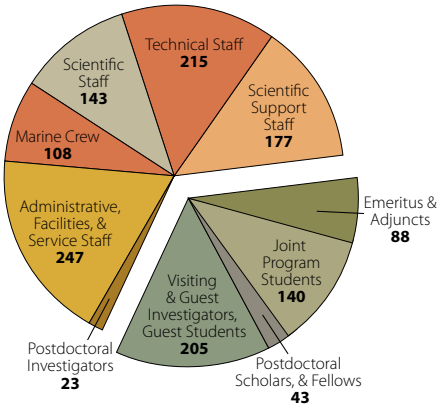
Woods Hole Oceanographic Institution

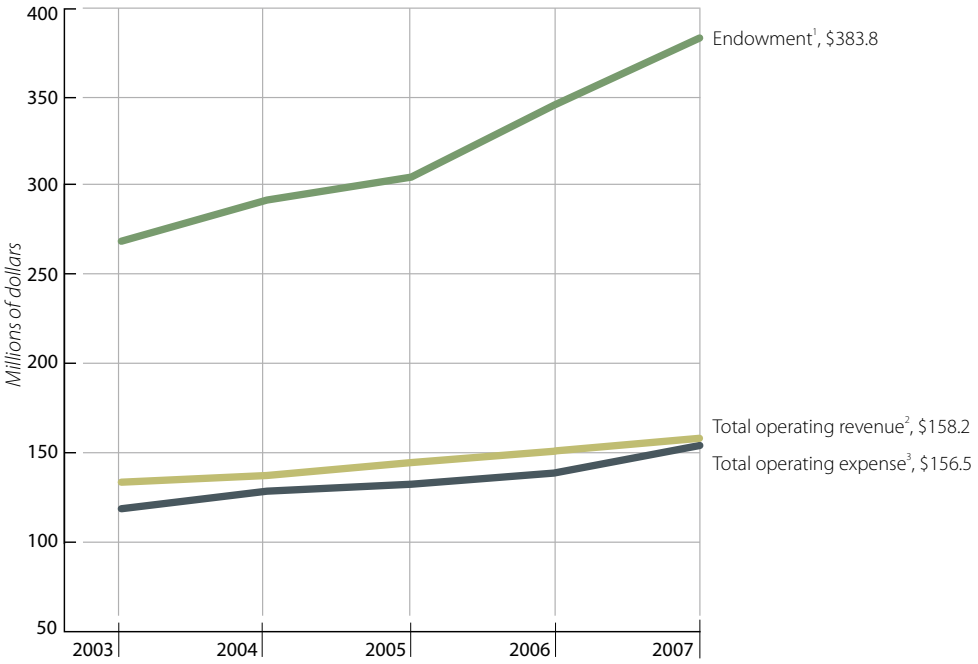
2007 Annual Report



WHOI employees totaled 913 in 2007; others affiliated with the Institution (separate wedge) totaled 476.

Financial Trends

Totals in millions of dollars

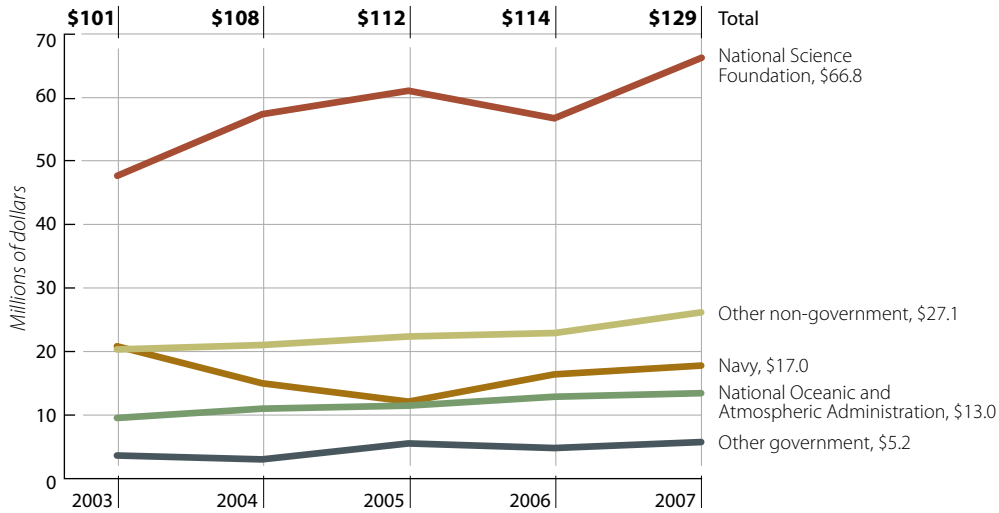


The Institution endowment ended 2007 at $383.8 million, with a 15.53 percent rate of return, outperforming our benchmark. Total gifts, grants, and pledges from private sources totaled $16.0 million.

[1]Endowment comprises cash and securities to provide income for maintenance of the organization. Market value is as of December 31.
[2]Total operating revenue is total funding of the Institution's research and education programs, including a component of endowment income appropriated for operations during the financial year ending December 31. See Financial Statements, Note 2, page 58.
[3]Total operating expense is cost incurred in support of research, education, and operations during the financial year ending December 31. See Financial Statements, Note 2, page 58.

Research Funding

Totals in millions of dollars



The $15 million increase in research funding, (up 13.16 percent over 2006), was driven primarily by growth in funding from the National Science Foundation and other non-government.

Contents

Woods Hole Oceanographic Institution is a private, nonprofit, marine research and engineering, and higher education organization. Its mission is to understand the oceans and their interaction with the Earth as a whole, and to communicate a basic understanding of the ocean's role in the changing global environment. Established in 1930 on a recommendation from the National Academy of Sciences, the Institution is organized into five scientific departments, interdisciplinary research institutes, and a marine policy center. The Institution conducts a joint graduate education program with the Massachusetts Institute of Technology.

Susan Mills, WHOI

Alvin *breaks the surface and engineering assistant Mike McCarthy talks to the pilot in preparation for recovery operations after a LADDER III project dive to a hydrothermal vent site in November 2007. (LADDER stands for LArval Dispersal on the Deep East Pacific Rise.)* Alvin *was used to deploy instruments, to survey the new vents as they recover from the 2005–2006 eruptions, and for instrument recovery.*

Chris Linder, WHOI

WHOI geochemist Mark Kurz hammers old volcanic rocks exposed on the edges of Mount Morning in Antarctica in December 2007. Kurz and colleagues made the expedition to get a better understanding of how the bitter, arid environment shapes and erodes rock and what that says about the age of the surface of the continent. The expedition was featured as part of WHOI's Polar Discovery public outreach project.

Editor: Mike Carlowicz • Design and Production: Jim Canavan

Leadership transitions are among the most important challenges an organization confronts. The selection of a new leader almost always leads to a process of deep reflection, raising essential questions like: What is our mission? What are the opportunities and threats in our organization's environment? Whom do we serve? What are we called to do now?

As WHOI undertook its search for a President and Director throughout much of 2007, it engaged in this process of reflection and recommitment, led with enthusiasm and skill by our Board of Trustees and Acting President and Director Jim Luyten. Among this group there was a strong understanding that, with the arrival of a new leader, the organization shifts and the context in which it operates changes, exposing outmoded practices as well as opportunities for growth and adaptation. The Board embraced the leadership transition process, taking on the work of projecting the organization into the future, anticipating what WHOI will need to ensure the organization's continued growth. They identified the challenges a new leader would face, among them the shift in the existing funding environment from smaller individual projects to large, interdisciplinary, multi-institutional research programs. And they identified WHOI's strengths: the agility and independence to respond to change and minimize the impact of limitations in the WHOI environment; a preeminent reputation for oceanographic research; an outstanding staff of gifted and dedicated researchers, teachers, engineers, technicians, administrators and support staff; state-of-the-art facilities for access to the sea; outstanding shore-based laboratories and a world-class library; preeminent graduate education and post-doctoral programs in ocean science.

The stage was set for the work of the leadership transition by Jim Luyten and the broad-based, Institution-wide effort he initiated to develop a strategic plan. Its goal was to identify how WHOI could strengthen its ability to pursue its mission, increase its competitiveness, and adapt to on-going changes in ocean research, education, and funding. Jim engaged the staff in the same kind of process the Trustees were engaged in, asking the staff to define the institution's culture and values, to look toward future challenges and to use

Tom Kleindinst, WHOI

In 2007, the WHOI Board of Directors appointed Newt Merrill (l) its new chairman and conducted a search for a new president and director. In October, it announced Susan Avery had accepted the position. Acting President and Director Jim Luyten (r) served from 2006 until Avery took office in February 2008.

WHOI's hallmark creativity and entrepreneurial spirit to find effective solutions to those issues. Jim communicated with the scientific staff about budget and funding issues, deepening their understanding of the factors that influence WHOI's bottom line, and engaged the administrative staff in the strategic planning process, encouraging them to voice their ideas about how to further improve our operations. This planning initiative produced a strategic plan, which the Board of Trustees endorsed in January 2007.

As those familiar with nonprofit governance know, the relationship between an organization's director and its Board chair is a critical one. The two must work hand-in-hand during the director's tenure to achieve their mutual goals. At the start of 2007, with the search for a President and Director newly underway, Board Chairman Jim Moltz announced that he would be stepping down after nine years in the position. He chose that time to ensure that the chairman's tenure would coincide with the projected 10-year time line of a new director. In May, Newton Merrill, who has served on the WHOI Board for 14 years, was appointed Chairman. Newt's dedication has been evident in his work over the years on a half dozen Board committees, raising funds for the R/V *Tioga* and the new labs, and helping to direct the capital fund-raising campaign.

The WHOI Board also saw the transition in leadership as an opportune time to assess and address strengths and weaknesses in its governance. The Board's self-evaluation sought to enhance its ability to respond quickly to changing conditions and to maximize the use of its members' expertise. The result is a set of recommendations to better align the WHOI Board's operations with best practices in nonprofit governance.

In the midst of this busy yet reflective 2007 leadership transition, WHOI continued to excel. WHOI again consistently demonstrated its leadership in regional, national and international arenas. Even as the organization was deeply engaged in planning for change, it simultaneously embarked on some of the most ambitious projects it had ever undertaken, including landing the Institution's largest federal and state awards to date—for work on the NSF-sponsored Ocean Observatories Initiative. Many of the year's science, engineering, and education highlights are discussed in greater length in the Director of Research letter and throughout this report.

When I stepped into my role as President and Director in February 2008, I accepted responsibility for the future of an institution renowned for its leadership in ocean science research, and for bringing its research to bear on problems that matter to societies around the globe. My own scientific research about the atmosphere has given me the chance to learn about ocean research from a fresh perspective. I've been delighted to discover many important connections between knowledge of the atmosphere and our oceans, and the interaction between them, as well as many similarities in how leading scientists conduct their research to advance knowledge and address societal problems. I am proud to be a member of this outstanding scientific enterprise. There are challenging times ahead, but I am confident that all levels of WHOI are committed to our goals and fully engaged in our mission to advance the frontiers of human knowledge.

Susan K. Avery

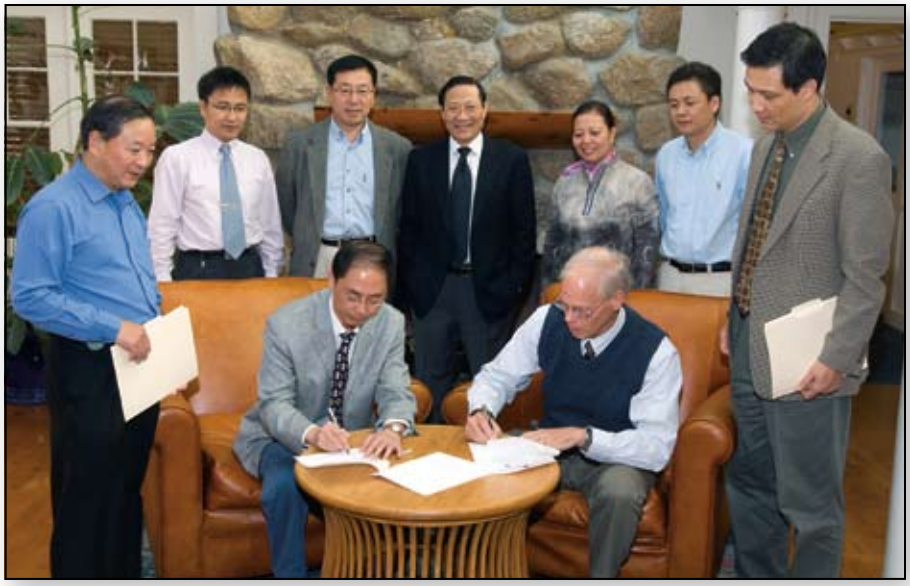
We often call oceanography the 'global science'. Not only are the waters and life of the world ocean intimately connected to both continents and atmosphere, but increasingly the problems of the ocean are apparent on a world-wide scale. Recognizing, understanding, and alleviating those problems will require more than ever that ocean scientists work cooperatively, at regional, national, and international scales.

WHOI has always been a 'blue water' institution, with a research fleet that operates in almost every part of the world ocean. Collaborative work with foreign scientists on cruises and in international programs has long been standard operating procedure for oceanographers, who have worked on fundamental questions in ocean physics, geology, chemistry, and biology that have little connection to the political and social boundaries and priorities that partition the continents.

A major part of WHOI's traditional leadership in ocean science has been our role as host or sponsor of large national and international research programs. In recent decades, a series of acronymic projects such as WOCE (World Ocean Circulation Experiment), JGOFS (Joint Global Ocean Flux Study), CLIVAR (Climate Variability and Predictability), and GLOBEC (Global Ocean Ecosystem Dynamics), have originated with WHOI scientists or had their program headquarters here for a period of time.

Today, we are continuing this role regionally by helping to establish NEAC (Northeast Academic Consortium) and NERACOOS (Northeast Regional Association for Coastal Ocean Observing Systems). These organizations are being created to foster and administer the development of the Northeast components of IOOS (Integrated Ocean Observing System). They will coordinate observing networks, data analysis and delivery to many users in the scientific community, governments, commerce, and the public.

On the international scale, our collaborations extend well beyond joint cruises and programs. WHOI has specific cooperative relationships with over a hundred other research and educational organizations around the world. These agreements can provide a framework for specific collaborative projects or the development of long-term cooperation in research and education. Recently, for example, WHOI has signed a Memorandum of Understanding with COMRA (China Ocean Mineral Resources Association) for collaborative work in the deep ocean, and additional agreements are being negotiated with other countries that will facilitate research clearances and the planning of joint projects. We are currently renewing long-term agreements covering a broad range of activities, either current or future, with JAMSTEC (Japan Agency for Marine Science and Technology), IFREMER (Institut Français de Recherche pour l'Exploitation de la Mer), and the University of Concepción (Chile).



Tom Kleindinst, WHOI

A memorandum of understanding was signed in fall 2007 to enhance scientific cooperation and academic exchange between WHOI and the Second Institute of Oceanography/State Oceanic Administration (SIO/SOA) of China. Attending the signing ceremony were WHOI Acting Director of Research Larry Madin (front right sitting), SIO/SOA Deputy Director Jiabiao Li (front left sitting), WHOI G&G Senior Scientist Jian Lin (front right), Secretary General of the China Ocean Mineral Resources R&D Association Bin Mao (back middle) and members of a Chinese science delegation.

In some cases these arrangements enable a significant WHOI presence within foreign territory and seas. Since 2001 our relationship with the LJL (Liquid Jungle Lab) in Panama has provided a field laboratory for research by more than thirty WHOI scientists and students, with further activity planned for 2009 and beyond. Our most significant recent foreign relationship is the agreement with KAUST (King Abdullah University of Science and Technology) in Saudi Arabia, which is providing substantial research funding to WHOI scientists working in the Red Sea, including a cruise there in October 2008 by the R/V *Oceanus*. With KAUST, as with LJL, WHOI has a leading role in the formation of a new research and educational facility for ocean science, as part of a bold experiment in graduate science education for the Middle East.

WHOI maintains enviable breadth and depth of expertise in most areas of ocean science and engineering and we can leverage and expand this strength through carefully chosen and nurtured partnerships with others, whether in New England, North America, or the other side of the world. Global partners can magnify the access, support, intellectual communion and motivation to work on global scale questions and problems in the world ocean. All nations and peoples are affected by the oceans, especially in a changing world climate. Working collaboratively and internationally is one of the most productive ways for WHOI scientists to gain an understanding of the vital interaction of the ocean with earth, air and life.

Larry Madin

In August 2007, WHOI was awarded a $97.7 million contract to support the development, installation, and initial operation of the coastal and global components of the National Science Foundation's (NSF) Ocean Observatories Initiative (OOI). This is the largest single award in the history of the Institution. WHOI's academic partners include the Scripps Institution of Oceanography and Oregon State University's College of Oceanic and Atmospheric Sciences, while Raytheon will provide project management and systems engineering support to WHOI.

OOI is a five-year, $331 million project funded by NSF to build a cutting-edge infrastructure aimed at improving long-term and real-time observations of fundamental ocean processes. These facilities will be operated on behalf of the entire ocean science community for at least 30 years. The OOI comprises coastal observing systems off of southern New England and the coast of Oregon; a regional cabled observatory in the Northeast Pacific; and three high-latitude sites in the northern and southern hemispheres. These systems will be linked by a common cyber-infrastructure that will deliver data in real-time or near-real-time to scientists' desktops. OOI is managed by the Consortium for Ocean Leadership, a non-profit, science-based organization located in Washington, D.C.

WHOI is also part of a regional effort to establish a New England Coastal Ocean Observing System, part of the Integrated Ocean Observing System (IOOS) program led by the National Oceanic and Atmospheric Administration (NOAA). The goal of IOOS is to provide state and federal agencies, scientific researchers, and other end users with better information to manage and protect the nation's coastal waters. WHOI and its partner institutions throughout New England successfully obtained three years of funding from NOAA to operate and enhance coastal observations in the region and to support longer range planning.

WHOI's involvement in OOI and IOOS will help the Institution maintain its position as a world leader in the development and operation of ocean moorings, and it will provide support to develop advanced technologies such as moored profilers, autonomous underwater vehicle docking systems, gliders, and remote power generation. The observatory efforts will complement WHOI's traditional strengths in shipboard oceanography and underwater vehicle systems, and is part of the Institution's commitment to provide WHOI scientists with the tools to develop transformative new approaches to interdisciplinary ocean studies.

—Robert Detrick,
Vice President for Marine Facilities and Operations

R/V *Atlantis*

Days at sea: 292; *Cruises:* 16; Alvin *dives:* 92
Investigators served: 326 participants; *Nautical miles:* 18,196
Atlantis began the year with a series of *Alvin* dives along the East Pacific Rise (EPR) to study the behavior and dispersal of larvae. Researchers also investigated recent volcanic eruptions and new hydrothermal activity. After a geophysical research leg to determine the presence of melt in the crust beneath the rise axis, the ROV *Jason* and the *DSL-120* were used to map and sample the overlapping spreading center at 9° N. In the summer, *Alvin* was deployed to study the fate and impact of methane seeps in the Santa Barbara Channel and Santa Cruz Basin. *Atlantis* then moved to the Juan de Fuca Ridge, using the ROV *Jason* to continue time-series measurements and sampling at Axial Volcano. After using *Alvin* to service seven circulation obviation retrofit kits (CORK) sites in the Northeast Pacific and to recover two sound sources at Hoke Seamount for the U.S. Navy, *Atlantis* ended the year with *Alvin* dive programs in the Guaymas Basin and on the EPR.

R/V *Knorr*

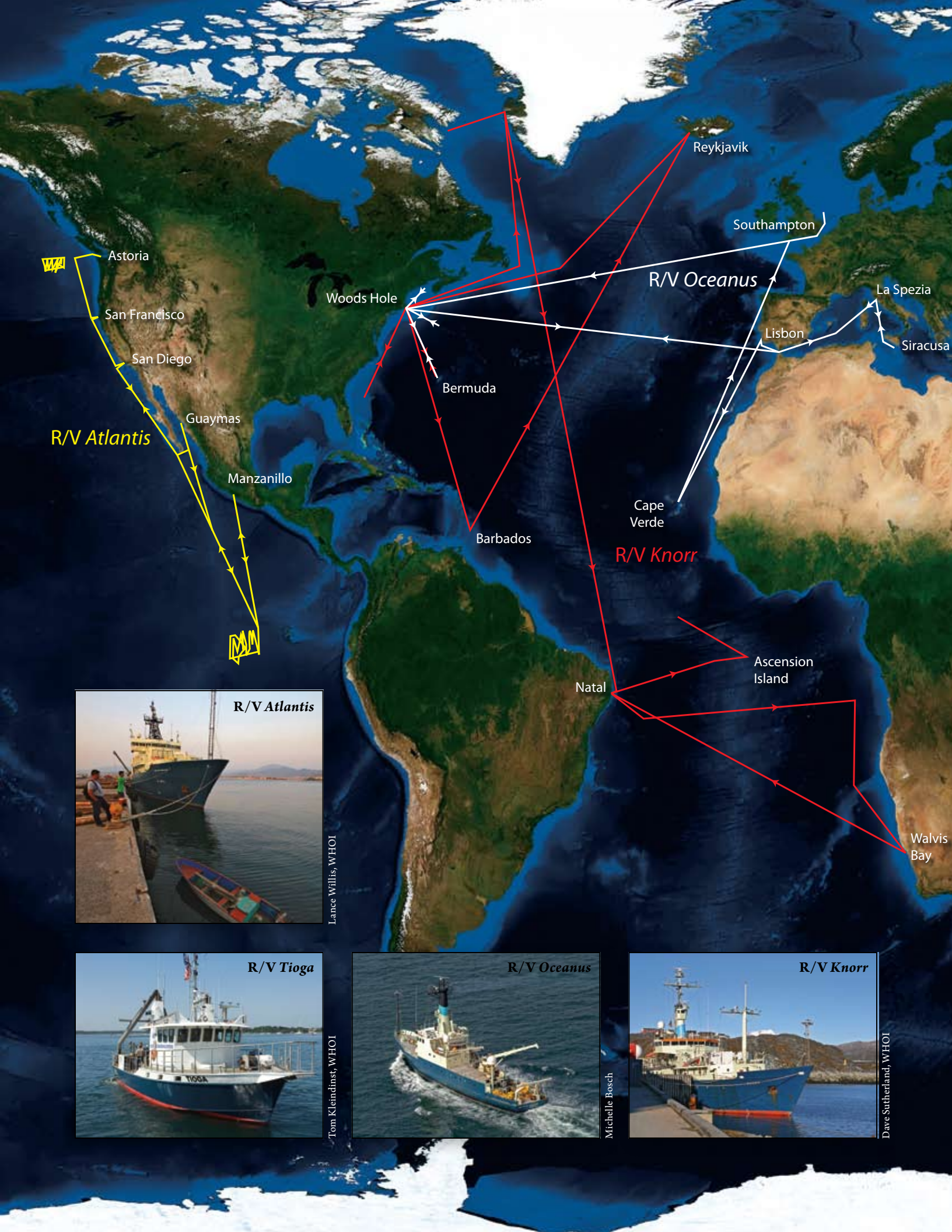
Days at sea: 283; *Cruises:* 16
Investigators served: 196 participants; *Nautical miles:* 44,133
Knorr began its year in the Northwest Atlantic, investigating the deep western boundary current with a broad array of surface, atmospheric, and underwater sensors. That work was followed by coral studies on the Shallows Bank south of Barbados. In early June, *Knorr* transited to Iceland for a multi-beam bathymetric and gravity survey of Reykjanes Ridge. In August, *Knorr* was used to study past cross-shelf sediment transport on New Jersey's outer shelf. Then *Knorr* successfully completed sea trials for WHOI's new long-coring system. The ship finished the year with hydrographic studies off of Greenland and Africa's Benguela upwelling region, and a test cruise to coordinate the operation of multiple AUVs deployed simultaneously.

R/V *Oceanus*

Days at sea: 171; *Cruises:* 18
Investigators served: 154 participants; Nautical miles: 27,000
After being laid up until April, *Oceanus* investigated variations in the Atlantic's deep western boundary current. In May, *Oceanus* conducted observations off Italy to develop observational/modeling strategies for identifying and reducing seabed clutter. The ship then transited to the Eastern Atlantic, where it collected sediment records of Northwest African climate and vegetation and of tropical sea surface temperatures. Following maintenance in Southampton, UK, *Oceanus* conducted ROV operations in the North Sea to search for the wreck of the USS *Bonhomme Richard*. In September, *Oceanus* was used to deploy a surface mooring near the Martha's Vineyard Coastal Observatory and to test a new sensor for measurement of surface waves. Another cruise determined the distribution of red tide cysts in the Gulf of Maine. The final cruise focused on the formation of subtropical "mode water" in the North Atlantic.

R/V *Tioga*

Days at sea: 114; *Trips for WHOI Projects:* 101; *Passengers:* 559
Tioga projects included water-quality monitoring in Massachusetts Bay; servicing the Martha's Vineyard Coastal Observatory; engineering test trials for the AUVs *Jaguar, Sentry,* and *REMUS-600;* recovery of instrumentation to study winter cooling and water mass modification off Cape Cod; tripod and mooring deployment for the Stratification, Wind and Wave on the Inner Shelf project:, red tide studies; mooring deployments for monitoring right whales during construction of an offshore liquefied natural gas terminal; deployment and recovery of equipment for the Optics Acoustics and Stress In Situ (OASIS) project; *REMUS* operations; and summer student fellow and education trips.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R/V Oceanus
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Barbados
R/V Knorr
Ascension
Island
Natal
Walvis
Bay
R/V Atlantis
Lance Willis, WHOI
R/V Tioga
Tom Kleindinst, WHOI
R/V Oceanus
Michelle Bosch
R/V Knorr
Dave Sutherland, WHOI

The AOP&E Department, to quote WHOI Honorary Trustee Robert Frosch, is living in "an expanding universe." Our budget, staff, and diversity of projects are all increasing, despite rather lean economic times for research overall. This is a tribute to the energy, enthusiasm, and creativity of our scientific and engineering staff.

Our department's "strategic plan" for approaching scientific questions and human applications has not changed much over the years. We are constantly trying to develop the best instrumentation and analysis tools to make significant inroads on hard—and even previously unsolvable—problems. It is a blend of the hardworking, roll-up-your-shirtsleeves creativity of Thomas Edison's workshop and the inspired visions of Jules Verne. When breakthrough technologies emerge, we want them to emerge in our labs.

But while the approach and philosophy remain the same, the technology surely does not. Our latest generation of instruments, sensors, models, and other technologies were unthinkable even a few decades ago. It sounds like Verne or Asimov—autonomous robotic vehicles carrying mass spectrometers, ultra-sensitive digital imaging systems, and other laboratory-style equipment to places like a deep, mid-ocean ridge or under the ice of the Arctic Ocean—but much of it was science nonfiction in 2007.

The Arctic Gakkel Vents Expedition—including AOP&E engineers Hanumant Singh, John Kemp, John Bailey, Clifford Pontbriand, and Mike Jakuba, and students Chris Murphy and Clayton Kunz—was a fine example of how autonomous vehicles are making their presence felt in polar science and other tough working environments.

Underwater vehicles with advanced sensors also are being developed and used for marine archaeology, Navy surveillance, and mine-hunting missions; for tracking and listening to whales; and for chemical sensing of ocean vents, toxic wastes, and oil leaks. Vehicles are being built with longer endurance, the ability to switch between autonomous and remote-controlled operations, easily interchangeable payloads, and other schemes for deploying and recovering robots in any part of the ocean.

While we all love our "techno-toys," the scientific and societal applications of technology can be just as exciting, and indeed provides the rationale for new technology development. In 2007, AOP&E officially secured a role in the large scale, national Ocean Observatories Initiative (OOI). Slated as a multi-year, multi-institutional program, OOI will require development, construction, and deployment of significant new hardware. AOP&E, along with the WHOI Physical Oceanography Department, will play a central engineering role in the coastal and global components of OOI.

Thanks to OOI and other initiatives, the AOP&E Department is growing—both its facilities and its mission. In 2007, the Mooring and Rigging group moved from the village of Woods Hole to a newly renovated facility in the Rinehart Coastal Research Laboratory on the Quissett Campus. The old Digital Buoy System lab, or DIBOS (a leftover name from an old ocean acoustics project), has been moved to Ocean Systems Laboratory, becoming the operational center for the REMUS family of vehicles.

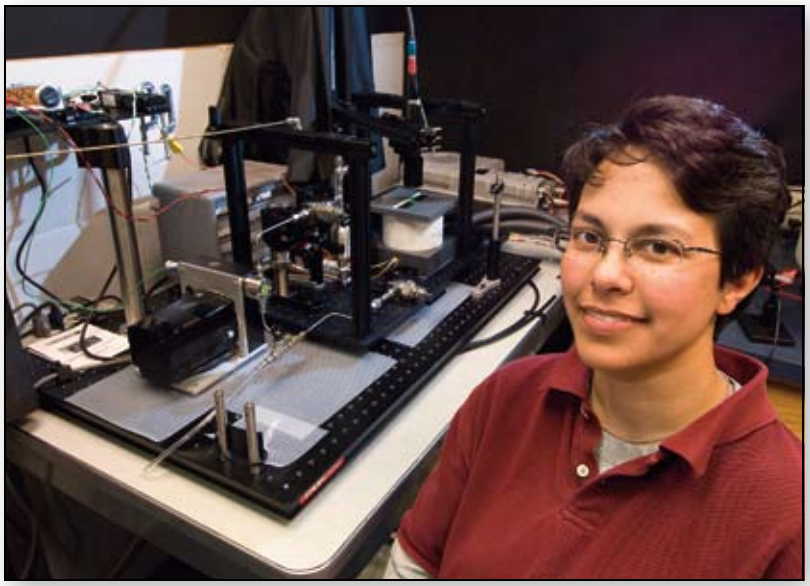
— James F. Lynch, Department Chair

Robert Elder, WHOI

The hybrid remotely operated vehicle (HROV) Nereus *is raised onto the research vessel* Kilo Moana *after open-water trials off Hawaii in November 2007. The new vehicle—which pushes the limits of fiber-optic technology and ceramic pressure housings—was designed by the Deep Submergence Lab to reach the deepest parts of the ocean as either an autonomous, free-swimming robot or as a tethered vehicle.*

Chris Linder, WHOI

Scientist Hanumant Singh (left) and graduate student Clayton Kunz steady the Jaguar *autonomous underwater vehicle as it hovers above the deck of the icebreaker* Oden *during the Arctic Gakkel Vents Expedition (AGAVE) in the summer of 2007. Singh and colleagues developed the vehicle specifically for deep-ocean dives beneath the ice cover of the Arctic Ocean.*



Tom Kleindinst, WHOI

To study deep-sea phenomena like gas hydrates up close, scientist Sheri White and colleagues are working to convert a laboratory device known as a laser Raman spectrometer for work in the difficult conditions of the deep sea. Raman spectrometers can tell scientists what almost any substance—solid, liquid, or gas—is made of.

Engineer Mark Johnson and colleagues are using non-invasive, temporary tags—known as D-tags—to digitally record the movements of whales during their dives, as well as the sounds that they make and hear. In a recent study of pilot whales, they discovered that the creatures make high-speed, all-or-nothing dives to chase and catch large prey before surfacing to catch their breath. Their behavior stands in stark contrast to the longer, slower, and more conservative dives of other whale species.

Petros Vezirtis, Hellenic Ministry of Culture

WHOI marine archaeologist Brendan Foley (right) joins Dimitris Kourkoumelis (Hellenic Ministry of Culture) and Maria Hansson (Lund University and WHOI) with two 2,400-year-old amphoras they studied to determine the original contents. Using molecular and genetic techniques, they discovered traces of olive oil, oregano, and mastic (an ancient wine preservative) that might lead to a better understanding about what crops and foodstuffs were traded in the ancient Mediterranean, as well as when, where, and to whom they were traded.

Photo courtesy of Mark Johnson

Research in biology covers a broad range of life forms, from the microscopic to the largest marine mammals on the planet. Equally broad is the range of sub-disciplines in biology, from studies of genes and molecules to modeling and examinations of ocean-scale processes. The overall goal of the Biology Department is to gain a better understanding of the ecology and evolutionary biology of living organisms in the sea. In 2007, WHOI biologists traveled from the poles to the tropics and from shallow lagoons to the deep sea to pursue such understanding.

Scientists use a variety of tools to observe, experiment, and model the interactions among species and between species and the environment. The most traditional tool is the research expedition, and WHOI scientists made some compelling trips in 2007. Several members of the Biology staff took part in the multi-disciplinary expedition to the Gakkel Ridge seafloor in the Arctic Ocean. Others explored Asia's Celebes Sea in collaboration with scientists from the Philippines. Scientists from WHOI, the University of Hawaii, and several other institutions conducted several research cruises to examine microbial diversity and upper ocean biogeochemistry in the South Pacific as part of the Center for Microbial Oceanography, Research, and Exploration (C-MORE) project.

Biological research also has benefited from the development of new tools that facilitate remote observations, analyses, and interpretation of phenomena. The FlowCytobot and the Imaging FlowCytobot, developed by Rob Olson and Heidi Sosik, allow investigators to monitor cell abundance and fluorescence in phytoplankton, and also record the images for later identification.

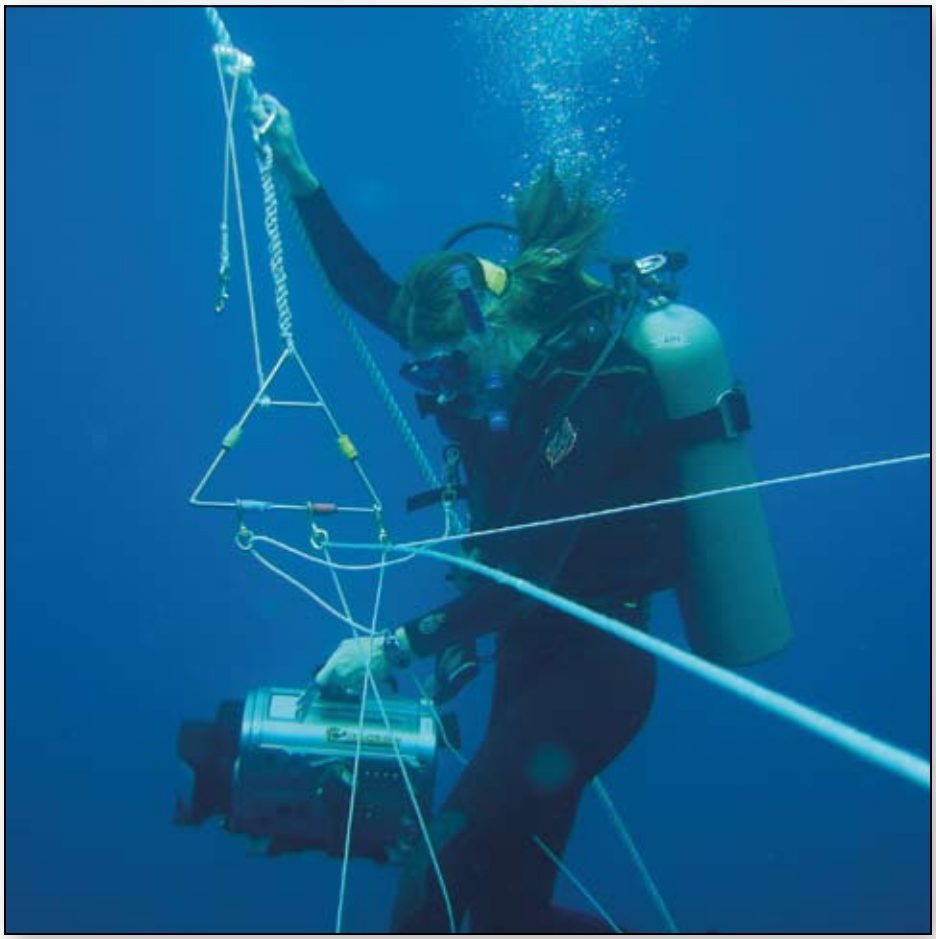
Scott Gallager built and deployed a habitat mapping camera system, or HabCam, to survey sea scallop habitat on Georges Bank in the North Atlantic. Working together with commercial scallopers, Gallager and colleagues hope to improve data collection for those who need to manage the sea scallop fishery.

Data access and interpretation are vital to biologists. Peter Wiebe and colleagues received support from the National Science Foundation to establish the Biological and Chemical Oceanography Data Management Office. BCO-DMO was conceived to assist investigators in the management of their marine biogeochemical and ecological data and information. More importantly, the system is designed to help protect, disseminate, and store data for use by the scientific community now and in the future.

Researchers from the Biology Department contribute extensively to the broader scientific community through consultation, peer-review, and committee membership for federal agencies, scientific journals, universities, the National Research Council, and other national and international committees. They also provide leadership to the WHOI Ocean Institutes, the Woods Hole Center for Oceans and Human Health, and the vital fleet committee of the University-National Oceanographic Laboratory System (UNOLS). Such activities benefit our Institution's scientific enterprise while maintaining the vitality of oceanography.

Particularly noteworthy is Hal Caswell's contribution to the International Polar Bear Study Team for the U.S. Department of the Interior. Caswell and colleague Christine Hunter of the University of Alaska (a former postdoctoral scientist at WHOI) took data collected by the U.S. Geological Survey on polar bear mortality rates, birth rates, life cycle characteristics, and habitats and incorporated it into mathematical models. By linking their models with projections of sea ice conditions in the Arctic, they were able to demonstrate the critical importance of sea ice and climate change to the population success of the polar bear. Recently the Department of Interior listed the polar bear as threatened with extinction because of the decline in sea ice, making it the first species to be so designated as a result of global warming.

— Judith E. McDowell, Department Chair



Andrew Gray, University of California, Santa Cruz

MIT/WHOI Joint Program student Kelly Rakow untangles tethers attached to her fellow divers during a "blue water" dive off the Pacific coast of Panama. The tether system is used to ensure that divers don't become disoriented or drift away when exploring the featureless—and seemingly bottomless—environment. Rakow is using blue water diving and an underwater video camera to study barrel shaped, gelatinous organisms called salps at the Liquid Jungle Lab.

Tom Kleindinst, WHOI

WHOI biologist Michael Moore and guest student Colby Moore (College of the Atlantic) carefully position a white-sided dolphin for a necropsy. The dolphin was one of dozens of animals that were examined in WHOI's necropsy facility in 2007.

Tom Kleindinst, WHOI

From left: Norman Vine (Advanced Habitat Imaging Consortium), Richard Taylor (a local fisherman), and WHOI biologist Scott Gallager assemble on the Iselin pier after testing the habitat camera mapping system, or HabCam, on Georges Bank. Gallager and colleagues are using HabCam to help assess populations of shellfish, finfish, and other marine populations through the Northeastern Bentho-Pelagic Observatory project.

Tom Kleindinst, WHOI

WHOI biologists Rob Olson and Heidi Sosik examine plankton-filled water samples on a prototype of the Imaging FlowCytobot (IFCB) in Olson's laboratory. The Cytobot, which is automated and submersible, counts and photographs microscopic plants in the water. The images and data are relayed by cable to a shore-based laboratory, where specially developed software classifies the plankton into taxonomic groups.

The scientists, staff, and students of the Geology and Geophysics Department continue to advance our understanding of the interactions between Earth, ocean, and climate systems. Our core strengths lie in the geology and geophysics of ocean basins, and the underlying dynamics of the mantle that keep the tectonic plates in motion; the geochemistry of Earth systems, from processes deep within the Earth to interactions between geology and biology; climate change and its relation to ocean circulation; and coastal processes, including climatic effects on coastal systems and influences on their ever-changing morphology.

The Department's staff members travel all over the world seeking data and samples to address their scientific questions. This year, our staff participated in cruises to the Pacific, Atlantic, Arctic, and Indian Oceans on research vessels from the U.S., Sweden, China, Japan, and Ukraine. Others conducted fieldwork on land in a variety of locations, including the Democratic Republic of the Congo, Greenland, Ireland, Algeria, and the deltas of the Mackenzie, Danube, and Indus Rivers.

Since it was International Polar Year, our scientific highlights this year focused on the Arctic. Sarah Das, Mark Behn, and Dan Lizarralde deployed an array of seismometers around lakes on the surface of the Greenland ice sheet. They are investigating how hydrofracturing opens conduits to drain water in lakes on the surface of the Greenland ice sheet to the base of the ice sheet. This can dramatically change the speed of the ice sheet, and is critical to determining how ice sheets will respond to fluctuations in climate. Another project led by Robert Reves-Sohn, and involving Susan Humphris, other WHOI scientists and engineers, as well as an international team, sailed to the Arctic on board the Swedish icebreaker *Oden*. The goal of this project, co-sponsored by NASA's Astrobiology Program, NSF's Office of Polar Programs and WHOI, was to use two autonomous underwater vehicles specially designed for use under ice, to search for volcanic and hydrothermal activity on the Gakkel Ridge—a poorly known part of the mid-ocean ridge system. Thousands of people followed the expedition daily on two WHOI websites: *Dive and Discover* and *Polar Discovery*.

The Department takes pride in having some of the best sampling and analytical facilities in the world, and this year saw the completion of two important projects. The first was the successful demonstration of the new long-coring system during a cruise to the Bermuda Rise and New Jersey margin. Designed and built by Jim Broda, this complex coring system was tested in late summer and recovered several high quality cores up to 38 meters in length. This new system nearly doubles the coring capacity of the U.S. research fleet, and will allow scientists to collect older sediment records of past conditions and events in the oceans. The second project was the completion of the Continuous Flow Accelerator Mass Spectrometer developed and constructed by Mark Roberts. This instrument is designed specifically for continuously monitoring ^{14}C in a flowing gas stream. It will significantly enhance the capabilities of the National Ocean Sciences Accelerator Mass Spectrometry facility and allow quantification of ^{14}C tracers at very high levels of dilution. These are two remarkable and spectacular achievements.

While the National Science Foundation continues to be the main source of funding for the Department, several members have received support from non-federal sources. Examples include Jian Lin who received funding from the U.S. Agency for International Development to investigate earthquake mechanisms and hazards in northern Algeria; John Collins, who received funding from Lighthouse R&D Inc., Houston, TX, to construct three cable-based tsunami-warning stations, one of which was deployed offshore of Oman; Ken Sims, who received a grant from the Taos and Zuni Pueblos through Glorieta Geoscience, Santa Fe, NM; and Jian Lin and Chris German, who are continuing collaboration with the China Ocean Mineral Resources R&D Association through a cruise that used the autonomous underwater vehicle, *ABE*, to locate the first hydrothermal vents in the SW Indian Ocean, an ultraslow spreading ridge.

The number of scientific staff decreased this year: three left for university faculty positions, and Stan Hart, one of the Department's National Academy of Sciences members and an international leader in solid earth geochemistry, retired although he will stay active as a Scientist Emeritus. Two scientists—Rob Reves-Sohn, who is a geophysicist, and Ken Sims, a geochemist—were awarded tenure. Our one addition of a new assistant scientist was Andrew Ashton, who first came to WHOI as a postdoctoral scholar in 2005. Andrew is a coastal modeler interested in the development and testing of models of the formation and evolution of coastlines on time scales of human and geologic relevance.

—Susan Humphris, Department Chair

Chris Linder, WHOI

Researchers examine and discuss seafloor data on the bridge of the Swedish icebreaker Oden *during the Arctic Gakkel Vents Expedition in July 2007. Front row, left to right: Hedy Edmonds (University of Texas), Rob Reves-Sohn, and Susan Humphris. Back row, left to right: Ulf Hedman, Mattias Peterson, Hanumant Singh, and Tim Shank.*

Alex Dorsk, WHOI

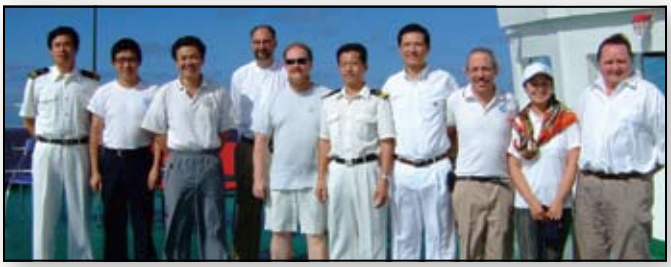
In 2007, WHOI geologists retrieved the first sediment cores with the newly installed "long-corer" on the research vessel Knorr. *Bill Curry, Jim Broda, and several WHOI colleagues conceived and built the new corer, which at 150-feet is the longest piston-coring system in the United States, nearly twice as long and four times as heavy as existing systems in the research fleet.*

Scientists walk along the edge of a large canyon carved by meltwater stream flow across the surface of the Greenland ice sheet. The lines along the canyon wall show the stratigraphic layers of ice and snow laid down over the decades. WHOI glaciologist Sarah Das, geophysicist Mark Behn, and other colleagues from WHOI and the University of Washington will continue their studies of how Greenland's ice is melting and moving in the summer of 2008.

Sarah Das, WHOI

Tom Kleindinst, WHOI

MIT/WHOI graduate student Jonathan Woodruff holds a sediment core for display to teachers participating in a coastal education workshop. Working with G&G associate scientist Jeff Donnelly, Woodruff has been examining the history of intense hurricanes and typhoons in the Caribbean and Asia.



Courtesy of Dana Yoerger, WHOI

WHOI researchers took part in a spring 2007 expedition aboard the Chinese research ship Dayang I *in which they discovered the first deep-sea hydrothermal vents along the Southwest Indian Ridge. G&G scientists Chris German (right) and Jian Lin (fourth from right) were joined by Dana Yoerger (third from right), Al Duester, and Andy Billings, (sixth and seventh from right) from the AOP&E Department. In January 2007, Lin and German also became co-chairs of InterRidge, an international organization of mid-ocean ridge researchers, which will be based at WHOI through 2010.*

The goal of chemical oceanographers is to elucidate the processes that govern the chemistry of the ocean, as well as to understand how that chemistry influences and responds to ocean life and Earth's climate. There is growing evidence that human activity is changing ocean chemistry, placing ever more urgency on our efforts to understand this change and place it in the context of natural variability. Scientists in the Marine Chemistry and Geochemistry (MC&G) Department are meeting this challenge in a wide variety of ways.

Several WHOI chemists are heavily engaged in GEOTRACES, an international program to characterize the distribution of elements and their isotopes in the global oceans. Armed with such information, oceanographers could better assess how ocean chemistry, circulation, and biological activity might change in the future. We also could better interpret the paleoceanographic archives (such as sediments and corals) that record past changes and better recognize the geochemical signatures emanating from deep-sea hydrothermal vent systems.

Tom Kleindinst, WHOI

Hauke Kite-Powell, Scott Doney, and Ken Buesseler (l to r) lead a public forum on iron fertilization of the oceans. The event was held in conjunction with a symposium that brought policymakers, scientists, entrepreneurs, and advocacy groups together to discuss some of the methods for removing excess carbon dioxide from Earth's atmosphere.

Bill Jenkins serves on the scientific steering committee for GEOTRACES, while Olivier Rouxel, Matt Charette, Carl Lamborg, and Phoebe Lam were heavily involved in the National Science Foundation-sponsored planning meetings that shaped the initiative. Karen Casciotti, Bernhard Peucker-Ehrenbrink, Ken Buesseler, and Lamborg are now coordinating efforts to establish sampling and analytical protocols for specific elements and isotopes. In the fall of 2007, Mak Saito led the first GEOTRACES cruise; the "CoFeMUG" expedition in the South Atlantic sought to examine how cobalt (Co) and iron (Fe) cycle through the oceans and influence biological productivity.

In 2007, much public attention was focused on "ocean acidification," one of the consequences of civilization's carbon dioxide emissions. Excess CO_2 from the atmosphere is being absorbed by the oceans and subtly but systematically reducing the pH. Marine organisms—from corals and clams to snails and plankton—build skeletons or shells from a type of calcium carbonate that is corroded and disrupted by even modest changes in pH. In May 2007, Scott Doney testified about these and other effects of climate change on living marine resources before a subcommittee of the U.S. Senate Committee on Commerce, Science, and Transportation.

There has also been much societal debate about how to respond to these dramatic increases in atmospheric CO_2. Some entrepreneurs and scientists have proposed removing CO_2 from the atmosphere and sequestering it in the ocean by "fertilizing" the ocean with iron. The theory holds that by adding iron (a limiting nutrient in some regions), we could increase the growth of marine plants and convert the CO_2 in surface waters to biomass that could sink to the deep ocean and sequester the carbon.

In order to raise awareness of this issue, MC&G scientists Ken Buesseler and Scott Doney, together with Hauke Kite-Powell from the WHOI Marine Policy Center, organized a symposium and public forum in Woods Hole in 2007. They brought together scientists, entrepreneurs, advocacy groups, and policymakers to debate the effectiveness and pitfalls of iron fertilization, particularly the potential for unintended consequences for ocean life. Buesseler later gave a briefing on the topic to House and Senate staffers on Capitol Hill.

MC&G scientists are exploring numerous other aspects of ocean chemistry, including: geochemical reactions that take place around deep-sea hydrothermal systems; the exchange of nutrients and chemicals between the land and the oceans through rivers and groundwater; the biogeochemistry of shallow and deep-sea corals; and microbial biogeochemistry in the open ocean. MC&G scientists have wandered as far afield as the dry valleys of Antarctica (Mark Kurz), the Mackenzie River delta in the Canadian Arctic (Tim Eglinton), freshwater springs in the Yucatan Peninsula (Matt Charette), and coral reefs in the Red Sea (Konrad Hughen). By weaving these diverse topics together, and by developing and applying novel and unique geochemical methodologies, we are building a deeper understanding of the processes that control the composition of the oceans.

— Timothy I. Eglinton, Department Chair

Chris Linder, WHOI

A research team from WHOI moves out along a ridge above the Koettlitz Glacier in Antarctica in December 2007. MIT/WHOI Joint Program student Andrea Burke has her rock hammer out, and senior scientist Mark Kurz (MC&G) is leading the group toward a rock sampling location for studies of how rock weathers in such extreme cold. WHOI geologist Adam Soule has just taken a photograph of the patterned ground beneath their feet. Science writer Hugh Powell (second from right) collected the stories.

Tom Kleindinst, WHOI

Analyzing climate data from ice cores and sediment cores, paleoclimatologist Konrad Hughen and colleagues showed that Neanderthals did not die out at a time of extreme and abrupt climatic change, refuting one of the leading theories for what led to the extinction. The research, written up with colleagues from four nations, was published in the fall of 2007.

Tom Kleindinst, WHOI

WHOI chemist Liz Kujawinski (back left) observes service engineer Rob Harper install a Fourier-transform ion cyclotron mass spectrometer in the Fye Laboratory. The new room-sized mass spectrometer can measure the molecular mass of many compounds simultaneously with very high precision and accuracy. It will be used to identify and characterize large organic compounds produced and used by marine microbes, and to detect petroleum products or pharmaceuticals in the environment. Kujawinski and Chris Reddy led a group that won a grant from the National Science Foundation for the new equipment. A complementary piece of equipment in this laboratory was provided by the Gordon and Betty Moore Foundation.

Researchers in the Physical Oceanography (PO) Department seek to describe and understand ocean circulation and how it interacts with the atmosphere. Oceanographers approach these questions through laboratory experimentation, analytical and numerical modeling, collection of new observations, analysis and synthesis of existing data, and the development of new observational methods. The greatest strength of the department lies in observing the ocean and in developing new ways to do it.

WHOI physical oceanographers are key contributors to several major national and international climate observing programs, building, deploying, and analyzing data for the Argo profiling float array and various moored surface buoys such as the Northwest Tropical Atlantic Station and the Stratus Ocean Reference Station.

In February 2007, several Department researchers braved rough winter storms—with winds reaching 30 meters per second (nearly 70 miles per hour)—for major field work in the CLIVAR Mode Water Dynamics Experiment (CLIMODE). Terry Joyce served as chief scientist as the R/V *Knorr* spent six weeks in the North Atlantic, deploying and recovering buoys and making hydrographic and weather observations. Joyce, John Toole, and colleagues looked for evidence of Gulf Stream waters being modified by winter conditions and being carried down to intermediate depths. Al Plueddemann (WHOI) and Jim Edson (University of Connecticut) deployed an Air-Sea Interaction Spar buoy to measure how much heat the ocean was losing when cold, dry air from land blew over the region. The research team was even called on to recover Bob Weller's surface mooring—previously deployed in the Gulf Stream—that had gone adrift just before the *Knorr* sailed from Woods Hole.

PO Department researchers also have been perfecting sensors and buoy systems that can collect accurate meteorological observations at the ocean surface as well as exchanges of heat, freshwater, and momentum between the air and sea. And they are using such data to synthesize global maps of the exchange of heat and freshwater between the atmosphere and ocean. The development and use of bottom-anchored and free-floating platforms—such as autonomous underwater vehicles, gliders, and novel buoy designs—continues and is increasing our understanding of the ocean.

A growing strength and focus for the Department involves collaborative efforts to improve our understanding of the Arctic. Several field programs were initiated in conjunction with the International Polar Year and aided by funds from WHOI's Arctic Research Initiative and the Ocean and Climate Change Institute. Working with WHOI engineers and field technicians, PO scientists are developing innovative observing tools for surviving the extremes of the North, including: a vertical profiler that is tethered to the ice; an under-ice version of the Argo profiling float; a microstructure instrument to sample fine-scale variability and mixing of Arctic waters; bottom-anchored moorings fitted with moored profilers; and even a subsurface mooring that uses a winch float to take instruments up to the surface and back down again when endangered by floating ice. Investigators are complementing these field studies with new numerical and laboratory models.

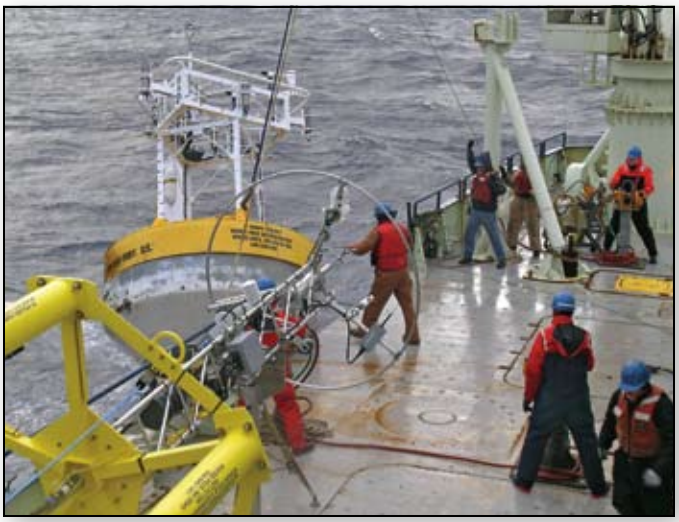
The year included the announcement of a major new observing effort that is being led by staff from PO and WHOI's Applied Ocean Physics and Engineering Department. In August, the National Science Foundation announced that it has awarded WHOI and its partners at Oregon State University and Scripps Institution of Oceanography a $98 million contract to design and deploy two coastal and three global observatories for the national Ocean Observatories Initiative (OOI). The OOI passed a Preliminary Design Review in December 2007 and is working toward a Final Design Review in 2008.

The development of a regional Integrated Ocean Observing System (IOOS) in the Northeast U.S. is being coordinated with these OOI efforts, with the goal of setting up an Atlantic coastal observatory, a "pioneer array" spanning the continental shelf south of Woods Hole.

— Robert Weller, Department Chair

Dave Sutherland, WHOI

WHOI engineers Jim Valdes (left) and Will Ostrom load a profiling float into the frame of a Submerged Autonomous Launch Platform, or SALP, on the deck of the research vessel Knorr *in the Labrador Sea. When a swirling eddy passes by, the SALP launches a float into it. The float travels along with the eddy, measuring its characteristics and occasionally surfacing to transmit data back to shore via satellite.*

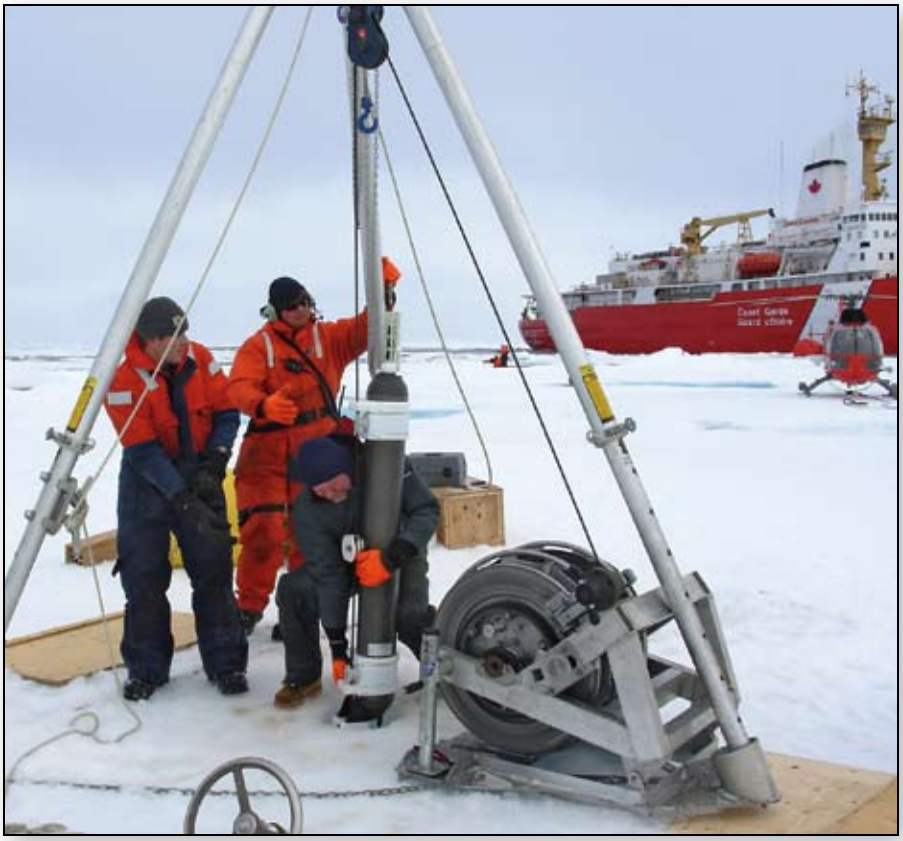


Terry Joyce, WHOI

Researchers and crew on the research vessel Knorr *prepare to deploy a meteorological buoy in March 2007 during the fifth of six cruises in the CLIMODE research program. The three-year field campaign, which ended in November 2007, was designed by Terry Joyce and colleagues to investigate the transfer of heat between the ocean and atmosphere at the eastern edge of the Gulf Stream, as well as the formation of 18° water masses that distinguish the region.*

Tom Kleindinst, WHOI

Working in the recently renovated Coastal Research Laboratory at WHOI, engineering assistant Paul Fraser puts finishing touches on surface buoys. Scientists and engineers have been reshaping their labs, shops, and research plans with the September 2007 announcement that WHOI and its partners at Scripps Institution of Oceanography and Oregon State University will be leading the coastal and global portions of the national Ocean Observatories Initiative.



Gary Morgan

WHOI engineering assistant Kris Newhall (left) and crewmember of the Canadian ice-breaker Louis V. St. Laurent *Brian Mackenzie (middle) prepare to assist WHOI research specialist Rick Krishfield in deploying an ice-tethered profiler (ITP) in the Arctic Ocean. WHOI researchers have been deploying an array of ITPs across the region to measure the dynamic changes—both natural and caused by global climate change—in the character of the waters beneath the ice cap.*

Patricia White, WHOI

Engineering assistant Sean Whelan assembles a mooring hook and acoustic release (yellow tube) for a tricky equipment recovery operation at sea. WHOI technicians and engineers have developed their own techniques for finding and recovering mooring wires—and their attached instruments and hardware—that get stuck underwater or fail to surface when commanded. Whelan, mooring specialist Jeff Lord, and colleagues recently made a mid-wire catch of pieces of Michael McCartney's GUSTO mooring, which had been battered for several years by the extreme currents of the Gulf Stream.

WHOI's strategic plan calls for diversifying the institution's research portfolio by working with new partners, with applied science, and with novel and non-traditional subjects. Some of the students in the Massachusetts Institute of Technology/WHOI Joint Program are helping to lead the way.

Epidemiology and carbon nanotubes are the focus of two recent Joint Program theses, but what does either topic have to do with ocean science? In 1988, phocine distemper virus (PDV) killed more than 23,000 harbor seals all across Northern Europe, though some locations had many more deaths than others. 2007 graduate Petra Klepac combined the study of disease and of animal behavior while developing a mathematical model to explain why the number of seal deaths differed between European locations.

Another student, Desirée Plata, is examining the industrial processes that produce carbon nanotubes, a new industrial material with many potential applications in electronics, construction, and manufacturing. Various metals are used as catalysts in the production process and can remain attached to nanotubes as a contaminant, with unintentional but nonetheless harmful impacts on the marine environment. Plata sought to identify which nanotube production processes are least likely to impact the environment, with the idea that "an ounce of prevention is worth a pound of cure."

Tom Kleindinst, WHOI

WHOI summer student fellow Tess Brandon (Cornell University) launches a REMUS autonomous underwater vehicle for a short survey in the waters off Martha's Vineyard. Working with physical oceanographer Al Plueddemann, Brandon studied the hydrodynamics of a submarine sand ridge.

Tom Kleindinst, WHOI

Associate Dean Jim Price presents the Rear Admiral Richard F. Pittenger Fellowship—for naval officers participating in the Joint Program—to Ensign Gregory C. Dietzen at the 2007 graduate reception.

During the 2006-2007 academic year, the MIT/WHOI Joint Program awarded 31 masters and doctoral degrees in ocean science and engineering. By the end of 2007, the Joint Program had awarded 785 degrees since its founding in 1968. Twenty-five new students enrolled in the program last year, and the total fall enrollment was 137.

Twelve postdoctoral scholars and a marine policy fellow were selected in 2007. The Scholar program is anchored by endowment funds and annual grants from benefactors. It also includes funds from the U.S. Geological Survey.

Other new postdoctoral fellows arrived in 2007 with financial support from the U.S. National Science Foundation, National Oceanic and Atmospheric Administration, and the Office of Naval Research, as well as Portugal, Greece, Spain, the European Union, Brazil, and the Organization of American States.

The Geophysical Fluid Dynamics Program met for its 49th summer in Woods Hole, with 41 staff members and 10 fellows participating. The principal topic for the session was "boundary layers."

Twenty-nine students were chosen from 190 applicants to participate in our annual summer programs for undergraduates and recent graduates. Students came to Woods Hole from twenty U.S. colleges and universities and eight international universities. During the 10- to 12-week program, the summer fellows attended lectures and workshops and conducted independent research projects under the supervision of WHOI scientists.

Students and postdocs bring energy, enthusiasm, and new ideas to WHOI's research portfolio and help us move in new directions. It's a privilege to oversee these fine education and training programs.

— James A. Yoder, Vice President for Academic Programs and Dean

The Coastal Ocean Institute (COI) promotes scientific inquiry into phenomena that shape our coastal waters and ecosystems. Through research grants, scientific gatherings, and the development of state-of-the-art facilities, COI encourages interdisciplinary research and innovative technology development.

COI's research themes focus on examining threats to and abuses of coastal waters; observing and analyzing the biological, physical, geological, and chemical processes at work where air, sea, and land meet; and developing instruments to better measure, monitor, and analyze the fundamental processes shaping the coastal region.

To support these themes, COI funded six research projects and one new initiative in 2007. We also initiated support for one new COI Fellow: Claudia Cenedese (PO) uses laboratory experiments and analytical models to simulate the dynamics of eddies and buoyant coastal currents. With this support, she is expanding her research to examine how physical and biological processes interact and affect each other in coastal waters.

COI continues its support of three other Fellows. Rob Evans (G&G) is using marine electromagnetics to study groundwater discharge and to characterize the sedimentary environment on the continental shelf. Becky Gast (BIO) is studying the epidemiology of infectious diseases in coastal areas. Andone Lavery (AOP&E) is using high-frequency sonar to learn more about how turbulence and mixing affect the biology of coastal waters.

The Institute supported several postdoctoral scholars and Joint Program graduate students in various ways this year. Postdoc Anders Carlson is investigating the interactions of ice sheets, oceans, and the climate system on orbital to centennial time scales, while postdoc Anthony Kirincich is using the Martha's Vineyard Coastal Observatory to examine the vertical structure of the water column and the effects of waves on sub-tidal circulation. COI-sponsored graduate student Dan Rogers is using molecular biology and stable isotopic techniques to examine the distribution, abundance, and activity of nitrogen cycling microbes in the subterranean estuary in Waquoit Bay, Mass. Five other graduate students received modest research awards for thesis research expenses not otherwise covered by existing support.

In the fall of 2007, COI presented the 14th Bostwick H. "Buck" Ketchum Award on behalf of the WHOI community. The award—which was presented to University of Delaware oceanographer Richard Garvine—honors a scientist who demonstrates an innovative approach to coastal research, provides leadership in the scientific community, and makes a link between coastal research and societal issues.

—Donald Anderson, Institute Director

A sampling of COI research projects for 2007

Bernhard Peucker-Ehrenbrink (MC&G) and **Michael Purcell** (AOP&E) are designing, building, and testing an automated, large-volume aerosol auto-sampler for the Air-Sea Interaction Tower (ASIT) of the Martha's Vineyard Coastal Observatory (MVCO). The project is part of a broader oceanographic initiative to construct new coastal ocean observing systems.

Gene Terray (AOP&E) is also utilizing ASIT to investigate the performance of Doppler SODAR for profiling winds in the coastal marine atmospheric boundary layer.

Jeff Donnelly (G&G) is examining the potential of deep lagoons in the tropical Pacific to provide detailed records of intense tropical cyclone activity. The work could allow scientists to reconstruct records of tropical cyclones in the Pacific for the last several millennia.

Carl Lamborg and **Bill Martin** (both from MC&G) are measuring the amount of mercury and radon in local pond and embayment waters, sediments, and organisms to determine the relative importance of groundwater as a source of mercury.

Ken Brink (PO) is using a simple model of mixing in a buoyancy current in order to characterize how waters get diluted (or not) and why the process is relatively constant. Model results could provide simple predictive tools for estimating dilution of river outflows and the concentrations for nutrients and other dissolved materials.

Karen Casciotti (MC&G) is using molecular and stable isotopic tools to examine the potential of natural populations of microorganisms to offset the flux of nitrogen from groundwater to coastal waters.

Al Plueddemann (PO), **John Trowbridge** (AOP&E), and **Heidi Sosik** (BIO) are developing and implementing a research plan to measure, monitor, and analyze the fundamental processes shaping the continental shelf ecosystem in the northwest Atlantic.

Tom Kleindinst, WHOI

Karen Casciotti is working to understand how microorganisms affect the exchange of excess nutrients (principally nitrate) between groundwater and the coastal ocean. Casciotti and colleagues are using microbiological, molecular, and chemical techniques to understand which nitrogen metabolizing microbes are present in the Waquoit Bay (Falmouth, Mass.) subterranean estuary and at what rate they are removing nitrogen from the system.

Many keys to unlocking Earth processes can be found deep under the ocean, on and within the seafloor that covers two-thirds of our planet's surface. These processes help regulate the chemistry of the oceans, determine the nature and shape of Earth's surface, and influence the microbiology, chemistry, and environments that allow life to flourish. The goal of the Deep Ocean Exploration Institute (DOEI) is to investigate these interrelated processes and to stimulate cutting-edge research in the earth and ocean sciences and technology development.

The past century has brought revolutionary advances in our broad understanding of the planet, but we are only just starting to gain detailed knowledge of the interactions between earth-forming and life-forming processes. We have been slowed by the inaccessibility of remote parts of the planet—especially the deep ocean and subsurface—and the challenges related to measuring Earth's dynamics over very long and very short scales of time and space. But this is changing.

DOEI promotes high-risk, high-reward exploration of remote parts of the planet with innovative technologies and interdisciplinary investigations. DOEI-funded researchers are particularly interested in understanding the flow of both magma and water within the planet; the nature and evolution of biological communities in the deep ocean and Earth's crust; and the characteristics of planetary processes that shape Earth. The Institute also supports engineers and scientists in the development of undersea technologies and the establishment of seafloor observatories in various settings.

DOEI has played an important role in WHOI's education and outreach efforts by sponsoring the Geodynamics Seminar Series—the topic this year was "Subductions—From Trench to Arc"—and in fostering K-12 and public outreach via the Dive and Discover™ web expeditions.

—Dan Fornari, Institute Director

A sampling of DOEI research projects for 2007

Chris Linder, WHOI

Susan Humphris and Tim Shank retrieve samples of Arctic seafloor mud snatched by the Camper *tethered sampling vehicle. On the Arctic Gakkel Vents Expedition and in other locations around the world, Shank and colleagues are examining the environmental conditions that promote the growth of different seafloor species and the processes that allow them to migrate and evolve in the depths.*

Juan Canales (G&G) is using novel techniques in seismic tomography—turning seismic wave readings into CT-like scans of the Earth—to see beneath the seafloor and resolve the structure of the upper ocean crust along a section of the Galápagos spreading center. Such a view will help researchers understand the distribution of magma beneath the mid-ocean ridge crest and its relationship to ocean crustal architecture.

John Collins (G&G), **Jeff McGuire** (G&G), and **Jonathan Ware** (AOP&E) are developing software and instrumentation for ocean-bottom seismometers and buoy systems that will be deployed off the Pacific Northwest of the United States. The project is part of a larger effort to develop more effective earthquake and tsunami warning systems for that region; the DOEI-sponsored work also has applications for other high-risk environments.

Chris German (G&G), **Chip Breier** (AOP&E), and **Brandy Toner** (MC&G) are developing a new water-sampling system that can sift suspended particles (such as manganese or iron) from deep ocean water and study how the chemicals in hydrothermal vent plumes affect biochemistry.

Tim Shank (BIO), a new DOEI fellow, combines molecular genetic approaches and ecological field studies to understand the conditions and adaptations that allow various species to migrate, evolve, and thrive in deep-sea habitats. With his fellowship, he plans to hunt for new genes and use gene-expression profiling to examine the basis for novel chemosynthetic adaptations that allow creatures to thrive at hydrothermal vent sites.

Maurice Tivey and **Ken Sims** (both from G&G) are using new seafloor magnetic mapping techniques and advanced rock dating (using isotopes of uranium) to investigate the age of basalts along the slow-spreading Mid-Atlantic Ridge. The goal is to better understand the evolution and timing of axial volcanic ridge formation.

Maurice Tivey (G&G) is a new DOEI fellow who is developing an industrial partnership program to further research and technology collaborations between marine mining and exploration companies and WHOI investigators.

Brian Tucholke, **Susan Humphris**, and **Henry Dick** (all from G&G) are analyzing the mineral, chemical, and isotopic compositions of rocks from the Kane megamullion site along the Mid-Atlantic Ridge. The goal is to better understand the geometry and chemistry of hydrothermal fluid flow associated with major fault systems.

With 2007-2008 designated as the International Polar Year (IPY), it is no surprise that much of the research effort of Ocean and Climate Change Institute (OCCI) has focused on the Arctic Ocean and its surrounding land masses. The combined resources of the OCCI, the North Atlantic-Arctic Abrupt Climate Change program, and the Clark Arctic Research Initiative supported more than 30 research projects in 2007, about two-thirds of them directly tied to IPY.

The research involved several significant field operations. Rick Krishfield, John Toole, Mary-Louise Timmermans and Andrey Proshutinsky (all PO) worked to deploy an array of ice-tethered profilers to monitor Arctic ice motion and ocean properties beneath the sea ice. Sarah Das, Mark Behn, and Dan Lizzaralde (all G&G) led a field program on the Greenland Ice Sheet to measure the development and fate of surface lakes produced by summer melting. Bob Pickart (PO) and Carin Ashjian (BIO) deployed an observing system near the southern tip of Greenland to observe the mixing of freshwater from the Arctic with the warmer, saltier waters of the North Atlantic.

Several other projects combined physical and biologic research to determine the effects of warming and loss of sea ice on marine algae and mammals. The research efforts also moved onto land, with researchers studying the impact of permafrost melting on nutrient and carbon content in rivers draining into the Arctic basin.

OCCI research activities benefitted greatly from the support of the Comer Science and Education Foundation and the SeaLark Foundation. That support allowed us to continue our studies of the North Atlantic circulation system and to begin a focused five-year research effort to study changes in the Arctic and North Atlantic ocean-atmosphere-ice system.

In 2007, the Institute supported three fellows and one graduate student for their climate-related research and outreach activities. OCCI also contributed to two important scientific and public symposia on iron fertilization of the oceans, a potential means of removing CO_2 from the atmosphere.

—William Curry, Institute Director

A sampling of OCCI research projects for 2007

Al Plueddemann (PO) and colleagues will deploy REMUS autonomous underwater vehicles beneath the ice to examine the winter flow of Pacific waters into the Arctic Ocean through the Bering Strait and Chukchi Sea. The goal is to understand the role these waters play in maintaining the Arctic ice cap.

Fiamma Straneo (PO) is working with Canadian colleagues to deploy a moored array of instruments—including an under-ice "Arctic winch" with a moored water profiler—in the Hudson Strait in order to measure how changes in Arctic waters propagate through the Fram Strait, Hudson Bay, and into the North Atlantic.

Samuel Laney and **Heidi Sosik** (both from BIO) are blending satellite data, field observations from the Chukchi Sea, and computer modeling to make satellite ocean color data a more robust tool for observing the Arctic environment.

Elizabeth Kujawinski (MC&G), **Sarah Das** (G&G), and **Matthew Charette** (MC&G) are assessing how meltwater is flowing from the Greenland Ice Sheet and how much carbon it carries out of the ice and from the ground beneath the glaciers.

Mark Baumgartner (BIO) is tagging bowhead whales in the Arctic to track their diving behavior and other movements, while monitoring ocean conditions and the concentration of prey. The ecology of the whales is closely associated with Arctic sea ice, and continuing changes in ice conditions will undoubtedly affect bowhead behavior.

Daniel Repeta, Tim Eglinton, and **Ben Van Mooy** (all from MC&G) are working with colleagues at the Woods Hole Research Center to investigate the transfer of carbon and organic nutrients from the melting soils of Arctic watersheds to the Arctic Ocean by sampling Russia's Lena and Ob rivers and North America's Colville River.

OCCI Fellow **Delia Oppo** (G&G) is documenting and modeling past changes in the North Atlantic and tropics with the overall goal of understanding to what extent, and how, the climate of these regions are linked.

Carin Ashjian (BIO) is observing the seasonal and annual changes in the ocean environment and plankton abundance off Alaska that affect the feeding of the bowhead whale prey and their prey. The goal is to understand how climate change is affecting marine populations and Iñupiat subsistence whalers.

Angela Dickens, WHOI

Tim Eglinton (red cap) and Daniel Montluçon work to extract a sediment core from the bottom of a frozen lake in the Mackenzie River Delta in April 2007, as two Inuit guides look on. The goal of the project was to sample the soil-rich sediments on the lake bottom for clues to past climate change. The team is headed back to the region for further studies in 2009.

The sea harbors a great diversity of life, with complex interactions between species and their environment. The productivity of ocean life affects global climate and provides important protein for the world food supply.

The human impact on sea life is growing every year, with global warming reducing ocean productivity, overdevelopment and pollution contaminating coastal waters, and the increasing demand for food causing the over-harvesting of fisheries. Addressing these issues requires an understanding of the underlying processes controlling diversity and productivity of ocean life which, in turn, requires a combination of exploration and quantitative analysis.

The Ocean Life Institute's (OLI) mission is to support high-risk, high-reward basic research that leads to fundamental new insights in ocean biology and to deeper awareness of biological issues of societal relevance. OLI has funded research on everything from bacteria to whales, from exploration to theoretical studies.

OLI currently supports research in three broad themes: biodiversity, ocean health, and technology development. We are also developing a new initiative to foster WHOI research in conservation biology, mathematical ecology, ecosystem management, and ocean modeling and observing systems. OLI also has continued its support of two ongoing research initiatives.

The North Atlantic Right Whale Initiative, led by Michael Moore (BIO), promotes research on feeding ecology, growth, reproduction, and mortality due to entanglement and ship strikes. The work of this active and diverse community of researchers is featured in a new book, *The Urban Whale*, published by Harvard University Press.

The Coral Reef Fish Connectivity and Conservation initiative is aimed at understanding the degree of isolation between different populations of coral reef fish. WHOI scientists, led by Simon Thorrold (BIO), conducted field studies on the spawning and larval transport of the Nassau grouper on coral reefs in Belize.

Eight research projects at the Liquid Jungle Laboratory (LJL) in Panama have been funded through OLI and the Institution's Tropical Research Initiative. Studies include: measurements by Matt Charette of groundwater and nutrient flow from terrestrial to marine habitats; surveys of temperature and salinity by Richard Limeburner (PO); surveys of nutrients and plankton and an upgrade of the Panama LJL underwater tropical observatory (PLUTO) by Scott Gallager (BIO); surveys of water chemistry and coral reefs by Rich Camilli (AOP&E); computer modeling of three-dimensional circulation by Rubao Ji (BIO); investigations of barnacle transport and colonization by Jesús Pineda (BIO); a survey of invasive and native sea squirts by Mary Carman (G&G); and an assessment by Simon Thorrold of the importance of mangroves as nursery areas for reef fish.

—Cabell Davis, Institute Director

A sampling of OLI research projects for 2007

Camille Weinberg

Jesús Pineda and Vicke Starczak adjust a plankton net that they used to sample zooplankton in Massachusetts Bay in September 2007. Pineda and his lab mates are studying how ocean currents and internal waves disperse and transport larvae of marine creatures.

Andone Lavery (AOP&E) and **Gene Terray** (AOP&E) are fabricating and testing an autonomous acoustic backscattering system to remotely map the distribution and abundance of zooplankton (such as copepods) in the water.

Laura Robinson (MC&G) is measuring trace elements and isotopes in coral skeletons to explore how the changing water chemistry—particularly nutrients and temperature—affect the health of *Desmophyllum dianthus* and other cold-water species. The goal is to see what changes occurred naturally and historically versus those that are anthropogenic.

Anne Cohen (G&G) uses CT-scanning technology to quantify the impacts of changing ocean temperatures and chemistry on the rates of carbonate production by corals as they build their skeletons.

Mark Dennett (BIO) is planning to study the distinctive and geographically isolated microbial communities of the slow-spreading Gakkel Ridge on the Arctic seafloor, with the goal of comparing them to other seafloor communities and how they evolved.

Jesús Pineda (BIO) is investigating how ocean currents disperse and transport the larvae of sedentary coastal invertebrates (such as barnacles and mussels), the processes that determine which larvae survive to reproduce, and the variation of the local populations.

Ken Foote (AOP&E) is working to analyze, model, and classify the sonar echo signals, or backscatter, from various marine organisms and insert them in an interactive, online visualization tool. The goal is to allow users to quickly identify what creatures they are detecting with sonar.

Sonya Dhyrman (BIO), an OLI Fellow, employs molecular biology tools to examine how phytoplankton—microscopic plants in the ocean—respond to changes in the supply of carbon dioxide, phosphorus, and nitrogen.

Hauke Kite-Powell, WHOI

Women from Unguja Ukuu-Tindini, on the island of Zanzibar off Tanzania, examine a shellfish farm that they are learning to set up and tend. Hauke Kite-Powell, an MPC research specialist, is working with scientists, fishers, and non-profit groups to promote aquaculture as an ecologically sound way to increase the yield of seafood protein for food, while also providing jobs and a saleable commodity for the villagers.

Research at the Institution's Marine Policy Center (MPC) focuses on the conservation and management of marine and coastal resources. While much of this work is aimed at supporting public policy decisions, some of it also supports sustainable economic development in the United States and beyond.

In 2007, MPC launched a three-year effort to establish small-scale shellfish farming activities among women residents of Zanzibar, Tanzania. Shellfish farming is a natural complement to the seaweed farming that has been carried out by women in coastal villages since the 1980s. Although seaweed farming for export has improved economic conditions for many women and families, it is directly affected by global market prices and has become less lucrative in recent years. Shellfish farming will target a local market and therefore be less susceptible to external economic forces. It also will provide an ecologically sound way to increase the yield of seafood protein from Zanzibar's coastal waters, where wild capture fisheries are overexploited and in decline.

MPC Research Specialist Hauke Kite-Powell is leading the shellfish farming project, which is funded by the McKnight Foundation. During 2007, Kite-Powell and colleagues assembled an outreach and training team that includes staff from Zanzibar's Institute of Marine Science, the Zanzibar Association for Farmers and Fishermen Development, the Zanzibar Department of Fisheries and Marine Resources, and Faida Mali, a Tanzanian non-profit that facilitates linkages between small farmers and the marketplace. The team is now training groups of women in five villages in the construction, stocking, maintenance, and harvesting of shellfish plots in tidal waters.

By the end of this project, Kite-Powell expects more than 350 women to be working more than 200 shellfish plots and generating some 44 tons of shellfish meats. The sustained income stream for their villages should be about $40,000 per year. The project will also provide training in the establishment of marketing and distribution channels for the harvest. The local tourist market could absorb significant quantities of oysters and other shellfish, but hotels in Zanzibar generally don't include shellfish on their menus because supply is unreliable. If shellfish farming can provide a steady supply, the tourist market can respond with a reliable level of demand and perhaps a rise in price.

In another recent study, Kite-Powell collaborated with MPC Research Specialist Porter Hoagland and MPC Senior Scientist Di Jin to document resource and market trends since 1990 in the herring fisheries supplying the sardine industry in Maine. The study was funded by Bumble Bee Seafoods, which owns the only remaining sardine cannery on the coast of Maine.

New England herring stocks are considered healthy, but there is uncertainty about their distribution and supply is highly seasonal. Supply is also constrained by regulatory limits in inshore areas—which are the best source of quality product—and by unpredictable fishing success in offshore areas.

Historically, demand for herring in New England was dominated by sardine canneries. But the use of herring as lobster bait surged around 2002-2003 and has since become the dominant source of demand. Today the lobster bait sector accounts for 85 to 90 percent of New England landings and effectively determines market price, which has risen steadily since 2002. Because the sardine industry requires higher-quality herring and because it is significantly constrained in competing for herring on price, it represents a substantially less attractive market to fishers than the lobster bait industry.

The MPC study concluded that recent trends show no signs of reversing. Continued expansion of lobster fisheries, greater restrictions on herring in inshore areas, and expansion of frozen storage capacity in the lobster bait industry can be expected to keep the market for herring extremely tight for several years to come.

—Andy Solow, Center Director

Established in 2004 through a novel partnership between the National Science Foundation and the National Institute of Environmental Health Sciences, the Woods Hole Center for Oceans and Human Health (WH-COHH) focuses and combines expertise in biomedical, genomic, and oceanographic sciences at WHOI, the Marine Biological Laboratory (MBL), and the Massachusetts Institute of Technology (MIT). Researchers funded by WH-COHH have been leading studies of harmful algal blooms and of human pathogens in marine systems, addressing the current and future needs of a growing human population.

WHOI researchers Don Anderson (BIO) and Dennis McGillicuddy (AOP&E) identified a massive harmful algal bloom in 2005 and provided timely information that resulted in decisive state and federal action to protect the public health. On WH-COHH sponsored research cruises in 2007, Anderson and McGillicuddy discovered another huge bloom of *Alexandrium fundyense* on Georges Bank, with concentrations more than 50 times higher than the lowest threshold for shellfish toxicity. Some resources there are not affected, but surf clam beds remain closed. The Center is actively investigating the causes of this offshore bloom, which may or may not be related to blooms closer to shore.

At our Genomics Core Facility, led by Mitch Sogin and Hilary Morrison of MBL, technological advances in DNA sequencing are helping us examine the depth of microbial diversity—the "rare biosphere"—to better distinguish the real pathogens from the harmless species in coastal waters. Investigators Rebecca Gast (WHOI-BIO) and Linda Amaral-Zettler (MBL) have used such molecular approaches to assess the microbial communities in New England waters and around New Orleans following hurricanes Katrina and Rita. That work has also provided researchers with an important new "baseline" for microbes and pathogens around New Orleans.

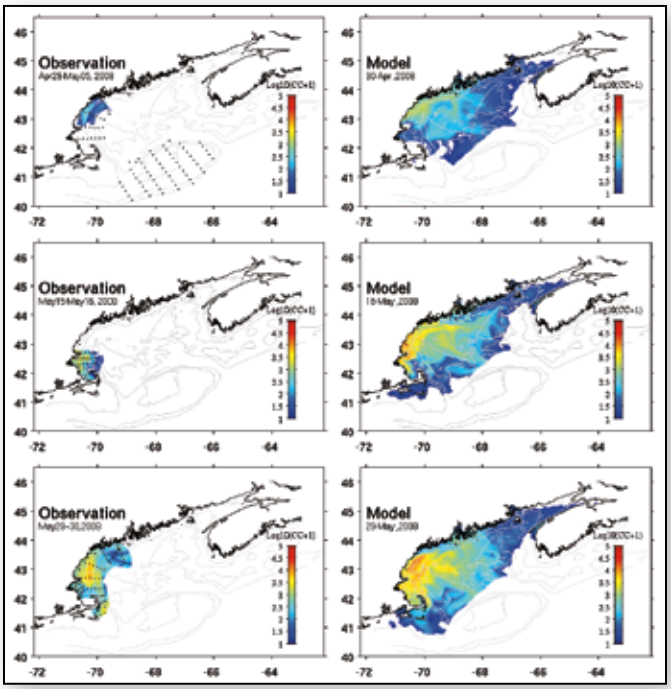
In studies of the evolutionary and ecological dynamics of marine pathogens and their close relatives, Martin Polz (MIT) and colleagues have assembled and characterized a collection of about10,000 clonal isolates of *Vibrios*. This work is giving us unprecedented resolution of *Vibrio* populations and how they are defined by ecological conditions. This collection of isolates is rapidly becoming a resource for other laboratories around the world.

WH-COHH has awarded more than $400,000 for 13 pilot projects addressing a range of topics, including: human pathogens on beaches; new methods for assessing fecal contamination of salt marshes; the economic impacts of harmful algal blooms; modeling of pathogen transport through water bodies; and cyanobacterial neurotoxins in seafood.

In a new pilot project, Hauke Kite-Powell and Porter Hoagland (WHOI-MPC) are analyzing the health-related economic impacts of marine pathogens. Results suggest that the most significant impacts occur in beach recreation—a $20 billion per year industry with an estimated $500 million per year in health costs—and seafood consumption—a $60 billion/per year industry with $3- to 4 billion in health costs.

Support from the WH-COHH has resulted in the publishing of 32 papers to date and more than $5 million in new grants recruited as a result of Center activities and discoveries. WH-COHH Director John Stegeman (BIO) also spearheaded the organization of an international Gordon Research Conference on Oceans and Human Health, a July 2008 meeting that will help frame the future directions for this new integrative science.

—John Stegeman, Center Director



Mike Carlowicz, WHOI

Oceanographers Dennis McGillicuddy (WHOI) (left) and Ruoying He (North Carolina State University) are several years along in the development of a computer model to predict the intensity and location of blooms of the toxic algae Alexandrium fundyense *in the Gulf of Maine. The mathematical model incorporates a series of equations and current field data to analyze the physical and biological factors involved and to predict the likelihood and overall intensity of harmful algal blooms in New England waters.*

The Cooperative Institute for Climate and Ocean Research (CICOR) is strategically situated to harness the leadership and research excellence of WHOI scientists and engineers in service of the mission and goals of the National Oceanic and Atmospheric Administration (NOAA). With NOAA funding and guidance, CICOR serves as a catalyst and incubator of ideas for collaborative work within the fields of climate, coastal, and ecosystems research.

In 2007, CICOR supported 75 projects totaling approximately $7.6 million in funding. Since its inception in 2001, CICOR has supported more than 134 research, education, outreach, and program development projects, bringing the five-year budget to more than $40.2 million.

In the past year, the CICOR agreement with NOAA was extended through June 2009 (past its scheduled ending), with a new competition for a longer contract expected in the summer of 2008. CICOR investigators and fellows are using this time to deepen their familiarity with NOAA's strategic goals for the region and to strengthen collaborative relationships with colleagues from other institutions. The best example is the development of the Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS), an effort led by scientists from CICOR and from WHOI's Center for Ocean, Seafloor, and Marine Observing Systems. NERACOOS will bring WHOI researchers and other academic research partners together into a New England research consortium that fits into the NOAA-led Integrated Ocean Observing System (IOOS).

IOOS marks a major shift in the government's approach to ocean observing, coordinating many networks of disparate observing systems to produce and integrate data, information, and products at the scales needed to support decision making. Once complete, IOOS will be a nationally important infrastructure enabling users to monitor and predict changes in coastal and ocean environments and ecosystems.

CICOR contributions to the global ocean climate observing system—including profiling ocean floats (principally, the Argo program), ocean gliders, ocean reference stations, and the collection of high quality surface meteorology from volunteer observing ships—are already improving the quality and quantity of climate data.

Bob Beardsley, a CICOR Fellow, and Changsheng Chen of the University of Massachusetts are collaborating on coastal modeling that is starting to provide experimental three-day forecasts of the surface weather and ocean currents and water properties for the Gulf of Maine coastal region. Their goal is to have this forecast information integrated into NOAA's National Weather Service reports, which are used by coastal managers to prepare for flooding and severe storm activity.

Harmful algal blooms research conducted by WHOI biologist Don Anderson and oceanographers Dennis McGillicuddy (WHOI) and Ruoying He (North Carolina State University) has been advanced by computer-modeled simulations of the spread of toxic algae along the northeast coast. Their research has become vitally useful to NOAA scientists and state and local coastal managers, improving the reliability and lead-time of fisheries management information.

CICOR continues to make a strong contribution to WHOI academic programming. In 2007, postdoctoral investigator Ricardo De Pol Holz (G&G) continued his CICOR-supported work with Lloyd Keigwin (G&G) on paleoceanography and the role of the ocean in global climate change. CICOR also welcomed a new postdoc, Tobias Kukulka, who is investigating the influence of surface waves on the oceanic boundary layer while working with Al Plueddemann (PO) and John Trowbridge (PO).

CICOR-supported graduate student Carlos Moffat (PO) successfully defended his thesis in 2007, following work with CICOR Fellows Bob Beardsley (PO) and Breck Owens (PO). In addition to postdoctoral and graduate student support, CICOR also funded three summer student fellows in 2007.

— Robert Weller, Center Director

Sean Whelan, WHOI

Senior engineering assistant Jeff Lord of the WHOI Upper Ocean Processes Group adjusts and services the instruments atop a deep-ocean moored buoy in October 2007. The research vessel Ronald H. Brown *looms in the distance. Working off the Pacific coast of Chile, the research team has been examining the exchange of heat, moisture, and momentum between the ocean and atmosphere, while also providing data for tsunami detection.*

The primary goal of the Center for Ocean, Seafloor, and Marine Observing Systems (COSMOS) is to establish a sustained, comprehensive, integrated observing system in the coastal ocean off the Northeastern United States. This region includes the historically rich fishing grounds of the Gulf of Maine and Georges Bank, as well as the diverse and economically important continental shelf, bays, and sounds of southern New England.

The observing system was conceived to enable interdisciplinary scientific research and to provide information required to address societal issues such as harmful algal blooms, coastal flooding, degradation of water quality, and protection and wise use of marine resources. Some elements of this Northeast observing system are operational; others have received funding but are not yet built or deployed; still others are in the planning stages.

COSMOS is responsible for the operation and maintenance of the Martha's Vineyard Coastal Observatory (MVCO), which was established in 2000 off the south coast of the island. Exposed to the open Atlantic, MVCO functions as a basic research facility, an engineering testbed, and a continuously operating monitoring station. The facility includes a shore laboratory, an onshore meteorological mast, an undersea node, and an air-sea interaction tower, each of which is connected by a cable providing electrical power and rapid communications. With this infrastructure, technologies that were previously used only in laboratories or on ships can make sustained *in situ* measurements of ocean conditions.

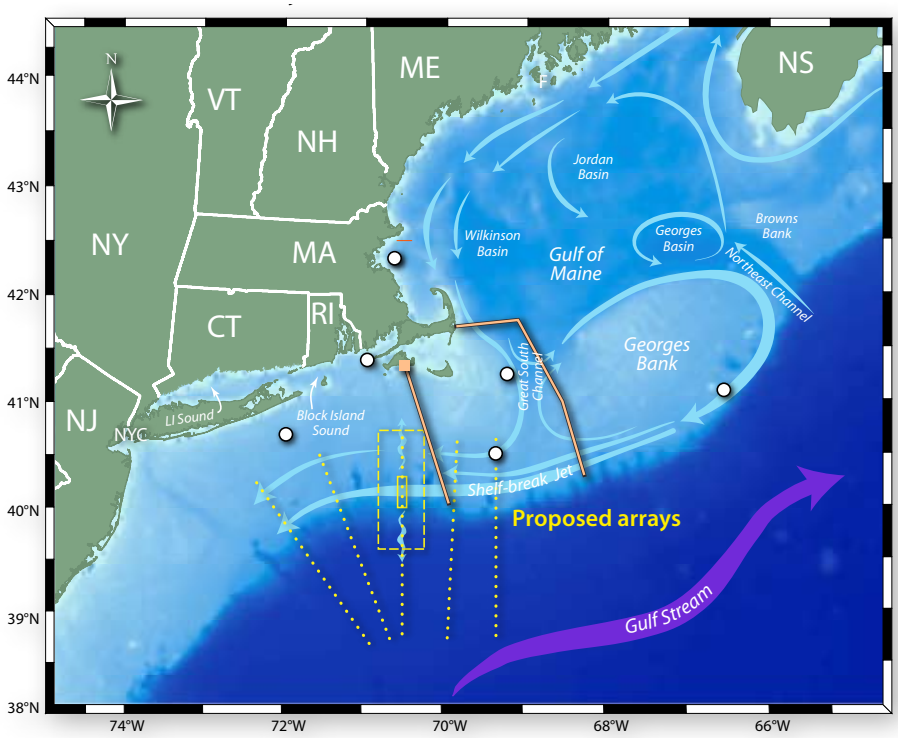
Heidi Sosik (BIO) serves as chief scientist for MVCO; Janet Fredericks (AOP&E) is project manager; Jay Sisson and Andy Girard (both AOP&E) provide operational and engineering support; and numerous other WHOI personnel provide short-term operations and engineering expertise. Since its establishment in 2001, MVCO has hosted several experiments each year, with funding from the National Science Foundation (NSF), the Office of Naval Research (ONR), the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration, the National Renewable Energy Laboratory, industrial and commercial interests, private donors, and WHOI.

A primary focus for COSMOS in 2007 was the Northeastern component of the Integrated Ocean Observing System (IOOS), an applications-oriented program spearheaded by NOAA. COSMOS engaged numerous regional partners in work that will lead to the formal establishment of the Northeastern Regional Association of Coastal Ocean Observing Systems, one of eleven regional associations. An important element of this work is the establishment of a state-based consortium to bring together academic institutions, government agencies, and industry to serve IOOS and other regional programs.

Working with regional partners—including the Bedford Institute of Oceanography, the Gulf of Maine Ocean Observing System, the NOAA Northeast Fisheries Science Center, and the state universities of Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island—WHOI was successful in winning grants for two IOOS proposals. One grant supports existing infrastructure for three years, while the other supports long-range regional planning (also for three years). In addition, several WHOI investigators won individual IOOS grants: Janet Fredericks, to integrate quality assurance and quality control procedures into the Open-Geospatial Consortium Sensor Web Enablement framework; Scott Gallager (BIO), to establish the Northeast Benthic Observatory in support of fisheries and ecosystem management; and Hauke Kite-Powell (MPC), to determine how to maximize the economic return from the Northeast regional observatories.

COSMOS also played a vital role in other WHOI efforts toward ocean observing networks. The most spectacular was a successful proposal and resulting contract with NSF to establish a WHOI-led Implementing Organization for the coastal and global components of the national Ocean Observatories Initiative. Bob Weller (PO) is serving as the lead principal investigator for that effort, with Libby Signell (AOP&E) as project manager and Al Plueddemann (PO) as the project scientist for the Pioneer Array. Many other WHOI scientists and engineers have and will contribute to this transformative initiative.

— John Trowbridge, Center Director



Jack Cook, WHOI

A WHOI-led science and engineering team will design and deploy permanent and transportable arrays of buoys and autonomous vehicles off the Mid-Atlantic Bight and Pacific Northwest to study coastal processes and to monitor changes in coastal systems. The team—which includes Oregon State University and the Scripps Institution of Oceanography—also will develop buoys to address global-scale problems in critical high latitude locations in the Northern and Southern hemispheres.

Woods Hole Sea Grant is part of the National Oceanic and Atmospheric Administration's national network of 32 Sea Grant programs. Collectively, we promote cooperation between government, academia, industry, scientists, and the private sector to foster better understanding of coastal systems and science-based decision-making in the use and conservation of coastal resources.

More than half of Woods Hole Sea Grant's $1 million annual budget supports multi-year research projects in environmental technology, estuarine and coastal processes, fisheries and aquaculture, as well as several smaller "new initiative" grants. Sea Grant-sponsored research is designed to address local and regional needs, but many projects have national or even global implications.

In 2007, Sea Grant supported nine projects at WHOI and other institutions. Topics ranged from submarine groundwater discharge to nutrient dynamics to plankton community structure. Of special note is a project by WHOI physical oceanographer Glen Gawarkiewicz, who is using the autonomous underwater vehicle REMUS to study the formation of cold, dense water off Cape Cod during the winter months and to better understand its role in ocean circulation.

In collaboration with the Barnstable County Cooperative Extension Service, we offer outreach and demonstration projects in fisheries and aquaculture and in coastal processes to local communities. As a partner with Massachusetts Coastal Zone Management and the Waquoit Bay National Estuarine Research Reserve, Woods Hole Sea Grant participates in the Massachusetts Coastal Training Program, designed to enable communities to better manage their coastal resources. With funding from the National Sea Grant Law Center, we collaborated on a new coastal training module with the Massachusetts Association of Conservation Commissions.

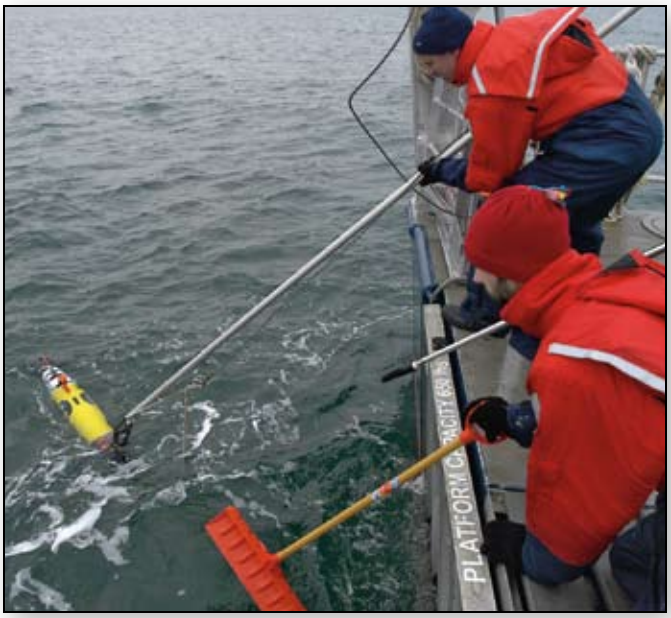
More than one-third of Woods Hole Sea Grant's budget is dedicated to research translation, outreach, and education. Sea Grant reaches its various audiences through training programs, publications, web sites, workshops, lectures, and one-on-one advice. In ocean science education, our staff has contributed to workshops for K-12 teachers and provided innovative publications directed at a general audience, such as the Beachcomber's Companion©, an award-winning publication and web site highlighting common marine invertebrates of the Atlantic.

For more than a decade, Woods Hole Sea Grant has partnered with colleagues at New Hampshire Sea Grant to provide marine career information to students. We are also participating in a WHOI effort to promote effective partnerships between researchers, educators, and outreach specialists.

—Judith E. McDowell, Program Director

Jeffrey Brodeur, WHOI

Aquaculture and Fisheries Specialist Bill Walton explains how oysters are raised to the co-hosts of TV's Aqua Kids program.



Chris Linder, WHOI

Senior scientist Al Plueddemann hooks the handle of the autonomous underwater vehicle REMUS so that it can be safely lifted onto the deck during a study of the wintertime coastal current system east of Cape Cod. Former WHOI postdoctoral fellow Andrey Shcherbina waits to prevent the REMUS from colliding with the stern of the R/V Tioga. *Woods Hole Sea Grant funded the project, led by senior scientist Glen Gawarkiewicz.*

External Relations comprises the Development Office, the Office for Applied Oceanography (OAO), and the Board Relations Office.

The objective of the Development Office is to cultivate financial support from foundations and private contributors in order to advance the educational and research priorities of the Institution. Currently, the Institution is nearing the end of its comprehensive campaign, with less than $20 million needed to reach the $200 million goal.

Under the leadership of Bill Kealy, chairman of the campaign committee, and his predecessor, Newt Merrill, we have generated substantial operations support and endowment for the Institution's four Ocean Institutes and the Access to the Sea Program. The Institutes promote high-risk, high-reward research and interdisciplinary collaborations among scientists and engineers within and beyond the Institution. The Access to the Sea Program has increased opportunities for scientists, engineers, graduate students, and postdoctoral scholars to conduct field research, develop instrumentation, and analyze data collected at sea. The comprehensive campaign has also funded two new buildings on the Quissett Campus and added the coastal research vessel R/V *Tioga* to the fleet.

Andrey Shcherbina, WHOI

The autonomous underwater vehicle REMUS is released in Belize during a pilot study of the effect of ocean currents on fish larvae spawned on coral reefs. Developed over the past two decades by members of WHOI's Oceanographic Systems Laboratory, some models of the REMUS line of vehicles have been successfully transferred to the commercial market. The Falmouth, Mass.-based firm Hydroid, Inc. now builds and sells standardized models of the autonomous underwater vehicles, paying royalties to WHOI, which continues to stretch the technology for the next generation of vehicles.

The goals of the Office for Applied Oceanography are threefold: to help WHOI principal investigators (PIs) uncover new and alternative funding sources and contracts; to help PIs protect their intellectual property and other proprietary information; and to increase technology transfer through commercialization and licensing activities. Honorary Trustee Herb Schwartz chairs the WHOI Industry Relations/Intellectual Property Committee, which has been advising the Institution in matters of intellectual property and licensing royalty agreements.

OAO works with individuals and groups to pursue projects with direct and immediate applications for commerce, industry, the military, and the public. Select sponsors include Raytheon, Schlumberger, Teledyne, Teck Cominco, the U.S. Navy, and the Defense Advanced Research Projects Agency. OAO related projects have included: studies of the effects of sonar on marine mammals; the geology, biology, and physical oceanography of Middle Eastern waters; development of autonomous underwater vehicles for defense; and new gas chromatography techniques for the analysis of complex oil compounds.

OAO is working closely with the Institution's leadership as it moves into the next phase of strategic planning. The future is likely to include more diversified funding and more creative research collaborations.

The Board Relations Office manages the official business and communications of the Board of Trustees and Corporation. In 2007, the Institution welcomed a new Chairman of the Board, Newt Merrill. One of his first acts was to convene a special Governance Committee to complete a comprehensive review of the board's governance practices. Several recommendations were implemented immediately, including the establishment of the position of Vice Chairman of the Board for a trial period of one year. The Board also added the chairs of several charter committees to the membership of the Institution's Executive Committee. Other recommendations will be phased in over the course of 2008-09.

—Daniel Stuermer, Vice President, External Relations

People learn and gather information from many different venues and media—from the World Wide Web, publications, and podcasts to tours, public lectures, and classroom learning. WHOI works in a variety of ways to reach out to each of these audiences.

The Institution put on a new public face this past year, relaunching its WHOI.edu Web site. With more than 7.6 million visits in 2007, the Web site must meet the needs of everyone from the middle-school student unfamiliar with the basics of ocean science, the industry representatives looking for potential research partners, and the technician looking for the specs of an instrument on a research vessel. The new site went through extensive usability testing in order to become more timely, topical, and navigable for both the novice and expert visitor.

Now in its eighth year, the Dive and Discover online expedition site established by Susan Humphris and Dan Fornari took more than a million Web visitors on a virtual cruise to the Arctic ice and the seafloor at Gakkel Ridge. For forty days, readers followed the daily doings of an international project to survey the uncharted seafloor territory.

As part of the International Polar Year (IPY), WHOI Communications staff and research associate Chris Linder launched the Polar Discovery project, bringing students, museum visitors, and the interested public along for online expeditions to the earth's Polar Regions. The project—which includes photojournals and essays, podcasts, and live-from-the-ice phone calls to museums across North America—took audiences to the Canadian Arctic, the Gakkel Ridge, and Antarctica.

There was big Institutional news in 2007, which prompted several WHOI media events and campaigns. In June, reporters came to Woods Hole to learn about the Gakkel Ridge expedition; the media returned in August for the announcement of the contract award for the Ocean Observatories Initiative; and they took several opportunities to meet and greet new WHOI President and Director Susan Avery in the fall. Ten journalists also took up residence at the Institution in September for intensive workshops and demonstrations during the annual Ocean Science Journalism Fellowships.

WHOI took ocean lovers out of this world twice in 2007, while also bringing space buffs back down to Earth. In January, WHOI biologist Tim Shank placed an extraordinary phone call to NASA astronaut Sunita Williams. He was on the seafloor in the *Alvin* submersible along the East Pacific Rise, she was in the International Space Station, and the rest of us were on our seats as we watched the live call carried on the Web and on NASA TV. Later in the year, Williams visited Woods Hole to join Shank for a well-attended public forum.

Biologist Sonya Dhyrman and education specialist Andrea Thorrold helped open a virtual oceanographic laboratory for harmful algal blooms on the social and educational networking site known as Whyville.net. Physical oceanographer Amy Bower made a special connection to visually impaired students through the OceanInsight program. Working with teachers and students from Perkins School for the Blind, Bower brought ocean adventures to the ears, hands, noses, and minds of students who have traditionally been shut out of science exploration.

Building on the momentum of the many initiatives to design, build, and operate high-tech ocean observatories, WHOI educators and their partners at Rutgers University and the Liberty Science Center (New Jersey) won a $2.5 million grant from the National Science Foundation to establish the Center for Ocean Sciences Education Excellence—Networked Ocean World (COSEE NOW).

Tom Kleindinst, WHOI

WHOI deep-sea biologist Tim Shank and NASA astronaut Suni Williams sit in a mockup of the personnel sphere of the Alvin *submersible. In January 2007, Shank and Williams made the first-ever phone call from the deep ocean to outer space, connecting via underwater acoustics, ship's radio, and satellite links so that Shank—diving in* Alvin *on the East Pacific Rise—could compare explorer's notes with Williams—who was in the midst of an eight-month stay on the International Space Station. The pair finally met on* terra firma *in the summer of 2007 at several public events in Woods Hole.*

Oceanus, the Institution's venerable print (and now Web-based) magazine, attracted more than 540,000 visits in 2007 (about 45,000 per month), up from 370,000 in 2006. Readers were particularly drawn to articles (published weekly) about rising sea level, global warming, life in the Arctic, pollution, and hydrothermal vents.

While many people "visit" WHOI remotely, a fair number see us in person. The Ocean Science Exhibit Center received more than 20,000 visitors including special groups of students, scouts, summer campers, and seniors—and a thousand more took walking tours of the Institution. The highlight of the year is the weekly "Science Made Public" lecture series—focused on IPY in 2007—held during the summer season.

WHOI continued the Elisabeth W. and Henry A. Morss Colloquia, which promote understanding of scientific issues of societal importance. In January, paleoclimatologist Jerry McManus organized a scientific workshop and public forum to address the relevance of past climate changes—as stored in sediments and ice cores—to the current environmental changes happening around us. In the fall, Ken Buesseler, Scott Doney, and Hauke Kite-Powell brought more than a hundred academic researchers, policymakers, industry researchers, and entrepreneurs together for a discussion of the benefits and costs of the use of ocean iron fertilization as a means to offset increasing carbon dioxide in the atmosphere. Proceedings of the workshop were captured in a special issue of *Oceanus* magazine.

—Mike Carlowicz, WHOI Science Writer

Scientists at WHOI contribute to the discussion of public and science policy issues at the state, national, and international levels. Here is a selection of their activities in 2007.

Don Anderson
Briefing on harmful algal blooms to the Subcommittee on Oceans, Fisheries and Coast Guard, U.S. Senate Committee on Commerce, Science, and Transportation

Carin Ashjian
Chair, Arctic Icebreaker Coordinating Committee, University-National Oceanographic Laboratory System (UNOLS)

Joan Bernhard
Member, Regional Class Vessel Technical Advisory Committee, UNOLS

Karen Bice
Member, roster of experts, UN Framework Convention on Climate Change
Reviewer, U.S. Climate Change Science Program

Richard Camilli
Advisory Panel, Cheyney University's STEM (Science Technology Engineering Mathematics) Program
Advisory Panel, Gulf of Mexico Gas Hydrate Research Consortium

Hal Caswell
Briefing on evaluating the polar bear for listing under the Endangered Species Act to the U.S. Department of Interior, Fish and Wildlife Service, U.S. Geological Survey, and the Office of Science and Technology Policy

Cabell Davis
U.S. Delegate, Working Group for Zooplankton Ecology, International Council for Exploration of the Seas

Scott Doney
Chair, Scientific Steering Group, Ocean Carbon and Climate Change
Chair, Scientific Steering Group, Ocean Carbon and Biochemistry
Member, advisory panel, NOAA OGP Global Carbon Cycle program
Member, Science Steering Committee, U.S. CLIVAR/CO_2 Repeat Hydrography
Testified on "Effects of Climate Change and Ocean Acidification on Living Marine Resources" to the Subcommittee on Oceans, Fisheries and Coast Guard, U.S. Senate Committee on Commerce, Science, and Transportation
Science expert for a panel on ocean climate change and ocean acidification at the annual meeting of the Society of Environmental Journalists

Brendan Foley
Maritime Archaeologist, Massachusetts Board of Underwater Archaeological Resources

Scott Gallager
Chair, ORION Sensors Advisory Committee

Chris German
Co-Chair, InterRidge Steering Committee
Co-Chair, Census of Marine Life: Chemosynthetic Ecosystems Steering Committee
Steering Committee, NSF GEOTRACES program

Rocky Geyer
Advisory Committee, Beacon (Hudson) Institute for Estuarine Research

Porter Hoagland
Member, National Harmful Algal Bloom Committee
Advisor, Sanctuary Advisory Committee, Stellwagen Bank National Marine Sanctuary

Konrad Hughen
Co-Chair, IntCal Radiocarbon Calibration Working Group
Chair, Arctic High-Resolution Working Group
Councilor, American Quarternary Association

Susan Humphris
Chair, Scientific Advisory Structure Executive Committee, IODP
Member, Scientific Ocean Drilling Vessel Oversight Committee

Rubao Ji
U.S. Representative, Working Group for Physical-Biological Interactions, International Council for Exploration of the Seas

Di Jin
Vice Chair, Academic Committee of the Coastal and Ocean Management Institute, Xiamen University, China

Lloyd Keigwin
Chair, Steering Committee for the UK Rapid Climate Change Programme

Darlene Ketten
Declaration/Testimony for U.S. Department of Justice briefings on the effects of sound in the sea

Hauke Kite-Powell
Member, Social Science Working Group, NOAA Science Advisory Board

Jian Lin
Co-Chair, InterRidge Steering Committee

Judith McDowell
Science Director "Sustainable Marine Aquaculture: Fulfilling the Promise, Managing the Risks," The Pew Charitable Trusts

Dennis McGillicuddy
Scientific Steering Committee, U.S. Global Ecosystem Dynamics (GLOBEC) Program
Scientific Steering Committee, Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB)

Jerry McManus
Member, U.S. Advisory Committee for Scientific Ocean Drilling

Photo Op

WHOI senior scientist Scott Doney has been called to testify before Congress several times over the past few years, offering insight on climate change, the effects of increased ocean acidification on marine life, and the techniques needed to effectively conserve marine ecosystems. One of his papers on the disproportionate effect of acid rain on coastal waters was named among the "100 Top Science Stories of 2007" by the editors of* Discover *magazine.

Michael Moore
Testimony in U.S. District Court (Boston) on large whale entanglement

Ann Mulligan
Member, Scientific Advisory Council for the Upper Cape Water Supply Reserve on the Massachusetts Military Reservation

Chris Reddy
Fellow, Aldo Leopold Leadership Program
Advisor to the Massachusetts Department of Environmental Protection on alternative fuels and lubricants

Rob Reves-Sohn
Member, NSF Ridge 2000 Steering Committee

Ray Schmitt
Member, Ocean Studies Board, National Academy of Sciences

Mary Schumacher
Alternate Member, Falmouth Conservation Commission

Tim Shank
Member Ex Officio, U.S. Deep Submergence Science Committee (UNOLS)

Hanumant Singh
Advisory Panel, Underwater Vehicle Technology Center at the University of Southern Mississippi

Jeff Seewald
ISS Site Coordinator, Lau Basin, NSF Ridge 2000 program

Andrew Solow
Chair, Boston Harbor Outfall Science Advisory Panel, U.S. EPA/ Massachusetts Department of Environmental Protection
Member, Massachusetts Audubon Science Advisory Panel
Member, California Invasive Species Science Advisory Panel
Member, Science Advisory Committee, Massachusetts Ocean Partnership Fund

Heidi Sosik
Member, SCOR Panel on New Technologies for Observing Marine Life
Member, International Working Group on Phytoplankton Functional Types

Ralph Stephen
Chair, Industry-IODP Science Program Planning Group, International Ocean Drilling Program

Simon Thorrold
Member, Connectivity Working Group, Coral Reef Targeted Research and Capacity Building, World Bank/ Global Environment Facility

Meg Tivey
Member, Nominating Committee, AGU Ocean Sciences Section
Panelist, eighth meeting of the UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea

John Trowbridge
Chair, Coastal Subcommittee, ORION/OOI Science & Technology Advisory Committee (STAC)

Bob Weller
Member, Committee on a Strategy to Mitigate the Impact of Sensor De-scopes and De-manifests on the NPOESS and GOES-R Spacecraft, National Academy of Sciences

Peter Wiebe
U.S. Representative, Working Group for Zooplankton Ecology and Oceanography Committee, International Council for Exploration of the Seas (ICES)

Applied Ocean Physics & Engineering

Alex Apotsos received an Outstanding Student Paper Award for "Parametric wave transformation models on natural beaches," which he presented at the 2006 Fall AGU meeting.

Bill Carey was awarded the 2007 Pioneer of Underwater Acoustics silver medal from the Acoustical Society of America.

Jim Ledwell was the 2007 winner of the Alexander Agassiz Medal, awarded by the U.S. National Academy of Sciences.

Dennis McGillicuddy received the Holger W. Jannasch Chair for Excellence in Oceanography.

Biology

Michael Berumen was awarded the Sir Keith Murdoch Fellowship from the American Australian Association.

Hal Caswell received the 2007 Ecological Research Award from the Ecological Society of Japan.

Sonya Dyhrman was named a 2007-2008 Marie Tharp Fellow of the Columbia University Earth Institute.

Rebecca Gast was chosen as the Provost's Distinguished Scholar and Schweppe Lecturer at The University of Texas at Austin Marine Science Institute.

Darlene Ketten was named a Senior Research Fellow of the Biophysics Division of the National Institute of Deafness and Other Communication Disorders, National Institutes of Health.

Geology & Geophysics

John Collins was awarded the W. M. Marquet Senior Technical Staff Award.

Chris German was awarded a Doctor of Science (ScD), or "Higher Doctorate," by the Faculty of Earth Sciences & Geography at the University of Cambridge, UK.

Mike Krawczynski received an Outstanding Student Paper Award for "Constraints on melt-water flux through the West Greenland ice-sheet: Modeling of hydro-fracture drainage of supraglacial lakes," presented at the 2007 AGU Fall Meeting.

Jian Lin was named a Fellow of the Geological Society of America.

Ralph Stephen was awarded the Edward W. and Betty J. Scripps Chair for Excellence in Oceanography.

Maurice Tivey received a 2007 Editors' Citation for Excellence in Refereeing for Geochemistry, Geophysics, Geosystems.

Marine Chemistry & Geochemistry

Matt Charette was cited as an "Outstanding reviewer" by the journal *Limnology* and *Oceanography*.

Chris Reddy received an "Excellence in Review Award" from the journal Environmental Science and Technology.

Chris Reddy, **Bob Nelson**, and **Li Xu** were part of a team that was presented with the John B Phillips Award at the 4th International Symposium on Comprehensive Two-Dimensional Chromatography.

Tim Eglinton was appointed Chair of Department of Marine Chemistry & Geochemistry.

Physical Oceanography

John Whitehead received the 2007 Stommel Award from the American Meteorological Society (AMS) and was also named an AMS Fellow.

Tom Kleindinst, WHOI

Physical oceanographer Amy Bower (right) recently led students from the Perkins School for the Blind on a tour of the research vessel Knorr. *The tour was part of an ongoing relationship between Bower and the students. In September 2007, while working in the Labrador Sea off the coast of Greenland to deploy a mooring equipped with instruments, Bower communicated with the students via a web portal, voice-to-voice communication, and audio postcards. Bower, once honored as Massachusetts' Blind Employee of the Year, strives to make science accessible for visually impaired individuals.*

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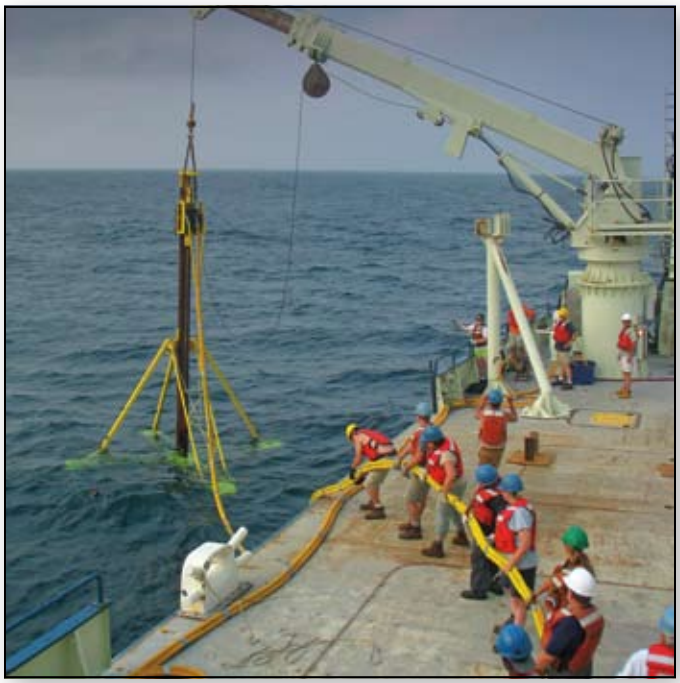

Courtesy of Jamie Austin and John Goff, University of Texas Institute for Geophysics

In the summer of 2007, University of Texas geophysicist Jamie Austin and colleagues traveled on the research ship Knorr *with a vibracorer, an instrument designed to shimmy into even the hardest-packed seafloor and collect sediment samples for paleoclimate studies. Austin earned his Ph.D. from the MIT/WHOI Joint Program in 1979, and served for many years as president of its alumni association. In 2007, he was named to the Institution's Board of Trustees.*

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Andone Lavery
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Andrea Bogomolni
Research Associate II

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Jiayan Yang
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Lisan Yu
Associate Scientist with Tenure

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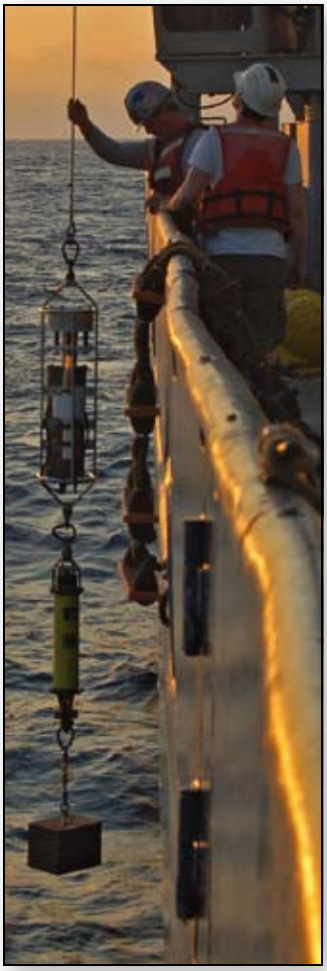

Susan Mills, WHOI

Atlantis *Bosun Patrick Hennessy (left) and MIT/WHOI Joint Program graduate Benjamin Walther deploy a pump mooring during the LADDER III (LArval Dispersal on the Deep East Pacific Rise) project. The mooring included two plankton pumps (one near bottom and one 75 meters above bottom, at the height of the neutrally buoyant plume) to collect planktonic larvae of hydrothermal vent animals.*

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Associate Scientist

Jack Zhang
Engineer II

Emeritus, Adjuncts, & Visiting Appointments – AOP&E

Robert D. Ballard
Scientist Emeritus

William M. Carey
Adjunct Scientist

George V. Frisk
Scientist Emeritus

Daniel E. Frye
Oceanographer Emeritus

Tian-Jian Hsu
Adjunct Scientist

James D. Irish
Oceanographer Emeritus

Boris G. Katsnelson
Visiting Investigator

Gail C. Kineke
Adjunct Scientist

Daniel R. Lynch
Adjunct Scientist

Valery G. Petnikov
Visiting Investigator

Alan D. Pierce
Adjunct Scientist

Andrey N. Serebryany
Visiting Investigator

Barrie B. Walden
Oceanographer Emeritus

Louis L. Whitcomb
Adjunct Scientist

Albert J. Williams 3rd
Scientist Emeritus

Biology Department

Judith E. McDowell
Senior Scientist, Department Chair, & Sea Grant Coordinator

Phil Alatalo
Research Associate II

M. Dicky Allison
Research Associate II

Donald M. Anderson
Senior Scientist, Director of Coastal Ocean Institute

Carin Ashjian
Associate Scientist

Mark F. Baumgartner
Assistant Scientist

David J. Beaudoin
Research Associate II

Stace Beaulieu
Research Specialist

Andrea Bogomolni
Research Associate II

Keith F. Bradley
Research Associate III

Regina Campbell-Malone
Postdoctoral Investigator

Hal Caswell
Senior Scientist

Nancy J. Copley
Research Associate II

John W.H. Dacey
Associate Scientist

Mary Ann Daher
Research Associate II

Cabell S. Davis
Senior Scientist, Director of Ocean Life Institute

Mark R. Dennett
Research Specialist

Sonya T. Dyhrman
Associate Scientist

Diana G. Franks
Research Associate II

Scott M. Gallager
Associate Scientist

Rebecca Gast
Associate Scientist

Annette M. Govindarajan
Postdoctoral Investigator

Robert C. Groman
Information Systems Specialist

Lara Gulmann
Postdoctoral Investigator (LOA)

Mark E. Hahn
Senior Scientist, Walter A. & Hope Noyes Smith Chair

Sheean T. Haley
Research Associate II

Erich Horgan
Research Associate II

Leah A. Houghton
Research Associate II

Matthew J. Jenny
Postdoctoral Investigator

Rubao Ji
Assistant Scientist

Sibel I. Karchner
Research Specialist

Bruce A. Keafer
Research Associate III

Darlene R. Ketten
Senior Scientist

Linda McCauley
Research Associate II

Susan W. Mills
Research Associate II

Zofia J. Mlodzinska
Research Associate II

Steve Molyneaux
Research Associate III

Michael J. Moore
Senior Research Specialist

Lauren S. Mullineaux
Senior Scientist, The Holger W. Jannasch Chair

Michael G. Neubert
Associate Scientist, J. Seward Johnson Chair as Education Coordinator

Robert J. Olson
Senior Scientist, The Henry Bryant Bigelow Chair for Excellence in Oceanography

Jesús G. Pineda
Associate Scientist

Mindy Richlen
Postdoctoral Investigator

Alexi A. Shalapyonok
Research Associate III

Timothy M. Shank
Associate Scientist

Stefan Sievert
Associate Scientist

Heidi M. Sosik
Associate Scientist

Victoria R. Starczak
Research Specialist

Ann Tarrant
Assistant Scientist

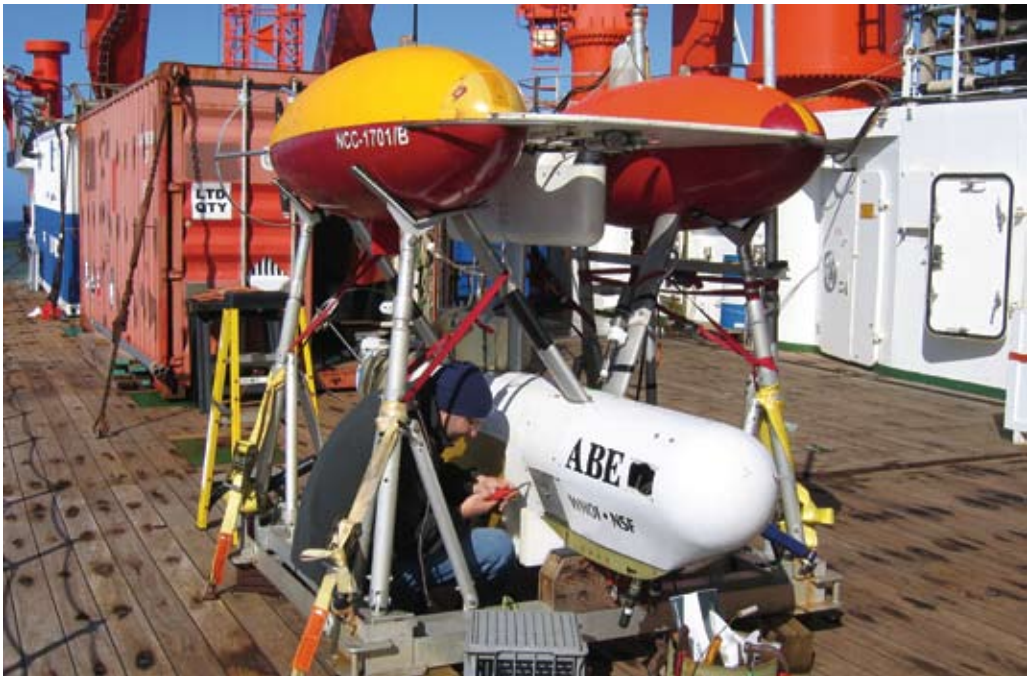
Craig D. Taylor
Associate Scientist

Simon R. Thorrold
Associate Scientist

Sanjay Tiwari
Research Specialist

Linda V. Martin Traykovski
Research Associate III (LOA)

Peter L. Tyack
Senior Scientist



New Zealand American Submarine Ring of Fire 2007 Exploration, NOAA Vents Program

WHOI engineer Andy Billings makes final checks on the ABE *autonomous vehicle before its first dive to explore the undersea Brothers Volcano, north of New Zealand. ABE completed eight dives totaling 96 hours.*

Tim Verslycke
Postdoctoral Investigator

Harvey J. Walsh
Research Associate II

Stephanie L. Watwood
Postdoctoral Investigator

Bruce R. Woodin
Research Associate III

Cornelia Wuchter
Postdoctoral Investigator

Emeritus, Adjuncts, & Visiting Appointments – Biology

Richard H. Backus
Scientist Emeritus

Debashish Bhattacharya
Adjunct Scientist

James E. Craddock
Oceanographer Emeritus

Michael Fogarty
Adjunct Scientist

Joel C. Goldman
Scientist Emeritus

Jed Goldstone
Visiting Investigator

George R. Hampson
Oceanographer Emeritus

Heather Handley Goldstone
Visiting Investigator

G. Richard Harbison
Scientist Emeritus

Jon Hare
Adjunct Scientist

Anne Isham
Sea Grant Intern Fellow

Peter Madsen
Adjunct Scientist

Teresa Radziejewska
Institution Visiting Scholar

Amelie H. Scheltema
Institution Visiting Scholar

Rudolf S. Scheltema
Scientist Emeritus

John M. Teal
Scientist Emeritus

Frederica Valois
Oceanographer Emeritus

John B. Waterbury
Scientist Emeritus

Carl O. Wirsen, Jr.
Oceanographer Emeritus

Geology & Geophysics Department

Susan E. Humphris
Senior Scientist and Department Chair

Andrew Ashton
Assistant Scientist

Mark D. Behn
Assistant Scientist

Joan M. Bernhard
Associate Scientist

Lance Wills, WHOI

Bruce Strickrott, Alvin *pilot and expedition leader for a winter 2007 cruise on the research vessel* Atlantis, *prepares for the launch of the submersible into the Pacific Ocean near the Juan de Fuca Ridge. Strickrott grew up in Maryland and New York, and earned his sea legs in the U.S. Navy, working with radar, surface-to-air missile defense, and anti-aircraft support. After six years, he went back to college for a degree in ocean engineering and eventually found his dream job at WHOI in the* Alvin *group.*

Karen L. Bice
Associate Scientist

Jerzy S. Blusztajn
Research Associate III

Tom Bolmer
Information Systems Associate II

Jim Broda
Senior Research Specialist

Ilya Buynevich
Assistant Scientist

J. Pablo Canales
Associate Scientist

Mary R. Carman
Research Associate III

Anne L. Cohen
Research Specialist

John A. Collins
Research Specialist

William B. Curry
Senior Scientist, Director of Ocean & Climate Change Institute

Sarah B. Das
Assistant Scientist

Henry J.B. Dick
Senior Scientist

Lori A. Dolby
Information Systems Associate III

Jeffrey P. Donnelly
Associate Scientist

Virginia P. Edgcomb
Research Associate III

Kathryn L. Elder
Research Associate III

Rob L. Evans
Associate Scientist

Daniel J. Fornari
Senior Scientist, Director of Deep Ocean Exploration Institute

Glenn A. Gaetani
Associate Scientist

Alan R. Gagnon
Research Specialist

Ernst Galutschek
Postdoctoral Investigator

Dana S. Gerlach
Research Associate II

Christopher R. German
Senior Scientist

Liviu Giosan
Associate Scientist

Andrey Gourenko
Research Specialist

Richard J. Healy
Information Systems Associate III

Greg Hirth
Associate Scientist (LOA)

Matthew Jackson
Postdoctoral Investigator

Lloyd D. Keigwin, Jr.
Senior Scientist, Edna McConnell Clark Chair

Peter B. Landry
Engineer II

Graham D. Layne
Senior Research Specialist

Peter C. Lemmond
Research Associate III

Jian Lin
Senior Scientist

Daniel Lizarralde
Associate Scientist

Brett E. Longworth
Research Associate II

Steven J. Manganini
Research Specialist

Olivier Marchal
Associate Scientist

Daniel C. McCorkle
Associate Scientist, J. Seward Johnson Chair as Education Coordinator

Jeffrey J. McGuire
Associate Scientist

Jerry F. McManus
Associate Scientist

Ann P. McNichol
Senior Research Specialist

Delia W. Oppo
Senior Scientist

Dorinda R. Ostermann
Research Specialist

Robert A. Reves-Sohn
Associate Scientist

Mark L. Roberts
Senior Research Specialist

Photos by Tom Kleindinst, WHOI

At the annual WHOI Employee Recognition celebration in July 2007, employees received awards from their peers for outstanding performance, representation of the WHOI spirit, and major contributions to the WHOI community. From left, the MC&G administrative team (l to r, Sheila Clifford, Susan Casso, Mary Zawoysky, and Donna Mortimer; Lauren Ledwell was not in the photo) won the Penzance Award, given to a group, for sustained exceptional performance, for outstanding representation of the WHOI spirit, and for major contributions to the personal and professional lives of our staff. Ann McNichol won the Linda Morse-Porteous Award, recognizing an outstanding female technician. Vicke Starczak won the Vetlesen Award "for true selfless dedication of a major portion of herself to the entire WHOI community over a long period of time." Monica Hill won the Ryan C. Schrawder Award, (accepted for her by Mike Brennan) given to an employee who has proved to be a valuable asset to scientific projects both at sea and ashore.

Kathryn Rose
Research Associate I

Hans Schouten
Senior Scientist

Alison M. Shaw
Assistant Scientist

Nobumichi Shimizu
Senior Scientist

Kenneth W. Sims
Associate Scientist

Deborah K. Smith
Senior Scientist

S. Adam Soule
Assistant Scientist

Ralph A. Stephen
Senior Scientist

Stephen A. Swift
Research Specialist

William G. Thompson
Assistant Scientist

Maurice A. Tivey
Associate Scientist

Brian E. Tucholke
Senior Scientist

Karl F. Von Reden
Senior Research Specialist

Jessica M. Warren
Postdoctoral Investigator

F. Beecher Wooding
Research Specialist

Li Xu
Research Specialist

Emeritus, Adjuncts, & Visiting Appointments– G&G

William A. Berggren
Scientist Emeritus

Carl O. Bowin
Scientist Emeritus

Joe Cann
Adjunct Scientist

Wayne Crawford
Adjunct Scientist

Javier Escartin
Adjunct Scientist

Graham S. Giese
Oceanographer Emeritus

John Hayes
Scientist Emeritus

Kai-Uwe Hinrichs
Adjunct Scientist

W. Steven Holbrook
Adjunct Scientist

Susumu Honjo
Scientist Emeritus

Barbara E. John
Adjunct Scientist

Peter B. Kelemen
Adjunct Scientist

Charles Langmuir
Adjunct Scientist

George P. Lohmann
Scientist Emeritus

Candace Major
Visiting Investigator

Larry A. Mayer
Adjunct Scientist

Peter S. Meyer
Adjunct Scientist

David A. Ross
Scientist Emeritus

Robert J. Schneider
Oceanographer Emeritus

Roger C. Searle
Adjunct Scientist

Jonathan Snow
Adjunct Scientist

Uri S. Ten Brink
Adjunct Scientist

Elazar Uchupi
Scientist Emeritus

Richard P. Von Herzen
Scientist Emeritus

Marine Chemistry & Geochemistry Department

Timothy I. Eglinton
Senior Scientist and Department Chair, The Stanley W. Watson Chair for Excellence in Oceanography

Heather Benway
Research Associate III

Ken O. Buesseler
Senior Scientist

Vladimir Bulygin
Research Associate II

Karen Casciotti
Assistant Scientist

Cynthia L. Chandler
Information Systems Associate III

Matthew A. Charette
Associate Scientist

Marco J.L. Coolen
Assistant Scientist

Sarah Cooley
Postdoctoral Investigator

Joshua M. Curtice
Research Associate III

Scott C. Doney
Senior Scientist, W. Van Alan Clark Sr. Chair for Excellence in Oceanography

Henrieta Dulaiova
Postdoctoral Investigator

Alan P. Fleer
Research Associate III (LOA)

Helen F. Fredricks
Research Associate II

David M. Glover
Research Specialist

Meagan J.E. Gonneea
Research Associate II

Dierdre Alison Toole
Assistant Scientist

Paul Henderson
Research Associate II

Konrad A. Hughen
Associate Scientist

William J. Jenkins
Senior Scientist

Carl G. Johnson
Research Specialist

Elizabeth B. Kujawinski
Assistant Scientist

Mark D. Kurz
Senior Scientist

Phoebe Lam
Assistant Scientist

Carl Lamborg
Assistant Scientist

Ivan D. Lima
Information Systems Associate III

Krista Longnecker
Postdoctoral Investigator

Dempsey E. Lott III
Senior Research Specialist

Irina Marinov
Postdoctoral Investigator

William R. Martin
Associate Scientist

Scott J. McCue
Information Systems Associate II

Matthew R. McIlvin
Research Associate II

James W. Moffett
Senior Scientist (LOA)

Daniel B. Montluçon
Research Associate III

Robert K. Nelson
Research Specialist

Bernhard Peucker-Ehrenbrink
Associate Scientist

Steven M. Pike
Research Associate II

Giora Proskurowski
Postdoctoral Investigator

Alexandra M. F. Rao
Postdoctoral Investigator

Christopher M. Reddy
Associate Scientist

Daniel J. Repeta
Senior Scientist

Laura Robinson
Assistant Scientist

Olivier Rouxel
Assistant Scientist

Mak A. Saito
Associate Scientist

David L. Schneider
Research Associate III

Jeffrey S. Seewald
Associate Scientist

Melissa Soule
Research Associate III

Sean P. Sylva
Research Associate II

Margaret K. Tivey
Associate Scientist, J. Seward Johnson Chair as Education Coordinator

Benjamin Van Mooy
Assistant Scientist

G. Todd Ventura
Postdoctoral Investigator

Wei Wang
Research Associate III

Emeritus, Adjuncts, & Visiting Appointments– MC&G

Wolfgang Bach
Adjunct Scientist

Michael P. Bacon
Scientist Emeritus

David F. Baker
Visiting Investigator

Minhan Dai
Adjunct Scientist

Michael D. Degrandpre
Adjunct Scientist

Werner Deuser
Scientist Emeritus

Geoffrey Eglinton
Adjunct Scientist

John W. Farrington
Scientist Emeritus

Roger François
Adjunct Scientist

Nelson M. Frew
Oceanographer Emeritus

Markus Kienast
Adjunct Scientist

Wajih Naqvi
Adjunct Scientist

Fred L. Sayles
Scientist Emeritus

Geoffrey Thompson
Scientist Emeritus

Thomas W. Trull
Adjunct Scientist

Jean King Whelan
Oceanographer Emeritus

Oliver C. Zafiriou
Scientist Emeritus

Physical Oceanography Department

Robert A. Weller
Senior Scientist, Department Chair, and CICOR Program Director

John Ahern
Engineer I

Geoffrey P. Allsup
Research Engineer

Frank Bahr
Research Specialist

Pavel S. Berloff
Associate Scientist

Amy S. Bower
Senior Scientist

Annalisa Bracco
Assistant Scientist (LOA)

Kenneth H. Brink
Senior Scientist

Benjamin H. Carr
Research Associate II

Michael J. Caruso
Information System Specialist (LOA)

Claudia Cenedese
Associate Scientist

James H. Churchill
Research Specialist

Ruth G. Curry
Senior Research Specialist

J. Thomas Farrar
Postdoctoral Investigator

David M. Fratantoni
Associate Scientist

Paula Sue Fratantoni
Research Specialist

Paul D. Fucile
Senior Engineer

Heather H. Furey
Research Associate III

Nancy R. Galbraith
Information Systems Associate III

Glen G. Gawarkiewicz
Senior Scientist

Melinda M. Hall
Research Specialist

Karl R. Helfrich
Senior Scientist

David S. Hosom
Principal Engineer

Rui Xin Huang
Senior Scientist

Steven R. Jayne
Associate Scientist

Xiangze Jin
Research Associate II

Terrence M. Joyce
Senior Scientist, The Paul M. Fye Chair

Richard A. Krishfield
Research Specialist

Young-Oh Kwon
Assistant Scientist

Steven J. Lentz
Senior Scientist, J. Seward Johnson Chair as Education Coordinator

James A. Lerczak
Assistant Scientist (LOA)

Richard Limeburner
Senior Research Specialist

Christopher A. Linder
Research Associate III

John M. Lund
Research Associate II

Alison M. Macdonald
Research Specialist

Craig D. Marquette
Research Engineer

Michael S. McCartney
Senior Scientist

Carlos Moffat
Postdoctoral Investigator

Ellyn T. Montgomery
Research Specialist (LOA)

W. Brechner Owens
Senior Scientist, W. Van Alan Clark Jr. Chair for Excellence in Oceanography

Robert S. Pickart
Senior Scientist

Tom Kleindinst, WHOI

Engineering assistant Dara Tebo performs a "break test" to verify the strength of a cable in a WHOI rigging shop. Every new reel of wire received in the shop gets tested to make sure it performs up to the breaking strength listed by the manufacturer. The size of the mooring wire (e.g. 1/4 inch) determines the amount of tension needed to break it.

Tom Kleindinst, WHOI

Longtime WHOI employee—now officially a retiree who forgot that he's not supposed to be at work—George Tupper works on a conductivity-temperature-depth (CTD) water sampler in a Woods Hole workshop. Ocean researchers are constantly inventing new and better ways to sample the ocean, but the tried-and-true veterans like George and the venerable CTD still play a key role. Tupper still goes to work at sea regularly after 40+ years associated with WHOI.

Albert J. Plueddemann
Associate Scientist

Kurt L. Polzin
Associate Scientist

Lawrence J. Pratt
Senior Scientist

James F. Price
Senior Scientist, Associate Dean of Academic Programs

Andrey Proshutinsky
Senior Scientist

Raymond W. Schmitt
Senior Scientist

Michael A. Spall
Senior Scientist

Fiammetta Straneo
Associate Scientist

H. Marshall Swartz, Jr.
Research Associate III

Leif N. Thomas
Assistant Scientist

Mary-Louise Timmermans
Assistant Scientist

John M. Toole
Senior Scientist, The Columbus O'Donnell Iselin Chair for Excellence in Oceanography

Daniel J. Torres
Research Associate III

Richard P. Trask
Research Specialist

George H. Tupper
Research Associate II

James R. Valdes
Senior Engineer

Deborah E. West-Mack
Research Associate II

Peter Winsor
Assistant Scientist

Jiayan Yang
Senior Scientist

Lisan Yu
Associate Scientist

Emeritus, Adjuncts, & Visiting Appointments – PO

Robert C. Beardsley
Scientist Emeritus

Changsheng Chen
Adjunct Scientist

Jerome P. Dean
Oceanographer Emeritus

Claude Frankignoul
Adjunct Scientist

Nelson Hogg
Scientist Emeritus

Joseph H. LaCasce, Jr.
Adjunct Scientist

Ray-Qing Lin
Adjunct Scientist

M. Susan Lozier
Adjunct Scientist

Robert C. Millard, Jr.
Oceanographer Emeritus

David Mountain
Adjunct Scientist

Richard E. Payne
Oceanographer Emeritus

Philip L. Richardson
Scientist Emeritus

William J. Schmitz, Jr.
Scientist Emeritus

Bruce A. Warren
Scientist Emeritus

Marine Policy Center

Andrew R. Solow
Senior Scientist and Center Director

Andrew Beet
Information Systems Associate II

Porter Hoagland III
Research Specialist

Di Jin
Associate Scientist

Hauke L. Kite-Powell
Research Specialist

Ann E. Mulligan
Associate Scientist

Emeritus, Adjuncts, & Visiting Appointments – MPC

Jesse H. Ausubel
Adjunct Scientist

Arthur G. Gaines, Jr.
Oceanographer Emeritus

Hillel Gordin
Senior Research Fellow

Jamie Grodsky
Institution Visiting Scholar

Guillermo Herrera
Adjunct Scientist

Michael P. Sissenwine
Institution Visiting Scholar

John H. Steele
Scientist Emeritus

Operational Science Services–*Alvin*

Gavin W. Eppard
Deep Submergence Vehicle Pilot

David C. Fisichella
Research Associate III

J. Patrick Hickey
Alvin Manager

Sean R. Kelley
Deep Submergence Vehicle Pilot

William N. Lange
Research Specialist

Mark O. Spear
Deep Submergence Vehicle Pilot

W. Bruce Strickrott
DSV Expedition Leader

Anthony P. Tarantino
Research Engineer

Communications and Graphic Services

Danielle M. Fino
Information Systems Associate III

Katherine Spencer Joyce
Information Systems Associate II

Dina A. Pandya
Information Systems Associate II

Computer & Information Services

Julie Allen
Information System Specialist

Michael J. Bishop
Information Systems Associate II

Fay McIntyre Cali
Information Systems Associate II

Eric Cunningham
Information Systems Associate III

Jeffrey A. Dusenberry
Information Systems Associate III

Roger A. Goldsmith
Senior Information Systems Specialist

Helen E. Gordon
Information Systems Associate III

Robert Katcher
Information Systems Associate II

John Krauspe
Information Systems Associate III

Andrew R. Maffei
Senior Information Systems Specialist

Randal Manchester
Information Systems Associate III

Jonathan E. Murray
Information Systems Associate II

Elizabeth Owens
Information Systems Associate II

Warren J. Sass
Information Systems Specialist

Deborah K Shafer
Information Systems Associate II

Adam Shepherd
Information Systems Associate II

Angela York
Information Systems Associate II

Emeritus, Adjuncts, & Visiting Appointments – CIS

Kevin Roland Fall
Institution Visiting Scholar

MBL/WHOI Library

Rosemary Davis
Information Systems Associate II, Library Archives

Ann W. Devenish
Information Systems Associate II, Library Computer

Colleen D. Hurter
Information Systems Associate III, Systems Library

Lisa M. Raymond
Information Systems Associate II, Library Manager

Margaret A. Rioux
Information Systems Associate III, Systems Library

Managers and Administrative Staff

Board Relations

Tom Nemmers
Director of Board Relations

Directorate Offices

Susan P. Ferreira
Senior Grants Administrator

Ruth E. Goldsmith
Executive Assistant to VP for Marine Facilities & Operations

Bonnie J. Griffin
Grants Administrator II

Leman Hadway
Security Officer

Deborah F. Hamel
Administrator, Office of VP for Finance & Administration

Pamela C. Hart
Director of Government Relations (LOA)

Molly M. Lumping
Executive Assistant to President & Director

Steven M. Murphy
Grants Administrator II

Anita D. Norton
Administrative Associate II

Richard F. Pittenger
Special Assistant for Strategic Planning

Claire L. Reid
Director of Grants & Contract Services

Peggy A. Rose
Executive Assistant to Director of Research

Terrence R. Schaff
Director Government Relations

Timothy R. Stark
Investment Officer & Manager of Treasury Operations

Cindy L. Tobey
Executive Assistant to VP for Finance & Administration/Chief Financial Officer

Applied Ocean Physics & Engineering

John M. Reilly
Department Administrator

Shirley J. Barkley
Administrative Associate I

Susan M. Grieve
Administrative Associate I

Dolores Chausse
Administrative Associate I

Sheila K. Hurst
Administrative Associate I

Gretchen McManamin
Administrative Associate I

Karen Schwamb
Administrative Associate I

Biology

Janis M. Umschlag
Department Administrator

Jeffrey Brodeur
Sea Grant Communicator

Sheri D. DeRosa
Administrative Associate II

Jennifer Hammock
Research Assistant III

Judith L. Kleindinst
Center Administrator II

Michelle McCafferty
Administrative Associate I

Geology & Geophysics

Maryanne Ferreira
Department Administrator

Andrew T. Daly
Administrative Associate II

Susan K. Handwork
Center Administrator II

Elaine A. Tulka
Administrative Associate I

Marine Chemistry & Geochemistry

Sheila A. Clifford
Administrative Associate I

Donna M. Mortimer
Administrative Associate I

Mary Zawoysky
Administrative Associate I

Physical Oceanography

Maryanne H. Wray
Department Administrator

Shirley Cabral McDonald
Administrative Associate I

Maureen E. Carragher
Administrative Associate I

Penny C. Foster
Administrative Associate I

Mary Ann Lucas
Administrative Associate II

Ruthanne Molyneaux
Administrative Associate II

Hazel Salazar
Administrative Associate I

Deborah A. Taylor
Administrative Associate I

Patricia A. White
Administrative Associate I

Marine Policy Center

Ellen M. Gately
Center Administrator II

Office of Applied Oceanography

Wallace C. Stark
Contracts & Licensing Specialist

Operational Science Services–*Alvin*

Richard S. Chandler
Submersible Operations Coordinator

Faith Hampshire
Center Administrator I

Terrence M. Rioux
Diving Safety Officer

Marine Operations

Jon C. Alberts
Marine Operations Coordinator

Mike Brennan
Marine Personnel Coordinator

Elizabeth A. Caporelli
Marine Operations Coordinator

John R. Dyke
Marine Resource Coordinator

Larry D. Flick
Marine Operations Administrator

Michael A. Gagne
Marine Electronics Shop Supervisor

Kerry E. Heywood
Administrative Associate I

Theophilus Moniz
Marine Engineer

Albert F. Suchy
Director of Ship Operations

Ernest C. Wegman
Port Engineer

Facilities

Paul S. Avery
Facilities Engineer

Ernest G. Charette
Director of Facilities

Patricia White, WHOI

Able Seaman Clindor Cacho holds tight to the hook end of a winch on the research vessel Oceanus. *Researchers and crew have sailed on the vessel several times this year in support of projects to understand the air-sea interactions and the deep water flows of the North Atlantic, particularly the Gulf Stream and the Deep Western Boundary Current.*

David F. Derosier
Assistant Facilities Manager

Richard E. Galat
Facilities Engineer

Academic Programs Office

Valerie J. Caron
Administrative Associate I

Christine S. Charette
Executive Assistant to VP of Academic Programs/Dean

Janet A. Fields
Administrative Associate I

Marsha Gomes
Graduate Administrator and Student Affairs Officer

Katherine Madin
Curriculum Coordinator

Andrea L. Thorrold
COSEE Program Coordinator

Laishona M. Vitelli
Administrative Associate I

Julia G. Westwater
Registrar/Graduate and Undergraduate Program Administrator

Controller's Office

Deborah A. Aimone
Senior Accountant II

Linda L. Church
Accountant III

Cheryl C. Daniels
Accountant III

Dana Fernandez
Manager of Budgets/General Accounting

Penelope Hilliard
Property Administrator

Patricia A. Lake
Accounts Receivable Manager

Laura A. Murphy
Assistant Controller

Dena Richard
Payroll Manager

David Stephens
Controller

Procurement

Paula Cloninger
Procurement Systems Coordinator

Dennis Fox
Director of Procurement

Veta M. Green
Procurement Representative II

Michelle A. Oliva
Procurement Representative II

Sandra A. Sherlock
Senior Procurement Representative

Mary Ann White
Procurement Representative II -Travel Coordinator

Human Resources

M. Beth Andrews
Foreign National Advisor

Emily M. Beaton
Human Resources Generalist

Tina A. Calisto-Betti
Employment Services Manager/Equal Employment Opportunity Officer

Susan M. Cina
Benefits Manager

Donna R. Hyman
Benefits Specialist

Pamela J. Reine
Employment Services Specialist

Emily H. Schorer
Director of Human Resources

John J. Sinibaldi, Jr.
Benefits Manager

Michelle A. Slattery
Administrative Associate I

Linda S. Snow
Benefits Specialist

June E. Sullivan
Retirement Benefits Administrator

Ann K. Sweck
Employment Services Specialist

Development Office

Peggy A. Daly
Department Administrator

Dina M. Dicarlo
Administrative Associate I

David G. Gallo
Director of Special Communications Projects

Wendy T. Henley
Development Officer

Alison Tilghman Kline
Development Officer

Donna L. Lamonde
Administrative Associate I

Peter J. Mollo
Senior Development Officer Major Gifts

Jane B. Neumann
Director of Principal Gifts

James Rakowski
Director of Major Gifts

Lesley M. Reilly
Director of Planned Giving & Annual Fundraising

Audrey M. Rogerson
Director of Foundation Relations

Marcella R. Simon
Administrative Associate II

Computer & Information Services

Arthur S. Gaylord
Computer and Information Services Director

Christine L. Hammond
Assistant Director of Computer and Information Services

Hartley Hoskins
Network Group Leader

Eileen R. Wicklund
Center Administrator I

Communications, Public Information, and Graphic Services

Frederic R. Heide
Director of Communications

Mike Carlowicz
Science Writer & Editor

Jayne H. Doucette
Manager of Graphic Services

Laurence S. Lippsett
Managing Editor

Stephanie A. Murphy
Manager Public Information & Internal Communications

Amy E. Nevala
Science Writer & Editor

Kathleen Patterson
Exhibit Center Manager

Joanne Tromp
Administrative Associate I

Management Information Systems

Nancy E. Barry
Business Analyst

Hilary C. Davis
NT Administrator/Developer

Karen E. Flaherty
Business Analyst

Kenneth R. Friend II
NT Administrator/Developer

John M. Lombardi
Director of Management Information Systems

Joseph C Messina
NT Developer/DBA

Robert Reves-Sohn, WHOI

In May 2007, WHOI researchers and technicians deployed the Real Time Offshore Seismic Station (RTOSS) off the coast of Grenada. RTOSS is part of a project to develop new mooring technology for earthquake monitoring, and it includes an ocean-bottom seismometer deployed directly on top of the volcano to collect real-time data from the hazardous Kick'em Jenny volcano.

Services

Stephen P. Senior
Distribution Manager

Debra A. Snurkowski
Assistant Distribution Manager

Environmental Health & Safety

Ronald H. Reif
Director of Environmental Health and Safety

Library

Catherine N. Norton
Library Director

Departmental Assistants

Applied Ocean Physics & Engineering

Tyler M. Andrade
Engineering Assistant I

Trevor Ball
Laboratory Assistant I

Andrew S. Billings
Engineering Assistant III

Alberto Collasius, Jr.
Engineering Assistant III

Thomas Crook
Senior Engineering Assistant II

Jack Dellibovi
Engineering Assistant III

Frederick Denton
Engineering Assistant I

Betsey G.P. Doherty
Research Assistant III

James M. Dunn
Engineering Assistant III

Stephen M. Faluotico
Senior Engineering Assistant I

Neil T. Forrester
Laboratory Assistant II

Paul M. Fraser
Engineering Assistant III

Alan T. Gardner
Engineering Assistant III

Andrew P. Girard
Engineering Assistant III

Levi Gorrell
Research Assistant II

Matthew R. Gould
Senior Engineering Assistant I

Brian J. Guest
Senior Engineering Assistant I

Craig E. Johnson
Engineering Assistant III

John N. Kemp
Senior Engineering Assistant II

Olga I. Kosnyreva
Research Assistant III

Amy Kukulya
Engineering Assistant III

Neil M. Mcphee
Senior Engineering Assistant II

Stephen D. Murphy
Senior Engineering Assistant I

Kristopher W. Newhall
Engineering Assistant III

Gregory Packard
Senior Engineering Assistant I

Marjorie J. Parmenter
Research Assistant II

Adam Re
Engineering Assistant I

James R. Ryder
Senior Engineering Assistant I

David S. Schroeder
Engineering Assistant II

Jared M. Schwartz
Engineering Assistant II

William J. Sellers
Senior Engineering Assistant II

Jonathan Shusta
Engineering Assistant II

Jay Sisson
Senior Research Assistant II

Gary N. Stanbrough
Engineering Assistant III

David Terrell
Engineering Assistant II

Benjamin Tradd
Engineering Assistant I

Karlen A. Wannop
Senior Engineering Assistant I

Jeremy Winn
Engineering Assistant II

Biology Department

Kim Amaral
Research Assistant III

Gale M. Clark
Laboratory Assistant II

Scott R. Cramer
Senior Research Assistant I

Tony Dispezio
Information System Assistant I

Amanda J. Hansen
Senior Research Assistant I

George Heimerdinger
Research Assistant III

Brittan L. Hlista
Research Assistant II

David M. Kulis
Senior Research Assistant II

Katie Libera
Research Assistant I

Dawn Moran
Research Assistant III

Kerry A. Norton
Research Assistant II

Melissa Patrician
Research Assistant II

Pamela A. Polloni
Research Assistant III

Daniel W. Smith
Research Assistant III

Sara K. Trowbridge
Laboratory Assistant I

Amber York
Research Assistant I

Tom Kleindinst, WHOI

Engineer Chris Lumping (left) and welder Tony Delane examine the mooring anchor framework they built for a "multifunction node" (MFN) and buoy system that will help researchers monitor whale activity. Built for the National Oceanic and Atmospheric Administration, the MFN was deployed in 2007 off the coast of Jacksonville, Florida, where North Atlantic right whales spend the winter calving season.

Geology & Geophysics

Rebecca A. Belastock
Senior Research Assistant I

Chanda J. Bertrand
Research Assistant III

L. Susan Brown-Leger
Senior Research Assistant I

Josh Burton
Research Assistant III

Max Cohen
Research Assistant I

David L. Dubois
Senior Research Assistant I

Anne S. Edwards
Research Assistant II

Mary C. Lardie Gaylord
Research Assistant II

Maya L. Gomes
Research Assistant I

Robert E. Handy
Engineering Assistant III

Marti Jeglinski
Research Assistant III

Patricia Long
Senior Engineering Assistant I

Julie Palmieri
Research Assistant III

Summer Praetorius
Research Assistant II

Ellen Roosen
Senior Research Assistant I

Luping Zou
Research Assistant III

Marine Chemistry & Geochemistry

Tracy L. Atwood
Research Assistant III

Maureen Auro
Research Assistant III

Nicole Benoit
Research Assistant I

Scot P. Birdwhistell
Senior Research Assistant I

Kevin Cahill
Research Assistant III

Joanne Goudreau
Senior Research Assistant II

Justin Ossolinski
Research Assistant III

Emily E. Peacock
Research Assistant III

Adam Rago
Research Assistant I

Gillian C. Smith
Laboratory Assistant II

Margaret M. Sulanowska
Senior Research Assistant II

J. Marshall Swartz
Laboratory Assistant II

Nan Y. Trowbridge
Research Assistant II

Physical Oceanography

Paul R. Bouchard
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Margaret F. Cook
Senior Research Assistant II

Jane A. Dunworth-Baker
Senior Information Systems Assistant I

Tom Kleindinst, WHOI

WHOI mechanical shop member Geoffrey Ekblaw welds part of the frame of the Nereus *hybrid remotely operated vehicle. The HROV is a single vehicle that will perform two very different kinds of missions: it will swim freely as an autonomous vehicle for survey work, and it will be tethered to a ship for direct control when researchers want to collect seafloor samples.*

Brian P. Hogue
Engineering Assistant III
Mark Lambton
Engineering Assistant III
Jeffrey B. Lord
Senior Engineering Assistant II
Theresa K. McKee
Senior Information Systems Assistant II
Edward F. O'Brien
Engineering Assistant II
William M. Ostrom
Senior Engineering Assistant II
Christopher Ross
Engineering Assistant II
Jason C. Smith
Senior Engineering Assistant I
Robert D. Tavares
Engineering Assistant III
Dara Tebo
Engineering Assistant II
W. David Wellwood
Research Assistant III
Sean P. Whelan
Engineering Assistant III
Scott E. Worrilow
Senior Engineering Assistant II
Sarah L. Zimmermann
Research Assistant III

Marine Policy Center

Erin P. Ralston
Research Assistant III
Mary E. Schumacher
Research Assistant III

Operational Science Services-*Alvin*

Lukas Bradley
Engineering Assistant I
C. Hovey Clifford
Senior Engineering Assistant I
Alexander Dorsk
Engineering Assistant III
Oya Erez
Engineering Assistant III
Benjamin Frantzdale
Engineering Assistant III
Christopher M. Griner
Engineering Assistant II
Allison Heater
Engineering Assistant III
Wyatt Jamison
Engineering Assistant II
Robert Stuart Laird
Engineering Assistant III
Thomas M. Lanagan
Engineering Assistant I
Michael K. McCarthy
Engineering Assistant II
Jeff McDonald
Engineering Assistant II
Amy M. Simoneau
Engineering Assistant III
David Sims
Engineering Assistant III
Amy Stetten
Engineering Assistant I
Andrew C. Waterbury
Engineering Assistant II
Anton L. Zafereo
Engineering Assistant II

Development

Ronald L. Timm
Information Systems Assistant III

Computer & Information Services

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Senior Information Systems Assistant I
Timothy J. Gage
Information Systems Assistant III
David A. Gaylord
Information Systems Assistant II
Jason H. Johnson
Information Systems Assistant III
Mark D. Jones
Information Systems Assistant II
Al Kuntz
Information Systems Assistant II
Dennis E. Ladino
Information Systems Assistant III
Alicia M. Rose
Information Systems Assistant II
Matthew J. Yorston
Information Systems Assistant II

MBL/WHOI Library

Ellen Levy
Information Systems Assistant III

Administrative Assistants

Applied Ocean Physics & Engineering

Linda A. Cannata
Senior Administrative Assistant II
Judith Fenwick
Senior Administrative Assistant II
Jane A. Hopewood
Senior Administrative Assistant II
Cheryl Nedd
Senior Administrative Assistant II
Linda M. Skiba
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Susan K. Stasiowski
Senior Administrative Assistant II
Ann E. Stone
Senior Administrative Assistant II
Judith A. Rizoli White
Senior Administrative Assistant II
Lidia K. Williams
Senior Administrative Assistant II

Biology Department

Ellen M. Bailey
Senior Administrative Assistant II
Chip Clancy
Senior Administrative Assistant I
Erin Dupuis
Senior Administrative Assistant I
Ethel F. Lefave
Staff Assistant III (LOA)
Olimpia McCall
Senior Administrative Assistant I
Janni Moselsky-Hansen
Senior Administrative Assistant II
Susan F. Tomeo
Senior Administrative Assistant I

Marine Chemistry & Geochemistry

Lauren Ledwell
Senior Administrative Assistant II

Dave Gray, WHOI

WHOI's Acting President and Director James Luyten (right) joins other state and federal dignitaries (including Mass. Senate President Therese Murray, at the podium) in announcing a $97.7 million contract to support the development, installation, and initial operation of the coastal and global components of the National Science Foundation's Ocean Observatories Initiative (OOI). WHOI will be working with the Scripps Institution of Oceanography and Oregon State University to establish the next generation of ocean observing systems.

Geology & Geophysics

Katherine W. Brown
Senior Administrative Assistant I

Christina Cuellar-Palcic
Senior Administrative Assistant I

Pamela V. Foster
Senior Administrative Assistant II

C. Frances Halbrooks
Senior Administrative Assistant I

Janet M. Johnson
Senior Administrative Assistant I

Lynn Stellrecht
Senior Administrative Assistant II

Physical Oceanography

Eleanor M. Botelho
Administrative Assistant II

Anne Doucette
Senior Administrative Assistant II

Jeanne A. Fleming
Senior Administrative Assistant I

Marine Operations

Barbara L. Costello
Senior Administrative Assistant II

Marjorie M. Holland
Senior Administrative Assistant II

Jennifer Maclone
Senior Administrative Assistant I

Facilities

M. Joan Watring
Senior Administrative Assistant II

Directorate (GCS)

Sandra L. Botelho-Sherlock
Senior Administrative Assistant I

Controller's Office

Julie L. Fawkes
Accountant II

Stacey MacDonald
Senior Administrative Assistant II

Wendy L. Sandner
Senior Payroll Practitioner

Maeve Thurston
Property Officer

Procurement

Pierrette M. Ahearn
Procurement Representative I

Suzanne M. Bolton
Procurement Representative I

Barbara G. Callahan
Senior Stockroom Services Representative

Glenn R. Enos
Procurement Representative I

Joanna F. Ireland
Procurement Representative I

Samuel J. Lomba
Stockroom Supervisor

Richard C. Lovering
Facilities Procurement Rep

Diane Rieger
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Laurie K. Thompson
Procurement Representative I

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Administrative Assistant I

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Diane Mirlicourtois
Senior Administrative Assistant II

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Kittie E. Elliott
Administrative Assistant II

Robin Hurst
Senior Administrative Assistant I

Stephen Roberts
Exhibit Center Assistant

Melanie Winsor
Exhibit Center Assistant

Edmund Zmuda
Exhibit Center Assistant

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Jack Cook
Graphic Designer

David L. Gray
Senior Photographer

Mark V. Hickey
Reproduction Supervisor

Thomas N. Kleindinst
Senior Photographer

E. Paul Oberlander
Illustrator

Jeannine M. Pires
Graphic Designer

Timothy M. Silva
Multi-Media Technician

Board Relations

Judy Thrasher
Senior Administrative Assistant II

Environmental Health & Safety Office

Georgi E. Crowley
Senior Administrative Assistant II

Facilities & Services Personnel

Steven W. Allsopp
Assistant Plant Mechanic

Michael K. Ayer
Senior Machinist

Lance Wills, WHOI

Expedition leader Will Sellers evaluates oncoming ocean swells as the crew prepares to lower the remotely operated vehicle Jason *to the Pacific's Juan de Fuca Ridge. Now in its third incarnation, the* Jason *vehicles have been taking researchers to the seafloor (without leaving the deck of a ship) for more than 20 years.*

Michael J. Blakesley
Security Guard

Thomas A. Bouche
Senior Electrician

James Brown
Machinist

Gary S. Caslen
Security Guard

Linda M. Cataldo
Security Guard

Don A. Collasius
Shop Services Assistant

Thomas N. Colon
Senior Carpenter

William B. Cruwys
Security Guard

Rowland N. Cummings
Senior Carpenter

Anthony P. Delane
Welder

Peter P. Delorey
Senior Carpenter

Richard Edwards, Jr.
Mechanic

Geoffrey K. Ekblaw
Lead Welder

John Fetterman
Lead Machinist

Scott D. Formisani
Senior Security Guard

Matthew Foye
Senior Plant Mechanic

Stephen G. Gagnon
Electrical Shop Supervisor

Damon E. Gayer
Senior Carpenter

James A. Haley
Welder

David S. Hamblin
Senior Machinist

Douglas M. Handy
Mechanic

Craig T. Henderson
Carpenter Shop Supervisor

Robert W. Hendricks
Senior Security Guard

Jeffrey J. Hood
Mechanic

Paul Keith
Welder

Fred W. Keller
Plant Supervisor

Bernard L. Kellogg
Senior Electrician

Casey King
Shop Services Assistant

Timothy Kling
Machinist

Rene Kokmeyer
Senior Machinist

Bruce A. Lancaster
Senior Carpenter

Donald C. LeBlanc
Senior Electrician

Robert A. McCabe
Mechanical Shop Supervisor

Carlos A. Medeiros
Assistant Mechanical Shop Supervisor

Samuel H. Moore
Shop Services Assistant

Richard Moquin
Lead Mechanic

Jose S. Mota
Senior Security Guard

Tom Kleindinst, WHOI

In May 2007, a team of biologists and veterinarians, including WHOI biologist Darlene Ketten (in blue) and Jeanette Wyneken (in white), a turtle physiology expert from Florida Atlantic University, used WHOI's Computerized Scanning and Imaging Facility to conduct a necropsy on a 900-pound leatherback turtle. The leatherback, an endangered species, was inadvertently caught in April 2007 off Florida. The unintentional catch did have a positive side: It presented a rare opportunity to learn more about this species. WHOI staff used the high-resolution medical scanner to create precise three-dimensional visualizations of the leatherback's internal structure, which are impossible to obtain by dissection.

John R. Murphy, Jr.
Senior Plant Mechanic

Richard F. Murphy
Senior Security Guard

Charles A. Olson
Senior Plant Mechanic

Norman A. Penman
Security Guard

Christopher M. Rheaume
Machinist

Doyal L. Richerson
Senior Security Guard

John Richerson
Senior Security Guard

Robert C. Sanker
Painter

Timothy M. Smith
Machinist

William F. Sparks
Night Services Supervisor

Robert G. Spenle
Painter

Mark L. St. Pierre
Experimental Machinist

Charles S. Sumner
Security Guard

Kevin D. Thompson
Assistant Plant Supervisor

William Vincent
Welder

Computer & Information Services

Isabel M. Penman
Senior Telecommunications Operator/ Dispatch/Receptionist

Clara Y. Pires
Telecommunications Operator/ Dispatch/Receptionist

Brenda M. Rowell
Telecommunications Operator/ Dispatch/Receptionist

Distribution & Shipping

Walter D. Albaugh III
Senior Distribution Assistant-Mail

Geoffrey Badger
Distribution Assistant

John Brinckerhoff
International & Domestic Shipping Coordinator

John A. Crobar
Distribution Supervisor (Warehouse)

Eric Drange
Distribution Assistant

Dana G. Hackett
Senior Distribution Assistant (Building Services)

Patrick J. Harrington
Distribution Supervisor-Mail

Troy Kelley
Vehicle Mechanic

Christopher Lipp-Alferes
Distribution Assistant

Jay R. Murphy
Distribution Super-Services

Lewis J. Saffron
Senior Distribution Assistant (Building Services)

Housekeepers

Mary Andrews
Housekeeper II (Procurement)

Lynne M. Ellsworth
Housekeeper II (Academic Programs)

Part-Time Helpers

Hannah Allen

Sophie R. Buchanan

Sarah Fackler

Ellen Gawarkiewicz

Brandy Joyce

Olivia Kurz

Ben Mann

Christopher Moore

Emily E. Nelson

Stephanie Pommrehn

Grace Rago

Daniel Roberts

Shaughnessy F. Rogers

Eric C. Schmitt

Stephen Schmitt

Meghan Soderstrom

Gregory A. Toltin

Camille Weinberg

Marine Crew

Licensed Officers

William S. Bank
CRV Mate, Tioga

Richard C. Bean
Third Mate, Atlantis

Lawrence T. Bearse
Master, Oceanus

Derek P. Bergeron
Second Mate, Knorr

Paul F. Carty
Chief Mate, Oceanus

Gary B. Chiljean
Master, Atlantis

Carl H. Christensen
Second Mate, Atlantis

Arthur D. Colburn III
Master, Atlantis

Margaret M. Crane
Chief Mate, Atlantis

Craig D. Dickson
Second Mate, Atlantis

Deidra L. Emrich
Chief Mate, Knorr

Ethan Galac
Second Mate, Oceanus

William E. Halpin
Communications Officer, Knorr

Jennifer Hickey
Third Mate, Knorr

Monica K. Hill
Second Assistant Engineer, Atlantis

Kenneth E. Houtler
Master, Tioga

Peter T. Leonard, Jr.
Chief Mate, Atlantis

Jeffrey Little
Chief Engineer, Atlantis

Timothy P. Logan
Communications Officer, Atlantis

Piotr Marczak
Second Assistant Engineer, Knorr

Gary M. McGrath
First Assistant Engineer, Knorr

Todd D. Meeker
Second Assistant Engineer, Atlantis

Anthony D. Mello
Master, Oceanus

Patrick S. Mone
Chief Engineer, Knorr

Christopher D. Morgan
Chief Engineer, Atlantis

Richard F. Morris
Chief Engineer, Oceanus

Ansley Peacock
Third Mate, Knorr

John W. Porter
Communications Officer, Atlantis

Trevor Robinson
Third Assistant Engineer, Knorr

Mark Sampson
Second Mate, Oceanus

Adam Seamans
Chief Mate, Knorr

Kent D. Sheasley
Master, Knorr

George P. Silva
Master, Knorr

Matthew J. Skelly
Second Mate, Atlantis

Anthony Skinner
Communications Officer, Knorr

Michael L. Spruill
Third Assistant Engineer, Atlantis

Linwood J. Swett, Jr.
Communications Officer, Knorr

Wayne A. Sylvia
First Assistant Engineer, Knorr

Michael Thorwick
First Assistant Engineer, Atlantis

Allison Tunick
Third Mate, Atlantis

Marcel Vieira
First Assistant Engineer, Atlantis

Stephen A. Walsh
Chief Engineer, Knorr

I. Sacha Wichers
Third Assistant Engineer, Knorr

Other Marine Crew

Russell P. Adams, Jr.
Marine Electrician

Jose Andrade
Ordinary Seaman

Robert V. Arthur
Ordinary Seaman

Wayne A. Bailey
Boatswain

Linda J. Bartholomee
Mess Attendant

Adam Beauregard
Able Body Seaman

Steven F. Berry
Able Body Seaman

Bobbie Bixler
Steward

Nelson L. Botsford
Junior Engineer

Philip Brennan
Mess Attendant

Alex Buchanan
Able Body Seaman

Kevin D. Butler
Able Body Seaman

Pimenio C. Cacho
Boatswain

Todd A. Carter
Oiler

Lawrence P. Costello
Ordinary Seaman

Kyle L. Covert
Boatswain

Albert P. Da Lomba
Steward

Michael R. Doherty
Oiler

Francis J. Doohan
Ordinary Seaman

William J. Dunn, Jr.
Able Body Seaman

Daniel R. Eident
Ordinary Seaman

Kathryn Eident
Mess Attendant

William P. Eident
Ordinary Seaman

Brian Eldred
Oiler

Leo Fitz
Able Body Seaman

Alex Forsythe
Cook

John J. Gaylord
Ordinary Seaman

Michael P.J. Gaylord
Oiler

Erskine Goddard
Cook

Jerry M. Graham
Able Body Seaman

Cecile S. Hall
Ordinary Seaman

Ian G. Hanley
Coastal Research Vessel Crew Member

Josephe G. Harte
Steward

Patrick J. Hennessy
Boatswain

Lawrence F. Jackson
Cook

Karen I. Johnson
Cook

Connor A. Kadlec
Junior Engineer

Tom Keller
Oiler

Marc La France
Cook

Peter J. Liarikos
Boatswain

E. Raul Martinez
Able Body Seaman

James M. McGill
Able Body Seaman

Paul C. McGrath
Oiler

Mirth N. Miller
Steward

Jesse Milton
Ordinary Seaman

Christopher Moody
Steward

Patrick L. Neumann
Ordinary Seaman

Mark P. Nossiter
Cook

Kerin O'Neill
Junior Engineer

Edward S. Popowitz
Able Body Seaman

Anthony Reveira
Mess Attendant

Paul Ruh, Jr.
Oiler

Michael Singleton
Ordinary Seaman

Charles Smith
Wiper

Alex Taylor
Oiler

G. Kevin Threadgold
Ordinary Seaman

Brendon Michael Todd
Mess Attendant

Sheikh Moin Uddin
Junior Engineer

Susan Van Apeldoorn
Able Body Seaman

James Vandever
Electronics Technician

Colin L. Walcott
Mess Attendant

Ronald Whims
Ordinary Seaman

Lance E. Wills
Able Body Seaman

Carl Owen Wood
Steward

David J. Ziskin
Electronics Technician

2007 Retirees

Marlene B. Messina Bender
Linda Benway
Susan A. Casso
Shelley M. Dawicki
Stanley R. Hart (Emeritus)
Alan J. Hopkins
Kathleen P. LaBernz
Marguerite K. McElroy
William McKeon
Sandra E. Murphy
Joseph Pedlosky (Emeritus)
Vasco Pires
Karen P. Rauss
David L. Schneider
Edward Sholkovitz (Emeritus)
John J. Stegeman
Philip M. Treadwell
Mary Jane Tucci
John A. Whitehead (Emeritus)
Peter H. Wiebe (Emeritus)
John A. Wood, Jr.

Dave Gray, WHOI

Hovey Clifford, WHOI retiree and volunteer Information Office tour guide, speaks with international naval officers from the Naval Command College in Newport, RI during a September 2007 tour of the dock and marine facilities.

Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Oceanography/Applied Ocean Science and Engineering

Doctor of Philosophy

Diane K. Adams
University of California, Santa Barbara; BS
Special Field: Biological Oceanography
Dissertation: Influence of Hydrodynamics on the Larval Supply to Hydrothermal Vents on the East Pacific Rise

Alex A. Apotsos
Duke University; BS
Special Field: Civil and Environmental and Oceanographic Engineering
Dissertation: Setup in the Surfzone

Claudia Augusto Martins
College of Science of the University of Lisbon (Portugal); Biology Degree
Special Field: Biological Oceanography
Dissertation: Functional Genomics of a Non-toxic Alexandrium lusitanicum *Culture*

Regina P. Campbell-Malone
State University of New York, Buffalo; BS
Special Field: Biological Oceanography
Dissertation: Biomechanics of North Atlantic Right Whale Bone: Mandibular Fracture as a Fatal Endpoint for Blunt Vessel-Whale Collision Modeling

Brian J. deMartin
Georgia Institute of Technology; BS, MS
Special Field: Marine Geophysics
Dissertation: Experimental and Seismological Constraints on the Rheology, Evolution, and Alteration of the Lithosphere at Oceanic Spreading Centers

Nicholas J. Drenzek
Rensselaer Polytechnic Institute; BS
Special Field: Marine Geochemistry
Dissertation: The Temporal Dynamics of Terrestrial Organic Matter Transfer to the Oceans: Initial Assessment and Application

J. Thomas Farrar
University of Oklahoma; BA, BS
Special Field: Physical Oceanography
Dissertation: Air-sea Interaction at Contrasting Sites in the Eastern Tropical Pacific: mesoscale variability and atmospheric convection at 10N

Melanie R. Fewings
Western Washington University; BS
Cornell University; MS
Special Field: Physical Oceanography
Dissertation: Cross-Shelf Circulation and Momentum and Heat Balances over the Inner Continental Shelf Near Martha's Vineyard, Massachusetts

Nathalie F. Goodkin
Harvard College; BA
Special Field: Chemical Oceanography
Dissertation: Geochemistry of Slow-Growing Corals: Reconstructing Sea Surface Temperature, Salinity, and the North Atlantic Oscillation

Michael V. Jakuba
Massachusetts Institute of Technology; BS
Special Field: Mechanical Engineering
Dissertation: Stochastic Mapping for Chemical Plume Source Localization with Application to Hydrothermal Vent Prospecting

Seth G. John
Carleton College; BA
Special Field: Chemical Oceanography
Dissertation: The Marine Biogeochemistry of Zinc Isotopes

Petra Klepac
University of Zagreb (Croatia); BS
Special Field: Biological Oceanography
Dissertation: Interacting Populations: Hosts and Pathogens, Prey and Predators

Joy M. Lapseritis
Simons Rock College of Bard; AA
Smith College; BA, MS
Special Field: Biological Oceanography
Dissertation: Comparative Analyses of Aryl Hydrocarbon Receptor Structure and Function in Marine Mammals

Wenyu Luo
Ocean University of Qingdao (PRC); BS
Institute of Acoustics, CAS; MS
Special Field: Oceanographic Engineering
Dissertation: Three-Dimensional Propogation and Scattering Around a Conical Seamount

Anna P.M. Michel
Massachusetts Institute of Technology; SB, SM
Special Field: Mechanical and Oceanographic Engineering
Dissertation: Laboratory Evaluation of Laser-Induced Breakdown Spectroscopy (LIBS) as a new in situ Chemical Sensing Technique for the Deep Ocean

Carlos F. Moffat
University of Concepcion (Chile); BS, MS
Special Field: Physical Oceanography
Dissertation: Ocean Circulation and Dynamics on the West Antarctic Peninsula Continental Shelf

Rajesh R. Nadakuditi
Lafayette College; BS
Special Field: Electrical and Oceanographic Engineering
Dissertation: Applied Stochastic Eigen-Analysis

Travis L. Poole
Luther College; BA
Special Field: Oceanographic Engineering
Dissertation: Geoacoustic Inversion by Mode Amplitude Perturbation

Cara M. Santelli
University of Wisconsin; BS
Special Field: Marine Geomicrobiology
Dissertation: Geomicrobiology of the Ocean Crust: the Phylogenetic Diversity, Abundance, and Distribution of Microbial Communities Inhabiting Basalt and Implications for Rock Alteration Processes

Rachel Stanley
Massachusetts Institute of Technology; BS
Special Field: Chemical Oceanography
Dissertation: A Determination of Air-Sea Gas Exchange and Upper Ocean Biological Production from Five Noble Gases and Tritiugenic Helium-3

Emily M. Van Ark
Northwestern University; BA
Special Field: Marine Geophysics
Dissertation: Seismic and Gravitational Studies of Melting in the Mantle's Thermal Boundary Layers

Benjamin D. Walther
University of Texas, Austin; BA, BS
Special Field: Biological Oceanography
*Dissertation: Migratory Patterns of American shad (*Alosa sapidissima*) Revealed by Natural Geochemical Tags in Otoliths*

Jessica M. Warren
University of Cambridge (UK); BA, MS
Special Field: Geochemistry & Geophysics
Dissertation: Geochemical and Rheological Constraints on the Dynamics of the Oceanic Upper Mantle

Clare M. Williams
University of Leeds (UK); BS
Special Field: Marine Geophysics
Dissertation: Oceanic Lithosphere Magnetization: Marine Magnetic Investigations of Crustal Accretion and Tectonic Processes in Mid-Ocean Ridge Environments

Jinshan Xu
Ocean University of Qingdao (PRC); BS, MS
Special Field: Mechanical and Oceanographic Engineering
Dissertation: Effects of Internal Waves on Low Frequency, Long Range Acoustic Propagation in the Deep Ocean

Master of Science

Kathryn P. D'Epagnier
U.S. Naval Academy; BS
Special Field: Mechanical Engineering
Thesis: A Computational Tool for the Rapid Design and Prototyping of Propellers for Underwater Vehicles

James R. Elsenbeck
Georgia Institute of Technology; BS
Special Field: Marine Geology & Geophysics
Thesis: Influence of Grain Size Evolution and Water Content on the Seismic Structure of the Oceanic Upper Mantle

David E. Farrell
U.S. Naval Academy; BS
Special Field: Mechanical Engineering
Thesis: Vortex Induced Vibrations of Cylinders: Experiments in Reducing Drag Force and Amplitude of Motion

Maria A. Parra-Orlandoni
U.S. Naval Academy; BS
Special Field: Mechanical Engineering
Thesis: Target Tracking Onbard an Autonomous Underwater Vehicle: Determining Optimal Towed Array Heading in an Anisotropic Noise Field

Vikrant P. Shah
University of Texas, Austin; BS
Special Field: Mechanical Engineering
Thesis: Design Considerations for Engineering Autonomous Underwater Vehicles

Christie L. Wood
Massachusetts Institute of Technology; BS
Special Field: Physical Oceanography
Thesis: The Interaction of Two Coastal Plumes and its Effect on the Transport of Alexandrium Fundyense

Joint Program Degree Statistics

	2007	1968–'07
WHOI Ph.D.	0	4
MIT/WHOI Ph.D.	25	522
MIT/WHOI Sc.D.	0	32
MIT/WHOI Eng.	0	57
MIT/WHOI S.M.	6	166
MIT/WHOI M.Eng.	0	4
Total Degrees Granted	**31**	**785**

MIT/WHOI Joint Program 2007/2008 Fall Term

Ann N. Allen
University of California - Santa Cruz, BS

Alexander Bahr
University of the Saarland (Germany), Vordiplom
Aachen Technical University (Germany), Diplom

Erin Banning
Syracuse University, BS
University of South Florida, BS

Jamie William Becker
University of North Carolina - Chapel Hill, SB

Jennifer Benoit
Oglethorpe University, BS

Jessica Benthuysen
University of Washington, BS

Erin M. Bertrand
Bates College, BS

Maya P. Bhatia
Queens University of Canada, BS
University of Alberta (Canada), MS

Ballard J. Blair
Cornell University, BS
Johns Hopkins University, MS

Jonathan N. Blythe
University of California - Santa Barbara, BS

Jennifer C. Braff
New York University, BA

Michael Brosnahan
Dartmouth College, BA

Carolyn Buchwald
Massachusetts Institute of Technology, SB

Kate L. Buckman
Smith College, BA

Andrea Burke
Williams College, BA/BA

Phoebe D. Chappell
Amherst College, BA

Ru Chen
Ocean University of China, BS

Walter W. Cho
Harvard University, BA

Sophie A. Clayton
Middlesex University (UK), AB
University of Wales – Bangor (UK), BS

Kevin L. Cockrell
University of California - San Diego, BS

Alysia D. Cox
Arizona State University, BS

Paul R. Craddock
University of Southampton (UK), BS
University of Leeds (UK), MS

Holly J. Dail
University of Washington, BS/BS
University of California - San Diego, MS

Rebecca W. Dell
Harvard University, BA

Stacy L. DeRuiter
St. Olaf College, BA

Tom Kleindinst, WHOI

MIT/WHOI graduate student Desirée Plata uses a flame torch to prepare samples for carbon isotope measurements. Her experiments have shown that carbon nanotubes made by different manufacturers have distinctive chemical characteristics, making it harder to track the material in the environment. Her research was published in March 2007 in the journal Nanotechnology.

Gregory C. Dietzen
US Naval Academy, BS

John H. Doherty
US Naval Academy, BS

Alexis J. Dumortier
Université des Sciences de Reims (France), Diplome
École Nationale Superieure d'Ingenieurs du Mans (France), Diplome
Georgia Institute of Technology, MS

Paula Echeverri
Massachusetts Institute of Technology, BS, MS

Lynne J. Elkins
Smith College, BA
University of New Mexico, MS

Patricia A. Engel
University of Notre Dame, BS

Helen Carter Esch
University of North Carolina - Wilmington, BS, MS

Vicente Fernandez
California Institute of Technology, BS

Christopher Follett
Massachusetts Institute of Technology, BS

Caitlin H. Frame
Harvard University, BA

Abigail J. Fusaro
University of Rhode Island, BS

Gregory P. Gerbi
Amherst College, BA
California Institute of Technology, MS

Fern T. Gibbons
University of Chicago, BS

Patricia M. Gregg
University of Missouri - Rolla, BS

David R. Griffith
Bowdoin College, BA
Yale University, MS

Joanna Gyory
Cornell University, BA
State University of New York - Stony Brook, MS

Elizabeth Halliday
University of Maryland - College Park, BS

Legena A. Henry
Howard University, BS

Laura R. Hmelo
Carleton College, BA

Sharon S. Hoffmann
Columbia University, BA

Michael Holcomb
University of Idaho, BS

Heather R. Hornick
University of South Carolina, BS
Naval Postgraduate School, Certificate

Rachel M. Horwitz
Williams College, BA

Hristina G. Hristova
Polytechnic School of France, B Eng
Polytechnic School of Montreal (Canada), MS

Annette M. Hynes
University of Nebraska - Lincoln, BS

Matthew G. Jackson
Yale University, BS

Harold F. Jensen III
Pacific Lutheran University, BS
Columbia University, BS

Jeffrey Kaeli
Virginia Polytechnic Institute, BS

Alexander Kalmikov
Hebrew University (Israel), BS
Tel-Aviv University (Israel), MS

Yohai Kaspi
Hebrew University (Israel), BS
Weizman Institute of Science (Isreal), MS

Anne K. Kauffman
Old Dominion University, BS, MS

Hyun Joe Kim
Seoul National University (South Korea), BA, MA

Jessie Kneeland
California Institute of Technology, BS
Massachusetts Institute of Technology, SM

Michael J. Krawczynski
Brown University, BS/BA

Whitney B. Krey
Texas A&M University, BS

Clayton G. Kunz
Stanford University, BS, MS

Daniel P. Lane
Cornell University, BS

Cara E. LaPointe
US Naval Academy, BS
Oxford University (UK), M Phil
Massachusetts Institute of Technology, SM

Jong-Mi Lee
Seoul National University, BS, SM

Wu-Jung Lee
National Taiwan University, BS

Karin L. Lemkau
Wesleyan University, BA

Naomi Levine
Princeton University, AB

Stephen C. Licht
Yale University, BS

Andrea Llenos
Brown University, BS/BA

Evgeny A. Logvinov
Moscow Institute of Physics & Technology, BS

Matthew R. Mazloff
University of Vermont, BS, MS

Andrew M. McDonnell
University of California - Los Angeles, BS

R. Shane McGary
Blinn College, AA
Texas A&M University - College Station, BS

Kelton W. McMahon
Bates College, BS

Luc M. Mehl
Carleton College, BS
University of California - Santa Barbara, MS

Evelyn M. Mervine
Dartmouth College, BA

Christian A. Miller
University of Saskatchewan (Canada), BSc, BA, MSc

Nathaniel C. Miller
Virginia Polytechnic Institute, BS

Christine M. Mingione
University of Notre Dame, BS

Christopher A. Murphy
Franklin W. Olin College of Engineering, BS

Maxim A. Nikurashin
Moscow Institute of Physics & Technology (Russia), BS, MS

Abigail E. Noble
Haverford College, BS

Richard H. Oates, Jr.
Georgia Institute of Technology, BS

Elizabeth Orchard
Cornell University, BA

Stephanie A. Owens
University of the South, BS

Sarah E. Pacocha Preheim
Carnegie Mellon University, BS

Joseph C. Papp
Worcester Polytechnic Institute, BS

Vera L. Pavel
California Institute of Technology, BS

Beatriz Pena-Molino
University of Las Palmas de Gran Canaria (Spain), BS

Colleen M. Petrik
University of Miami (Florida), BS

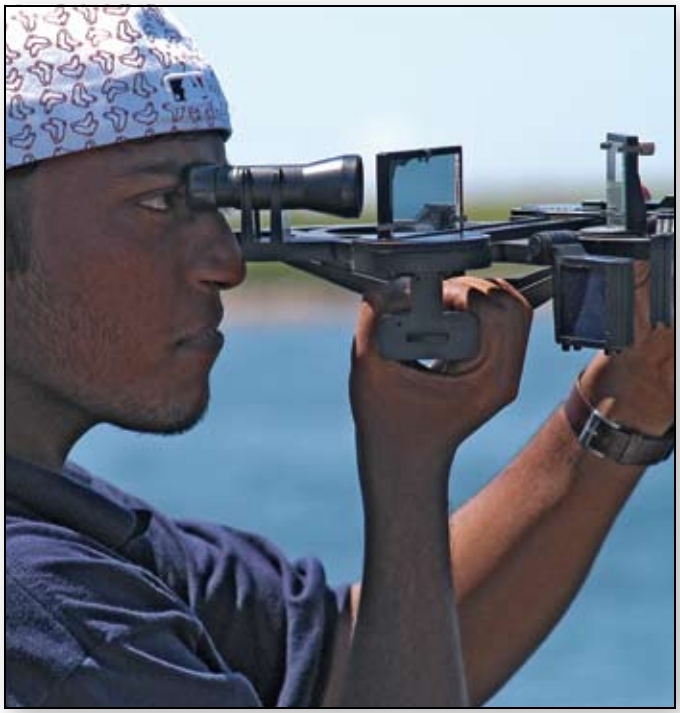
Desirée L. Plata
Union College, BS

Camilo Ponton
Santa Fe Community College, AA
Florida International University, BS, MS

Kimberly J. Popendorf
California Institute of Technology, BS

Kelly C. Rakow
Tufts University, BS
University of South Alabama, MS

Mark A. Rapo
Bowdoin College, BA



Jayne Doucette, WHOI

Before computers and global positioning systems, mariners set their course with a sextant, a rotating instrument that uses the sun and stars for celestial navigation. Many sailors still keep sextants on their vessels in case their electronic navigation equipment fails. Ravishankar Vadasseri Kizhakkedil, an ocean engineering student visiting from the Indian Institute of Technology, Madras, practiced with the instrument during a field trip on the research vessel* Tioga. *He was one of 29 students to participate in undergraduate fellowships at WHOI in 2007.

Eoghan Reeves
University of Wales, Bangor (UK), B Sc
University of Leeds (UK), M Sc

Virginia Rich
University of California - Berkeley, BA

Kevin P. Richberg
California Institute of Technology, BS

Adam R. Rivers
New College of University of Florida, BA

Daniel Rogers
University of Connecticut, BS, MS

Emily C. Roland
Colorado School of Mines, BS

Tatiana A. Rykova
Moscow Institute of Physics & Technology (Russia), BS

Casey P. Saenger
Bates College, BS

James Saenz
Boston University, BA

Julian J. Schanze
University of Southampton (UK), SM

Toby E. Schneider
Williams College, BA

Jared Severson
Colorado School of Mines, BS

Ari D. Shapiro
Boston College, BS

Alexey Shmelev
Moscow State University, MS

Joseph Sikora III
Rensselaer Polytechnic Institute, BS

Katherine Silverthorne
Southwestern University, BS

Kristin Smith
Bates College, BS

Michael J. Stanway
Massachusetts Institute of Technology, SB, SM

Carly A. Strasser
University of San Diego, BA

Peter J. Sugimura
University of California - Berkeley, BS

Ratsirin Supcharoen
Bowdoin College, BA

David A. Sutherland
University of North Carolina - Wilmington, BA

Lorraine M. Thomas
Harvey Mudd College, BS

Anne W. Thompson
Middlebury College, BA

Kjetil Vaage
University of New Brunswick (Canada), BS

Ariane Verdy
Polytechnic School of Montreal (Canada), B Eng

Wilken-Jon von Appen
International University of Bremen (Germany), BS

Jacob R. Waldbauer
Dartmouth College, BA

Matthew R. Walter
University of Illinois, BS

Jinbo Wang
Lanzhou University (PRC), BS
Peking University (PRC), MS

Stephanie N. Waterman
Queen's University (Canada), BS
California Institute of Technology, MS

Christopher Waters
University of New Hampshire, BS

Kristen E. Whalen
University of North Carolina - Wilmington, BS

Meredith M. White
Lafayette College, BS

Claire C. Willis
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Jonathan D. Woodruff
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MIT/WHOI Joint Program, SM

Nicholas W. Woods
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Cimarron Wortham
Reed College, BA

Louie L. Wurch
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Min Xu
University of Science and Technology of China, BS, MS

Maya Yamato
Princeton University, BA

Shaoyu Yuan
Ocean University of Qingdao (PRC), BS, MS

Yu Zhang
Ocean University of Qingdao (PRC), BS

Postdoctoral Scholars/Fellows

Monica Cordeiro Almeida Silva
University of St. Andrews (Scotland)
Portuguese Foundation for Science and Technology Postdoctoral Fellow

Andrew D. Ashton
Duke University
United States Geological Survey Postdoctoral Scholar

Heather M. Benway
Oregon State University
Comer-Steele Postdoctoral Scholar

Sébastien L. Bertrand
University of Liège (Belgium)
European Union Marie Curie Postdoctoral Fellow

Michael L. Berumen
James Cook University (Australia)
Doherty Postdoctoral Scholar

Sebastien Bigorre
Florida State University
Clivar Mode Water Dynamics Experiment Postdoctoral Fellow

John "Chip" Breier
The University of Texas at Austin
National Science Foundation Ridge 2000 Postdoctoral Fellow

Anders E. Carlson
Oregon State University
Coastal Ocean Institute Postdoctoral Scholar

Clara S. Chan
University of California, Berkeley
National Science Foundation Ridge 2000 Postdoctoral Fellow

Jason D. Chaytor
Oregon State University
United States Geological Survey Postdoctoral Scholar

Ricardo De Pol-Holz
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Cooperative Institute for Climate and Ocean Research Postdoctoral Scholar

Julie C. A. Deshayes
Université Pierre et Marie Curie (France)
NOAA/UCAR Climate and Global Change Postdoctoral Scholar

Stéphanie Desprat
Bordeaux I University (France)
Comer Postdoctoral Scholar

Angela F. Dickens
University of Washington
National Ocean Sciences Accelerator Mass Spectrometry Facility Postdoctoral Scholar

Paul E. Drevnick
Miami University
United States Geological Survey Postdoctoral Scholar

Henrieta Dulaiova
Florida State University
Postdoctoral Scholar

Theodore S. Durland
University of Hawaii
Ocean and Climate Change Institute Postdoctoral Scholar

Luciano Felicio Fernandes
Universidade Federal do Parana (Brazil)
Brazillian National Council for Scientific and Technological Development/Organization of American States Postdoctoral Fellow

Helena Lofstedt Filipsson
Göteborg University (Sweden)
Fulbright/Swedish Research Council Postdoctoral Fellow

Valier Galy
Institut National Polytechnique de Lorraine (INPL) (France)
National Ocean Sciences Accelerator Mass Spectrometry Facility Postdoctoral Scholar

Irene Garcia Berdeal
University of Washington
Physical Oceanography-Biological Oceanography Interdisciplinary Research Postdoctoral Fellow

Isabelle Martins Gil
University of Bremen (Germany)
Portuguese Foundation for Science and Technology Postdoctoral Fellow

Breea Govenar
The Pennsylvania State University
Deep Ocean Exploration Institute Postdoctoral Fellow

Sachin Goyal
University of Michigan
Postdoctoral Scholar

Chad R. Hammerschmidt
University of Connecticut
Postdoctoral Scholar

Maria C. Hansson
Lund University, Sweden
Postdoctoral Scholar

Benjamin A Hodges
UCSD, Scripps Institution of Oceanography
Doherty Postdoctoral Scholar

Patrick Ryan Jackson
University of Illinois at Urbana-Champaign
Postdoctoral Scholar

Stéphanie Jenouvrier
Université Pierre et Marie Curie (France)
UNESCO-L'Oreal Postdoctoral Fellow/European Union Marie Curie Postdoctoral Fellow

Eva Maria E. Jonsson
Stockholm University (Sweden)
Swedish Research Council Postdoctoral Fellow

James C. Kinsey
The Johns Hopkins University
Deep Ocean Exploration Institute Postdoctoral Scholar

Anthony R. Kirincich
Oregon State University
Coastal Ocean Institute Postdoctoral Scholar

Tobias Kukulka
University of Rhode Island
Cooperative Institute for Climate and Ocean Research Postdoctoral Scholar

Phoebe J. Lam
University of California, Berkeley
Postdoctoral Scholar

Samuel R. Laney
Oregon State University
Ocean Life Institute Postdoctoral Scholar

Weichang Li
MIT-WHOI Joint Program
Office of Naval Research Ocean Acoustics Postdoctoral Fellow

Ying-Tsong Lin
National Taiwan University (Taiwan)
Devonshire Postdoctoral Scholar

Kanchan Maiti
University of South Carolina, Columbia
Postdoctoral Scholar

Joanne Muller
James Cook University (Australia)
Sir Keith Murdoch/Comer Postdoctoral Fellow

Maria Del Mar Nieto Cid
University of Vigo (Spain)
Spanish Ministry of Education and Sciences Fulbright Postdoctoral Fellow

Alison N. Olcott
University of Southern California
Postdoctoral Scholar

JongJin Park
Seoul National Univeristy (South Korea)
Ocean and Climate Change Institute Postdoctoral Scholar

Gwenn Peron-Pinvidic
Louis Pasteur University of Strasbourg (France)
Universite Louis Pasteur - Total Postdoctoral Fellow

Michelle E. Portman
University of Massachusetts
Marine Policy Fellow

David K. Ralston
University of California, Berkeley
Postdoctoral Scholar

Adam M Reitzel
Boston University
WHOI - Beacon Institute for Rivers and Estuaries Postdoctoral Scholar

Nathalie B. Reyns
North Carolina State University
Ocean Life Institute Postdoctoral Scholar

Justin B. Ries
Johns Hopkins University
Ocean and Climate Change/ Ocean Life Institutes Postdoctoral Scholar

Karyn L. Rogers
Washington University in St. Louis
Deep Ocean Exploration Institute Postdoctoral Scholar

Andrew L. Rose
The University of New South Wales (Australia)
Australian Research Council Postdoctoral Fellow

Tom Kleindinst, WHOI

Summer Student Fellow Skylar Bayer (Brown University) holds a jar of juvenile crabs collected from the deep ocean floor along the East Pacific Rise. Working with WHOI biologist Lauren Mullineaux in the summer of 2007, Bayer participated in studies of how organisms colonize deep-sea hydrothermal vents after disturbances.

Julie M. Rose
University of Southern California
National Science Foundation Postdoctoral Fellowship in Polar Regions Research

Malcolm E. Scully
The College of William and Mary, School of Marine Science
WHOI - Beacon Institute for Rivers and Estuaries Postdoctoral Scholar

Timothy M. Shanahan
University of Arizona
NOAA/UCAR Climate and Global Change Postdoctoral Scholar

Ann M. Tarrant
University of Hawaii, Manoa
National Institutes of Health Postdoctoral Fellow

Alicia R. Timme-Laragy
Duke University
Postdoctoral Scholar

Brandy M. Toner
University of California, Berkeley
NRC/ORAU/NASA Astrobiology Institute Research Associateship Postdoctoral Fellowship

Zhengrong Wang
California Institute of Technology
Deep Ocean Exploration Institute Postdoctoral Scholar

Brian L. White
Massachusetts Institute of Technology
Coastal Ocean Institute Postdoctoral Scholar

Becky L. Woodward
University of Maine
Ocean Life Institute Postdoctoral Scholar

Geophysical Fluid Dynamics (GFD) Seminar Fellows

Rebecca Dell
Massachusetts Institute of Technology

Basile Gallett
École Normale Supérieure

Jeroen Hazewinkel
Amsterdam University

Miranda Holmes
Courant Institute of Mathematical Science

Iva Kavcic
University of Zagreb

Frederic Laliberte
New York University

Angel Ruiz-Angulo
Caltech

Henrik van Lengerich
Cornell University

Andrew Wells
University of Cambridge

Jan Zika
University of New South Wales

GFD Staff and Visitors

Benjamin Akers
University of Wisconsin, Madison

Erik Anderson
Grove City College

James Anderson
Stevens Institute of Technology

Andrew Belmonte
Pennsylvania State University

Onno Bokhove
University of Twente

Gregory Buck
Saint Anselm College

Claudia Cenedese
Woods Hole Oceanographic Institution

Eric Chassignet
Florida State University

Greg Chini
University of New Hampshire

Predrag Cvitanovic
Georgia Institute of Technology

William Dewar
Florida State University

Charles Doering
University of Michigan

Robert Ecke
Los Alamos National Laboratory

James Edson
University of Connecticut

Kerry Emanuel
Massachusetts Institute of Technology

J. Thomas Farrar
Woods Hole Oceanographic Institution

Stephan Fauve
Ecole Normale Supérieure

H. Joseph Fernando
Arizona State University

Glenn Flierl
Massachusetts Institute of Technology

Rockwell Geyer
Woods Hole Oceanographic Institution

John Gibson
Georgia Institute of Technology

Karl Helfrich
Woods Hole Oceanographic Institution

Louis Howard
Massachusetts Institute of Technology

Edward Johnson
University College

Shane Keating
University of California, San Diego

Joseph Keller
Stanford University

Joseph Kuehl
University of Rhode Island

Joseph LaCasce
The Norwegian Meteorological Institute

Norman Lebovitz
University of Chicago

Steven Lentz
Woods Hole Oceanographic Institution

Amala Mahadevan
Boston University

Willem Malkus
Massachusetts Institute of Technology

John Marshall
Massachusetts Institute of Technology

Brad Marston
Brown University

John McHugh
University of New Hampshire

W. Kendall Melville
University of California, San Diego

Philip Morrison
University of Texas, Austin

Takahide Okabe
University of Texas, Austin

Thomas Peacock
Massachusetts Institute of Technology

Joseph Pedlosky
Woods Hole Oceanographic Institution

Lawrence Pratt
Woods Hole Oceanographic Institution

James Price
Woods Hole Oceanographic Institution

Antonello Provenzale
Instituto di Scienze Dell'Atmosfera

Vitalii Sheremet
University of Rhode Island

Alexander Soloviev
Nova Southeastern University

Michael Spall
Woods Hole Oceanographic Institution

Edward Spiegel
Columbia University

Fiamma Straneo
Woods Hole Oceanographic Institution

Georgi Sutyrin
University of Rhode Island

Nobuhiro Suzuki
University of Rhode Island

Leif Thomas
Woods Hole Oceanographic Institution

Steve Thorpe
University of Wales, Bangor

Andreas Thurnherr
Lamont Doherty Earth Observatory

Mary-Louise Timmermanns
Woods Hole Oceanographic Institution

Peter Traykovski
Woods Hole Oceanographic Institution

John Trowbridge
Woods Hole Oceanographic Institution

Eli Tziperman
Harvard University

Lars Umlauf
Baltic Sea Research Institute

George Veronis
Yale University

John Whitehead
Woods Hole Oceanographic Institution

Carl Wunsch
Massachusetts Institute of Technology

Jiayan Yang
Woods Hole Oceanographic Institution

Philip Yecko
Montclair State University

Chris Zappa
Columbia University

2007 Summer Student and Minority Fellows

Roy Barkan
Tel Aviv University (Israel)

Skylar Bayer
Brown University

Marley Bice
The College of William and Mary

Elizabeth Boatman
Beloit College

Tess Brandon
Cornell University

Marlene Brito
Northeastern Illinois University

Carolyn Clarkin
Bucknell University

Andreia Da Costa
Rutgers University - Newark College

Orianna DeMasi
Western Connecticut State University

Neal Duryea
Case Western Reserve University

Jessica Fitzsimmons
Boston University

Carolina Gutierrez
University of Tolima (Colombia)

Sarah Hale
Smith College

Abigail Heithoff
College of Saint Catherine

Andrew Ho
Stanford University

David Leen
University of Dublin, Trinity College (Ireland)

Angus Logan
University of Cambridge (UK)

Caroline Martin
National University of Ireland, Galway

DeAnna McCadney
Western Kentucky University

Jessica Millar
The University of Chicago

Sreeja Nag
Indian Institute of Technology, Kharagpur (India)

Dorene Nakata
Carleton College

Elena Paulssen
International University Bremen (Germany)

Lara Polansky
University of Miami

Meredith Praamsma
Hope College

Michael Toomey
Pomona College

Ravishankar Vadasseri Kizhakkedil
Indian Institute of Technology, Madras (India)

Nicholas Ward
University of California - San Diego

Kelsey Winsor
Smith College

2007 Guest Students

Andres Antico
University of Buenos Aires (Argentina)
McGill University

Skylar Bayer
Brown University

Jamie Becker
University of North Carolina - Chapel Hill

Hannah Blossom
Northeastern University

Alyson Bodendorf
College of Charleston

Courtney Boeff
College of St. Catherine

Katherine Boldt
Dartmouth College

Patricia Bowie
Furman University
Duke University

Nadine Buchs
Technical University of Darmst (Germany)
University of Bremen (Germany)

Carolyn Buchwald
Massachusetts Institute of Technology

Catherine Carmichael
Trinity College

Yuan-Pin Chang
National Taiwan University

Elena Chung
University of Maryland

Alysha Coppola
University of Arizona

Joanna Domenicali-Shah
Smith College

Florin Filip
University of Bucharest (Romania)

Katherine French
Yale University

Lindsay Green
Northeastern University

David Griffith
Bowdoin College
Yale University

Elisabet Head
St. Louis University
Michigan Technological University

Lauren Heinen
Northeastern University

Abigail Heithoff
College of St. Catherine

Janelle Homburg
Rice University
Columbia University

Feng-Hsin Hsu
National Sun Yat-Sen University (Taiwan)
National Taiwan University

Anne Isham
Colby College
Vermont Law School

Max Kaiser
Barnstable High School

Garrett Leahy
University of Colorado
Yale University

Yee Cheng Lim
National Sun Yat-sen University (Taiwan)
National Taiwan University

Samuel Lincoln
Cornell University

Sara Lincoln
University of Rhode Island
Massachusetts Institute of Technology

Shannon Long
Northeastern University

Ana Rita Luis
Faculdade de Cienaas, University of Lisbon (Portugal)

Chao Ma
Ocean University of China

DeAnna McCadney
Western Kentucky University

Rogelio Morales
University of Central Venezuela

Kristine Nielson
California Institute of Technology
Purdue University

Taryn Noble
University of Bristol (UK)

Fraser Novakowski
University of California - Berkeley

Alexandra Pogue
Whitman College

Matthew Poyton
Providence College

Natasha Rabinowitz
Mount Holyoke College

Florence Schubotz
Carl von Ossietzky University (Germany)
University of Bremen (Germany)

Kathryn Shaughnessy
Northeastern University

David Spofforth
Oxford University (UK)
University of Southampton (UK)

Yingyu Tan
Ocean University of China (PRC)

Susanne Tanner
University of Lisbon (Portugal)

Crighton Thornton
Cape Cod Academy

Mengmeng (Jessie) Tong
Gullin University of Electronics & Technology (PRC)
Jinan University (PRC)

Tali Treibitz
Technion, Israel Institute of Technology

Sarah Webster
Massachusetts Institute of Technology
Johns Hopkins University

Branwen Williams
University of Guelph (Canada)
University of Quebec at Montreal (Canada)

Violetta Wolf
Massachusetts Institute of Technology

Andrew Wozniak
University of Virgnia
College of William and Mary

Huan-Xiang Xu
Shandong University (PRC)

Uriel Zajaczkovski
University of Buenos Aires (Argentina)

Hao Zuo
Nanjing University (PRC)
Southampton Oceanography Centre (UK)

Tom Kleindinst, WHOI

2007 Geophysical Fluid Dynamics summer study program participants pose for a group photo at Walsh Cottage. Since 1959 the GFD program has promoted an exchange of ideas among researchers in the many distinct fields that share a common interest in the nonlinear dynamics of fluid flows in oceanography, meteorology, geophysics, astrophysics, applied mathematics, engineering, and physics. Each year, the program is organized around a ten-week course of study and research for a small group of competitively selected graduate-student fellows.

We are pleased to present the 2007 financial statements of the Woods Hole Oceanographic Institution (WHOI) and to describe some new reporting requirements that impacted the statements. WHOI completed 2007 in good financial condition largely because of the strong returns of the endowment and the support of organizations and individuals who recognize the long term benefits of basic research.

Statement of Financial Position:

WHOI continues to have a strong balance sheet. At December 31, 2007, WHOI's total assets were $551 million, total liabilities were $123 million and total net assets were $428 million, an increase of $21 million.

Net assets represent the accumulated financial strength of a not for profit organization and are an important gauge of its ability to carry out its mission. Included in the liabilities is the Massachusetts Health and Educational Facilities Authority bond debt of $54.9 million.

The endowment represents 90% of the total net assets. Its growth from $347 million in 2006 to $384 million in 2007 accounts for the increase in total net assets.

Statement of Activities:

WHOI's total operating revenues increased by $7 million: from $151 million in 2006 to $158 million in 2007. Contributions and gifts amounted to $16 million.

$15.5 million of endowment income and appreciation was distributed to operations as follows:

Education $6.3 million

Research $5.7 million

Unrestricted $3.5 million

The Institution had overhead costs of $60.8 million, and approximately 81.7% of that amount, $49.7 million, was recovered from the government and non-government research. The remainder was an institutional expense.

WHOI paid $2.2 million in interest during 2007. Principal payments on the $54.9 million of debt will begin in 2008. The Federal government allows us to include interest and depreciation in our overhead rates and will reimburse us for these expenses.

New Reporting Requirements:

The Financial Accounting Standards Board (FASB) and the American Institute of Certified Public Accountants (AICPA) have issued new guidelines and interpretations on topics such as internal controls and the appropriate recording of postretirement liabilities.

Tom Kleindinst, WHOI

Carolyn Bunker (red shirt) meets with members of the Finance and Administration staff as well as future WHOI President and Director Susan Avery (left) and Acting Director of Research Larry Madin (yellow shirt).

Internal Controls:

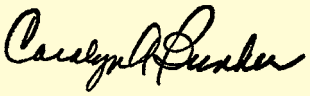
The AICPA recently amended professional standards and now requires auditors to report and classify any internal control weaknesses. Internal controls have been a major focus of regulatory bodies and auditors for several years and WHOI strives to continually improve its policies and procedures.

Recording of Postretirement Liabilities:

On September 29, 2006, the FASB issued Statement 158 that includes a requirement to recognize the over or under funded status of pensions and other postretirement benefit plans in the balance sheet. This was effective for nonpublic entities in 2007 and, the result, as reported in Footnote 8, was a net decrease in unrestricted net assets of $2.2 million.

Summary:

The Institution's commitment to understanding the oceans is unchanged; however, the federal funding environment continues to challenge our investigators. WHOI has responded by finding new funding sources in other government agencies and in industry. We are also continuing the process of evaluating our administrative systems and allocating resources to support an evolving strategic plan.



Statement of Financial Position

December 31, 2007 (with summarized information as of December 31, 2006)

	2007	2006
Assets		
Cash, unrestricted	$ 28,206,655	$ 16,626,538
Cash, restricted	2,269,104	1,592,177
Reimbursable costs and fees		
Billed (net of allowance for doubtful accounts of $112,119 for 2007 and $113,910 for 2006)	3,558,454	3,473,723
Unbilled	5,799,835	5,766,906
Receivable for investments sold	88,117	194,440
Interest and dividends receivable	107,533	671,182
Other receivables	851,891	750,846
Pledges receivable, net	10,678,076	13,231,894
Inventory	1,919,810	1,435,985
Deferred charges and prepaid expenses	1,511,788	1,434,441
Investments, pooled (Note 3)	372,183,273	343,217,764
Investments, nonpooled (Note 3)	70,036	7,137,628
Deposits with trustees for construction	-	1,063,695
Deposits with trustees for debt service	92	118,986
Prepaid pension and postretirement benefit cost	887,243	788,826
Supplemental retirement	7,111,673	7,173,633
Other assets	13,512,160	9,196,523
Deferred financing costs	1,140,091	1,182,978
	449,895,831	415,058,165
Property, plant and equipment		
Land, buildings and improvements	127,045,920	121,110,015
Vessels and dock facilities	7,509,772	7,391,436
Laboratory and other equipment	26,720,659	24,444,600
Construction in process	880,178	973,754
	162,156,529	153,919,805
Accumulated depreciation	(72,820,520)	(65,285,849)
Net property, plant and equipment	89,336,009	88,633,956
Receivable from remainder trusts (Note 5)	11,477,118	11,311,983
Total assets	$ 550,708,958	$ 515,004,104
Liabilities		
Accounts payable and other liabilities	$ 9,817,163	$ 9,251,502
Accrued payroll and related liabilities	5,495,504	5,241,173
Payable for investments purchased	219,787	506,007
Deferred fixed rate variance	895,384	1,685,926
Accrued supplemental retirement benefits	7,111,673	7,173,633
Accrued pension liability	29,935,722	21,374,109
Accrued postretirement liability	6,829,244	-
Deferred revenue and refundable advances	7,501,719	7,517,056
Bonds and loans payable	54,850,000	54,850,000
Total liabilities	122,656,196	107,599,406

	Unrestricted	Temporarily Restricted	Permanently Restricted		
Net Assets					
Undesignated and plant	$ 38,604,637	$ -	$ -	38,604,637	41,775,293
Pension	(36,711,089)	-	-	(36,711,089)	(21,384,575)
Designated	5,570,855	8,265,619	-	13,836,474	13,272,353
Pledges and other	-	11,867,376	14,267,309	26,134,685	24,363,502
Education	-	2,348,066	-	2,348,066	2,420,555
Endowment and similar funds	89,443,781	229,796,930	64,599,278	383,839,989	346,957,570
Total net assets	$ 96,908,184	$ 252,277,991	$ 78,866,587	428,052,762	407,404,698
Total liabilities and net assets				$ 550,708,958	$ 515,004,104

Statement of Activities

Year Ended December 31, 2007 (with summarized information for the year ended December 31, 2006)

	Unrestricted					
	Operating	Sponsored Research	Temporarily Restricted	Permanently Restricted	2007	2006
Revenues and releases from restriction						
Fees	$ 1,000,542	$ -	$ -	$ -	$ 1,000,542	$ 657,159
Sponsored research						
Government	-	79,220,329	-	-	79,220,329	69,878,315
Subcontract and nongovernment	-	20,469,707	5,720,852	-	26,190,559	22,895,094
Ships and subs operations	-	23,848,658	-	-	23,848,658	21,851,478
Sponsored research assets released to operations	129,065,758	(123,538,694)	(5,527,064)	-	-	-
Education						
Joint program income	4,030,683	-	-	-	4,030,683	3,924,277
Endowment income	4,263,649	-	2,075,976	-	6,339,625	5,919,500
Gifts	-	-	-	-	-	-
Education funds released from restriction	2,521,927	-	(2,521,927)	-	-	-
Investment return designated for current operations	3,675,754	-	-		3,675,754	3,738,766
Contributions and gifts	6,740,730	-	1,603,382	7,634,568	15,978,680	23,143,638
Releases from restrictions	-	-	(2,891,209)	(1,659,678)	(4,550,887)	(2,610,902)
Contributions in kind	1,107,195	-	-	-	1,107,195	186,854
Rental income	812,464	-	-	-	812,464	773,049
Communication and publications	192,469	-	-	-	192,469	175,980
Other	365,767	-	-	-	365,767	316,085
Total revenues and releases from restriction	153,776,938	-	(1,539,990)	5,974,890	158,211,838	150,849,293
Expenses						
Sponsored research						
National Science Foundation	47,894,430	-	-	-	47,894,430	40,577,466
United States Navy	14,700,120	-	-	-	14,700,120	13,618,180
Subcontracts	10,533,312	-	-	-	10,533,312	10,587,315
National Oceanic & Atmospheric Administration	11,455,058	-	-	-	11,455,058	11,054,410
Department of Energy	538,460	-	-	-	538,460	729,007
United States Geological Survey	1,141,153	-	-	-	1,141,153	1,054,337
National Aeronautics & Space Administration	1,084,372	-	-	-	1,084,372	1,065,550
Ships Operations	18,054,230	-	-	-	18,054,230	16,505,047
Submersible and ROV operations	5,794,428	-	-	-	5,794,428	5,346,431
Privately funded grants	5,179,756	-	-	-	5,179,756	4,275,110
Other	12,690,439	-	-	-	12,690,439	9,664,871
Education						
Faculty expense	3,608,015	-	-	-	3,608,015	3,688,362
Student expense	4,411,514	-	-	-	4,411,514	4,466,502
Postdoctoral programs	436,859	-	-	-	436,859	342,510
Other	689,204	-	-	-	689,204	674,412
Rental expenses	603,964	-	-	-	603,964	579,731
Communication, publications and development	2,166,487	-	-	-	2,166,487	2,304,657
Fundraising expenses	2,407,542	-	-	-	2,407,542	2,145,717
Unsponsored programs	11,065,609	-	-	-	11,065,609	8,456,654
Other expenses	1,994,089	-	-	-	1,994,089	2,288,862
Total expenses	156,449,041	-	-	-	156,449,041	139,425,131
Change in net assets from operating activities	(2,672,103)	-	(1,539,990)	5,974,890	1,762,797	11,424,162
Nonoperating income and expenses						
Investment return in excess of amounts designated for sponsored research, education and current operations	7,598,227	-	25,305,906		32,904,133	36,550,427
Net realized/unrealized losses on interest rate swap	(1,651,898)	-			(1,651,898)	888,848
Change in split interest agreements	(10,079)	-	15,219	406,652	411,792	899,754
Contributions and gifts	-	-	5,000	-	5,000	15,000
Net assets released from restriction	5,000	-	(5,000)	-	-	-
Other nonoperating expenses	(99,976)	-	-	-	(99,976)	(99,976)
Net periodic pension costs	(6,405,433)	-	-	-	(6,405,433)	(7,300,134)
Redesignation of gifts	(26,000)	-	(15,063)	1,000	(40,063)	(116,051)
Change in net assets from nonoperating activities	(590,159)	-	25,306,062	407,652	25,123,555	30,837,868
Change in net assets from operating and nonoperating activities	(3,262,262)	-	23,766,072	6,382,542	26,886,352	42,262,030
Change in additional pension minimum liability (Note 8)	-	-	-	-	-	(44,538)
Adoption of accounting principle - SFAS 158	(8,921,081)	-	-	-	(8,921,081)	-
Cumulative effect of a change in accounting principle	2,682,793	-	-	-	2,682,793	-
Total change in net assets	(9,500,550)	-	23,766,072	6,382,542	20,648,064	42,217,492
Net assets at beginning of year	106,408,734		228,511,919	72,484,045	407,404,698	365,187,206
Net assets at end of year	$ 96,908,184	$ -	$ 252,277,991	$ 78,866,587	$ 428,052,762	$ 407,404,698

Statement of Cash Flows

Year Ended December 31, 2007 (with summarized information for the year ended December 31, 2006)

	2007	2006
Cash flows from operating activities		
Total change in net assets	$ 20,648,064	$ 42,217,492
Adjustments to reconcile increase in net assets to net cash used in operating activities		
Depreciation and amortization	7,890,601	7,476,043
Change in split interest agreements	(411,792)	(899,754)
Allowance for uncollectible pledges	(761,709)	676,945
Discount on pledges	433,968	569,641
Net realized and unrealized (gain) loss on investments	(40,569,822)	(41,707,373)
Unrealized (gain) loss on interest swap	1,511,543	(1,110,370)
Change in additional minimum pension liability	-	44,538
Contributions to be used for long-term investment	(1,743,205)	(1,688,591)
Gift in kind	(4,300,000)	(2,497,104)
Cumulative effect of a change in accounting principle	(2,682,793)	-
Receipt of contributed securities	(3,346,639)	(685,982)
Adoption of accounting principle	8,921,081	-
(Increase) decrease in assets		
Restricted cash	(676,927)	(565,158)
Interest and dividends receivable	563,649	(342,550)
Reimbursable costs and fees		
Billed	(84,731)	(1,417,545)
Unbilled	(32,929)	1,098,423
Other receivables	(101,045)	20,336
Pledges receivable	2,881,559	(9,670,643)
Inventory	(483,825)	(264,107)
Deferred charges and prepaid expenses	(77,347)	(396,804)
Other assets	(15,637)	(40,856)
Remainder trusts	261,759	-
Deferred finance costs	42,887	-
Prepaid pension costs	788,826	-
Supplemental retirement	61,960	(588,426)
Increase (decrease) in liabilities		
Accrued pension liability	6,371,359	6,208,391
Accrued postretirement liability	(788,826)	-
Accounts payable and other liabilities	1,456,739	(1,865,132)
Accrued payroll and related liabilities	254,331	74,181
Deferred revenue and refundable advances	(15,337)	401,190
Accrued supplemental retirement benefits	(61,960)	588,426
Deferred fixed rate variance	(790,542)	(1,435,817)
Net cash used in operating activities	(4,856,740)	(5,800,606)
Cash flows from investing activities		
Capital expenditures		
Additions to property and equipment	(8,327,584)	(9,759,668)
Short-term investments		
Purchase of investments	-	(2,000,000)
Sale of investments	7,000,000	-
Endowment		
Receivable for investments sold	106,323	(194,440)
Payable for investments purchased	(286,220)	473,572
Proceeds from the sale of investments	117,767,704	110,531,930
Purchase of investments	(106,095,799)	(104,112,983)
Change in construction fund	1,063,695	1,974,857
Change in debt service funds	118,894	1,779,116
Liquidation of contributed securities	3,346,639	685,982
Net cash provided by (used in) investing activities	14,693,652	(621,634)
Cash flows from financing activities		
Contributions to be used for long-term investment	1,743,205	1,688,591
Net cash provided by financing activities	1,743,205	1,688,591
Net increase (decrease) in cash and cash equivalents	11,580,117	(4,733,649)
Cash and cash equivalents, beginning of year	16,626,538	21,360,187
Cash and cash equivalents, end of year	$ 28,206,655	$ 16,626,538
Supplemental disclosures		
Cash paid for interest	$ 2,166,858	$ 2,078,593
Noncash activity		
Construction in process additions remaining in accounts payable	265,070	-
Change in intangible pension asset	-	(13,674,720)
Contributed securities	3,346,639	685,982
Gift in kind	4,300,000	2,497,104

Report of Independent Auditors

To the Board of Trustees of Woods Hole Oceanographic Institution

In our opinion, the accompanying statement of financial position and the related statements of activities and cash flows present fairly, in all material respects, the financial position of Woods Hole Oceanographic Institution (the "Institution") at December 31, 2007, and the changes in its net assets and its cash flows for the year then ended in conformity with accounting principles generally accepted in the United States of America. These financial statements are the responsibility of the Institution's management. Our responsibility is to express an opinion on these financial statements based on our audit. The prior year summarized comparative information has been derived from the Institution's 2006 financial statements, and in our report dated June 25, 2007, we expressed an unqualified opinion on those financial statements. We conducted our audit of these statements in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

As described in Notes 2, 8 and 9, in 2007, the Institution changed the manner in which it accounts for its benefit plans and consideration of the effects of prior year misstatements.

PricewaterhouseCoopers LLP

August 20, 2008

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1. Background

Woods Hole Oceanographic Institution (the "Institution") is a private, independent not-for-profit research and educational institution located in Woods Hole, Massachusetts. Founded in 1930, the Institution is dedicated to working and learning at the frontier of ocean science and attaining maximum return on intellectual and material investments in oceanographic research.

The Institution is a qualified tax-exempt organization under Section 501(c)(3) of the Internal Revenue Code as it is organized and operated for education and scientific purposes.

2. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying financial statements have been prepared on the accrual basis and in accordance with accounting principles generally accepted in the United States of America.

The financial statements include certain prior-year summarized comparative information, but do not include sufficient detail to constitute a presentation in conformity with accounting principles generally accepted in the United States of America. Accordingly, such information should be read in conjunction with the Institution's audited financial statements for the year ended December 31, 2006, from which the summarized information was derived.

Net assets, revenues, and realized and unrealized gains and losses are classified based on the existence or absence of donor-imposed restrictions and legal restrictions imposed under Massachusetts State law. Accordingly, net assets and changes therein are classified as follows:

Permanently Restricted Net Assets

Permanently restricted net assets are subject to donor-imposed stipulations that they be maintained permanently by the Institution. Generally the donors of these assets permit the Institution to use all or part of the income earned and capital appreciation, if any, on related investments for general or specific purposes.

Temporarily Restricted Net Assets

Temporarily restricted net assets are subject to donor-imposed stipulations that may or will be met by actions of the Institution and/or the passage of time. Unspent gains on permanent endowment are classified as temporarily restricted until the Institution appropriates and spends such sums in accordance with the terms of the underlying endowment funds and in accordance with Massachusetts law, at which time they will be released to unrestricted revenues.

Unrestricted Net Assets

Unrestricted net assets are not subject to donor-imposed stipulations. Revenues are reported as increases in unrestricted net assets unless use of the related assets is limited by donor-imposed restrictions. Expenses are reported as decreases in unrestricted net assets. Gains and losses on investments and other assets or liabilities are reported as increases or decreases in unrestricted net assets unless their use is restricted by explicit donor stipulations or law. Expirations of temporary restrictions on net assets, that is, the donor-imposed stipulated purpose has been accomplished and/or the stipulated time period has elapsed, are reported as reclassifications between the applicable classes of net assets. Amounts received for sponsored research (under exchange transactions) are reflected in unrestricted sponsored research and released to operations when spent for the appropriate purpose, or as deferred revenue if expenditures have yet to be incurred.

Contributions

Contributions, including unconditional promises to give, are recognized as revenues in the period received. Contributions subject to donor-imposed stipulations that are met in the same reporting period are reported as unrestricted support. Promises to give that are scheduled to be received after the balance sheet date are shown

as increases in temporarily restricted net assets and are reclassified to unrestricted net assets when the purpose or items' restrictions are met. Certain releases from temporarily restricted amounting to $2,891,209 and $1,020,108 for the years ended December 31, 2007 and 2006, respectively, are netted against contributions and are included in unrestricted sponsored research. Promises to give, subject to donor-imposed stipulations that the corpus be maintained permanently, are recognized as increases in permanently restricted net assets. Conditional promises to give are not recognized until they become unconditional, that is, when the conditions on which they depend are substantially met. The Institution has received $0 and $3,405,000 conditional promises to give for the years ended December 31, 2007 and 2006, respectively. Contributions other than cash are generally recorded at market value on the date of the gift (or an estimate of fair value), although certain noncash gifts, for which a readily determinable market value cannot be established, are recorded at a nominal value until such time as the value becomes known. During 2007, a gift of land was received which was valued at $4,300,000 and is currently being held for sale and included in other assets. Contributions to be received after one year are discounted at the appropriate rate commensurate with risk. Amortization of such discount is recorded as additional contribution revenue in accordance with restrictions imposed by the donor on the original contribution, as applicable. Amounts receivable for contributions are reflected net of an applicable reserve for collectibility.

The Institution reports contributions in the form of land, buildings, or equipment as unrestricted operating support at fair market value when received.

Dividends, interest and net gains on investments of endowment and similar funds are reported as follows:

- as increases in permanently restricted net assets if the terms of the gift require that they be added to the principal of a permanent endowment fund;
- as increases in temporarily restricted net assets if the terms of the gift or relevant state law impose restrictions on the current use of the income or net realized and unrealized gains; and
- as increases in unrestricted net assets in all other cases.

Operations

The statement of activities reports the Institution's operating and nonoperating activities. Operating revenues and expenses consist of those activities attributable to the Institution's current annual research or educational programs, all gifts received except those received for property, plant and equipment purposes and a component of endowment income appropriated for operations (Note 3). Unrestricted endowment investment income and gains over the amount appropriated under the Institution's spending plan are reported as nonoperating revenue as investment return in excess of amounts designated for sponsored research, education and current operations. Nonoperating revenue also includes the change in value of split interest agreements, contributions restricted for property, plant and equipment purposes, gains or losses on disposals of fixed assets, net realized/unrealized gains (losses) on interest swaps and the net periodic pension cost on the noncontributory defined benefit pension plan that is not reimbursed by the employee benefit fixed rate. Additionally, nonoperating activities includes redesignation of donor gifts, depreciation on certain government-funded facilities, adoption of Financial Accounting Standards Board Statement No. 158, Employers' Accounting for Defined Benefit Pension and Other Postretirement Plans ("SFAS 158"), and change in accounting principle for Staff Accounting Bulletin No. 108, Considering the Effects of Prior Year Misstatements when Quantifying Misstatements in the Current Year Financial Statements ("SAB 108").

In September 2006, the Securities and Exchange Commission staff issued SAB 108. SAB 108 was issued in order to eliminate the diversity of practice surrounding how public companies quantify and assess the materiality of financial statement misstatements. Although the SAB is directly applicable to public companies, the Institution has elected to follow the prescribed guidance, by analogy.

Traditionally, there have been two accepted methods for quantifying and assessing the materiality of the effects of financial statement misstatements: the "rollover" method and the "iron curtain" method. The rollover method focuses primarily on the impact of a misstatement on the statement of activities - including the reversing effect of prior year misstatements - but its use can lead to the accumulation of misstatements in the balance sheet. The iron curtain method, on the other hand, focuses primarily on the effect of correcting the period-end balance sheet with less emphasis on the reversing effects of prior year misstatements on the statement of activities. Prior to the application of SAB 108, the Institution used the rollover method for quantifying and assessing the materiality of financial statement misstatements.

SAB 108 establishes an approach that requires quantification and assessment of the materiality of financial statement misstatements based on the effects of the misstatements on each of the Institution's financial statements and the related financial statement disclosures. This model is commonly referred to as a "dual approach" because it requires quantification and assessment of the materiality of misstatements under both the iron curtain and the rollover methods. SAB 108 permits companies to initially apply its provisions either by (i) restating prior financial statements as if the dual approach had always been applied or (ii) recording the cumulative effect of initially applying the dual approach as adjustments to the carrying values of assets and liabilities with an offsetting adjustment recorded to the opening balance of unrestricted net assets. The Institution elected to record the effects of applying SAB 108 using the cumulative effect transition method.

Prior to fiscal 2007, the Institution had certain accumulated accruals/reserves that are no longer required. Under the rollover method, these misstatements were not material to the statement of activities in any given year. With the adoption of SAB 108 as of December 31, 2007, management eliminated certain expenses in the amount of $2,682,793 and recorded this change as a cumulative effect of a change in accounting principle in the statement of activities.

Cash and Cash Equivalents

Cash and cash equivalents consist of cash, money market accounts, certificates of deposit and overnight repurchase agreements with initial maturities of three months or less when purchased which are stated at cost and approximates market value.

Included in restricted cash at December 31, 2007 and 2006 is $1,477,744 and $1,041,361, respectively, representing advances

received from the United States Navy and other U.S. Government and state agencies. Such amounts are restricted as to use for research programs. Interest earned on unspent funds is remitted to the federal government.

Also included in restricted cash at December 31, 2007 and 2006 is $791,360 and $550,816, respectively, representing cash restricted by the Massachusetts Radiation Control Program and Department of Environmental Protection. Interest earned on unspent funds is reinvested within the restricted cash account.

In addition, cash and cash equivalents include uninvested amounts from each classification of net assets (e.g., endowment).

Investments

Investment securities are carried at market value determined as follows: securities traded on a national securities exchange are valued at the last reported sales price on the last business day of the year; securities traded in the over-the-counter market and listed securities for which no sales prices were reported on that day are valued at closing bid prices. The value of publicly traded securities is based upon quoted market prices and net asset values. Other securities, such as private equity funds, venture capital funds and hedge funds for which no such quotations or valuations are readily available, are carried at fair value as estimated by management using values provided by external investment managers. The Institution reviews and evaluates the valuations provided by investment managers and believes that these valuations are a reasonable estimate of fair value as of December 31, 2007 and 2006 but are subject to uncertainty and, therefore, may differ from the value that would have been used had a ready market for the investments existed and such differences could be material.

Purchases and sales of investment securities are recorded on a trade date basis. Realized gains and losses are computed on a specific identification method. Investment income, net of investment expenses, is distributed on the unit method.

Investment Income Unitization

The Institution's investments are pooled in an endowment fund and the investments and allocation of income are tracked on a unitized basis. The Institution distributes to operations for each individual fund an amount of investment income earned by each of the fund's proportionate share of investments based on a total return policy.

The Board of Trustees has appropriated all of the income and a specified percentage of the net appreciation (depreciation) to operations as prudent considering the Institution's long- and short-term needs, present and anticipated financial requirements, expected total return on its investments, price level trends, and general economic conditions. Under the Institution's current endowment spending policy, which is within the guidelines specified under state law, between 4% and 5.5% of a 36-month average market value of qualifying endowment investments is appropriated. This amounted to $15,555,591 and $14,351,257 for the years ending December 31, 2007 and 2006, respectively, and is classified in operating revenues (research, education, and operations).

Deposits with Trustees

Deposits with trustees consists principally of investments in United States Government obligations and have been deposited with trustees as required under certain loan agreements. At December 31, 2007 and 2006, respectively, the amounts consist of $92 and $118,986 for debt service and $0 and $1,063,695 for construction purposes. Interest income on debt service amounted to $617 in 2007 and $55,590 in 2006 and is reflected in the statement of activities within other income. Interest income on construction funds amounted to $58,323 and $49,855 in 2007 and 2006, respectively, and is reflected in the statement of activities within other income.

Other Assets

Other assets consist primarily of investments held by various split-interest agreements and donated property.

Inventories

Inventories are stated at the lower of cost or market. Cost is determined using the first-in, first-out method.

Contracts and Grants

Revenues earned on contracts and grants for research are recognized as related costs are incurred.

The Institution received approximately 88% and 89% of its sponsored research revenues from government agencies including 52% and 50% of its operating revenues from the National Science Foundation and 13% and 14% from the United States Navy in fiscal years 2007 and 2006, respectively. Although applications for research funding to federal agencies historically have been funded, authorizations are subject to annual Congressional appropriations and payment.

Deferred Financing Costs

Costs incurred in connection with the placement of the Massachusetts Health and Educational Facilities Authority, Variable Rate Revenue Bonds, Woods Hole Oceanographic Institution Issue, Series 2004, have been deferred and are being amortized over the term of the obligation on a straight line basis.

Interest Rate Swap

The Institution has entered into an interest rate swap agreement on the Massachusetts Health and Educational Facilities Authority, Variable Rate Revenue Bonds, Woods Hole Oceanographic Institution Issue, Series 2004 Bonds in order to convert a portion of the variable rate debt to fixed rate, thereby economically hedging against changes in the cash flow requirements of the Institution's variable rate debt obligations.

Net payments or receipts (difference between variable and fixed rate) under the swap agreement along with the change in fair value of the swap are recorded in nonoperating activities as net realized/unrealized gains (losses) on interest swap.

Property, Plant, and Equipment

Property, plant and equipment are stated at cost. Depreciation is provided on a straight-line basis at annual rates of 12 to 39 years on buildings and improvements, 10 to 15 years on vessels and dock facilities and 5 to 10 years on laboratory and other equipment. Depreciation expense on property, plant, and equipment purchased by the Institution in the amounts of $7,790,625 and $7,333,180 in 2007 and 2006, respectively, has been charged to operating activities. Depreciation on certain government-funded facilities (the

Laboratory for Marine Science and the dock facility) amounting to $99,976 both in 2007 and 2006 has been charged to nonoperating expenses as these assets were gifted by the Government.

Construction commitments totaled $0 and $177,464 at December 31, 2007 and 2006, respectively.

The Institution did not capitalize any interest in fiscal 2007 or 2006.

Use of Estimates

The preparation of the financial statements in accordance with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the period. Actual results could differ from those estimates.

Reclassifications

Certain amounts have been reclassified in the prior year financial statements to conform with current year classification.

Recent Pronouncements

In September 2006, the FASB issued SFAS No. 157, Fair Value Measurement, and SFAS No. 159, The Fair Value Option for Financial Assets and Financial Liabilities - Including an Amendment of FASB Statement No. 115. SFAS No. 157 and 159 will be effective for the Institution for its fiscal year ending December 31, 2008. SFAS No. 157 and 159 are not expected to have a material effect on the Institution's financial position, results of operation or cash flows.

3. Investments

The cost and market value of pooled investments held at December 31 are as follows:

	2007		2006	
	Cost	**Market**	**Cost**	**Market**
U.S. equity	$ 60,767,849	$ 71,919,631	$ 67,326,427	$ 80,131,322
Global developed equity	74,620,741	93,490,200	58,641,537	83,782,660
Emerging markets equity	17,986,546	24,607,525	16,593,997	24,347,400
Marketable alternative assets	36,295,000	53,360,764	36,295,000	45,142,360
Real assets	27,049,709	38,926,689	19,001,716	26,272,164
Bonds	46,463,977	48,312,910	49,173,891	49,958,988
Nonmarketable assets	35,142,051	41,565,554	29,621,866	33,536,177
Other	-	-	46,693	46,693
Total investments	$298,325,873	$372,183,273	$276,701,127	$343,217,764

Included in bonds and equities are alternative investment vehicles including commingled funds with a market value of $67,880,784 and $61,591,215 at December 31, 2007 and 2006, respectively, whose holdings are bonds and equities. Included in U.S. equity, marketable alternative assets and nonmarketable assets are hedge funds of $60,030,751 and $52,225,311 at December 31, 2007 and 2006, respectively. Included in global developed equity and nonmarketable assets are private equity and venture capital funds of $73,198,102 and $61,719,669 at December 31, 2007 and 2006, respectively. Total alternative investments (as described in the American Institute of Certified Public Accountants document, "A Practice Aid for Auditors: Alternative Investments - Audit Considerations) included in the above categories at December 31, 2007 and 2006, respectively, were $240,036,326 and $201,808,357.

The nonpooled investments consist of a common/collective trust fund invested in bonds with a market value of $70,036 in 2007 and $7,137,628 in 2006.

The following schedule summarizes the investment return on pooled and nonpooled investments and its classification in the statement of activities:

	Unrestricted	**Temporarily restricted**	**2007 Total**	**2006 Total**
Dividend and interest income	$ 7,821,336	$ 2,075,976	$ 9,897,312	$11,604,806
Investment management costs	(1,826,770)	-	(1,826,770)	(1,855,614)
Net realized gains	7,741,354	25,555,287	33,296,641	17,971,287
Change in unrealized appreciation	1,801,710	5,471,471	7,273,181	23,736,086
Total return on investments	15,537,630	33,102,734	48,640,364	51,456,565
Investment return designated for				
Sponsored research	-	(5,720,852)	(5,720,852)	(5,247,872)
Education	(4,263,649)	(2,075,976)	(6,339,625)	(5,919,500)
Current operations	(3,675,754)	-	(3,675,754)	(3,738,766)
Total distributions to operations	(7,939,403)	(7,796,828)	(15,736,231)	(14,906,138)
Investment return in excess of amounts designated for sponsored research, education and current operations	$ 7,598,227	$25,305,906	$32,904,133	$36,550,427

Investment return distributed to operations includes $180,640 and $554,881 earned on non-endowment investments for the years ended December 31, 2007 and 2006, respectively.

Investment securities are exposed to various risks such as interest rate, market and credit risks. Due to the level of risk associated with certain investments, it is at least reasonably possible that changes in the value of investment securities will occur in the near term and that such changes could materially affect the market values and the amounts reported in the statement of financial position.

Endowment income for pooled investments is allocated to each individual fund based on a per unit valuation. The value of an investment unit at December 31 is as follows:

	2007	**2006**
Unit value, beginning of year	$4.7179	$4.3755
Unit value, end of year	5.2520	4.7179
Net change for the year	.5341	.3424
Investment income per unit for the year	.1075	.1256
Total return per unit	$ .6416	$ .4680

4. Pledges Receivable

Pledges that are expected to be collected within one year are recorded at their net realizable value. Pledges that are expected to be collected in future years are recorded at the present value of estimated future cash flows. The present value of estimated future cash flows has been measured utilizing a discount rate equivalent to U.S. Treasury yields of similar maturity (ranging from 2.36% – 4.74%, depending upon the anticipated pledge fulfillment date).

Pledges receivable consist of the following at December 31:

	2007	2006
Unconditional promises expected to be collected in:		
Less than one year	$ 5,818,583	$ 2,341,468
One year to five years	6,306,000	12,664,674
Reserve for uncollectible pledges receivable	(288,721)	(1,050,430)
Unamortized discount	(1,157,786)	(723,818)
	$10,678,076	$13,231,894

5. Contribution Receivable from Remainder Trusts, Net

Contributions receivable from remainder trusts balance at December 31, 2007 and 2006 was $11,477,118 and $11,311,983, respectively. The receivable and related revenue is measured at the present value of estimated future cash flows to be received, net of expected payouts, and recorded in the appropriate net asset category based on donor stipulation. During the term of these agreements, changes in the value are recognized based on amortization of discounts and changes in actuarial assumptions. Related payment liabilities of $5,121,920 and $5,163,203 were recorded at December 31, 2007 and 2006, respectively. Discount rates ranging from 5% to 8% were used in these calculations.

6. Deferred Fixed Rate Variance

The Institution receives funding or reimbursement from federal government agencies for sponsored research under government grants and contracts. Revenue is recognized as related costs are incurred. The Institution has negotiated fixed rates with the federal government for the recovery of certain fringe benefits and indirect costs on these grants and contracts. Such recoveries are subject to carryforward provisions that provide for adjustments to be included in the negotiation of future fixed rates. The deferred fixed rate variance accounts represent the cumulative amount owed to or due from the federal government. The Institution's rates are negotiated with the Office of Naval Research (ONR), the Institution's cognizant agency.

The composition of the deferred fixed rate variance is as follows:

Deferred Fixed Rate Variance liability, December 31, 2005	$ (3,121,743)
2006 indirect costs	60,969,335
2005 adjustment	(135,153)
Amounts recovered	(59,398,365)
2006 change	1,435,817
Deferred Fixed Rate Variance liability, December 31, 2006	(1,685,926)
2007 indirect costs	61,298,187
2006 adjustment	(11,529)
Amounts recovered	(60,496,116)
2007 change	790,542
Deferred Fixed Rate Variance liability, December 31, 2007	$ (895,384)

As of December 31, 2007 the Institution has received a cumulative recovery in excess of expended amounts of $895,384 which will be reflected as a deduction to future year recoveries. This amount has been reported as liability of the Institution.

7. Bonds Payable

In fiscal 2004, proceeds were received from the offering of the $54,850,000 Massachusetts Health and Educational Facilities Authority (MHEFA) Variable Rate Revenue Bonds, Woods Hole Oceanographic Institution Issue, Series 2004, which were used to repay the MHEFA B Pool loans and are currently being used for campus construction, which was completed in December 2007. The bonds contain certain restrictive covenants including limitations on obtaining additional debt, filings of annual financial statements and limitations on the creation of liens. In addition, the Institution agrees that, subject to any governmental restrictions, its fiduciary obligations and limitations imposed by law, it will maintain unrestricted resources at a market value equal to at least 75% of all outstanding indebtedness. The bonds also required a debt service fund to be established at the time of issuance. Included in deposits with trustees on the statement of financial position is the market value of the debt service fund of $0 and $118,986 at December 31, 2007 and 2006, respectively. The Series 2004 Bonds are collateralized by the Institution's unrestricted revenues. The interest rate for the Series 2004 Bonds is variable and set weekly, and at December 31, 2007, the rate was 4.25%. Interest expense for the years ended December 31, 2007 and 2006 was $2,166,858 and $2,078,593, respectively.

In 2004, the Institution issued R-FLOAT securities that initially held an interest rate of 1.05% upon original issuance. As a result of the deterioration in the credit markets surrounding these types of securities, interest rates have risen as high as 11%. The highest interest rate paid by the Institution as of July 31, 2008 is 7.65%. The Institution continues to monitor the impact of the credit markets on its obligations.

The aggregate maturities due on long-term debt at December 31, 2007 are as follows:

Fiscal Year	Principal Amount
2008	$ 1,200,000
2009	1,250,000
2010	1,300,000
2011	1,350,000
2012	1,400,000
Thereafter	48,350,000
	$54,850,000

In June 2004, the Institution entered into an interest rate swap agreement, with a term through June 1, 2034. This swap effectively locks in a fixed rate of 3.79% per annum. The agreement has a notional amount of $54,850,000. At December 31, 2007 and 2006, respectively, the market value of the swap agreement amounted to a liability of $3,471,999 and $1,960,456 which is included in accounts payable and other liabilities. The value of the interest rate swap is reflected within accounts payable and other liabilities and nonoperating income/expense in the financial statements. Additionally, the Institution paid interest expense in association with the swap agreement of $140,355 and $221,522 which is reflected as part of the net realized/unrealized gains (losses) on interest swap at December 31, 2007 and 2006, respectively.

8. Retirement Plans

The Institution maintains a noncontributory defined benefit pension plan covering substantially all employees of the Institution, a restoration plan for certain senior employees and a supplemental benefit plan for certain other employees. Pension benefits are earned based on years of service and compensation received. The Institution's policy is to fund at least the minimum required by the Employee Retirement Income Security Act of 1974.

The Institution uses a December 31 measurement date for all of its plans.

	Restoration Plan Pension Benefits	
	2007	2006
Change in benefit obligation		
Benefit obligation at beginning of year	$ 34,074	$ 1,640,939
Interest cost	4,641	70,523
Actuarial loss	119,307	68,617
Settlements	(158,022)	(1,746,005)
Benefit obligation at end of year	$ -	$ 34,074
Funded status	$ -	$ (34,074)
Unrecognized net actuarial loss	-	44,538
Net amount recognized	$ -	$ 10,464
Amounts recognized in the statement of financial position consist of		
Accrued benefit liability	$ -	$ (34,074)
Additional minimum liability	-	44,538
Net amount recognized	$ -	$ 10,464
Change in net assets attributable to change in additional minimum liability recognition	$ -	$ 44,538
Information for pension plans with accumulated benefit obligations in excess of plan assets		
Projected benefit obligation	-	34,074
Accumulated benefit obligation	-	(34,074)
Component of net periodic benefit cost		
Interest cost	4,641	70,523
Recognized actuarial loss	79,201	-
Net periodic benefit cost	$ 83,842	$ 70,523
Weighted-average assumptions used to determine benefit obligations at December 31		
Discount rate	6.25%	6.00%
Rate of compensation increase	4.50%	4.50%
Weighted-average assumptions used to determine net periodic benefit cost for years ended December 31		
Discount rate	6.00%	5.75%
Rate of compensation increase	4.50%	4.50%

Expected Contributions

The Institution does not anticipate contributing to the Restoration Plan in 2008.

Estimated Future Benefit Payments

There are no expected benefit payments for 2008. The new director is eligible in 2009.

	Qualified Plan Pension Benefits	
	2007	2006
Change in benefit obligation		
Benefit obligation at beginning of year	$215,891,241	$ 214,770,764
Service cost	6,525,239	6,137,340
Interest cost	12,424,161	11,980,814
Actuarial gain	(2,764,717)	(483,219)
Benefits paid	(16,015,984)	(16,514,458)
Benefit obligation at end of year	$216,059,940	$ 215,891,241
Change in plan assets		
Fair value of plan assets at beginning of year	$171,342,150	$ 155,921,888
Adjustment to beginning balance for additional fair value of investments	-	2,605,614
Employer contributions	6,027,869	5,242,851
Actual return on plan assets	24,770,183	24,086,255
Benefits paid	(16,015,984)	(16,514,458)
Fair value of plan assets at end of year	$186,124,218	$ 171,342,150
Funded status	$(29,935,722)	$(44,549,091)
Unrecognized net actuarial loss	-	7,885,799
Unrecognized prior service cost	-	15,323,257
Net amount recognized	$(29,935,722)	$(21,340,035)
Amounts recognized in the statement of financial position consist of		
Accrued benefit liability	$(29,935,722)	$(21,340,035)
Net amount recognized	$(29,935,722)	$(21,340,035)
Information for pension plans with accumulated benefit obligations in excess of plan assets		
Projected benefit obligation	$216,059,940	$215,891,241
Accumulated benefit obligation	180,366,990	180,744,218
Fair value of plan assets	186,124,218	171,342,150
Components of net periodic benefit cost		
Service cost	6,525,239	6,137,340
Interest cost	12,424,161	11,980,814
Expected return on plan assets	(10,365,552)	(10,140,183)
Amortization of prior service cost	1,933,919	1,933,919
Recognized actuarial loss	1,915,535	2,631,095
Net periodic benefit cost	$ 12,433,302	$ 12,542,985

The Institution has reflected $6,027,869 and $5,242,851 for the years ending December 31, 2007 and 2006, respectively, of the net periodic benefit cost in the operating section of the statement of activities which represents the amount reimbursed through the employee benefit fixed rate as negotiated with the United States Government. The remaining $6,405,433 and $7,300,134 for the years ending December 31, 2007 and 2006, respectively, of net periodic benefit cost is reflected in nonoperating expenses.

The impact of the adoption of SFAS 158 resulted in a net decrease of $2,190,254 in unrestricted net assets, which has been recorded as an adoption of an accounting principle. The net decrease is comprised of the net prior service cost of $13,389,338 and actuarial gain of $11,199,084.

	Qualified Plan Pension Benefits	
	2007	2006
Weighted-average assumptions used to determine benefit obligations at December 31		
Discount rate	6.25%	6.00%
Rate of compensation increase	4.50%	4.50%
Weighted-average assumptions used to determine net periodic benefit cost for years ended December 31		
Discount rate	6.00%	5.75%
Expected long-term rate of return on plan assets	8.00%	8.00%
Rate of compensation increase	4.50%	4.50%

The incremental effect of applying SFAS 158 on individual items in the statement of financial position as of December 31, 2007 is as follows:

	Before Application of SFAS 158	Defined Benefit Plan Adjustments	After Application of SFAS 158
Accrued pension liability	$ 27,745,468	$ 2,190,254	$ 29,935,722
Total liabilities	120,465,942	2,190,254	122,656,196
Unrestricted net assets	99,098,438	(2,190,254)	96,908,184
Total net assets	430,243,016	(2,190,254)	428,052,762

The amount expected to be recognized as amortization of prior net service cost and a component of net periodic cost in the upcoming year is $2,346,055.

To develop the expected long-term rate of return on assets assumption, the Institution considered the current level of expected returns on risk-free investments (primarily government bonds), the historical level of the risk premium associated with the other asset classes in which the portfolio is invested and the expectations for future returns of each asset class. The expected return for each asset class was then weighted based on the target asset allocation to develop the expected long-term rate of return on assets assumption for the portfolio, net of expenses expected to be paid. This resulted in the selection of the 8.00% assumption.

Effective December 31, 2004, final average compensation for the Plan was frozen and equal to a participant's final average compensation determined as of December 31, 2004. A one year index of 4.5% will be applied to the frozen December 31, 2004 final average compensation for service performed during 2005. In addition, effective December 31, 2004, the minimum lump-sum benefit was amended to eliminate the 8% pay credit for years after 2005. These changes have been reflected in the liabilities as of December 31, 2004.

Effective January 1, 2006, the Qualified Plan was amended. The lump sum (introduced in 1999) will no longer be available on benefits earned after January 1, 2006. Benefits for service from 25 to 35 years introduced in 1999 will be removed. The lifetime benefit payable upon early retirement has changed from a 6% per year reduction to a 5% per year reduction. Minimum lump sum benefits equal to 5% of final average compensation times service replaces the minimum introduced in 1999 of approximately 8%. The preretirement death benefit has been reduced from 100% of the accrued pension benefit to 50% of the accrued pension benefit but not less than the participant's accrued benefit as of December 31, 2006. The 3-year vesting period (introduced in 1999) will change to a 5-year vesting service for employees hired after December 31, 2005.

Plan Assets

The Institution's pension plan weighted-average asset allocations at December 31, 2007 and 2006, by asset category are as follows:

Asset Category	2007	2006
U.S. equity	13%	18%
Global developed equity	26%	27%
Emerging markets equity	7%	7%
Marketable alternative assets	15%	14%
Real assets	8%	5%
Bonds	14%	16%
Nonmarketable assets	12%	11%
Cash and cash equivalents	5%	2%
	100%	100%

The following target asset allocation is used:

Asset Category	Target Allocation
U.S. equity	21%
Global developed equity	20%
Emerging markets equity	4%
Marketable alternative assets	20%
Real assets	10%
Bonds	10%
Nonmarketable assets	10%
Cash and cash equivalents	5%

The primary financial objectives of the assets of the Plan are to (1) provide a stream of relatively predictable, stable and constant earnings in support of the Qualified Plan's annual benefit payment obligations; and (2) preserve and enhance the real (inflation-adjusted) value of assets, over time, with the goal of meeting the anticipated future benefit obligations of the qualified plan.

The long-term investment objectives of the assets of the Plan are to (1) attain the average annual total return assumed in the Plan's most recent actuarial assumptions (net of investment management fees) over rolling five-year periods; and (2) outperform the custom benchmark.

Expected Contributions

The Institution anticipates contributing $8,000,000 to the Qualified Plan in 2008.

Estimated Future Benefit Payments

The following benefit payments, which reflect expected future service are expected to be paid as follows:

Years	Benefit Payments
2008	$13,137,966
2009	12,854,261
2010	12,697,553
2011	14,015,255
2012	15,230,986
2013 - 2017	83,527,837

	Supplemental Plan Pension Benefits	
	2007	2006
Change in benefit obligation		
Benefit obligation at beginning of year	$ 3,113,322	$ 3,595,900
Service cost	42,114	55,341
Interest cost	149,445	168,532
Actuarial gain	(485,609)	(535,722)
Benefits paid	(163,059)	(170,729)
Benefit obligation at end of year	$ 2,656,213	$ 3,113,322
Change in plan assets		
Fair value of plan assets at beginning of year	$ -	$ -
Employer contributions	163,059	170,729
Benefits paid	(163,059)	(170,729)
Fair value of plan assets at end of year	$ -	$ -
Funded status	$(2,656,213)	$(3,113,322)
Unrecognized actuarial (gain) loss	-	(557,044)
Unrecognized prior service cost	-	32,731
Net amount recognized	$(2,656,213)	$(3,637,635)
Amounts recognized in the statement of financial position consist of		
Accrued benefit liability	$(2,656,213)	$(3,637,635)
Net amount recognized	$(2,656,213)	$(3,637,635)
Information for pension plans with accumulated benefit obligations in excess of plan assets		
Projected benefit obligation	$ 2,656,213	$ 3,113,322
Accumulated benefit obligation	2,519,193	2,919,806
Components of net periodic benefit cost		
Service cost	$ 42,114	$ 55,341
Interest cost	149,445	168,532
Expected return on earmarked reserves	(192,548)	(190,256)
Amortization of prior year service cost	6,620	6,620
Recognized actuarial gain	(138,983)	(47,831)
Net periodic benefit income	$ (133,352)	$ (7,594)

The accrued supplemental retirement is matched by a "Rabbi" Trust with $7,111,673 and $7,173,633, respectively, as of December 31, 2007 and 2006. An additional accrual of $4,455,460 and $3,535,998 has been established for the excess of the "Rabbi" Trust assets over the accrued supplemental retirement benefits at December 31, 2007 and 2006, respectively. Income earned on the investments earmarked for the supplemental retirement plan amounted to $202,232 and $200,249 for the years ended December 31, 2006 and 2005, respectively.

The impact of the adoption of SFAS 158 resulted in a net increase of $887,243 in unrestricted net assets, which has been recorded as an adoption of an accounting principle. The net increase is comprised of the net prior service cost of $26,111 and actuarial gain of $913,354.

	Supplemental Plan Pension Benefits	
	2007	2006
Actual return on earmarked reserves	$202,232	$200,249
Weighted-average assumptions used to determine benefit obligations at December 31		
Discount rate	6.25%	6.00%
Rate of compensation increase	4.50%	4.50%
Weighted-average assumptions used to determine net periodic benefit cost for years ended December 31		
Discount rate	6.00%	5.75%
Expected long-term rate of return on plan assets	8.00%	8.00%
Rate of compensation increase	4.50%	4.50%

The incremental effect of applying SFAS 158 on individual items in the statement of financial position as of December 31, 2007 is as follows:

	Before Application of SFAS 158	Defined Benefit Plan Adjustments	After Application of SFAS 158
Prepaid pension and postretirement benefit cost	$ -	$ 887,243	$ 887,243
Total assets	549,821,715	887,243	550,708,958
Unrestricted net assets	96,020,941	887,243	96,908,184
Total net assets	427,165,519	887,243	428,052,762

The amount expected to be recognized as amortization of prior net service credit and a component of net periodic cost in the upcoming year is $112,495.

Expected Contributions

The Institution does not anticipate contributing to the Supplemental Plan in 2008.

Estimated Future Benefit Payments

The following benefit payments, which reflect expected future service are expected to be paid as follows:

Years	Benefit Payments
2008	$ 389,602
2009	338,938
2010	424,041
2011	472,074
2012	436,237
Years 2013 - 2017	1,195,601

9. Other Postretirement Benefits

In addition to providing retirement plan benefits, the Institution provides certain health care benefits for retired employees and their spouses. Substantially all of the Institution's employees may become eligible for the benefits if they reach normal retirement age (as defined) or elect early retirement after having met certain time in service criteria.

	Other Postretirement Benefits	
	2007	2006
Change in benefit obligation		
Benefit obligation at beginning of year	$ 31,291,763	$ 25,605,822
Service cost	791,711	754,521
Interest cost	1,726,221	1,591,037
Plan amendment	-	(241,938)
Benefits paid	(1,038,077)	(1,044,207)
Actuarial (gain) loss	(3,055,014)	4,626,528
Benefit obligation at end of year	$ 29,716,604	$ 31,291,763
Change in plan assets		
Fair value of plan assets at beginning of year	$ 21,276,483	$ 19,323,651
Employer contributions	755,248	884,556
Actual return on plan assets	1,893,708	2,112,483
Benefits paid	(1,038,077)	(1,044,207)
Fair value of plan assets at end of year	$ 22,887,362	$ 21,276,483
Funded status	$ (6,829,242)	$ (10,015,280)
Unrecognized net actuarial loss	-	21,105,885
Unrecognized prior service cost (credit)	-	(10,301,779)
Net amount recognized	$(6,829,242)	$ 788,826
Amounts recognized in the statement of financial position consist of		
Accrued benefit liability	$(6,829,242)	$ -
Prepaid benefit cost	-	788,826
Net amount recognized	$(6,829,242)	$ 788,826
Components of net periodic benefit cost		
Service cost	$ 791,711	$ 754,521
Interest cost	1,726,221	1,591,037
Expected return on plan assets	(1,678,301)	(1,528,948)
Amortization of prior service cost	(1,366,423)	(1,366,423)
Recognized actuarial gain	1,282,040	1,434,365
Net periodic benefit cost	$ 755,248	$ 884,552

The Institution has reflected the net periodic benefit cost in operating expenses, as the amount is reimbursed through federal awards.

The impact of the adoption of SFAS 158 resulted in a net decrease of $7,618,070 in unrestricted net assets, which has been recorded as an adoption of an accounting principle. The net decrease is comprised of the net prior service cost of $8,935,356 and actuarial loss of $16,553,426.

Weighted-average assumptions used to determine benefit obligations at December 31		
Discount rate	6.50%	6.00%
Weighted-average assumptions used to determine net periodic benefit cost for years ended December 31		
Discount rate	6.00%	5.75%
Expected long-term rate of return on plan assets	8.00%	8.00%

The incremental effect of applying SFAS 158 on individual items in the statement of financial position as of December 31, 2007 is as follows:

	Before Application of SFAS 158	Defined Benefit Plan Adjustments	After Application of SFAS 158
Accrued postretirement liability	$ (788,826)	$ 7,618,070	$ 6,829,244
Total liabilities	115,038,126	7,618,070	122,656,196
Unrestricted net assets	104,526,254	(7,618,070)	96,908,184
Total net assets	435,670,832	(7,618,070)	428,052,762

The amount expected to be recognized as amortization of prior net service credit and a component of net periodic cost in the upcoming year is $287,833.

The plan does not provide prescription drug benefits for post-65 retirees; therefore, there is no anticipated Medicare employer subsidy.

	2007		2006	
	Pre-65	Post-65	Pre-65	Post-65
Assumed health care cost trend rates at December 31				
Health care cost trend rate assumed for next year	9.0%	7.0%	9.0%	7.0%
Rate to which the cost trend rate is assumed to decline (the ultimate trend rate)	5.0%	5.0%	5.0%	5.0%
Year that the rate reaches the ultimate trend rate	2015	2012	2015	2012

Assumed health care cost trend rates have a significant effect on the amounts reported for the health care plan. A one-percentage-point change in assumed health care cost trend rates would have the following effects:

	2007	2006
	One-Percentage-Point Increase in Trend	One-Percentage-Point Increase in Trend
Effect on total of service cost and interest cost components	$ 449,211	$ 424,894
Effect on year-end postretirement benefit obligation	4,296,768	4,772,870
	One-Percentage-Point Decrease in Trend	One-Percentage-Point Decrease in Trend
Effect on total of service cost and interest cost components	$ (358,060)	$ (337,831)
Effect on year-end postretirement benefit obligation	(3,530,266)	(3,890,358)

Plan Assets

The Institution's postretirement benefit plan weighted-average asset allocations at December 31, 2007 and 2006, by asset category are as follows:

Asset Category	2007	2006
Equity securities	92%	92%
Cash	8%	8%
	100%	100%

To develop the expected long-term rate of return on assets assumption, the Institution considered the current level of expected returns on risk free investments (primarily government bonds), the historical level of the risk premium associated with the other asset classes in which the portfolio is invested and the expectations for future returns of each asset class. The expected return for each class was then weighted based on the target asset allocation to develop the expected long-term rate of return on assets assumption for the portfolio, net of expenses expected to be paid. This resulted in the selection of the 8.00% assumption.

As of January 1, 2006, the required copayments and other features of the underlying medical benefit plan were updated resulting in a decrease in the obligation of $242,000.

Expected Contributions

The Institution anticipates contributing $1,100,000 to the Retiree Medical Plan in 2008.

Estimated Future Benefit Payments

The following benefit payments, which reflect expected future service are expected to be paid as follows:

Years	Benefit Payments
2008	$ 1,453,259
2009	1,520,956
2010	1,570,893
2011	1,682,013
2012	1,804,047
Years 2013 - 2017	10,752,777

10. Commitments and Contingencies

The Defense Contract Audit Agency (DCAA) is responsible for auditing both direct and indirect charges to grants and contracts on behalf of the ONR. The Institution and the ONR have settled the years through 2004. The current indirect cost recovery rates, which are fixed, include the impact of prior year settlements. The DCAA issued an audit report on the completed audit of direct and indirect costs for the year ended December 31, 2006 on September 14, 2007. The 2007 costs remain subject to audit. Any adjustments will be recorded in the years they become known.

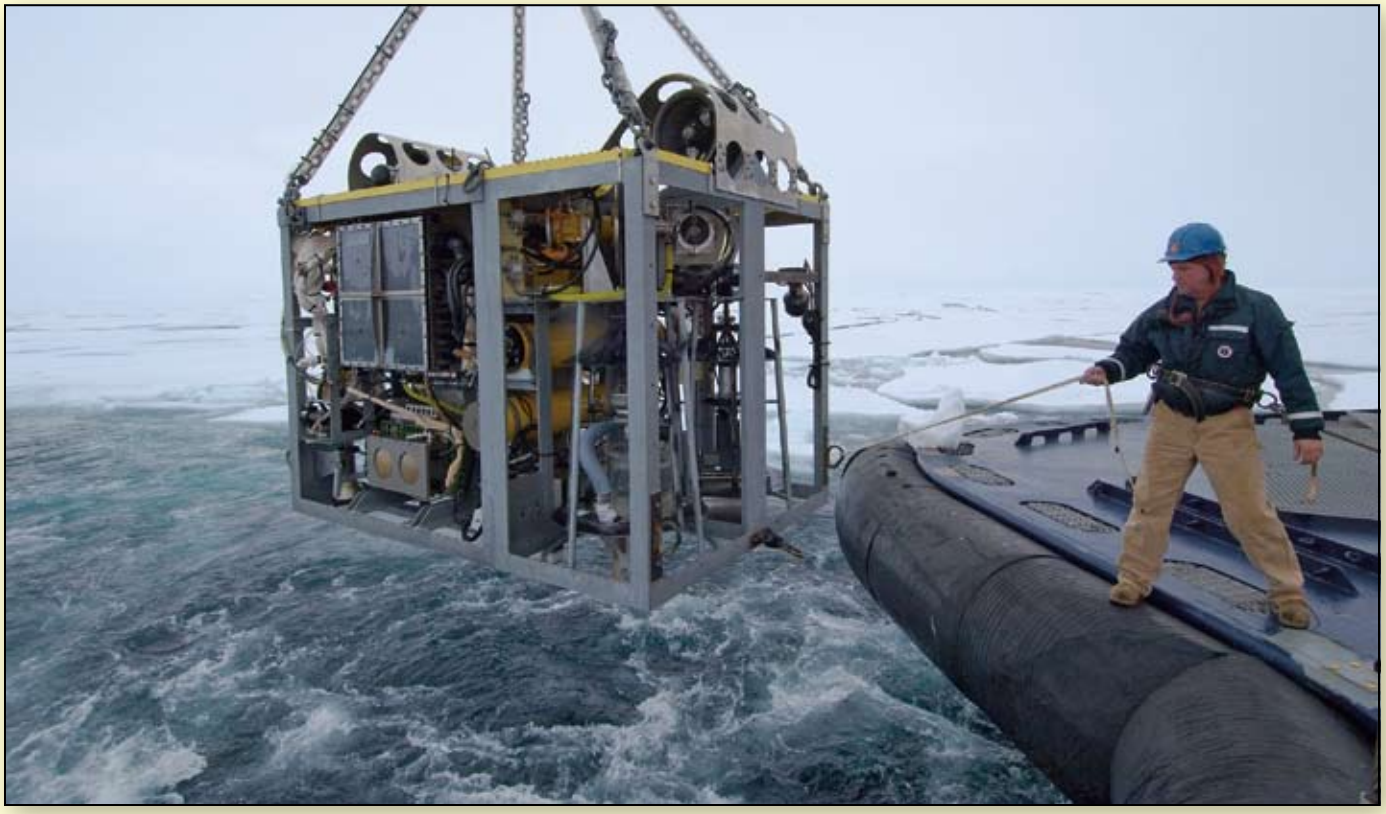
The Institution, through its pooled investments, is committed to invest $25 million in certain venture capital and investment partnerships as of December 31, 2007. Such commitments will be funded through liquidity in existing investments.

The Institution is a defendant in legal proceedings incidental to the nature of its operations. The Institution believes that the outcome of these proceedings will not materially affect its financial position.

11. Related Party Transactions

In fiscal year 2007, the Institution's subcontracts, of which some could be federal pass-through awards, was approximately $645,383 and $437,000 for the years ended December 31, 2007 and 2006, respectively, to subgrantee organizations in which an individual associated with the subgrantee organization is also a member of the Institution's Board of Trustees or Corporation. The Institution also has other transactions such as legal services and other items with organizations where members of the Board of Trustees or Corporation are affiliated with the organizations. Total expenditures for these legal and other transactions were approximately $1,158,791 and $1,005,000 for the years ended December 31, 2007 and 2006, respectively.

The Institution has loans due from various employees for education advances and computer purchases. The amounts outstanding are approximately $791,000 and $613,000 at December 31, 2007 and 2006, respectively.



Chris Linder, WHOI

WHOI engineer John Kemp, head of deck operations during the Arctic Gakkel Vents Expedition, supervises the deployment of the Camper *towed sampling vehicle off the fantail of the Swedish icebreaker* Oden. *The vehicle was mobilized to find the autonomous underwater vehicle* Jaguar, *which was somewhere under the ice on a testing dive.*