



COASTAL RESEARCH

a newsletter from the Coastal Ocean Institute
and Rinehart Coastal Research Center



A message from the Director of the COI



Once again, I find myself writing a newsletter message while attending a scientific conference—this time in Kuwait

at the Arabian Seas Conference on Fisheries, Aquaculture and Technology. I have been conversing with Iraqi scientists struggling to conduct their research under extraordinarily difficult conditions in Basra, and with Iranian and Kuwaiti scientists as well. All of us are from countries that were either at war, that had recently been at war, or that were threatened by such conflicts, and all of us shared common concerns and a desire to work together to address them.

At the conference, we discussed dam construction along the Shatt al Arab river, marsh, and watershed system in southern Iraq and what it means for fisheries, water quality, and ecosystems. The Shatt al Arab case is unfortunately not an isolated one; the drawdown or diversion of fresh water is dramatically altering coastal zones worldwide, and this impact will only increase with human population growth and the resulting demands for limited water supplies. In the Arabian (Persian) Gulf, critical marsh habitats for many Gulf species are threatened, as are the human societies that have lived within and grown dependent on the associated fisheries. The “Marsh Arabs” were driven from their homes when Saddam Hussein shut off the water flow to the marsh system. The U.S. has since re-opened some of these blocked flows, but now freshwa-

ter diversions far upstream threaten to finish what Saddam started.

Another striking wake-up call came from discussions of the health of coral reef systems in the Gulf. Human activities and development, combined with climate-driven coral bleaching events, have produced vast areas of dead and dying reefs. I was startled when I heard that the “doomsday scenario” for these reefs was not some distant moment in the future but perhaps as little as a decade or two away. As the waters around reef systems grow warmer, critical temperature thresholds will be exceeded more often, bleaching the corals. When such events are infrequent, corals have time to spawn and re-establish themselves. But with current, increasing temperature trends, the threshold may be reached so often that recovery is impossible. And the story gets worse. As coral reefs die and break down, they can no longer slow and attenuate wave energy, meaning there will be more beach erosion and overwash.

I’m sure that my colleagues who work with coral reefs are familiar with these urgent issues, but it was new to me. I don’t consider myself an alarmist, but these and other threats to the coastal zone are indeed worrisome. The good news is that scientific cooperation and progress can make a difference, and WHOI and the Coastal Ocean Institute are fully engaged in this effort. We hope you share in our concern for the coastal ocean and join in our efforts to protect it.

—Don Anderson

WHOI Activities in Observing Systems

Much of the ocean science community has been talking for the past few years about ocean observatories and how they will revolutionize ocean sciences in the 21st century. At WHOI, the revolution has been underway since 2001, when the Martha’s Vineyard Coastal Observatory (MVCO) was put into operation.

MVCO consists of a shore laboratory, an onshore meteorological mast, an undersea node, and an air-sea interaction tower. All of these components are linked together by fiber-optic cable, which provides power and high-speed, real-time communications. With this infrastructure, scientists and engineers can collect long-term, in situ measurements and deploy technologies that were previously used only in the laboratory and on ships.

2007 is shaping up as a busy year at MVCO, with projects including:

- WHOI biologists Heidi Sosik and Rob Olson have been funded by the National Science Foundation and the Moore Foundation to take another step in their development and application of optical technologies for quantifying and imaging microscopic plants (phytoplankton) in the North Atlantic.
- NASA has funded Steve Lentz, Sosik, and I to study the dynamics of phytoplankton blooms and their effect on the optical properties of the ocean.
- Lentz has won NSF support for a new study of the physical oceanography of inner shelves.
- The National Ocean Partnership program has awarded funding to Rich Camilli to develop an in situ mass

- spectrometer for cabled observatories.
- The Office of Naval Research has funded Tom Austin, Ben Allen, and the REMUS group to develop advanced docking capabilities for autonomous underwater vehicles.
- Wade McGillis (formerly a COI fellow, now at Lamont-Doherty Earth Observatory) will use a grant from the National Oceanic and Atmospheric Administration to study air-sea gas fluxes.
- Ru Morrison and Doug Vandemark (University of New Hampshire) have garnered support from NASA and NOAA to investigate optical properties of the coastal ocean.
- And ONR is supporting several WHOI scientists in multi-institutional studies to address underwater communications (Jim Preisig),

the dynamics of wave-formed sand ripples (Peter Traykovski), and the dynamics and optical and acoustical properties of suspended particles (John Trowbridge).

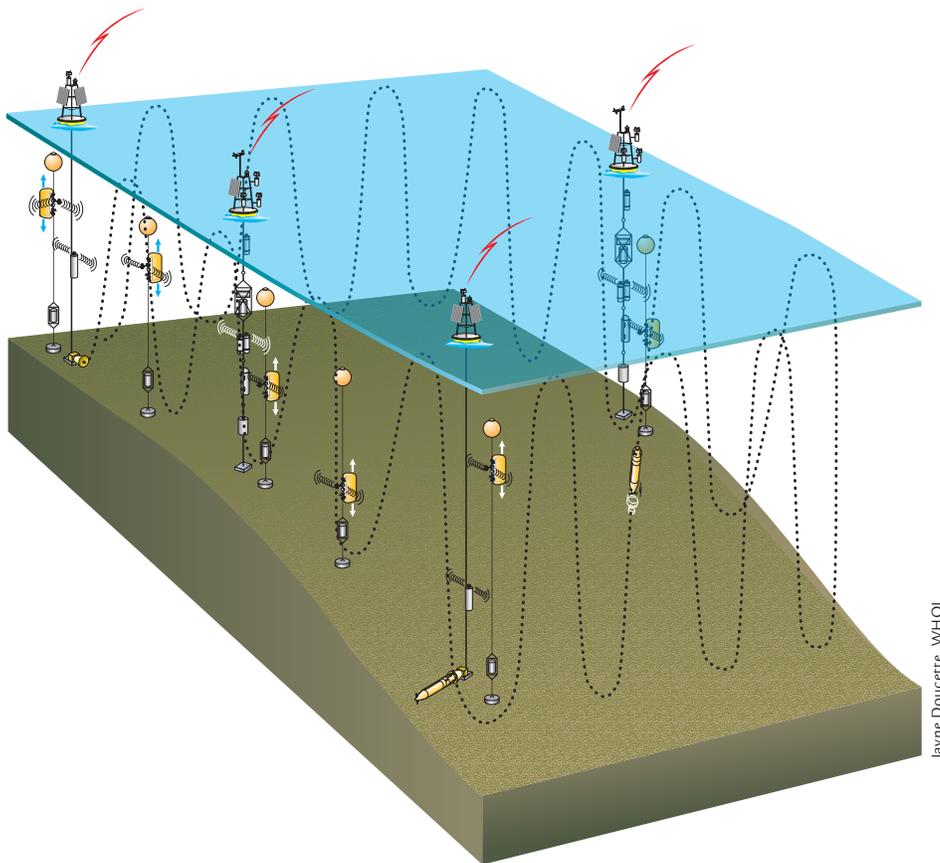
On the national scale, the Ocean Observatories Initiative (OOI) of the Ocean Research Interactive Observatory Networks (ORION) is about to begin. Funded by NSF and managed by the Joint Oceanographic Institutions, the program's leaders have been collecting broad input from the oceanographic community and developing conceptual network designs for the four components of the OOI: the global scale nodes (GSN), the coastal scale nodes (CSN), the regional cabled nodes (RCN), and cyber-infrastructure (CI). JOI and NSF have requested proposals from institutions that would like to implement and

manage pieces of the ORION network, and WHOI is leading a multi-institutional team (with Scripps Institution of Oceanography and Oregon State University) that will compete for the contract to establish the coastal and global observing systems. The WHOI-led proposal is due in June, and a decision by NSF and JOI is expected by the end of 2007. WHOI participants in the proposal-writing team include Bob Detrick, Al Plueddemann, Libby Signell (project manager) and Bob Weller (lead principal investigator).

WHOI scientists are particularly interested in a proposed component of the coastal system known as the Pioneer Array. Conceived at WHOI by Glen Gawarkiewicz, Al Plueddemann, Breck Owens, and Heidi Sosik, the array is designed to capitalize on new mooring and vehicle technologies to enable sustained, continuous, adaptive sampling at scales of time and space that cannot be achieved with traditional oceanographic tools and methods. Full-time, real-time observing in the coastal ocean would enable us to investigate the incredibly complex interplay of physical, biological and chemical processes in the ocean.

Another major observing program—the Integrated Ocean Observing System (IOOS)—is also moving into a new phase. After several years of funding IOOS through congressionally mandated earmarks, the NOAA Coastal Services Center announced an open competition for funding this year to support regional, integrated ocean observing systems. The program offers three focus areas: development of regional coastal ocean observing systems (RCOOS); development of IOOS applications and products for regional stakeholders; and data management and communication by local data network nodes. After a competitive pre-proposal process, WHOI researchers were invited to submit four full proposals.

I helped organize a multi-institutional proposal to put together a Northeast Regional Association of Coastal Ocean



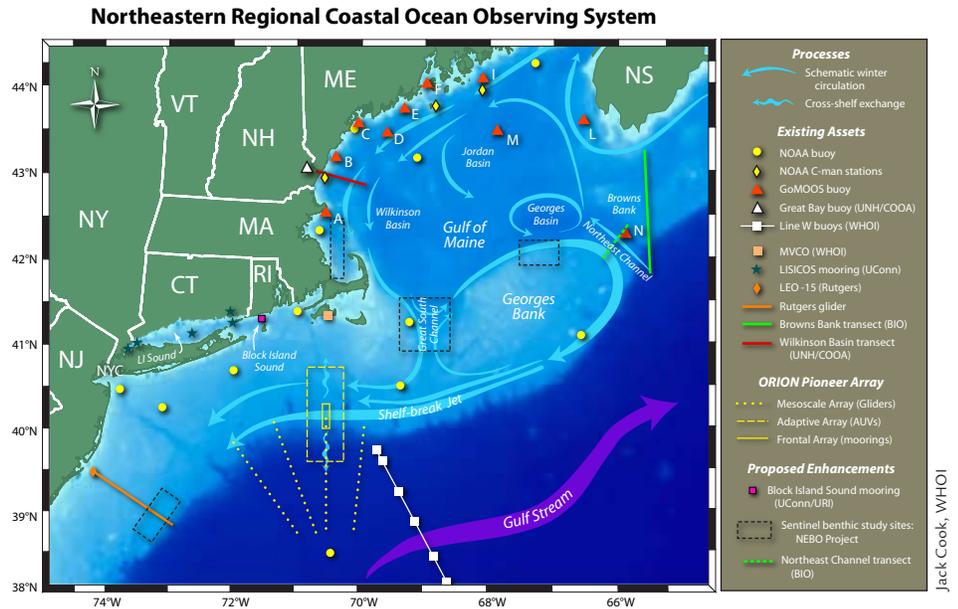
Jayne Doucette, WHOI

Figure 1. Conceptual diagram of the ORION Pioneer Array, in a configuration intended for an investigation of the shelf-slope front south of Woods Hole. Profiling moorings and sampling paths by autonomous underwater vehicles (AUVs) with associated docking stations are shown. The cross-isobath and along-isobath scales are approximately 40 and 10 km, respectively.

Observing Systems. Scott Gallager led a proposal to establish a mobile Northeast benthic-pelagic observatory to support fisheries and ecosystem management. Hauke Kite-Powell proposed to develop procedures and tools to maximize the economic return from the Northeast RCOOS. Janet Fredericks proposed to develop and implement Open-Geospatial Consortium/Sensor standards for quality assurance and quality control for in situ ocean sensors.

— John Trowbridge

Figure 2. Diagram of the Northeastern Regional Coastal Ocean Observing System, taken from a WHOI-led IOOS proposal to NOAA.



Jack Cook, WHOI

COI Funding Announcements

Annual Call for Proposals

COI received 18 proposals requesting \$1.3M in response to our annual call for proposals, April 2007. We were able to fund 6 (plus 1 new initiative—see page 4) for a total of \$432,000. These projects encompass every scientific department at WHOI and represent a funding success rate of 39%, much higher than the current federal funding success rate.

Student Research Awards

We are pleased to continue a program we began last year with a generous donation from a COI committee member—Student Research Awards for Joint Program graduate students working in coastal ocean science. We received 6 applications and are able to fund 5 (one proposal was funded by the Ocean Life Institute). These awards provide modest funding for thesis research expenses such as field work, equipment, and supplies that are not covered by supervising scientists' research support. We have received highly favorable responses from students and their advisors about the value of this program and the difference this has made to students' progress.

New COI Research Fellow



Claudia Cenedese, Associate Scientist *Physical Oceanography Department*

Claudia's research interests are in the field of geophysical fluid dynamics—she uses laboratory experiments and analytical models to simulate relevant dynamics that occur in the ocean. As a COI Fellow, she will expand her research program to encompass the coupling of physical and biological processes. She also intends to communicate the importance of coastal research through use of the Geophysical Fluid Dynamics laboratory (www.whoi.edu/science/PO/gfd/) at the Rinehart Coastal Research Center.

Student Letter

"The project was successful, and with a relatively modest budget I was able to generate a robust set of measurements characterizing the distribution of anaerobic ammonium oxidizing bacteria in the Waquoit Bay subterranean estuary, via their unique ladderane lipids. This represents the first evidence for anammox in a coastal subterranean environment. I am still waiting on the analysis of some final data, which should be complete in the next month, at which point I will begin finalizing a manuscript for publication. I will also follow up with a more comprehensive review and synthesis of my results, which I could not have generated without COI support. I am very grateful to the COI Student Research Fund for its support of my project. Thank you!"

—James P. Sáenz

New Initiatives

As we reported in our September 2006 newsletter, a new program has been instituted—to provide development funds for “new initiatives” that can lead to sustained and significant funding for teams of investigators at WHOI who share common research interests in coastal ocean science.

COI is funding one new initiative this year—*A Coastal Ecosystem Research Initiative for the Northwest Atlantic*. This continuation project, led by **Al Plueddemann**, (*Physical Oceanography*), **John Trowbridge** (*Applied Ocean Physics and Engineering*), and **Heidi Sosik** (*Biology*), will expand on activities they began last year to develop and implement a research plan to measure, monitor and analyze the fundamental processing shaping the northwest Atlantic continental shelf ecosystem. They have made progress moving this initiative forward both by coordinating activities within the Institution by representing WHOI-interests in programs at NSF, NOAA and the state of Massachusetts. With continued funding, they are organizing a seminar series with external visitors/speakers to foster exchange and partnerships with non-WHOI researchers active in biophysical modeling of the region.



Jack Cook, WHOI

The Initiative focuses on the northwest Atlantic continental shelf from Nova Scotia to Cape Hatteras.

Friends of Coastal Science—David Stone



Jane Neumann, WHOI

Businessman, family man, sailor and fisherman, David Stone has been a steadfast friend of the Woods Hole Oceanographic for close to 40 years. His distinguished professional career, love and understanding of the sea, wit, and keen sense of humor have served the Institution well.

He has helped guide several Board committees over the years, currently serving as chair of Access to the Sea, and as a member of the Campaign and Coastal Ocean Institute (COI) Committees. In his role as a COI Committee member, David has introduced many colleagues to the Institution, both in and around the Boston area, and even in his own backyard.

David and his family welcomed our 60' coastal boat, *Tioga*, to their dock

in Marion MA, to introduce the vessel—and current coastal research initiatives—to a gathering of their many friends and neighbors. The day was filled with boat tours, hosted by Captain Ken Houtler, and poster sessions presented by WHOI scientists.

Among the Stones' guests were Trustee, Hope Smith, and now retired Vice President for Marine Operations, Dick Pittenger, pictured here standing between David and Margot, *Tioga* in the background.

As the vessel's “maiden voyage” across Buzzards Bay to meet new WHOI friends and supporters, it was a great success.

We thank the Stones for their continuing and active support of the Institution and our coastal initiatives.

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