



COASTAL RESEARCH

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



A message from the Director of the COI



This is the inaugural issue of WHOI's Coastal Ocean Institute (COI) newsletter.

Hopefully, you will find this informative and timely, a simple way to keep up with the activities of the COI, the Rinehart Coastal Research Center (RCRC) and the scientists they are supporting. We have no rigid schedule, but instead will publish when we have information to convey. Our plan is to keep things simple, brief, and informative.

Let me first introduce myself. I became the Director of the COI and RCRC in July, 2004. I am a biologist and conduct research on the "toxic and harmful blooms" of algae that are known to many as "red tides." I run an active research program, and would be happy to elaborate on this line of research in person, or to host a visit to my lab if this topic interests you.

This newsletter highlights several important COI activities. One is our "Moving Shoreline" Initiative. This refers to the many processes that alter our shorelines, including coastal erosion, sea level rise, and barrier beach overwash. The COI helped scientists and managers meet together to identify priority research topics and information needs for this topic, and to develop plans for a novel research center. This newsletter describes a follow-up workshop attended by Trustees and other

interested individuals who wished to learn about shoreline change science first-hand through lectures, poster presentations, and field excursions.

Another story is by COI Fellow Jeff Donnelly. Jeff studies the history of major storms using, among other tools, coring techniques that reveal layers of sand deposited in inland areas when barrier beaches are breached by hurricanes. 2004 was an extraordinarily powerful and destructive hurricane season, which, of course, is a "good year" for Jeff. COI provided funds for him to travel to the Cayman Islands to collect data soon after that island was devastated by tropical storm Ivan.

One of the most important roles of the COI is to distribute funds for research within the Institution. To help you understand this process and to highlight the science proposals that were successful, this newsletter also summarizes recent COI funding decisions. The issue concludes with a short description of the manner in which WHOI scientists obtain their funding and the assistance COI can provide. One needs to understand this in order to appreciate the importance of a new initiative by COI Committee members to fund one Fellow in addition to the three that COI typically supports each year.

We hope you enjoy this newsletter, and welcome your comments and suggestions.

Don Anderson, COI Director

Investigators Spotlight

In addition to support for one Post-doctoral Fellow, one MIT/WHOI Joint Program Student and three Research Fellows, COI funded the following six research grants. 17 proposals were submitted from WHOI scientists requesting over \$1M in support. The selected projects represent a total commitment of \$343,000.

Nelson Frew (*Marine Chemistry & Geochemistry*) – Validation of the use of heat as a proxy tracer for gases in air-sea exchange.

Porter Hoagland, Di Jin (*Marine Policy Center*), **Rob Evans** (*Geology & Geophysics*), **Hauke Kite-Powell** (*Marine Policy Center*) – Developing annual estimates of the economic consequences of shoreline change in the United States.

Dan Repeta, Benjamin Van Mooy (*Marine Chemistry & Geochemistry*) – A collaborative microbiological and organic geochemical study of dissolved organic carbon cycling in the coastal ocean.

Dan McCorkle (*Geology & Geophysics*) – The influence of tidal pumping on denitrification in Waquoit Bay sediments.

Matt Charette (*Marine Chemistry & Geochemistry*), **Ann Mulligan** (*Marine Policy Center*) – Developing the concept of a coastal groundwater observatory.

Jim Ledwell, Gene Terray (*Applied Ocean Physics and Engineering*) – Airborne LIDAR mapping of dispersion and mixing in the coastal ocean.

Non-federal funds received

Chris Reddy received \$11,000 from the Lovell Foundation for his project, "Using chemical modeling to interpret the fate of oil spills."

Sedimentary Signature of Hurricane Ivan on Grand Cayman



Hurricane Ivan struck the island of Grand Cayman in September, 2004.



The photo above shows a road cut through one of these washover deposits, with the sand being more than 1 meter thick.

The 2004 Atlantic hurricane season was one of the most active in recent memory, with 15 named storms, including six major hurricanes (category 3, 4, or 5 on the Saffir-Simpson Scale). Four made landfall in Florida, resulting in tens of billions of dollars in damage. Recent work based on climatology suggests that we may have entered a hyper-active period of tropical cyclones. Faced with expectations of possible increased tropical cyclone activity, scientists, decision makers, and the general public have become increasingly concerned about risks to coastal communities and resources. Understanding how changes in tropical cyclone activity may be linked to changes in climate is imperative in order to project future changes in hurricane activity and possibly mitigate human injury, property damage and other hardship.

Work has begun to reconstruct long-term records of past tropical cyclone activity in the North Atlantic using the geologic record. Evidence of past intense hurricane strikes is often well preserved in the sediment record of coastal ponds and wetlands that are inundated with sand overwash from nearby beaches. However, no detailed study of the sedimentary fingerprint left in these environments from a modern hurricane strike of known intensity and duration has been undertaken in order to cali-

brate prehistoric records.

Hurricane Ivan, one of the most powerful tropical cyclones in the Caribbean in the last decade, struck the island of Grand Cayman in September, 2004.

Ivan's effects on the island provide a unique opportunity to determine how sediment is transported to and deposited in normally quiescent environments during intense storms. With Coastal Ocean Institute "rapid response" support, this project aims to examine the sedimentary signature left by Hurricane Ivan within the coastal ponds of the Cayman Islands and to reconstruct the history of previous intense hurricane strikes dating back several millennia.

Hurricane Ivan was a category 5 storm with sustained winds over 155 mph. Our initial survey revealed that

storm surge and waves overtopped most of the island's beaches and deposited large quantities of sand as much as 150 meters landward. Sediment cores extracted from coastal ponds located behind the beaches (below, left) now contain a layer of sand overlying the organic-rich mud that is normally deposited within these ponds (below, top right). Additional sand layers present deeper within the pond sediments (below, bottom right) were likely deposited by earlier historic and prehistoric hurricanes. We plan to study the evidence from these earlier cyclones and to determine their age so that a long-term record of intense tropical cyclones impacting the Cayman Islands can be reconstructed.

Jeff Donnelly, COI Fellow



Seminars and Workshops

Following a forum in the spring, *The Moving Shoreline: Coastal Change in Response to Rising Sea Level*, COI hosted a group of 24 trustees, corporation members, friends, and guests for a two-day Moving Shoreline Workshop on September 15 and 16. Organized by Associate Scientist Rob Evans of the Geology and Geophysics Department, and led by COI Committee Chair Bill Kealy and COI Director Don Anderson, the group discussed coastal science

issues needing research, and heard presentations by Assistant Scientists Ilya Buynevich, Jeff Donnelly, and Liviu Giosan of the Geology and Geophysics Department; and Assistant Scientist Tom Hsu, Associate Scientists Britt Raubenheimer and Peter Traykovski, and Senior Scientist John Trowbridge of the Applied Ocean Physics and Engineering Department. There was also a discussion of the economic impacts of shoreline change, led by Research Specialist

Porter Hoagland of the Marine Policy Center. The first day included technology demonstrations and a cruise on the R/V *Tioga*, and the second day included fieldwork on Sampson's Island in Cotuit (owned by the Massachusetts Audubon Society) and a discussion of the Science Plan for the Moving Shoreline Initiative. This was followed by a cocktail reception hosted by Honorary Trustee Kay Crawford at her home on the Evergreen Estate.

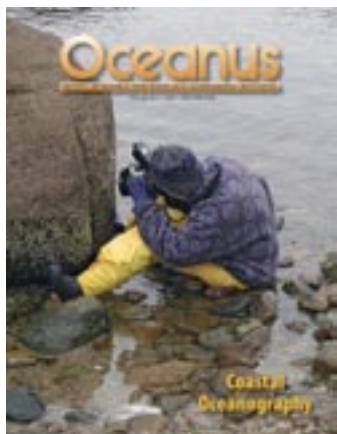


Assistant Scientist Ilya Buynevich, kneeling, demonstrates how ground-penetrating radar can be used to map ancient inlets on barrier beaches.



Kay Crawford and Peter Dragone on board the R/V *Tioga*.

Highlighted Publications



The just published issue of *Oceanus* is devoted to research that falls within the mandate of the Coastal Ocean Institute and Rinehart Coastal Research Center. Articles are being posted on line as soon as they are available: <http://oceanusmag.whoi.edu/v43n1>. As of this printing, 11 have been posted, covering the following subject areas: moving shoreline, harmful algae, dead zones, wind power, coastal processes, aquaculture, groundwater, oil pollution, and nutrient processes. Contact Judy Kleindinst for printed copies at jkleindinst@whoi.edu or 508-289-2745.

COI Committee Fellow

Bill Kealy, Chairman of the COI Committee, proposed at the October committee meeting that members consider voluntary contributions to fund one additional Fellow for the COI, which currently supports three. The approximate annual cost is \$60,000. Member response to this innovative idea has been gratifying, as approximately half of the funds for the first year of support have already been raised. We expect to announce the first COI Committee Fellow early in 2005. Contributions are entirely voluntary, and should be separate from annual gifts or other contributions to WHOI. It is also possible for donors who are not members of the Committee to contribute. For example, Topsy Montgomery, a long-time friend and supporter of coastal ocean science at WHOI, has generously joined the contributors.

One of my goals as COI Director is to increase the number of Fellows that COI supports. Many readers may not realize that WHOI is a "soft money" institution or, if they have heard the term, they don't know what it means. This refers to the fact that most of the salaries of our scientists must be raised through grants and contracts. Proposals must be written that compete with submissions from other investigators at other institutions, and it is not unusual for the proposal success rate to be as low as 10-20%. As a result, times have changed dramatically with respect to the way investigators fund their laboratories. Years

ago, a WHOI scientist could write one or two proposals to obtain all the support they needed. Now the number of submitted proposals is much larger, as is the number of funded projects needed to support a lab.

Given this background, it should be clear that when a scientist is designated a COI Fellow, (and receives 2-3 months of unrestricted salary each year for 3 years), proposal writing pressures are dramatically reduced. This allows that scientist to work on new and risky subjects that are often unfundable at an early stage, or to devote more attention to their core science, which can become increasingly fragmented by the competing demands of multiple projects. Another way to look at this is that as a scientist works to line up a full year of salary support, he or she will often write proposals for research on the fringe of their interests - all because of the need to raise that last few months of salary beyond what is covered by their core research programs. The unrestricted funding associated with being a Fellow of one of WHOI's Institutes frees our scientists from these constraints and leads to innovative research and breakthrough science.

On behalf of the WHOI scientific community, I sincerely thank those who have contributed or will contribute to the COI Committee Fellow. This sends a wonderful message to WHOI's hard-working coastal scientists.

Don Anderson

Friends of Coastal Science



"I choose to live at the ocean's edge and find it at times menacing, but always magnificent. The sea is at once an engine of Earth's climate, a source of life, and a joyous playground. I want to see it and to study it - from near-shore processes to deep ocean currents. Everything about it fascinates me."

— Bill Kealy

For Bill Kealy, Trustee and Chair of the COI committee, the ocean is clearly a passion. He has been involved with WHOI for more than ten years. The Institution and the COI are grateful for his leadership and dedication to the new Institute committee.

Bill was a Partner at Goldman Sachs for 29 years, retiring to Duck, North Carolina, in 1994. In his "spare" retirement time, he serves on the board of the Coastal Institute of the University of North Carolina, the NC School of the Arts, Aquarium Society and NC Community Foundations. He is a member of the Dean's Committee for International Development at Harvard's Kennedy School of Government and was adjunct professor of business at Columbia's Graduate School of Business.

Bill's interest in, and support of, WHOI's coastal research is long-standing.

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