



AT SEA

The University of Delaware
Graduate College of Marine Studies
Newsletter

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CMS Data Unit Gathers an Ocean of Information

by Claire McCabe

Thanks to oceanographer Ferris Webster and his research team at the University of Delaware Graduate College of Marine Studies (CMS), scientists from Lewes to Timbuktu can access an ocean of data that may help us learn more about global climate change. Dr. Webster and his staff manage the Data Information Unit (DIU) of the World Ocean Circulation Experiment. Located in Cannon Laboratory at the Hugh R. Sharp Campus in Lewes, the DIU is an international directory of ocean circulation data collected by scientists from around the world.

As an oceanographer and data set analyst, Dr. Webster is interested in the influences and interactions of the atmosphere and the ocean. In order to look at the role of the ocean in possible climate change, many different types of data from all regions of the world ocean must be used. The World Ocean Circulation Experiment (WOCE) — one of the largest and most comprehensive ocean projects to date — involves scientists from more than 30 nations. Using an array of modern measurement techniques, they are developing a picture of the ocean's circulation over a 10-year period. The challenge is to find a way for the program's researchers to know what their colleagues around the world have done and to share results.

The DIU was established at the beginning of WOCE to provide a tool to manage the diverse data and information developed by WOCE scientists. The National Science Foundation and National Oceanic and Atmospheric Administration have provided funding since 1987.

"Comprehensive studies of global ocean circulation demand the participation of scientists from many countries," Dr. Webster explains. "Such studies are helping to reveal processes of the trans-



Robert Cohen

Dr. Ferris Webster heads a seven-member team that runs the World Ocean Circulation Experiment's Data Information Unit (DIU) at the College of Marine Studies in Lewes. The DIU is an international directory of ocean circulation data collected by scientists around the world.

port of heat in the ocean and other large-scale ocean patterns that may result in long-term climate change."

Sharing Oceanographic Data

Sharing data brings up many issues, including the intellectual rights of the original investigator. WOCE participants may choose to work with their data for up to two years after collection before the data are released for general use. This allows the scientists time to complete their own analyses and publications. The data are then put into WOCE's data centers and made available for use by anyone.

"The complexity of the WOCE program underscored the need for some means to keep track of the data collected by researchers around the world," he says. "Because no single researcher can collect all the data needed to look at global processes, scientists must collaborate and share data in order to get a comprehensive picture of ocean circulation."

Certainly, the events of this past year's El Niño underscore the need for open exchange of information to predict weather and climate anomalies. Information and data exchange is also necessary to understand and predict long-term climate change. Ocean circulation and interactions between the ocean and atmosphere must be understood and modeled in order to predict climate change. For example, the ocean plays a key role in moving heat from the tropics to higher latitudes.

Collecting Data: Methods & Types

The collection of information from project participants includes many types of data and methods of observation. Direct measurements of temperature, salinity, ocean currents, and chemical properties are collected by research ships, subsurface floats, surface drifting buoys, current profilers, commercial ships, and moored buoys. Global measurements

(Continued on page 8)



At the Helm

As the Year of the Ocean unfolds, the faculty, staff, students, and alumni of CMS continue to participate in a variety of special activities to advance public education about the ocean. In this issue of *At Sea*, you'll learn more about the events we've hosted, as well as the exciting activities we have planned for later this year.

We hope you enjoyed our Year of the Ocean lunchtime lecture series at the Hotel du Pont in Wilmington and will continue to attend our popular evening lecture series in Lewes. We have another special event in store for you this fall. Dr. Bob Ballard, the oceanographer who discovered the wreck of the *Titanic*, will present a free public lecture at the University's Bob Carpenter Center on October 14. Please plan to join us!

In addition to serving as a catalyst for heightened public education activities here at CMS, the Year of the Ocean has signaled a period of introspection and change in our academic programs. We're proud that CMS is ranked among the top 10 marine education institutions in the United States. To continue our record of excellence, we recently completed the first phase of a strategic planning process that has resulted in the formation of a new academic program area in the college — Physical Ocean Science and Engineering.

During the past year, with the help of our own faculty and staff, and a distinguished external advisory committee, we did a thorough reassessment of one of our four academic program areas — Applied Ocean Science — and determined that we needed to make some changes in order to respond well to future student and environmental needs. During the same period, we also received a proposal from the Ocean Engineering Group within the University's College of Engineering to establish a joint program in coastal engineering, nearshore physical oceanography, and coastal geology, with the goal to create a much stronger coastal processes emphasis on campus. As a result of these efforts, we have decided to create a new program in Physical Ocean Science and Engineering that will serve as the center for physics research and education at CMS.

The underlying theoretical basis for the Physical Ocean Science and Engineering Program is a strong emphasis on fluid dynamics and its application to coastal processes, including coastal engineering, nearshore processes, coastal physical oceanography, ocean acoustics, air-sea-sediment interaction, and estuarine processes.

Our academic program draws on physics, mathematics, and engineering to prepare students well for careers as physical oceanographers, coastal engineers, specialists in underwater acoustics, and other professions requiring a keen understanding of ocean physics.

I'm pleased to announce that Dr. Richard Garvine has agreed to serve as the interim director of the new program. As our Maxwell P. and Mildred H. Harrington



Bob Bowden

Professor of Marine Studies, Dr. Garvine has a distinguished record of teaching and scholarship. He has achieved national recognition for his discovery of the Delaware Coastal Current and other coastal circulation features.

Joint faculty appointees from the Department of Civil and Environmental Engineering from the University's College of Engineering will join our CMS faculty to instruct students in the new program.

The new Physical Ocean Science and Engineering Program, together with our three other academic program areas in Marine Biology-Biochemistry, Marine Policy, and Oceanography, will offer students the interdisciplinary education to help them take their places as leaders in environmental science.

Carolyn A. Thoroughgood

Dr. Carolyn A. Thoroughgood
Dean, Graduate College of Marine Studies



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In Memoriam

Marian H. Hinkle, 80, passed away in January. Mrs. Hinkle was a strong supporter of the college. In 1991, she established a scholarship in memory of her late husband, Thomas H. Hinkle, for students who demonstrate creative research on a topic pertaining to Delaware's Inland Bays. Both of the Hinkles had an interest in preserving the historical environment of the Indian River near their home in Millsboro. Mrs. Hinkle is survived by a son, two daughters, six grandchildren, and three great-grandchildren.

Virginia Walters McKusick, a longtime friend and ardent supporter of the college, as well as an active Marine Associate, passed away in March. Mrs. McKusick, a painter and ceramist who taught at the Wilmington Art Museum and at Tower Hill School, took a strong interest in CMS faculty and students. She is survived by her husband, Blaine, chair of Marine Associates for many years and a Delaware Sea Grant Advisory Council member; five sons; two daughters; and five grandchildren.

Ocean Quiz Bowl Taps Talents of CMS Professor and Alumni

What better time than the Year of the Ocean to launch the National Ocean Sciences Bowl? The event finals, held this past April in Washington, DC, brought drama, excitement, and competition to the discipline of ocean study.

A joint effort of the Consortium for Oceanographic Research and Education (CORE) and the National Marine Educators Association (NMEA), the National Ocean Sciences Bowl was developed to test high-school students' knowledge of marine science through questions designed by scientists and educators. The landmark first competition was organized by CMS alumna Sarah Schoedinger who works as CORE's educational coordinator.

"During this first year of the competition, our goal was to recognize and reward excellence among students interested in ocean studies and to help them become the next generation of oceanographers and marine scientists," Schoedinger explains.

Schoedinger called on another alumna, Paula Coble, and CMS oceanography professor Bill Ullman to be part of the Technical Advisory Panel that recommended questions to be used in the competition. Coble, an assistant professor of chemical oceanography at the University of South Florida, helped develop questions relating to marine biology and chemistry. Ullman headed the group that formulated questions on marine geology and geography.

"The National Ocean Sciences Bowl does a lot to promote interest and enthusiasm for science applied to ocean environmental issues," Ullman says. "But some scientists and science teachers have questioned whether the contest promotes the best kind of science and research methods. Good science is more about patience, dedication, and understanding than it is about being able to give rapid responses to factual, short-answer questions."

As Schoedinger evaluates the first year of the competition, she says she may try to work a research project into next year's.

"The National Ocean Sciences Bowl is more than a contest," she says. "It also creates an opportunity for teachers to use ocean sciences in their biology, physics, chemistry, geology, and math curricula. Another goal of the event is to help university oceanographic research programs develop strong links with pre-college communities in their home areas."

Alumni Update



Editor's Note: Alumni Update, a periodic feature of *At Sea*, helps our graduates stay in touch and illustrates the exciting careers built on a CMS education.

Paula Coble

M.S., Marine Science, 1977

Paula Coble, an associate professor of chemical oceanography at the University of South Florida, completed her doctorate at Massachusetts Institute of Technology/Woods Hole in 1990. Coble's marine science expertise was tapped for the National Ocean Sciences Bowl, held in April in Washington, DC. For this educational competition, sponsored by the Consortium for Oceanographic Research and Education, and the National Marine Educators Association, Coble helped develop suitable marine biology and chemistry questions for high-school science students.

In addition to studying the effect of dissolved organic material on ocean color at the University of South Florida, Coble is program director for *Project Oceanography*. This televised educational program for middle-school students airs in half the counties in Florida and a total of 18 states.

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This year's bowl was a success with more than 200 high schools participating at the regional level. Schoedinger hopes to double that figure next year. Regional competitions were held at 16 marine science colleges and research centers around the nation. This year's first-place team, Lexington High School of Lexington, Massachusetts, won an educational trip to Spain and Portugal that includes working on a research vessel and a visit to Ocean Expo '98, in Lisbon.

For her efforts in organizing the National Ocean Sciences Bowl, Schoedinger will receive the 1998 NMEA President's Award at the association's annual conference this August in Puerto Rico.

For readers who'd like a flavor of the competition, Ullman offers what he considers his best question from the 1998 National Ocean Sciences Bowl:

Which is warmer, the deep waters of Lake Superior or the deep waters of the Atlantic Ocean, and why?

Answer: Deep waters in lakes and the ocean are the result of the cooling of surface waters and represent the most dense waters in each water column. In the Atlantic Ocean, the maximum density of seawater occurs just at the seawater freezing point (always < 0°C). In Lake Superior, the maximum density of fresh water occurs at 4°C. Thus, the deep waters of Lake Superior are always warmer than the deep waters of the Atlantic Ocean.



Admiral James Watkins (left), head of the Consortium for Oceanographic Research and Education (CORE); Sarah Schoedinger, CORE education coordinator; and Bill Ullman, CMS professor, bask in the success of the first National Ocean Sciences Bowl.

Photo courtesy of CORE

Faculty Tidings

Robert Cohen



Craig Cary

Craig Cary, Marine Biology-Biochemistry, published results of his Pompeii worm research in the Feb. 5 issue of *Nature*. This deep-sea worm is an extremophile that has adapted to living near thermal vents and surviving sustained temperatures up to

176°F. Bacterial hitchhikers that coat the worm like a fleece also are able to survive these temperatures. Researchers suspect the bacteria are manufacturing heat-resistant enzymes that may prove useful in developing products that can dislodge oil inside wells, convert cornstarch to sugar, and support other industrial processes.

Biliana Cicin-Sain and **Robert Knecht**, Marine Policy, were selected to participate in the invitational National Ocean Conference, June 11–12, at the U.S. Naval Postgraduate School in Monterey, California. A historic event, the National Conference featured key speeches on ocean policy by President Clinton, Vice President Gore, and First Lady Hillary Rodham Clinton. In attendance were a number of Cabinet officers, members of Congress, and 500 leaders in government, business, academia,



Biliana Cicin-Sain



Robert Knecht

and the environmental community. The capstone event for the U.S. celebration of the Year of the Ocean, the conference set direction for national ocean policy in the 21st century. Results of the study on U.S. coastal tourism and recreation (conducted by Cicin-Sain and Knecht earlier this year) were quoted extensively at the conference.

Also as part of Year of the Ocean activities, Cicin-Sain and Knecht, together with NOAA's National Ocean Service, organized the Stratton Roundtable, held May 1 in Washington, DC. Five members of the original Stratton Commission, which issued a seminal report on national ocean policy 30 years ago, met with a number of today's ocean policy leaders to review lessons

learned from the earlier exercise that might be relevant to today's situation. Legislation creating a new commission to study ocean policy reform is now pending in Congress.

Cicin-Sain and Knecht also recently published their book *Integrated Coastal and Ocean Management: Concepts and Practices*. The book's goal is to provide coastal and ocean managers around the world with information that will allow them to create effective programs to sustain coastal areas both environmentally and economically.

Gerard Mangone, Marine Policy, was keynote speaker at the International Conference on Shipping Development and Port Management in Kaohsiung, Taiwan. Some 500 government and business officials from 33 countries attended the conference. The agenda included discussing the challenges faced by competitive ocean carriers of cargo and the problems of ports around the world.

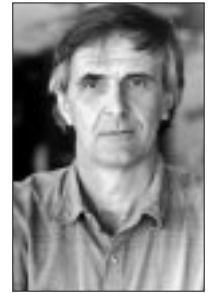


Gerard Mangone

Mangone opened the conference with an address on world trade and world shipping. He noted that trade is now 25% of the global economy. And especially in developing nations, standards of living have been raised as a result of participation in this industry. Cruise lines have grown faster than any other maritime industry. The average capacity of tankers has increased from 17,000 deadweight tons to 170,000 deadweight tons. Mangone concluded by noting that the gap between the rich and the poor has been closing since the 15th and 16th centuries when sailing ships first tied the continents together. Now trade and communications through wire, computers, and satellites bind

the nations of the world together as never before and open to all people the prospect of improving their welfare.

Jonathan Sharp, Oceanography, recently hosted a workshop at CMS in Lewes for scientists from state agencies charged with environmental monitoring of the Delaware Estuary and the Inland Bays. The workshop's purpose was to help enhance local monitoring efforts and advance the development of an intercalibrated water-quality and living resources data base for the region.



Jonathan Sharp

Given concerns about nutrient over-enrichment, as well as the potential incidence of *Pfiesteria* in local waters, the workshop focused on primary production, or the relationship between the microscopic plants that form the base of the estuarine food chain and nutrient inputs. Workshop participants reviewed the measurement of chlorophyll, total inorganic carbon, suspended sediments, light (using quantum meters and Secchi disks), and primary production (using radioactive tracers), and the correlations among these parameters.

In addition to Sharp, presenters included CMS research assistant Karen Savidge and graduate students Matt Schwartz, Mark Schmidt, and Robin Tyler.

Participants came from the Delaware River Basin Commission, Delaware Department of Natural Resources and Environmental Control, New Jersey Department of Environmental Protection, Pennsylvania Department of Environmental Protection, and Entrix environmental consulting.

CMS Graduate Student Garners NOAA Award

Marine Policy student Dosoo Jang (center) receives the Walter B. Jones Memorial and NOAA Excellence Award for Ocean and Coastal Resource Management from Congressman Walter B. Jones, Jr. (left) and Dr. D. James Baker, Under Secretary of Commerce for Oceans and Atmosphere and Administrator of the National Oceanic and Atmospheric Administration.



CMS Docents Lead Tours of Marine Labs in Lewes to Help Public Gain Insight into Ocean Science

Tucked away in the quiet coastal community of Lewes is a bustling center of marine research. That may not be news to those associated with the University of Delaware Graduate College of Marine Studies (CMS), but to the thousands of tourists who visit Delaware's resort beaches, it's a pleasant surprise.

The CMS facilities tour program, established in 1992, gives the public a peek into the science that is conducted just minutes from the boardwalks and amusement centers that line Delaware's beaches. The tour makes a convenient and ideal educational stop on a vacation. But without a group of docents, who are versed in the latest research and teaching news from the college, the tours wouldn't be possible. These unsung heroes shepherd approximately 1,500 people through the CMS facilities each year.

Bob Carnahan, a retired administrator from the National Oceanic and Atmospheric Administration, is the docent program manager as well as a tour guide.

"In 1997, participation in the tours reached 1,750," he says. "We now have seven docents leading tours, including three of the original five docents."

"Without our corps of docents it would be impossible to offer this important service to the public," says Dr. Nancy Targett, associate dean of the college. "The growth of the program is quite gratifying. And because this is the Year of the Ocean, we expect another record participation."

In a recent tour, three of the docents — Kay Hackett, Dot Danegger, and Jim Gillard — guided 60 high-school science students through the facilities.

"We all come from different backgrounds, so we bring different perspectives to the tour," Hackett says. "Some of us speak from a scientific point of view, while others, like myself, have the basic approach of a nonscientist, so we won't lose groups with too much technical detail."

Hackett views the docents' experience as an opportunity to give something back to the University and to the Lewes community. Gillard says his interest in the Inland Bays led him to become a docent. Before he became a docent, he was a volunteer in the Inland Bays Citizen Monitoring Program, which collects water-quality data.

Dot Vessels, one of the original docents and a longtime Lewes resident, can remember firsthand when the CMS research sta-



Bob Bowden

Jim Gillard is one of seven docents who lead educational tours of the CMS facilities in Lewes. Gillard explains current marine research to a group of students from St. Andrews High School in Middletown, Delaware.

tion was on Beach Plum Island and the only way to get there was by boat. All of this diversity in the docents group makes for interesting and individualized tours.

Fortunately, the college hasn't needed to advertise for volunteer docents. Usually, recommendations come to the college from current docents and friends.

Going on Tour at CMS

Although the bulk of visitors visit CMS during June, July, and August, tours were conducted every month of the year in 1997. Carnahan says the tours are not just for the summer crowd. During the school year, student groups are the more likely tour goers.

Repeat customers are a sure sign that the program is a success. Peter McLean, a science teacher from St. Andrews High School in Middletown, is in his sixth year bringing students to the CMS tour. He says his students find the tours interesting and useful in terms of the science they are studying and the careers they are considering.

A tour typically begins with a slide presentation that serves as an introduction to the college. The docents talk about the graduate education available at CMS, including programs, professors, and research projects. This presentation is followed by a one-hour walking tour of the college's facilities.

Tour stops range from the scientific — figuring out how to develop an artificial eel

bait to replace horseshoe crab, to the whimsical — paying respects to the preserved remains of Oscar the octopus who fell to his untimely death when he climbed out of his aquarium.

Carnahan says the best way to present CMS research to the public is through visiting the laboratories, including aquariums that house native species of marine life and greenhouses where experiments to find salt-tolerant crops are conducted.

Among the facilities are an Interactive Television (ITV) room. This room serves as the link between the Lewes and Newark campus, whether for students to meet with a class in a different location, or for college staff in each location to have efficient meetings.

A visit to the college's 120-foot research vessel, *Cape Henlopen*, is not a part of the tour since the ship is out on research cruises more than half the year. But visitors learn that the ship can be quickly and efficiently fitted from one type of research to another by removing and installing mobile laboratories on the craft.

Guided group tours of the CMS facilities in Lewes are available year-round. Throughout the summer, there are open tours on Fridays; reservations are required 24 hours in advance. Other tour times may be arranged in advance. For more information, call (302) 645-4346. Tours are not suitable for children under the age of 12.

Students, Faculty, and Staff in Marine Studies Recognized for Outstanding Contributions

Students, faculty, and staff of the University of Delaware Graduate College of Marine Studies (CMS) were recognized for their accomplishments at Honors Day ceremonies held Friday, May 8, at the Hugh R. Sharp Campus in Lewes. Dr. Nancy M. Targett, associate dean of CMS, presided over the ceremonies. Guest speaker was CMS alumnus Dr. Nicholas H. Vrolijk, regulatory affairs specialist with Cato Research Ltd., in Durham, North Carolina.

Now in its 28th year, CMS is a graduate college whose mission is to advance the knowledge, wise use, and conservation of global, estuarine, and coastal ocean environments through a program of excellence in research, teaching, and service. CMS also serves as home to the University of Delaware Sea Grant College Program, a partnership among federal and state governments, the University, industry, and the public, focused on the wise use, conservation, and management of marine and coastal resources.

The E. Sam Fitz Award, recognizing the CMS student who has displayed the

greatest aptitude for professional development in the field of marine studies, was awarded to **Timothy P. Mavor**, Ph.D. graduate in applied ocean science.

The following students were recognized for outstanding theses and dissertations:

Jinglan Wu, Ph.D. graduate in marine biology-biochemistry, received the Frances Severance Award for best student thesis or dissertation within CMS. **Miriam C. Balgos**, doctoral student in marine policy, received the Center for the Study of Marine Policy Award for the best research paper by a student in marine policy. Functioning within CMS, the center focuses on legal, political, and economic marine issues.

Academic Council Awards for the best thesis or dissertation within a program area were awarded to **Louis E. Keiner**, dissertation in applied ocean science; **Jinglan Wu**, dissertation in marine biology-biochemistry; **Kelly Bungee-Rogers**, thesis in marine policy; and **Maria G. Honeycutt**, thesis in oceanography.

Publications Awards to recognize outstanding student publications went to

Niels Henrik Borch, Ph.D. graduate in marine biology-biochemistry, for "Concentration and Composition of Dissolved Combined Neutral Sugars (Polysaccharides) in Seawater Determined by HPLC-PAD," co-authored by Dr. David L. Kirchman, and published in *Marine Chemistry*; Yun He, Ph.D. student in applied ocean science, for "Surface Heat Fluxes in the Western Equatorial Pacific Ocean Estimated by Bulk Parameterization and by an Inverse Mixed Layer Model," co-authored by Drs. Xiao-Hai Yan and W. T. Liu, and published in the *Journal of Physical Oceanography*; and **Stephen M. Theberge**, master's graduate in oceanography, for "Determination of the Electrochemical Properties of a Soluble Aqueous FeS Species Present in Sulfidic Solutions," co-authored by Dr. George W. Luther III, and published in *Aquatic Geochemistry*.

The following internal fellowships and scholarships were presented:

Tammy R. Brant, master's student in marine policy, and **Cecily C. Natunewicz**, doctoral student in oceanography, received Marian R. Okie Fellowships granted on the basis of academic and research excellence and demonstrated leadership abilities. The University Competitive Fellowship was presented to **Rosemarie Hinkel**, master's student in marine policy. **Sandra M. Schwalm**, master's student in marine biology-biochemistry, was awarded the Dr. Paul R. Austin Sea Grant Student Fellowship for academic and research excellence in the field of biochemistry.

President's Fellowships for academic and research accomplishments were awarded to **Lexia M. Valdes-Murtha**, doctoral student in marine biology-biochemistry; and **Richard A. Wong**, master's student in marine biology-biochemistry.

CMS Program Fellowships were granted to a student in each CMS program on the basis of academic accomplishments. Recipients for 1997–1998 are **Yun He**, doctoral student in applied ocean science; **Kimberly Hoffman**, master's student in marine biology-biochemistry; **Miriam C. Balgos**, doctoral student in marine policy; and **Magdalena D. Anguelova**, doctoral student in oceanography.

Six oceanography students received National Science Foundation Graduate Research Traineeships/Fellowships in Coastal Oceanography. They are **Cecily C. Natunewicz**, master's student, (1995–1998); **Carol D. Janzen**, doctoral student, and **Matthew C. Schwartz**, master's student (1996–1998); **Michelle R. Overway**, master's student (1997–1999); **Susan Park**, doctoral student, and **Michael W. Whitney**, master's student (1998–2000).

Many students received special recognition from international, national, and regional organizations:

Alison R. Sipe, master's student in marine biology-biochemistry, received the National Shellfisheries Association Student Poster Award and a Student Travel Award from UD's Commission on the Status of Women. **Thomas M. Arnold**, doctoral candidate in marine biology-biochemistry, received the 1997 International Society of Chemical Ecology Student Travel Award. **Lexia M. Valdes-Murtha**, doctoral student in marine biology-biochemistry received the Marine and Estuarine Shallow-Water Science and Management Conference Student Presentation Award. **Forbes L. Darby**,

(Continued on page 5)

Bob Bowden



Dr. Nick Vrolijk, a marine biology-biochemistry alumnus, was keynote speaker for the 1998 Honors Day at CMS. Vrolijk, who is working on pharmaceutical development, encouraged students to think broadly in terms of the kinds of careers that can be developed from their CMS education.

Honors Conferred

(Continued from page 4)

master's student in marine policy, and **Vinton J. Valentine**, doctoral student in applied ocean science, were named NOAA graduate research fellows in the National Estuarine Research Reserve System Fellowship Program. **Milen Filipov Dyoulgerov**, doctoral student in marine policy, and **Maria G. Honeycutt**, doctoral student in oceanography, received Dean John A. Knauss Marine Policy Fellowships in the National Sea Grant Federal Fellows Program. **Nicole Lopanik**, master's student in marine biology-biochemistry, received an honorable mention from the National Science Foundation Graduate Fellowship Committee. **Richard A. Wong**, master's student in marine biology-biochemistry, received a research scholarship from the Delaware Mobile Surf Fishermen, Inc., for his project "Determination of Essential Fish Habitat for the Early Life History Stages of Tautog, *Tautoga onitis*."

Faculty were recognized for their teaching and research. **John S. Boyer**, professor of marine biology-biochemistry, received a Bullard Fellowship from Harvard University. **George W. Luther III**, professor of oceanography, was selected to give the inaugural Fred M. Weissman Lecture in analytical chemistry, University of South Carolina. **Xiao-Hai Yan**, professor of applied ocean science, received the best paper award from the Fourth International Conference on Remote Sensing for Marine and Coastal Environment. **Yan** and **Vic Klemas**, also a professor of applied ocean science, received the Center of Excellence Award from NASA's Office of Mission to Planet Earth.

The following CMS staff also were recognized at Honors Day:

James M. Falk, Marine Advisory Service Agent IV, earned a Professional Staff Merit Award. **Jacqueline Bijansky**, technical secretary III, **Margaret Ann Conlon**, staff assistant, and **Julie Ann Tigue**, administrative assistant, received Salaried Staff Merit Awards.

The Marine Communications team of **David A. Barczak**, art director; **Tracey L. Bryant**, marine outreach coordinator; **Pamela L. Donnelly**, production manager; and **Claire McCabe**, marine outreach specialist, was honored with three awards in the Delaware Press Association's 1998 First State Communications Contest and four awards in the Society for Technical Communication's 1998 Publications and Art Competition.

Marine Associates' Corner



From the Chairman

The Year of the Ocean has been a busy one so far for both the College of Marine Studies and the Marine Associates. And there are more activities to come!

This past spring, the college launched two public lecture series, one in Lewes and one in Wilmington. We heard from nationally renowned scientists about the fish-killing microbe *Pfiesteria*, the weather phenomenon El Niño, and the importance of the ocean's health to the entire planet. We've also heard CMS scientists relate their research on El Niño's effect

on Delaware, the dangers of rip currents and their impact on coastal erosion, and the steps we need to take to improve the water quality of Delaware's Inland Bays. All who attended these lectures came away with a better understanding of the ocean and the significant role it plays in our lives.

This fall, the college will continue its celebration of the Year of the Ocean with Coast Day on Sunday, October 4. This annual festival is the largest public education event hosted by the University. Held from 11 a.m. until 5 p.m., Coast Day will include updates on marine research projects, hands-on exhibits, marine life touch tanks, children's activities, a crab cake cook-off, and more. Admission is free; parking is \$2.

In addition, another exciting lecture is scheduled for the evening of Wednesday, October 14. Dr. Robert Ballard, the oceanographer who found the wreck of the *Titanic*, will be speaking at the University's Bob Carpenter Center in Newark. With the help of the deep-sea sub *Alvin*, Ballard and his crew found the remains of the great ocean liner, stirring up intense interest in the haunting tragedy that most recently culminated in an Academy Award-winning movie. Ballard also recently found the remains of the aircraft carrier *Yorktown*. Marine Associates, watch the mail for your special invitation to Ballard's lecture. A special members-only activity is planned before the lecture.

If you're not already a member of the Marine Associates and would like to receive notification of upcoming events and other membership benefits, please take a moment to fill out and mail in the form below. If you have access to the World Wide Web, you'll find more information about the Marine Associates' program at our Web site: www.ocean.udel.edu/associates.html.

William M. W. Sharp

William M. W. Sharp

University of Delaware Marine Associates 1998

☐ I/My family would like to become a member(s) of the Marine Associates. Enclosed are my/our annual dues of \$50. Please send me a copy of the current University of Delaware Marine Programs report.

Name: _____

Address: _____

Please return to: Ms. Sandy Goodley, The Graduate College of Marine Studies, University of Delaware, Newark, Delaware 19716. (Checks should be made payable to the University of Delaware.)

Data Information Unit

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from satellites follow the variability of sea-surface temperatures, and, by measuring elevations of the surface, determine surface ocean currents.

"Satellite measurements, *in situ* observations, and computer models all contribute to this global experiment," says Dr. Webster. "WOCE provides a global picture of ocean circulation that will improve models for predicting the future state of the ocean and its large-scale interaction with the atmosphere."

The Center's Operations

The WOCE program has developed a system of specialized data centers, located in several countries. Each center assembles WOCE data of a particular type and archives part of the global data set. To keep track of what the group of data centers are doing, the DIU keeps track of who collected the data, the conditions under which they were collected, and where they are located.

"The DIU serves as a nerve center for the entire WOCE Data System, keeping track of what the various components are doing," says Dr. Webster.

With the WOCE project, the DIU does the data tracking, keeping tabs on what was collected and what data are needed to fill in the blanks. Every WOCE data center is able to answer requests for standardized forms of data sets. It is often a two- to three-year process to get data from the centers analyzed and archived into the DIU.

Katherine Bouton, the associate scientist who keeps track of the operations at the DIU, likens the data center's role to that of a card catalog in a library.

"We retain the information on the data, and specify its location," she says. "But we are not a repository for the actual data."

Dr. Webster adds, "We're not a distribution center. We carry a few items, but basically we tell researchers where the information is in the system and maintain an overview.

"There has been a huge change in the way we operate over the past 10 years," he notes. "When we began, there was no World Wide Web. We spent a lot of time creating special procedures to allow users to find WOCE data sets. Now that we can use the Web, the flexibility and ease of use is amazing."

Although the WOCE field program is now coming to an end, the data set will continue to be assembled for about three additional years. The DIU will focus on results and syntheses during a final year or two. After that, scientists should be able to use the WOCE DIU for many years following its transfer from the College of Marine Studies to the World Data Center for Oceanography.

The group is now involved in a three-part program to support new international systems created to monitor the state of the global environment. The Global Climate Observing System (GCOS) will provide

information on the state of the Earth's climate; the Global Ocean Observing System (GOOS) will monitor the ocean to assess and predict its health and sustainable use and contribute to prediction of climate change and variability; and the Global Terrestrial Observing System (GTOS) will observe changes in land quality, freshwater resources, pollution and toxicity, loss of biodiversity, and climate change. An Information Center to serve the three programs (called collectively G3OS) is being established in Lewes, using the talents of the DIU group.

Dr. Webster's concern about the international exchange of data for environmental studies has translated into involvement in a number of activities under the auspices of the International Council of Scientific Unions (ICSU). He chairs the ICSU Panel on World Data Centers, as well as ICSU's Group on Data and Information. In these roles, Dr. Webster has been working as a representative of the scientific community to help insure that information about the planet's environment is openly available to researchers in all countries.

Student's Research Featured on Discovery Channel Web Site

Carol DiMeo, CMS master's degree student in marine biology-biochemistry, has been 'discovered' on the Discovery Channel's Web site. DiMeo and adviser Craig Cary have been studying deep-sea worms that live near thermal vents. She's examining bacteria that live on one of the worms for clues to its heat tolerance. The Discovery Channel interviewed DiMeo for its series on life in extreme environments. Visit the site at www.discovery.com/stories/sciences/seavents/archive/entry4.html.



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