A group of six scientists and students from The University of Southern Mississippi Department of Marine Science participated in a cruise on the Gulf of Mexico studying how the coastal oceans influence climate-related greenhouse gases in the atmosphere.

“The project, led by Department of Marine Science Chair Steven Lohrenz, is in collaboration with Dr. Wei-Jun Cai of the University of Georgia. The group studied how carbon dioxide, a greenhouse gas, is taken up and released in coastal waters.

“This is one of the most extensive surveys to date of the dynamics of carbon dioxide in northern Gulf of Mexico coastal waters,” said Lohrenz. “We are seeing evidence for a very strong biological influence over much wider areas than previously studied.”

The Gulf of Mexico has been identified by the North American Carbon Program as a region of particular importance in influencing carbon dioxide levels in the atmosphere. The team has found preliminary evidence for particularly strong uptake of carbon dioxide in the vicinity of the Mississippi River, where high biological production is believed to be responsible for reducing carbon dioxide levels in surface waters.

“This cruise will generate data that are critical to my research on remote sensing of particle dynamics in coastal waters,” said marine science doctoral student Sarah Epps of Anchorage, Alaska. “In a world where growing instrumentation and remote sensing technologies allow us to observe large areas of the sea, it becomes increasingly more important to gather data to validate and calibrate these capabilities.”

The project was conducted aboard the research vessel Cape Hatteras from the Duke Marine Laboratory. The cruise, one of a series of cruises that will be conducted by this team, is funded by the National Science Foundation and NASA.
As we begin another academic year in the Department of Marine Science, we mark the passing of the fourth anniversary of Hurricane Katrina. This was an event that devastated the Mississippi Gulf Coast and personally affected all of us, including some who lost everything in the storm.

As is true for the rest of the Gulf Coast, over the past four years, we have seen tremendous growth in our program, in many ways emerging from the disaster stronger and better. Despite tough economic times, our program continues to remain strong with a bright future that can largely be credited to a talented and dedicated team of faculty, staff and students.

We anticipate the completion of the new Oceanographic Support Facility, a 10,000 square foot multi-use complex that will expand our presence at the John C. Stennis Space Center and grow our capabilities to conduct field operations and assemble and service oceanographic instrumentation.

With the help of a grant from the Department of Education, we are upgrading our technology infrastructure, including steps to make it more resilient in the event of extreme weather events, such as Katrina.

Our faculty, staff and students continue to carry out cutting edge research on various topics, some of which are described in this issue and include climate research and geospatial mapping on the Gulf Coast.

Southern Miss Marine Science researchers continue to present their work in national and international settings and contribute to efforts to enhance public awareness and understanding of the importance of the oceans to our future. Our academic programs continue to excel with graduates successfully finding jobs in their field of interest and our programs attracting high quality students from the region and from around the world.

Diversity, unity, creativity, and passion are our strengths and the willingness to make a difference is the key to our future.
Department of Marine Science professors Kjell Gundersen, Scott Milroy and Karen Orcutt were featured speakers at the 2009 National Science Teachers Association Conference in New Orleans where over 9,000 science teachers from across the Nation gathered March 19 - 22. The featured speakers presented the workshop titled “COSEE: The Oceans, They Are A-Changin’: How Might This Affect You?”

Targeting middle and high school science educators, the professors used the COSEE-OS Climate Interactive Web site (http://cosee.umaine.edu/cfuser/index.cfm) and concept maps to illustrate concepts ranging from biological and chemical processes in the ocean to global climate change.

Gundersen used the concept map tool developed by the COSEE Mid-Atlantic group and talked about biological processes in the coastal waters off Mississippi that remove carbon from the atmosphere (phototrophic phytoplankton). This process was compared to the organisms that return carbon to the atmosphere (heterotrophic microplankton). These processes are not linear and the concept map proved a great tool to illustrate the different pathways and short cuts.

Milroy addressed concepts focusing on the Mississippi River watershed and Gulf of Mexico environment. These concepts include water cycle, nutrient flux (nitrogen and phosphorus) from land to the ocean, coastal ecosystems and carbon fixation by primary producers. He also addressed how human behaviors such as over-fertilization, increased production of corn and soybeans and increased agricultural processes on land can affect delicate ecosystems in the ocean and influence climate change.

Orcutt focused on the often misunderstood concept of nitrogen fixation by open ocean primary producers, particularly the contribution of planktonic filamentous cyanobacteria called Trichodesmium which live in colonies and contribute significantly to the global nitrogen cycle by “fixing” nitrogen gas into more biologically useful nitrogen-containing compounds (e.g., NH4, ammonium). She also described the roles of other oceanic biological pump and microbial loop “players” such as heterotrophic bacteria, dinoflagellates and diatoms. Additionally, she addressed how the biological pump is a process that is influenced by atmospheric processes such as dust deposition, which in turn is influenced by climate change.

The Professors’ PowerPoint presentations can be found on the COSEE-OS Climate Interactive Web site which contains resources for teaching, including a concept map builder.

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Class of 2009 Hydrography Students Chart Gulfport Harbor

The class of 2009 hydrographic survey project was conducted primarily with the Research Vessel LeMoyne using state-of-the-art multibeam and side scan sonars and advanced techniques in kinematic GPS positioning. Most of the equipment used was loaned by the U.S. Navy Fleet Survey Team.

After processing and analyzing all of the collected data, products in compliance with standards set by the International Hydrographic Organization will be provided to the Port of the Future organization for their planning purposes and to NOAA for future chart updates. The students graduated with a master of science degree in hydrographic science and were recognized in a ceremony July 31.
SPECIAL PROGRAMS AND ACTIVITIES

• In February, Charlotte Brunner officially completed her three-year term as Editor-in-Chief of the Journal of Foraminiferal Research and handed over the editorship to her replacement, Dr. Kenneth Finger of the University of California - Berkeley. During her term, she guided to publication 70 research papers in 12 issues of the journal. The Journal of Foraminiferal Research is published by the Cushman Foundation for Foraminiferal Research and continues the contributions from the Cushman Laboratory for Foraminiferal Research, which was started in 1925 by Joseph A. Cushman.

• Steve Lohrenz gave a plenary presentation at the North American Carbon Program Second All Investigators meeting in San Diego, Calif., February 17 - 20. The plenary talk was titled “Toward understanding of carbon fluxes in the coastal oceans: synthesis activities for the U.S. East Coast and the Gulf of Mexico.”

• Jerry Wiggert, along with J. Vialard and M. Behrenfeld, presented “Use of a newly developed remote sensing production algorithm to assess the Indian Ocean dipole’s impact on regional to basin scale biogeochemical fluxes” at the Aquatic Sciences Meeting, ASLO, in Nice, France, January 25 - 30.

• For the multi-agency seminar “Hypoxia in the Mississippi Bight,” organized by the Mississippi Department of Marine Resources and hosted by the MSU Coastal Research and Extension Center in Biloxi, Stephan Howden gave the keynote address titled “History and Physical Environment of Hypoxic Zone in the Mississippi Bight.”

• Organized by NOAA and the Chinese Arctic and Antarctic Administration, Laodong Guo attended the Pacific Arctic Group Synthesis Workshop on Arctic Marine Carbon Cycles June 29 - July 1 in Xiamen, China, where he presented “Importance of terrestrial organic carbon in the Arctic marine carbon cycle.” Guo also co-chaired a morning session and a group discussion during the workshop.

• Charlotte Brunner, her students Jennifer Kuykendall and Valerie Hartmann, and colleague Stephan Howden, presented an invited talk titled “The Impact of Hypoxia on Foraminifera in the Northern Mississippi Bight” at the Mississippi Department of Marine Resources Seminar Series, February 20, in Biloxi.

• Steve Lohrenz gave a presentation to the Gulf of Mexico Coastal Ocean Observing System Board of Directors February 25 in Orlando, Fla. The talk was titled “Elements of a Gulf of Mexico Carbon Observing System.”

STUDENT ACTIVITIES

• Virgilio Masionet, graduate student of Stephan Howden, won second place for the Outstanding Oral Presentation at the Mississippi Academy of Sciences for his talk, “Using Ocean Color to Measure Coastal Sea-Surface Salinity of the Louisiana Shelf.” His co-authors are Joel Wesson and Derek Burrow of the Naval Research Laboratory at Stennis Space Center, Chris Osburn of North Carolina State University, and Stephan Howden.

• Xuri Wang, graduate student of Laodong Guo, received an award of $500 for the “Dissertation and Thesis Research Grant” from the Southern Miss Office of Graduate Studies.

• Mohamed Mahasseb was awarded a plaque for his achievement in the Joint International Hydrographic Applied Science Program, AY ’08-’09. LCDR Jeff Dixon received the Hydrographer of the Navy award from the U.S. Navy. The awards were presented at the DMS Hydrographic Science Recognition Ceremony July 31.

PUBLICATIONS


• McPhaden, M. J., G. R. Foltz, T. Lee, V. S. N. Murty, M. Ravichandran, G. A. Vecchi, J. Vialard, J. D. Wiggert, and L. Yu, 2009, Ocean-Atmosphere Interactions During Cyclone Nargis, EOS, v 90, #7, 53 - 54. This was the cover article.


Continued on page 5
Garcia-Hansen Honkala Receives Ph.D. in Biological Oceanography

Ingrid Garcia-Hansen Honkala was born in Bogota, Colombia, where she started her successful career as a marine biologist working for different government and private agencies. In December 2002, she came to the U.S. and joined DMS in September 2004.

Her advisor, Donald Redalje, will never forget the day she arrived at his office with a large pile of documents that he thought were her searches about the department, but was amazed when he discovered they were her publications and related research work. DMS is proud to have had Ingrid as a student. She embodies the qualities of endurance, dedication and perseverance.

In spite of many difficulties, Ingrid managed to be a full-time student at DMS while working at NASA. She completed her Ph.D. in biological oceanography in May with a 4.0 GPA.

Southern Miss Awards Data Center Upgrade Bid to Dell

The University of Southern Mississippi announces the award of a bid to Dell, Inc., to upgrade the Data Center for the Department of Marine Science (DMS) at the Stennis Space Center Teaching and Research Site.

The upgrade, funded in part by a grant from the U.S. Department of Education, will include equipment racks outfitted with in-row cooling and uninterruptable power supplies. The equipment racks will house a high performance computing cluster consisting of multiple blade servers and up to 27 terabytes of storage.

Southern Miss is recognized as the flagship institution in marine science for the state of Mississippi. DMS plays a key role in fulfilling that mandate and is committed to graduate and undergraduate education, research, economic development and public outreach of national and international distinction through the use of advanced technologies and multidisciplinary approaches in marine science.


GRANTS


• State of Maine and the Environ Corporation: Penobscot River Mercury Study – Field Program ($158,961, 2009-2011), Yeager, K. M.: Accumulation, natural attenuation and speciation of Hg in the lower Penobscot River basin, ME.

• State of Maine and the Environ Corporation: Penobscot River Mercury Study – Analytical Program ($480,750, 2009-2011), Yeager, K. M.: Accumulation, natural attenuation and speciation of Hg in the lower Penobscot River basin, ME.
**Professor Profile**

**Professor Prefers Liquids Over Solids in Physics Research**

Although he has worked at the John C. Stennis Space Center since 1982, Dr. Jerald Caruthers did not become part of the Department of Marine Science until nearly twenty years later. He first started working in Hancock County as a research physicist for the Naval Research Laboratory. Then, in 2000, Jerald retired from the research laboratory and began his career as a faculty member with The University of Southern Mississippi.

After receiving his Ph.D. in physics from Texas A&M University, Jerald joined the Department of Oceanography at Texas A&M as an assistant professor. Although his degree was in solid state physics, he has been an underwater acoustician ever since.

“I went from the solid state to the liquid state,” added Jerald.

Before coming to Mississippi, Jerald worked for the Central Intelligence Agency in Washington, D.C., where he received the Agency’s Intelligence Medal of Merit.

**While at DMS, Jerald has contributed to two large Office of Naval Research ocean acoustic projects - one off Kauai, Hawaii, and the other off Destin, Fla. - by conducting research on high-frequency acoustic backscatter from the seafloor. Jerald’s research in seafloor scattering and its contribution to reverberation are important factors in various civilian and military uses of sonar.**

His most interesting project, however, occurred before coming to DMS. “I crossed the Atlantic from Europe twice while contributing to a large low-frequency reverberation research project near the Mid-Atlantic Ridge,” explained Jerald.

Outside of work and research, Jerald enjoys reading the history of early civilizations and the prehistory of early mankind.

**Student Profile**

**Hydrography Student Knows Ocean is Where He Belongs**

“The ocean has been a large part of my life from a young age,” said DMS student Michael Gonsalves.

Michael started his courses with DMS in 2007, but when he finishes his Ph.D. in marine science, he will continue to work within the NOAA Corps. Unless NOAA decides to use Michael for an alternative role, he expects to first work with the Remote Sensing Division and eventually return to NOAA’s hydrographic fleet to act as a Field Operations Officer.

“Spending time on the water, I was suffused with a taste for all things nautical - so making a career of sailing around the nation, contributing to the creation of nautical charts seemed both a noble and self-servicing career path,” added Michael.

“It is only through recent events that I have developed a true appreciation for the need of accurate, up-to-date bathymetric datasets: the fuel for storm surge and sea-level rise models and the backbone of the every Gulf coast states’ marine shipping industry.”

Currently, Michael is working on a project in conjunction with the Joint Airborne LIDAR Technical Center of Expertise who is contracting the construction of the new Coastal Zone Mapping and Imaging LIDAR which will provide the capability to study the land-water margin of the U.S. The thrust of Michael’s research is the development of a geometric calibrator that will improve the overall accuracy of the associated laser system within CZML.

Another important part of Michael’s life is volunteering with the Big Brothers Big Sisters organization where a certain 9-year-old is “steadily reminding me just how old I have become.”
Spotlight on Southern Miss Alumnus, Susan Sebastian

What is your current area of research/work?
I am a technical subject matter expert in the field of Bathymetry and Hydrography for the Naval Oceanographic Office in both deep and shallow water oceanography. I fortunately have the opportunity for world-wide travel on a yearly basis that the ship survey work of my position affords me, having seen seven continents in the past 23 years. I now sail as the Senior NAVOCEANO Representative while at sea and lead process improvement efforts and data analysis projects in the Navigation Department while in the home office at Stennis Space Center.

What area of Marine Science did you study at Southern Miss?
I achieved the master of science degree in hydrography in 2001.

What brought you to the Marine Science program originally?
NAVOCEANO granted Southern Miss funding to develop a Category A class program in hydrography catered to NAVOCEANO students for the first several years. I took advantage of the long term training opportunity presented to me and my co-workers. Since this was my new field of assigned duties, I was extremely fortunate to obtain the educational background required to quickly perform my job at a high professional level vice OJT over an extended time frame.

When were you a student at the Department of Marine Science?
2000 – 2001

Did you like the size of the program?
Yes, it fostered an amazing amount of team work. We all brought something unique to the team and pulled together to make sure everyone was up to speed on all topics.

How did your experience in graduate school prepare you for your current work?
I constantly rely on not just some of the theory that I learned, but my ability to put together presentations and organize my thoughts was greatly impacted. I operate with a greater level of knowledge and confidence in all my tasks.

Were there specific classes or professors that informed which direction your research went?
Dr. Wells mainly.

The DMS Category “A” Hydrography Program - Wouldn’t Trade it For the World

The following excerpt, written by Susan Sebastian in November 2001, was a narrative for the NAVOCEANO Bulletin about the Department of Marine Science graduation.

The 13 of us put our heads and talents together, guided by the new program coordinator Dave Dodd, and outfitted a Carolina skiff with a singlebeam echo sounder and sidescan sonar to map the Bay-Waveland Yacht Club harbor.

It was a wonderful experience and so what if it was outdoors in mid-July. We were in the field! Doing what we like best - data collection and processing, mapping and charting.

The final product was awesome and a day-long final presentation by all category participants wrapped up the year-long effort. I would not trade the experience for the world and I’m pretty sure we all feel the same way.

Graduation was on August 3, 2001, and I must say, I have rarely been so moved in my career at NAVOCEANO as I was on that day when an incredible showing of Naval officers and their wives truly honored us with their presence at the graduation ceremony in Hattiesburg.

The mayor of Hattiesburg gave a wonderful commencement address and the contribution of the Navy was duly acknowledged during the ceremony.

Capt. Tim McGee and his wife Nancy, who have been watching over us like parents all year, even threw the perfect graduation party for us at their home in Mandeville, La. To them and all the others who have supported us throughout the past year, we give our heartfelt thanks and appreciation. It was definitely a team effort and well worth the ride!
The University of Southern Mississippi
Marine Science

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Stennis Space Center, MS 39529

The College of Science and Technology

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