indicated that the practical application of usable research has been the hallmark of Sea Grant and, if the program is transferred to the National Science Foundation, it will be lost. He urged the Commission to undertake deliberate consideration of the costs and benefits of any major modification to the current Sea Grant structure and goals of Sea Grant before any changes in organizational structure are undertaken. He recommended leaving Sea Grant in NOAA.

- Dr. James A. Austin, Jr., Professor of Oceanography, TAMU – The Integrated Ocean Drilling Program

Dr. Austin described the new Integrated Ocean Drilling Program (IODP) that is to succeed the present Ocean Drilling Program (ODP). He gave a brief synopsis of its contribution to our knowledge of the geology of the seabed and geological history of the earth including a better understanding of global climate change. He made a strong pitch for continued U.S. participation in the program and for the funding needed to keep the U.S. a strong participant and a leader. Japan will co-lead the IODP with the U.S. and possibly a European consortium. The Japanese vessel "Chikyu" was launched on January 18, 2002, and is a state-of-art, riser-equipped and dynamically positioned vessel which cost \$500 million to build. The proposed U.S. vessel will be a suitable replacement for the JOIDES Resolution and Europe may supply a "mission-specific" vessel that can be operated on coral reefs, shallow-water areas and high latitude environments. All of these vessels should be operational for scientific research in 2006 – 2007. He explained the relationship between IODP and the global ocean observing system and indicated that IODP will form a vital role. He stressed the need for the international academic communities and industry to form partnerships during the new program. He would like the Commission to fully support the funding that will be needed from the U.S. in the overall IODP program.

- Dr. Wilford Gardner, Professor of Oceanography, TAMU – The Oceanographic Research Fleet

Dr. Gardner described the oceanographic vessel building program that is planned for UNOLS. He indicated that if the proposed vessel construction plan is adhered to, the U.S. oceanographic community will have the required research vessels needed for the immediate future. He stressed the need for the program to remain on the proposed schedule and funding levels and any significant deviation from the schedule would result in a severe shortage of research vessels. He would like the Commission to endorse the proposed construction plan and support the proposed budget.

125th Anniversary Celebration Symposium

- Dr. Coleman's presentation explored the history of Gulf of Mexico geological and geophysical research conducted at TAMU over the past 50 years. He highlighted the work done by distinguished scientists from the 1950s through 2002. Dr. Coleman noted that much of our early and current knowledge of Gulf geology was the result of the research conducted by TAMU scientists.
- Admiral Gaffney's presentation centered on the use of America's marine waters as a surrogate for foreign waters. Using the Gulf of Mexico as the specific example, he highlighted the existing ocean research, modeling and monitoring/surveillance systems that benefit the Navy in its littoral zone exercises.

- Dr. Muller-Karger’s presentation explored climate effects on the Gulf of Mexico Ecosystem. His presentation provided a broad overview of the difference between climate and weather effects on the oceanography of the Gulf. The main conclusions were that while climate change is taking place, human-induced changes are acting over much faster time scales and at both localized and regional scales.

Appendix I

Participants:

- Dr. James P. Ray, Manager, Environmental Sciences, Equilon Enterprises, LLC - New Biological Discoveries in the Gulf of Mexico
- Dr. William Bryant, Professor of Oceanography, TAMU – Deep Water Geologic Hazards in the Gulf of Mexico
- Dr. Worth Nowlin, Jr., Professor of Oceanography, TAMU – Gulf of Mexico Components of an Ocean Observing System
- Mr. Spencer Reid, Texas General Land Office – Texas General Land Office and Emerging Coastal Issues
- Mr. A. R. “Babe” Schwartz, Attorney & former State Senator – The Texas Sea Grant College Program
- Dr. James A. Austin, Jr., Professor of Oceanography, TAMU – The Integrated Ocean Drilling Program
- Dr. Wilford Gardner, Professor of Oceanography, TAMU – The Oceanographic Research Fleet

Ocean Confidence Oil Rig Site Visit

On March 6, 2002, the U.S. Commission on Ocean Policy conducted a site visit to the Ocean Confidence drilling rig located 175 miles southeast of New Orleans in the Gulf of Mexico’s Mississippi Canyon. The Ocean Confidence is a dynamically-positioned, semisubmersible drilling rig anchored 7,000 feet above the largest oil discovery in the Gulf of Mexico, the oil field known as Thunder Horse.

Commissioners Participating in the Ocean Confidence Site Visit:

Admiral James D. Watkins, USN (Ret.)
 Robert Ballard, Ph.D.
 Mr. Ted A. Beattie
 Mrs. Lillian Borrone
 Dr. James M. Coleman
 Mr. Lawrence Dickerson
 Vice Admiral Paul G. Gaffney II, USN
 Professor Marc J. Hershman
 Mr. Paul L. Kelly
 Dr. Frank Muller-Karger
 Mr. Edward B. Rasmuson
 Dr. Paul A. Sandifer

Commission Staff:

Dr. Thomas R. Kitsos
 Ms. Laura Cantral
 Ms. Kate Naughten
 Ms. Deb Trefts

Others in Attendance:

Mr. Scott Treibitz
Mr. David Roscow

Presentations

- James V. Dupree, Vice President Deep Water Production, BP

Following a fly-over of the Louisiana wetlands and barrier islands to view wetland restoration efforts from the air, the Commissioners landed on the rig where they received a safety briefing. The group then toured the rig, the bridge, the moon pool and remotely operated vehicle (ROV) operations. Briefings included information on exploration and drilling technology and environmental protection.

According to officials and crewmembers aboard, the rig was designed to operate anywhere in the world in extremely harsh environments and drill as deep as 7,500 feet. The Ocean Confidence is among the world's top five semisubmersible rigs as far as technological capabilities, which include a state-of-the-art dynamic global positioning system. The rig also contains the most advanced drilling systems in use today. Following the tour of the rig, the Commissioners departed for the second half of the site visit which was a tour of the NAVOCEANO facility at the Stennis Space Flight Center in Mississippi.

Navy Oceanographic Office (NAVOCEANO) Site Visit

On March 6, 2002, following a welcome and introductory briefs by Rear Admiral Thomas Q. Donaldson, Commander of the Naval Meteorology and Oceanography Command (CNMOC), and Captain Timothy McGee, Commanding Officer, Naval Oceanographic Office, the Commissioners and staff toured the facilities and received briefings on the following topics:

- Supercomputing Facilities
- Ocean Prediction, Remote Sensing, and Ocean Observing
- Data Fusion
- Nautical Charting
- Hydrographic Operations
- Naval Research Laboratory

Welcome and Introduction

- Rear Admiral Thomas Q. Donaldson

Admiral Donaldson welcomed the Commissioners to Stennis and provided a brief overview of the global capabilities and responsibilities of the Naval Meteorology and Oceanography Command:

- 3,100 personnel
- Eight military survey ships and eight major shore activities
- \$350M Annual Budget

He also stressed the number and diversity of Federal, State and Industry organizations resident on the Stennis Space Center campus:

- 25 government agencies (Federal, Mississippi, Louisiana)
- Four universities / colleges
- Over 50 private companies

Finally, Admiral Donaldson asked the Commissioners to examine NAVOCEANO's current capabilities, future capacity, and demonstrated partnerships with Federal, state, and local government agencies, academia, and private industry.

NAVOCEANO Overview

- CAPT Tim McGee

CAPT McGee stated that operational oceanography is the systematic production of ocean knowledge. Ocean knowledge (both a cognitive and functional process) is at the end of a **Data + (Processing) → Information + (Cognition) → Understanding + (Judgment) → Knowledge** continuum.

He also stressed the Nation's long-term, **\$5.2 Billion Capital Investment in NAVOCEANO**. Specifically:

- \$153M annual operating budget
- \$1.2B in operational oceanographic infrastructure:
 - \$800M afloat capability
 - \$300M supercomputer, visualization, and mass storage
 - \$ 80M information technology Infrastructure
 - \$ 70M operational facilities
- \$4.0B in the world's largest oceanographic data holdings.

CAPT McGee discussed the NAVOCEANO eight ship survey fleet. Their operational tempo is 74%, they operate globally with contract crews and government scientific survey party personnel, and NAVOCEANO has operated survey ships for the past 172 years. Finally, he stated that NAVOCEANO is a National Center of Excellence in the following areas: ocean survey; ocean modeling, prediction and visualization; ocean remote sensing; ocean data warehousing, quality control and distribution; ocean data fusion (knowledge production); and ocean exploration.

During Captain McGee's brief, several Commissioner's asked about the availability of NAVOCEANO's data holdings, given its classified DoD missions. CAPT McGee responded that much of the data were reviewed and declassified in the mid-90's, so that there are only a few useful (for civilian purposes) datasets left that will likely remain classified. If one considers historical, modeled, and remotely-sensed data as a whole, up to 90% of the total holdings are currently unclassified. If NAVOCEANO became a "national data center", there is no reason that a few top NOAA, USGS, NASA, etc. personnel could not obtain clearances and have the ability view these classified datasets. This concept was fully vetted in the MEDEA study of the mid to late 1990's. The real strength of NAVOCEANO, in addition to its vast data holdings, is the proven ability to manage very large oceanographic datasets. NAVOCEANO continues to invest in the intellectual, computational, and physical capacity to manage the oceanographic data holdings of the future.

- **Mr. Stephen Adamec, Director Stennis / DoD High Performance Computing Center**

Mr. Adamec conducted a brief tour of the Major Shared Resource Center (MSRC), and the off-site mass storage facilities located in former Army ammunition bunkers on the Stennis campus. Mr. Adamec stressed the \$300M continuing investment in the MSRC by DoD, the continually upgraded hardware capabilities, and how 50% of its capability has gone to the operational climate – weather – ocean user communities. Computing power and mass storage capability continue to grow at an

exponential rate at the MSRC, and both measures of computational capacity will triple between now and 2004. At the former ammunition bunkers, the Commissioners toured the exceptionally secure, redundant, off-site petabyte capacity storage facilities now in use. Barring a nuclear blast at Stennis, the data are secure.

- **Mr. James Rigney, Director of Operations, NAVOCEANO**

The Commissioners were briefed by Mr. Rigney on the multiple types of unclassified, remotely-sensed data that NAVOCEANO processes, including multi-channel sea surface temperature, altimetry and ocean color. Other processes including in the briefing were the uses of in situ data from survey vessels, ships of opportunity, ARGO floats and buoys -- many of which are deployed by NAVOCEANO.

Mr. Rigney also gave an overview of operational modeling efforts at NAVOCEANO, stressing the difference between a robust operational system and models run in an R&D environment. Operational modeling is unique at NAVOCEANO because its hardware suite continually undergoes significant upgrades, funded by the DoD High Performance Computing initiative. However, both the operational modelers, and the supercomputer managers have made the commitment to support operational modeling in this environment. The result is a much more rapid increase in computation power available to operational modeling than exists at most environmental centers. NAVOCEANO is currently running global and regional circulation models, as well as selected high resolution estuarine basin models. They also run rapidly relocatable wave, surf and tidal models, depending on their users' needs.

The productive work from the Data Buoy Cooperative Panel was highlighted, along with an overview of the drifting buoy program. The cooperation and data format standardization between many operational and academic organizations located in multiple countries may serve as a model for an Integrated Sustained Ocean Observing System (ISOOS).

- The Digital Bathymetric Data Base with Variable Resolution (DBDB-V) program was briefed. Key aspects of this data base (in addition to its resolution varying from 0.1 to 5.0 minutes) is the ability to ingest many different formats of data inputs, and the capability to produce databases that include and/or exclude data marked with varying degrees of restrictiveness (*e.g.*, classified, publicly releasable, commercial proprietary, etc.). The standards (HDF) used to create the database come from the University of Illinois / Urbana; that is, NAVOCEANO is not using a Navy-proprietary standard. Future plans for DBDB-V include creating a world-wide, publicly-releasable bathymetry grid whose resolution is no coarser than 1 or 2 minutes (~1.5 – 3 km resolution), extending the database into very shallow water, and addressing technical land/sea interface issues to ensure DBDB-V is compatible with selected global terrain databases.

- **Mr. William Lingsch (Acting) Director, Warfighting Support Center**

Presentations and discussion centered on how disparate data are merged and fused into a timely and user-relevant product, how NAVOCEANO understands users' needs, and how the command ensures that the products are useful. The Commissioners also received a presentation on how data are updated in the rapidly changing littoral

environment and though NAVOCEANO's riverine work. The diverse nature of the raw data was emphasized, and numerous remotely-sensed visible, radar, hyper-spectral, and infra-red images annotated with relevant Oceanographic data were shown to the Commissioners. Mr. Lingsch stated that NAVOCEANO produces nearly 2000 of these operational products each year. Primary customers are in DoD, although Customs, USCG, and other Federal agencies also use NAVOCEANO products.

- **Mr. Max van Norden, Ms. Barbara Reed, Hydrographic Department**

Mr. van Norden and Ms. Reed briefed the Commissioners on NAVOCEANO's hydrographic capabilities, stressing the numerous "tools in the tool box" available to meet operational Hydrographic challenges. They discussed their side scan sonar capability, an airborne Scanning Hydrographic Operational Airborne Lidar Survey (SHOALS), the international Hydrographic Cooperative Program (HYCOOP), where NAVOCEANO assists with the technical collection of data and production of charts at the invitation of a host nation. NAVOCEANO adds to its data holdings in regions where DoD would not otherwise have access, and the host nation receives technical expertise in hydrographic operations, the processed data, and charts suitable for navigation.

Following the briefs, the Commissioners got underway on the Pearl River with the Fleet Survey Team (FST) on Hydrographic Survey Launches (HSL), where they were briefed on the rapid deployment capabilities of the FST and observed side scan sonar operations.

- **Dr. William Jobst, Superintendent, Naval Research Laboratory, Stennis Space Center**

Dr. Jobst briefed the Commissioners on the robust two-way interactions between the Naval Research Laboratory at Stennis Space Center and NAVOCEANO. Dr. Jobst stressed the importance of the collaboration to both organizations, and how a common focus on the ultimate user of a product enhances both commands' success. Dr. Jobst also discussed the importance of understanding and correctly modeling global oceanography to the successful forecasting of discrete littoral events.

Summary:

NAVOCEANO has the capability and capacity to collect, securely store, and fuse data; to assimilate these disparate data into current generation numerical oceanographic models, and through a combination of analysts and technology and the DoD requirements process, to derive and distribute timely and relevant products that lead to intelligent decisions.

Admiral Donaldson and Captain McGee believe that the Navy model of operational oceanography, coupled with the Navy's requirements' process (to ensure user relevance to products) is a good template from which to design a National Operational Oceanography center. They also believe that, given appropriate resources, the NAVOCEANO / Stennis infrastructure could be leveraged to serve as the site for a pilot project to collect and assimilate Integrated Sustained Ocean Observing System (ISOOS) data and develop and deliver relevant products to civilian authorities.

Powerpoint briefs of several of the NAVOCEANO presenters are available on CD-ROM at the Ocean Commission office.

Appendix I

Presenters:

- Rear Admiral Donaldson, Commander of the Naval Meteorology and Oceanography Command
- Captain Timothy McGee, Commanding Officer, NAVOCEANO
- Mr. Steven Adamec, Director, Stennis / DoD High Performance Computing Center
- Mr. James Rigney, Director of Operations, NAVOCEANO
- Mr. William Lingsch Deputy Director, Warfighting Support Center, NAVOCEANO
- Mr. Max van Norden, Director of Hydrography, NAVOCEANO
- Ms. Barbara Reed, Office of Hydrography, NAVOCEANO
- Dr. William Jobst, Superintendent, Naval Research Laboratory, Stennis Space Center

Ocean Confidences Oil Rig Site Visit (forthcoming)