

Fieldwork

Exciting New Discoveries in Submarine Hydrothermal Systems, Commonwealth of the Northern Mariana Islands

By Jim Hein and Science Team (names at end of article)

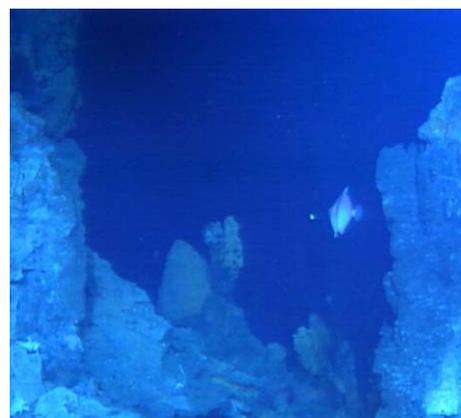
An interdisciplinary team of scientists explored submarine volcanoes of the Mariana Arc during a recent National Oceanic and Atmospheric Administration (NOAA) cruise to the U.S. Commonwealth of the Northern Mariana Islands (CNMI). Called “Submarine Ring of Fire, 2004,” the cruise produced several fundamental and exciting new discoveries about hydrothermal systems in active volcanic arcs. The most spectacular discoveries—such as the first observation of a deep-sea volcanic eruption—have been reported in numerous newspaper articles and radio and TV programs.

The cruise took place in March and April 2004 aboard the research vessel *Thomas G. Thompson*. It was the second

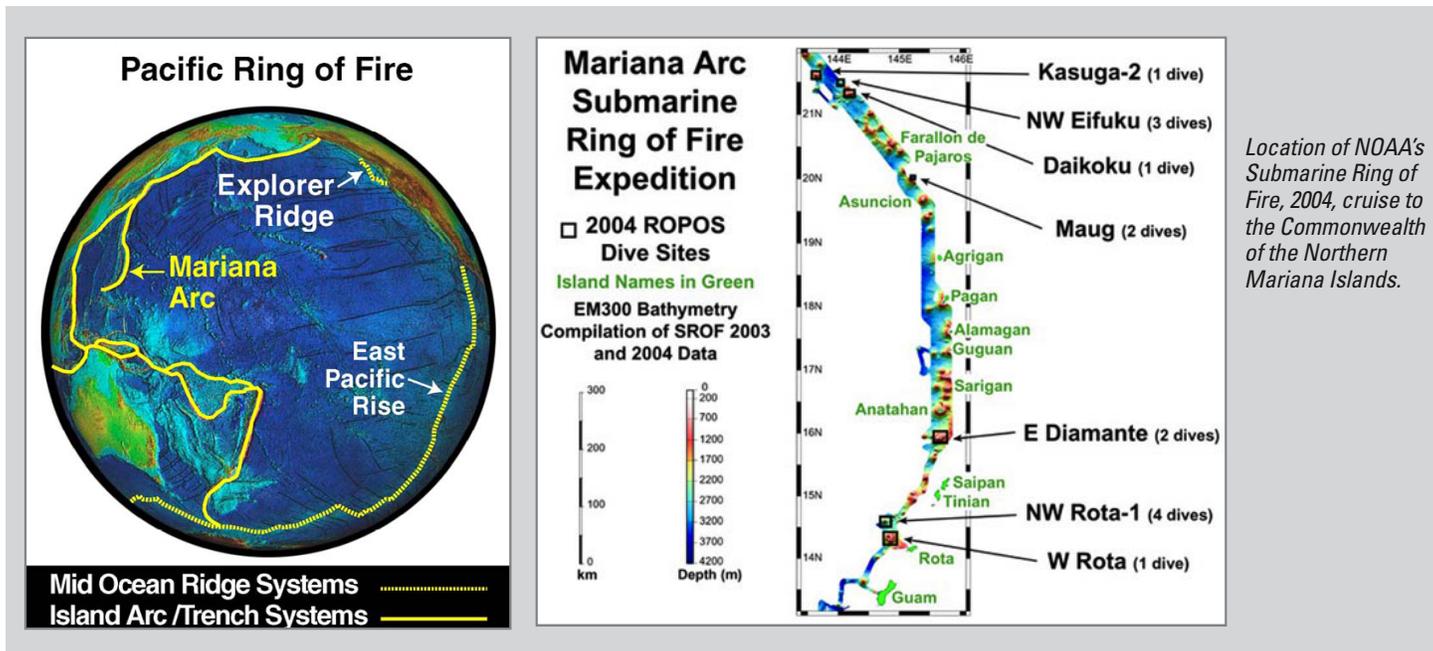
NOAA cruise to the CNMI; the first, conducted in 2003, completed extensive swath mapping of the arc and discovered 10 new submarine hydrothermal systems. During this year’s followup cruise, 34 scientists from the United States, Canada, Japan, and New Zealand, representing 13 institutions, worked in four research groups and one operations group:

- chemistry of the water column, vent fluid, and vent gas (9 participants),
- mapping (4 participants),
- biology (7 participants),
- geology and mineralization (4 participants), and
- remotely operated vehicle (ROV) dives (10 participants).

(Mariana Islands continued on page 2)



Tropical angel fish at the Black Forest black-smoker chimney field at 345-m water depth, East Diamante volcano. Note that the chimney at the left margin is venting, whereas the other chimneys in the field support only minor flow of warm fluids. The chimneys rise up to 9 m tall.



Sound Waves

Editor

Helen Gibbons
Menlo Park, California
Telephone: (650) 329-5042
E-mail: hgibbons@usgs.gov
Fax: (650) 329-5198

Print Layout Editors

Susan Mayfield, Sara Boore
Menlo Park, California
Telephone: (650) 329-5066
E-mail: smayfiel@usgs.gov; sboore@usgs.gov
Fax: (650) 329-5051

Web Layout Editor

Jolene Shirley
St. Petersburg, Florida
Telephone: (727) 803-8747 Ext. 3038
E-mail: jshirley@usgs.gov
Fax: (727) 803-2032

SOUND WAVES (WITH ADDITIONAL LINKS)
IS AVAILABLE ONLINE AT URL
<http://soundwaves.usgs.gov/>

Contents

Fieldwork	1
Research	6
Outreach	7
Meetings	12
Awards	14
Staff and Center News	14
Publications	15

Submission Guidelines

Deadline: The deadline for news items and publication lists for the September 2004 issue of *Sound Waves* is Thursday, August 12.

Publications: When new publications or products are released, please notify the editor with a full reference and a bulleted summary or description.

Images: Please submit all images at publication size (column, 2-column, or page width). Resolution of 200 to 300 dpi (dots per inch) is best. Adobe Illustrator® files or EPS files work well with vector files (such as graphs or diagrams). TIFF and JPEG files work well with raster files (photographs or rasterized vector files).

Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

U.S. Geological Survey Earth Science Information Sources:

Need to find natural-science data or information? Visit the USGS Frequently Asked Questions (FAQ's) at URL <http://ask.usgs.gov/faqs.html>

Can't find the answer to your question on the Web? Call **1-888-ASK-USGS**

Want to e-mail your question to the USGS? Send it to this address: ask@usgs.gov

Fieldwork, continued

(Mariana Islands continued from page 1)

Scientist **Jim Hein** of the U.S. Geological Survey (USGS)'s Western Coastal and Marine Geology Team in Menlo Park, CA, was part of the geology and mineralization group, along with **Cornel de Ronde** (Institute of Geological & Nuclear Sciences, New Zealand), **Bob Stern** (University of Texas at Dallas), and **Bob's** graduate student **Neil Basu**.

The main cruise operations included dives by the Canadian ROV *ROPOS* (Remotely Operated Vehicle for Ocean Science), conductivity-temperature-depth (CTD) measurements throughout the water column, and plankton tows. The CTD instrument also had sensors for measuring oxidation-reduction potential (Eh), particle size and volume, and amounts of dissolved oxygen (O₂), hydrogen (H₂), and methane (CH₄), as well as equipment for collecting water samples for laboratory chemical analyses.

In general, each site required at least two ROV dives, one to collect biologic and geologic samples and map geologic features and biologic habitats, and another to collect vent fluids and gases. Fourteen ROV dives were completed on seven volcanic edifices. One or two dives were canceled near the end of the cruise because of the need to get to port in Japan before the super typhoon Sudal passed between us and our destination.

This frontier exploration program was designed to increase our understanding of hydrothermal systems in volcanic arcs, which are poorly known in comparison with hydrothermal systems at spreading centers. Hydrothermal systems in volcanic arcs, unlike those at spreading centers, occur at a wide range of water depths and in varying rock compositions, with magmatic gases being likely common constituents of the hydrothermal fluids. Shallow-water vents are important because they can discharge hydrothermal products directly into the shallow ocean, including the photic zone, where biologic productivity is high, and the shallow vent sites may host unique and interesting biologic communities.

The volcanoes chosen for study were identified by examining CTD data collected during the 2003 cruise. For the 2004 cruise, more detailed CTD operations

were undertaken at each volcanic edifice to pinpoint the areas of most intense hydrothermal activity on the basis of various diagnostic plume tracers, such as particulate matter and methane content.

The first ROV dive on each volcano searched for local sites of venting. This technique was remarkably successful in finding hydrothermal fields at each volcano. Some of the major shipboard results and observations include (1) the first observations of a deep submarine arc volcanic eruption; (2) the shallowest massive sulfide and sulfate formation, at 345-m water depth and 240°C temperature; (3) a site at 1,600-m water depth with intense venting of carbon dioxide (CO₂), mostly as liquid CO₂; (4) wide variation in biologic communities between volcanoes; and (5) interaction of photosynthetic and chemosynthetic ecosystems. Three of the seven volcanoes studied will be discussed in more detail below to illustrate these points.

At NW Rota-1 volcano, we discovered a 20-m-deep pit crater (dubbed "Brimstone Pit") at about 550-m water depth that displayed thick, billowing yellow plumes of molten sulfur and volcanic-rock fragments as much as several centimeters in size. This hydrothermal-magmatic event plastered the ROV with molten sulfur that had to be scraped off the vehicle after it was back on deck. This discovery clearly demonstrates that magmatic degassing dominates the hydrothermal plume and contributes to the resulting mineral deposits. The contribution of magmatic degassing to hydrothermal systems has long been an area of controversy and intense discussion. Because sulfur is a relatively minor volatile component of arc magmas in comparison with water and CO₂, arc hydrothermal systems emitting abundant sulfur must also be supplying large fluxes of water and CO₂ to the oceans and atmosphere.

The CO₂ magmatic contribution was directly observed at the NW Eifuku volcano vent site (named "Champagne vent") at 1,600-m water depth, much deeper than the Brimstone Pit at NW Rota-1 volcano. At the NW Eifuku vent site, the higher pressures and lower temperatures stabi-

(Mariana Islands continued on page 3)

Fieldwork, continued

(Mariana Islands continued from page 2)

lize CO₂ as a liquid, and the liquid CO₂ can be seen exiting the sea floor as large bubbles that look very different from gas bubbles (think lava lamp). Those liquid CO₂ bubbles were collected in a plastic core liner, and changes in their characteristics were observed as the ROV ascended and the bubbles were subjected to decreasing pressure and increasing temperature. The dominant hydrothermal mineral deposited at both NW Rota-1 and NW Eifuku is elemental sulfur, including spherules in volcanoclastic sediment, massive deposits, fracture fill, chimneys as much as 1 m tall, cement in breccia, and flat slabs forming at the sea floor in areas of diffuse venting.

In contrast to the hydrothermal-magmatic systems at NW Rota-1 and NW Eifuku volcanoes, a sulfide/sulfate chimney field developed at 650-m water depth at East Diamante volcano had a paucity of elemental sulfur, indicating a more mature hydrothermal system with little magmatic contribution—a system more like those at spreading centers. Chimneys up to 9 m tall composed the Black Forest vent field. An interesting observation at the Black Forest vent field was phase separation (separation of gas and liquid) within a single chimney. Gas bubbles and liquid were exiting from one subvent in a chimney, and liquid from another subvent in the same chimney. The measured fluid



Liquid CO₂ bubbles being released from fractures adjacent to the white-smoker sulfur chimneys at the Champagne vent, NW Eifuku volcano.

temperature of 240°C produces boiling at the 650-m water depth of these vents. Preliminary evaluation indicates that the chimneys and mounds are composed of various amounts of pyrite, sphalerite, chalcopyrite, barite, and anhydrite. This copper-zinc-iron-barium mineralization is likely controlled largely by water/rock interaction. It was a little disconcerting while studying

the Black Forest vent field to see a tropical angel fish swim by one of the black-smoker chimneys—something one would never see at a midocean spreading center.

All the hydrothermal systems observed in the Mariana arc are associated with either volcano summits or resurgent domes inside a volcanic caldera. The main characteristics of the hydrothermal systems along the Mariana arc are shallow-water, highly permeable rocks, gas-rich discharge, and mineralization and fluid/gas composition controlled by the boiling point of the hydrothermal fluids (phase separation), which, in turn, depends on water depth (pressure). These characteristics result in the subsurface deposition of sulfides, except in the more mature hydrothermal systems, such as at East Diamante volcano.

The biologic discoveries were as profound as the geologic discoveries. Large biologic collections recovered relatively few (33 total) species, and each volcano supported a different dominant fauna. Significantly, no larvae were observed in the water column above the vent fields, in contrast to spreading centers, where transport of larvae by currents in the water column is the main mechanism of dispersal to distant sites. It was discovered that for some fauna—



Diffuse-flow venting supports a densely packed mussel field with abundant galatheid crabs, East Diamante volcano.

for example, several types of snails—egg cases are placed on rocks, and the larvae hatched from the cases remain near the bottom and rapidly develop into forms that exist at the sea floor. Thus, many vent taxa seem to produce larvae with limited dispersal potential. These observations, combined with the fact that currents commonly circulate around the volcanoes, likely enhance larval retention and retard inter-volcano colonization.

To learn more about the cruise, visit URL <http://oceanexplorer.noaa.gov/explorations/04fire/>. Hundreds of samples and gigabytes of data will keep Ring of Fire scientists busy for many years, unraveling the mysteries of the workings of volcanic arcs. The shipboard results are spectacular, and those that will follow from laboratory analyses are bound to be even more remarkable.

Science Team: **Ed Baker, Neil Basu, Sheryl Bolton, Dave Butterfield, Bill Chadwick, Cornel de Ronde, John Dower, Bob Embley** (Chief Scientist), **Leigh Evans, Jim Hein, Kim Juniper, Ben Larson, Geoff Lebon, John Lupton, Susan Merle, Anna Metaxas, Shunsuke Miyabe, Craig Moyer, Ko-ichi Nakamura, Shannon Ristau, Kevin Roe, Jonathan Rose, Bob Stern, Verena Tunnicliffe**. For scientists' backgrounds and affiliations, visit URL <http://oceanexplorer.noaa.gov/explorations/04fire/background/explorers/explorers.html>. ☼

USGS Woods Hole Dive Team Deploys Samplers for Study of a Phosphorus Plume

By Rick Rendigs

Members of the U.S. Geological Survey (USGS)'s Woods Hole Science Center dive team (**Dann Blackwood, Michael Casso, and Rick Rendigs**) successfully completed emplacement and recovery of "seepage samplers" in the offshore sediment of Ashumet Pond in Falmouth, MA, on June 3-4, 2004. This reconnaissance project was conducted in collaboration with **Denis LeBlanc**, of the USGS Water Resources Discipline (WRD)'s Massachusetts District, in an effort to determine the extent and concentration of phosphorus contained within ground water that is flowing into the pond.

The source of phosphorus is believed to be a sewage-treatment plant located on the Massachusetts Military Reservation. Phosphorus is one of a suite of nutrients that has been associated with increased algal blooms and potential eutrophication processes in lakes and estuaries.

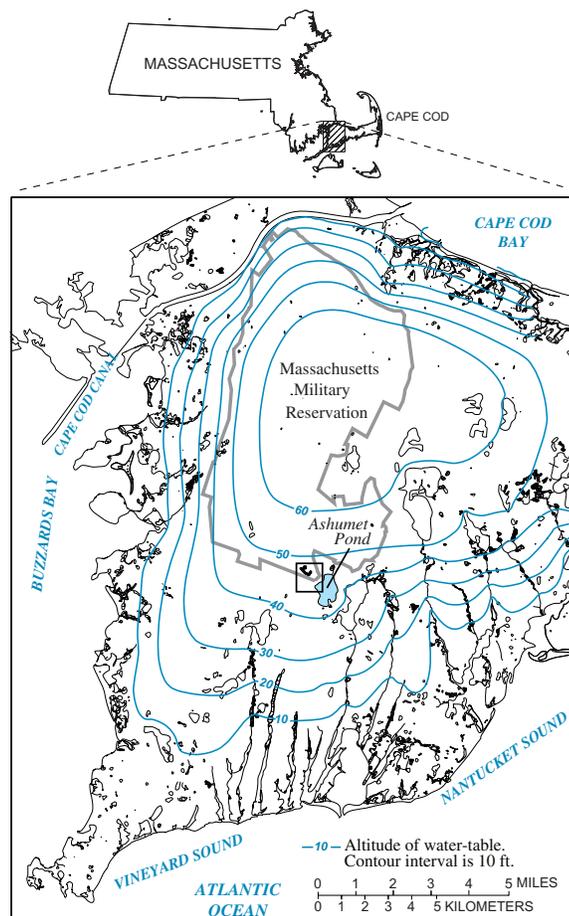
The nearshore area of high-nutrient ground-water flow into Ashumet Pond is readily defined by black discoloration on the pond-bottom sediment. The discoloration is believed to be a manganese oxide coating that precipitates under anaerobic conditions associated with the biodegradation of organic matter in sewage-treatment processes. USGS divers observed this dis-



Seepage samplers in Ashumet Pond. Inset, **Nick Geboy** (USGS/National Association of Geoscience Teachers student intern from University of Wisconsin, Oshkosh) installing a seepage sampler.

coloration as extending more than 100 ft from the shoreline to a water depth of more than 10 ft. The discoloration covers several hundred yards along the offshore area north of the public boat ramp. Results from the offshore seepage samplers indicate elevated concentrations

Phosphorus continued on page 5)



Location of Ashumet Pond.



Pond-bottom drive-point wells being installed and sampled.

Fieldwork, continued

(Phosphorus continued from page 4)

of phosphorus out to a distance of 80 ft from the shoreline.

Eight drive-point wells were also drilled into the pond sediment from a floating barge at two sites near the seepage-sampling area. The wells were drilled and sampled to maximum depths of 100 ft to delineate the vertical extent of the phosphorus plume within the offshore sediment. On the basis of these preliminary results, further sampling efforts are planned throughout the summer to determine and map the offshore concentration gradients of phosphorus entering the pond. Stay tuned! ❁



(From left to right) **Jonathan King** (WRD, Northborough, MA) confers with divers **Michael Casso** and **Rick Rendigs** (USGS Woods Hole Science Center).

California Sea-Otter Numbers Climb for Second Consecutive Year

By **Gloria Maender**

Observers tallied a record-high total of 2,825 California sea otters for the 2004 spring survey led by the U.S. Geological Survey (USGS). The 2004 total marked the second consecutive year the threatened population has shown an appreciable increase in numbers, up 12.8 percent over the 2003 total of 2,505 otters.

“The latest 3-year running average of the three most recent spring counts is up 9.8 percent, to 2,490 sea otters,” said survey organizer **Brian Hatfield**, a USGS biologist in California. The use of 3-year running averages in assessing trends is the approach recommended by the Southern Sea Otter Recovery Team to reduce the influence of any anomalous counts in a given year. For the southern sea otter to no longer be considered “threatened” under the Endangered Species Act, a 3-year running average count of at least 3,090 sea otters would need to be sustained for 3 consecutive years.

The recent increase in sea otters, however, apparently has not occurred across all segments of the population evenly. “Most of the recent increase has been in areas dominated by male sea otters,” said USGS scientist **Jim Estes**. “Numbers of reproductive females have remained roughly stable for the past decade, or perhaps even longer.”

Though encouraged by the high count, the scientists have not yet fully assessed

what it means for the recovery of the southern sea otter. Elevated sea-otter mortality has hindered recovery of the population. “We are assembling a recovery-implementation team to address this and other recovery issues,” said **Greg Sanders**, southern sea-otter-recovery coordinator for the U.S. Fish and Wildlife Service. “Increasing sea-otter numbers will help us reach our recovery goals, but ultimately we must address the underlying threats to the population.”

Scientists from Federal and State agencies, universities, and the Monterey Bay Aquarium have been working collaboratively to better understand why the California sea otter has not yet fully recovered. The team is using radio transmitters and

time-depth recorders in dozens of tagged sea otters to track and monitor behavior and vital signs as the animals dive and forage for food. Preliminary results from these telemetry studies are showing an increase in male survival in recent years, but not in female survival.

“By very precisely and closely following these tagged individuals, we are taking a qualitatively new look into the population,” said **Estes**. “From these individuals we will be able to make a sounder assessment as to what causes them to die or acts on their mortality, and the relative proportion of various threats.” Additional insight into mortality comes from detailed necropsies by the California Department of Fish

(Sea Otters continued on page 6)



Kayakers and a sea otter (foreground) share the waters of Elkhorn Slough, CA. Photograph by **Paula Messina**, San Jose State University.

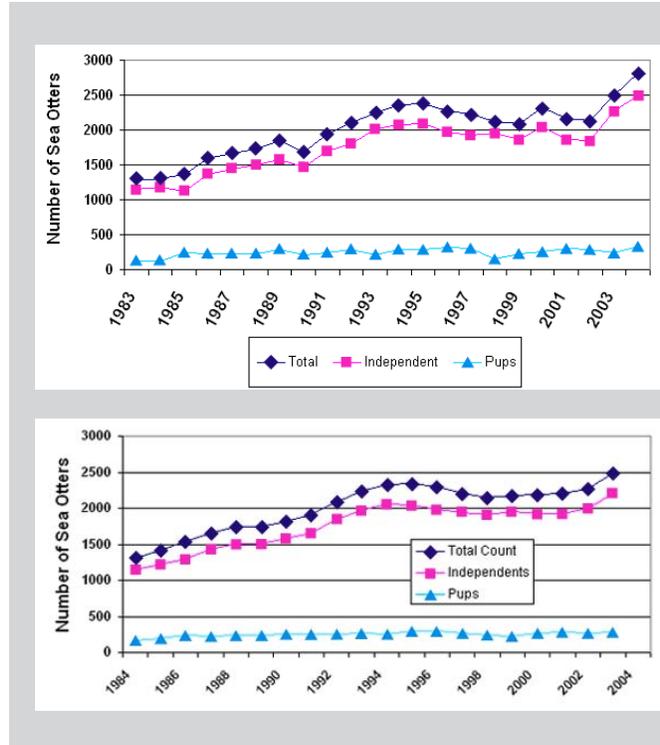
Fieldwork, continued

(Sea Otters continued from page 5)

and Game of freshly dead sea otters found stranded along the California coast.

The spring 2004 California sea-otter survey was conducted May 6-21, from Point San Pedro in the north to Rincon Point in the south, in overall viewing conditions slightly less favorable than for spring 2003. The spring survey is a cooperative effort of the USGS, the California Department of Fish and Game's Marine Wildlife Care and Research Center, the Monterey Bay Aquarium, and many experienced and dedicated volunteers. The information gathered from spring surveys is used by Federal and State wildlife agencies in making decisions about the management of this small sea mammal.

On June 15, a new high-definition USGS video product was premiered on HDNet. The program, "Precipice of Survival: The Southern Sea Otter," explains how the sea otter population in central California, slowly recovering from near-extinction after the 18th- and 19th-century fur trade, is being studied by a diverse team of scientists and volun-



Graph on top shows number of sea otters counted in California spring surveys since 1983; graph on bottom shows 3-year running averages of the same data. (Example: Values for 2002 are averages of the 2001, 2002, and 2003 counts.) Scientists use 3-year running averages—which reduce the influence of anomalously high or low counts during any particular year—to assess whether the California sea-otter population is growing or declining.

teers whose collaborative research effort may provide key information for the sea otters' recovery. The program will air

repeatedly on HDNet over the next year. Go to URL <http://hd.net/> for broadcast information. ☼

Research

West-Central Florida Coastal Studies Project Celebrates Successful Conclusion

By Jennifer Leigh Oates

A celebration was held on March 16 at the U.S. Geological Survey (USGS)'s Center for Coastal and Watershed Studies in St. Petersburg, FL, to commemorate the conclusion of a 5-year collaborative study between the USGS, the University of South Florida (USF), and Eckerd College. The West-Central Florida Coastal

Studies Project was undertaken to investigate the geologic history of the west-central Florida coast and the processes that control the distribution of sediment and the formation of barrier islands in this heavily developed region, where high rates of beach erosion have become a major concern.

Project participants sought to better understand the recent geologic history of the region's barrier-island system and its natural variation, sea-floor bathymetry, surficial-sediment distribution, and subsurface stratigraphy, as well as water circulation and its interaction with the coastal inner-

(Coastal Studies Project continued on page 7)



Celebrants proudly display some of the final products of the West-Central Florida Coastal Studies Project. From left to right: **Lisa Robbins** (USGS), **Gregg Brooks** (Department of Marine Science, Eckerd College), **Al Hine** and **Stan Locker** (College of Marine Science, USF), and **Laurinda Frye**, **Betsy Boynton**, **Rob Wertz**, and **Kristy Guy** (USGS).

Research, continued

(Coastal Studies Project continued from page 6)

shelf system. Numerical models developed from the project help describe the responses of west-central Florida's continental-shelf circulation and sea level to storms and varying seasonal conditions.

The scientists, technicians, and staff members who participated in the creation of recent publications for the project were recognized at the March 16 celebration. The

published works include 24 USGS Open-File Reports, 5 USF Technical Reports, 17 theses and dissertations, and 39 papers and abstracts. Many papers appeared in a special issue of the international journal *Marine Geology* (2003, v. 200, no. 1-4). Project participants anticipate that their products will be widely used by regional and local coastal engineers, planners, government officials,

and interested citizens in managing west-central Florida's coastal resources.

For more information about the project, visit URL <http://coastal.er.usgs.gov/wfla/>. To view three-dimensional numerical circulation models created with data collected by current meters and satellite imagery, visit URL <http://ocgmodel.marine.usf.edu/~ruoying/nowcast.html>. ❁

Outreach

Third USGS Tour for Congressional Staff in South Florida

By Judy Salvo and Jennifer Leigh Oates

The U.S. Geological Survey (USGS) hosted its third annual tour for Congressional staff in south Florida during the week of January 4-9. The tour highlighted USGS science and partnerships in Tampa Bay, the Everglades, Biscayne National Park, and the U.S. Fish and Wildlife Service (USFWS)'s Chassahowitzka National Wildlife Refuge complex on Crystal River. Congressional staffers who participated were well educated in environmental issues. Topics addressed were manatee research, aquatic vegetation, mangrove environments, water quality, dynamics of ground- and surface-water interaction, saltwater intrusion, Everglades' restoration, coral-reef ecosystems, and effects of urbanization.

Seven staffers participated: **Aloysius Hogan**, Legislative Director, Office of Senator **James M. Inhofe**; **Dan Bresette**, Senate Environment and Public Works Committee; **Amy Carroll** and **Susannah Foster**, House Subcommittee on Environment, Technology and Standards; **David Zacher**, House Resources Committee; and **Nicole Carter** and **Pervaze Sheikh** from the Congressional Research Service,

Library of Congress. The staffers commented that they were impressed with the breadth of USGS science and have since attended other USGS-sponsored briefings in Washington, DC. **Jane Lyder**, Legislative Counsel in the Department of the Interior's Office of Congressional and Legislative Affairs, also attended.

En route to the Chassahowitzka Refuge on January 5, **Bonnie McGregor** (USGS Eastern Regional Director) welcomed guests and discussed science partnerships in Florida. Two pontoon boats, refuge managers, and **Bob Bonde** (USGS, Gainesville) greeted staffers at the refuge docks, eager to introduce their springs and manatees. The "slipping" into wetsuits became a "team-building" activity in the ladies' room. **Bob** discussed manatee research and how manatees are tagged to track life cycles, migratory habits, and populations. After visiting two freshwater springs, the group picnicked at the refuge as project leader **Jim Kraus**, Chassahowitzka National Wildlife Refuge, helped answer questions, discussed demands on the refuge, and stressed the refuge's importance.

The following day began at Weedon Island Preserve. **Kim Yates**, of the USGS Center for Coastal and Watershed Studies (CCWS) in St. Petersburg, presented an overview of the day's activities and explained what and how USGS scien-



Peter Swarzenski (in green hat) fielded questions about ground-water geochemistry and pollutants in Tampa Bay.

tists and cooperators are studying in Tampa Bay. The walking tour of the mangrove environment at Weedon Island Preserve included presentations by CCWS scientists on estuary vegetation (**Tom Smith**), sea-level rise and archeology (**Terry Edgar**), and estuary fishes (**Carole McIvor**, **Justin Krebs**, and **Adam Brame**). The group next boarded a boat. **Kim**, **Mark Hansen**, **Ellen Raabe**, and **Kathryn Smith** (CCWS) and **Mike Crane** (USGS, South Dakota) pointed out areas of interest during the ride to Bishop Harbor in Terra Ceia Aquatic Preserve and adjoining Buffer Preserve. The staffers were able to see the difference between a pristine and a disturbed coastal habitat. Seagrass habitats, island mangrove environments, and prehistoric Indian archeological sites were discussed. **Terry** and **Ellen** taught staffers how to take a core in Terra Ceia Aquatic

(Congressional Staff continued on page 8)



Staffers sighted numerous manatees while snorkeling through the springs.

Outreach, continued

(Congressional Staff continued from page 7)

Preserve. **Peter Swarzenski** spoke on ground water in Tampa Bay.

The next morning, the group saw the effects of urbanization in the Everglades while en route by car to the Loxahatchee National Wildlife Refuge. **Dave Krabbenhoft** (USGS, Middleton, WI) discussed water quality, mercury, and other geochemical issues in the Everglades. At the refuge, the staffers boarded an airboat and saw rare species of wildlife, including ro-



Staffers take a sediment core in Terra Ceia Aquatic Preserve that will be used to interpret the history of Tampa Bay.

seate spoonbills and alligators. The cooperative work between the USGS and the U.S. Fish and Wildlife Service strives to understand the natural and anthropogenic processes that affect the health and future of the Everglades.

On the final day, USGS scientists and National Park Service rangers explained the importance of the delicate and complex ecosystem in Biscayne Bay. **Lynn Wingard** (USGS, Reston, VA), **Caroline Rogers** (USGS, St. John, VI), and **Chris Reich** (USGS, St. Petersburg) showed the staffers soft- and hard-bottom areas, coral-reef nurseries, seagrass, and sponge habitats. Aquifers were discussed, and a freshwater spring was observed. Lunch was eaten under palm trees at the Biscayne National Park visitors center at Convoy Point. By the end of the week, the staffers had a better appreciation of how delicate and threatened are the numerous components of the south Florida ecosystem. ❁



Several airboats at the Loxahatchee National Wildlife Refuge whisked the group into the Everglades for a memorable ride and picnic lunch.



Group photograph was taken in Biscayne Bay at the end of the last day.

2004 Florida Oceans Day

By Jennifer Leigh Oates

The 2004 Florida Oceans Day, held in Tallahassee on April 20 and 21, was successful in bringing the health of Florida's oceans to the attention of legislators and governmental officials. **Governor Jeb Bush** spoke about the importance of Florida's oceans to its economy during a midmorning presentation on April 21 from the steps of the original Capitol. Members of the U.S. Commission on Ocean Policy concluded the presentation by discussing their preliminary report findings.

The Mote Marine Laboratory (Sarasota, FL) sponsored a reception for legislators and other governmental officials to meet participating exhibitors and Mote scientists and educators on the 22d floor of the

Capitol. The USGS booth was located on the third floor, directly across from the Florida Senate in the Capitol Rotunda. **Richard Marella**, **Jim Tomberlin**, and **Ed Oaksford** from the USGS Tallahassee office helped with behind-the-scenes logistics. **Jen Oates** (USGS, St. Petersburg) and **Richard** staffed the booth and answered questions about Florida's hydrology and coastal research. The booth received a steady flow of visitors interested in the information being distributed. Florida Oceans Day was sponsored this year by the Florida Ocean Alliance. Local Tallahassee students visited the event. ❁



Richard Marella and **Jennifer Oates** represented the USGS at the 2004 Florida Oceans Day in Tallahassee.

USGS Scientists Assist with the University of South Florida's Hydrogeology Field Camp

By George Kish

During the weeks of May 10 and May 17, U.S. Geological Survey (USGS) scientists assisted **Mark Stewart** and **Mark Rains** from the University of South Florida (USF)'s Department of Geology with the USF Hydrogeology Field Camp. Activities included the use of various types of equipment and numerous field stops throughout south Florida.

Arturo Torres (USGS, Tallahassee) opened the camp with an overview of USGS research in the Comprehensive Everglades Restoration Plan (CERP). On May 13, camp participants installed and took measurements with piezometers and collected soil and vegetation data along an ecohydrologic gradient previously studied by **George Kish** (USGS, Tampa) and **Mark Rains**. On May 17, **George, Billy Lewelling, and John Trommer** (USGS, Tampa) accompanied the participants to Crystal Springs to provide hands-on instruction on making a discharge measurement. **Billy** described the relation between stage and discharge and assisted participants with measuring equipment. Later, he guided participants to several sites along the Peace River where surface water is being recharged to ground water through numerous sinkholes. Participants also visited a drillsite where **Lari Knochenmus** (USGS, Tampa) explained the drilling process and the significance of the cores being collected. On May 19-21, **Arturo** and **Ben McPherson** (USGS, Tampa) led participants to four sites within the south Florida Everglades ecosystem:

1. The Loxahatchee Impoundment Landscape Assessment (LILA) project is now underway within Water Conservation Area 1 (WCA 1), also known as the Arthur R. Marshall (ARM) Loxahatchee National Wildlife Refuge, in North Palm Beach. LILA is a 300-acre hydrologic-assessment facility within the ARM Loxahatchee National Wildlife Refuge, designed to answer key questions about Everglades' restoration. The project will define hydrologic regimes that sustain a healthy Everglades ecosystem. **Eric Cline**, a South Florida

Water Management District (SFWMD) environmental scientist from West Palm Beach, provided the tour.

2. The Stormwater Treatment Area 1W (STA 1W) is the first experimental freshwater artificial marsh constructed in the Everglades to filter or remove phosphorus from runoff draining Everglades agricultural areas. SFWMD environmental scientist **Christy Combs** (West Palm Beach) briefed participants on the history and purpose of the STA 1W project, formerly known as the Everglades Nutrient Removal Project (ENRP). The STA 1W is SFWMD's first experimental site to investigate the feasibility of filtering phosphorus-laden water by using an artificial marsh.
3. The city of West Palm Beach's water-utility Aquifer Storage and Recovery (ASR) well is the world's largest freshwater injection well. Approximately 1,200 ft (365 m) deep, it can store as much as about 8 million gallons per day.
4. Scientists at the SFWMD and the Florida Department of Environmental Protection's Division of Recreation and Parks are monitoring vegetation along a coastal reach of the Loxahatchee River in the Jupiter area. Field-trip participants visited transect #10, located within Jonathan Dickinson State Park. USGS scientists **Ben McPherson** (Tampa, FL), **Bill Orem** (Reston, VA), and **Peter Swarzenski** (St. Petersburg, FL) are conducting a parallel study for assessing ground-water influx and



USF students measure streamflow.

(Hydrogeology Field Camp continued on page 10)



Billy Lewelling describes the relation between stage and streamflow.

(Hydrogeology Field Camp continued from page 9)

biogeochemical characteristics of the Loxahatchee River and flood-plain ecosystem.

After the four stops, **Ben** provided an overview of Everglades National Park and led the group to several sites along the park's main road: (1) the Anhinga Trail over a section of Taylor Slough, (2) Rock Reef Pass (elevation, 3 ft), (3) the Pa-hay-okee Overlook over Shark River Slough, (4) Mahogany Hammock, (5) Nine Mile Pond to observe the ecotone, or transition zone, between the freshwater marsh and the mangrove area, and (6) Flamingo Beach. **Chris Langevin** (USGS, Miami) briefed the group on the objectives of the Tides and Inflows in the Mangroves Ecotone (TIME) hydrodynamic model, which covers the Everglades National Park area.

The group also made a quick stop on water structure S-12D along the Tamiami Trail for a brief description of two of the most important Everglades restoration projects, the Modified Waters project and the CERP Decompartmentalization Project, that will restore sheetflow in the Everglades National Park. The next stop was a drivethrough of Loop Road within Big Cypress National Preserve. There, the group had an opportunity to observe a near-dry pond in the Roberts Lake Strand that serves as a refuge for a small fish community and several starving alligators. The day ended with a stop at Everglades City.



Peace River sinkhole.

On May 21, **Eduardo Patino** (USGS, Fort Myers) joined the group and provided an overview of USGS activities in southwest Florida. Stops included the Fakahatchee Strand State Preserve and the Southern Golden Gate Estates area, site of another major CERP undertaking in southwest Florida. The group made a brief, mosquito-infested stop along the 2,000-ft (610 m)-long boardwalk at Big Cypress Bend. The boardwalk ended at another near-dry pond that was also refuge for a handful of alligators trying to survive the dry season. The final stop was at Collier-Seminole State Park to observe one of the historic walking dredges used during the construction of the Tamiami Trail in the 1920s. ❁



Ben McPherson (beside white monitoring well) describes ground-water features of the Everglades.

ASLO Minorities Program Keynote Address

By **A. Keith Miles**

Keith Miles of the U.S. Geological Survey (USGS)'s Western Ecological Research Center delivered the keynote address at the Minorities Program of the American Society of Limnology and Oceanography (ASLO)'s national meeting held June 12-17 in Savannah, GA. The ASLO directorate, directors of the National Science Foundation (NSF), and many leading scientists in limnology and oceanography attended the presentation.

The NSF has sponsored the Minorities Program for more than a decade. The pro-

gram's goal is to attract gifted minorities, women, and economically underprivileged students into graduate education and, subsequently, professional environmental disciplines. This effort has been an uphill battle because many of these talented individuals choose more lucrative professions, such as medicine. The Minorities Program brings primarily undergraduate students to the ASLO national meeting and matches them with experienced scientists from academic, private, and governmental institutions who mentor them through presen-

tations and provide counsel on their plans for the future. Many of the students also present their research on projects supervised by mentors in the program. Several scientists who participated in this year's conference were recruited through the ASLO Minorities Program and are now tenured or tenure-track professors. **Keith** has served as a mentor since the inception of the program in 1990; the title of his presentation was "Contaminants in the Nearshore Environment of the Aleutian Archipelago, Alaska." ❁

University of South Florida's Oceanography Camp for Girls Makes a Splash Around Town

By Jennifer Leigh Oates

Scientists from the U.S. Geological Survey (USGS), the University of South Florida (USF)'s College of Marine Science, and the Florida Marine Research Institute (FMRI) sat down with teenage girls attending USF's Oceanography Camp for Girls to discuss what it is like to be a scientist. The girls asked the scientists questions about their education, inspirations, research, and achievements.

The 36 girls toured the USGS, USF, and FMRI facilities in downtown St. Petersburg, FL, on June 9 and 10. At the USGS Center for Coastal and Watershed Studies, the girls were briefed about ongoing research and were teamed with a USGS scientist, their "scientist buddy." As part of the exercise, the girls cooperatively thought of questions to ask their scientist buddies later in the day. It was impressive to see interested teenage girls leaning over an open sediment core in the USGS core lab and discussing Louisiana's problems with subsidence, rising sea level, and wetland loss.

In the USGS research laboratory, lab manager **Molly McLaughlin** explained how scientists use some of the center's equipment. Posters showing coastal erosion, effects of Hurricane Isabel, airborne-lidar imagery, karst hydrology, coral reefs, and uses of the underwater incubation chamber named the Submersible Habitat for Analyzing Reef Quality (SHARQ) inspired many questions from the young scientists. The campers thought building an unmanned aerial vehicle (UAV), a small plane, would be a great high-school science-class project. Microbiologists use the USGS UAV to sample atmospheric dust blown across the Atlantic Ocean from Africa and have installed a global positioning system (GPS) and a video camera on the plane. Microorganisms in the dust samples are identified to understand the possible effects of African dust on coral reefs that are declining in Florida and the Caribbean. The possible effects of African dust on agriculture, human health, and homeland security were also discussed during the tour. At the conclusion of the tour, camp-



*USGS lab manager **Molly McLaughlin** shows eager USF oceanography campers how dried cores, when sprayed with water, reveal sediment layers more clearly.*

ers were given the opportunity to interview scientists. Many campers and scientists exchanged e-mail addresses.

The USF College of Marine Science started the first Oceanography Camp for Girls to increase awareness and to address the shortfall of women scientists. The camp was created to respond to several national studies conducted in the 1990s that revealed a tremendous drop in the number of women pursuing mathematics and science degrees.

The benefits of an all-girl camp include a decrease in the number of social learning barriers, a risk-free environment to ask questions, and a positive sense of self. Camp participants enjoy getting their hands dirty and not being concerned with their appearance because there are no boys to impress, just girls with the same interest in learning. With interdisciplinary learning that focuses on math, ecology, and physical and natural sciences, campers are able to participate in real-world research projects and problem solving. Alumni campers and graduate-student mentors are also offered the chance to serve as peer mentors to new campers, while enhancing their own communication and leadership skills.

"The Oceanography Camp for Girls was developed to inspire and motivate young women entering high school to consider career opportunities in the sciences," said **Teresa Greely**, camp director and biological oceanographer. "Thanks to everyone who participated in USF interviews and helped explain USGS scientific research and equipment to the campers. This

event was possible and a success because of you." USGS participants were **Julie Bernier, John Brock, Adam Brame, Michael Gray, Molly McLaughlin, Tara Miller, Christina Kellogg, Justin Krebs, Ilsa Kuffner, Chad Stout, Ginger Tiling, and Dana Wiese.**

The summer program provides hands-on, real-world experiences in both laboratory and field environments for three weeks in June. A day camp that operates from 8 a.m. to 4 p.m., the program is available to girls who have completed the eighth grade and live and attend school in Pinellas County, FL. Contributions from local individuals and businesses fund camp expenses. For more information, visit URL <http://www.marine.usf.edu/girlscamp/index.html>. ☼



***Julie Bernier**, a GIS mapping intern contracted with USGS, shows USF oceanography campers the USGS core lab and sediment cores collected in Louisiana wetlands.*

Florida Festival Stresses Water Conservation

By Jennifer Leigh Oates

The U.S. Geological Survey (USGS)'s Center for Coastal and Watershed Studies in St. Petersburg, FL, participated in this year's "A River Runs Through It" community festival in New Tampa on May 1. The focus of the festival was on water conservation, the importance of green space, and family fun.

Ann Tihansky (USGS hydrologist) created a poster specifically for the festival to illustrate where the USGS has monitoring stations in the Hillsborough and Alafia River basins, Tampa Bay, and other coastal areas. Separate maps for ground-water, surface-water, and water-quality monitoring sites were included on the poster.

Mike Holmes (USGS supervisory information-technology specialist) brought a computer to the festival to showcase USGS real-time data. A large crowd was attracted to the booth to view rainfall and streamflow data. The day before the festival, a large rainstorm occurred in the upper part of the Hillsborough River basin, providing an opportunity to see the effects of rainfall on streamflow.



From left to right: **Arnell Harrison**, **Mike Holmes**, **Jennifer Oates**, **Ann Tihansky**, and friend. Photograph by **Chris Holmes**.

Arnell Harrison (USGS hydrologic technician) and **Jennifer Oates** (USGS public outreach coordinator) were also present to

help field questions and distribute information. The festival was sponsored by the Hillsborough River Greenways Task Force. ❁

Meetings

USGS Participates in the Seventh Biennial Basics of the Basin Research Symposium, New Orleans

By James Flocks and Carol Franze (University of New Orleans, Department of Biological Sciences)

The Seventh Biennial Basics of the Basin Research Symposium was held May 20 and 21 at the University of New Orleans along the shore of Lake Pontchartrain. The symposium, sponsored in part by the U.S. Geological Survey (USGS), addresses the conditions of the Lake Pontchartrain Basin, the largest estuarine ecosystem on the Gulf Coast and one of the largest in the United States.

Since the early 1900s, environmental resources of the basin have been severely stressed by a burgeoning population and intensive industrial, commercial, and recreational use. Efforts by numerous universities and State and Federal agencies to assess, monitor, and remediate the health

of the basin have produced a wide variety of scientific research. The Pontchartrain Research Committee initiated the symposium in 1992 to present this research to the public and academia. Since then, the USGS has played an active role in both supporting and participating in the symposium.

More than 100 people attended this year's meeting, which included updates on research in water quality, wetland restoration, and habitat mapping; the list of contributors can be viewed at URL http://conferences.uno.edu/webPage/Program_3.pdf. USGS scientists who attended include **Jimmy Johnston** and **Chris Wells** (Lafayette, LA), **Clint**

Padgett (New Orleans, LA), **Brian Perez** (Baton Rouge, LA), **Chandra Dreher** (USGS contract employee and graduate student at the University of New Orleans), and **Jim Flocks** (St. Petersburg, FL).

Chris provided an oral presentation describing recent efforts by the USGS National Wetlands Research Center to map, quantify, and describe trends over 2 years of marsh dieback syndrome in coastal wetlands in 2000 and 2001. Marsh dieback (or "brown marsh") has killed or weakened thousands of acres of *Spartina alterniflora*, the dominant saltgrass in the marsh. Grasses provide habitat and also stabilize the fragile marsh soils. Approximately 400

(Basin Research continued on page 13)

(Basin Research continued from page 12)

photographs were interpreted, about 200 for each year. More than 100,000 polygons were delineated within 12 quadrangles covering most of the marsh surrounding Terrebonne Bay. Results indicate that more than 40 percent of the marsh in the study area exhibited some effects of the syndrome in 2000. A year later, substantial recovery was noted in the least affected areas, while the most affected areas displayed slight recovery by autumn 2001. There was some indication that mangroves may have occupied marsh areas denuded of the affected grass. The degree to which the marsh has recovered since 2001 is not known in detail.

Clint and **Jimmy** presented a poster entitled "Pontchartrain Basin Coastal Land and Marsh Vegetative Type Trends," which showed vegetation-distribution trends in Lake Pontchartrain Basin from 1949 through 2001, and net land loss

(140,799 acres) for the time period 1956 through 2000. Additionally, the poster showed the projected land loss (39,040 acres) for the basin from 2000 to 2050, which was calculated to help support the Louisiana Coastal Area Ecosystem Restoration Study (see URL <http://www.mvn.usace.army.mil/prj/lca/>).

Jim and **Chandra** presented a poster that displayed products from the decades of collaborative efforts between the USGS and the Pontchartrain Research Committee in the Louisiana coastal zone, including Lake Pontchartrain. The poster focused on studies that characterize the geologic framework in an effort to understand environmental issues affecting the coastal areas.

The meeting included presentation of the coveted "Pirogue Award," which is bestowed on those individuals who have made outstanding contributions to the

symposium. Past USGS awardees include **Jeff Williams** (Woods Hole, MA), **Jack Kindinger** (St. Petersburg), **Frank Mannheim** (Woods Hole), and **Jimmy Johnston** (Lafayette).

A product of the efforts by Pontchartrain Research Committee members is USGS Open-File Report 02-206, "Environmental Atlas of the Lake Pontchartrain Basin." The atlas, a summary of the basin's ecology, geology, biologic resources, and more, is available online at URL <http://pubs.usgs.gov/of/2002/of02-206/>. For additional information on marsh dieback syndrome, visit URL <http://www.brownmarsh.net/>. Information on historical and projected coastal Louisiana land changes is presented in USGS Open-File Report 03-334, posted at URL <http://www.nwrc.usgs.gov/special/landloss.htm>. ☼

USGS Cofosts a Swarm Modeling Workshop at the University of Florida

By Alisa Coffin

Interdisciplinary research related to the adaptive management of complex systems is a growing concern for scientists, as evidenced by recent initiatives in the U.S. Geological Survey (USGS), the National Science Foundation, and other research institutions. Physical and social scientists who work together often must resolve issues of language, standards, and research practices as they investigate complex systems.

Agent-based modeling is a computerized modeling method that gives these researchers a common tool to simulate the dynamic behavior of social, ecological, and evolutionary systems. Agent-based modeling appeals not only to researchers but also to planners, managers, and decisionmakers as they seek ways to simulate alternative futures derived from model parameters that they control. "Swarm" is an example of such an agent-based modeling program. It was developed initially by the Santa Fe Institute, a nonprofit research and education center, and is currently supported by the Swarm Development Group,

a group of volunteer users and core developers who help maintain and develop the experimental software. The software and more information about it are available to the general public at the SwarmWiki Web site, URL http://wiki.swarm.org/wiki/Main_Page.

On May 20-21, the Geographic Information Systems (GIS) group of the Gainesville USGS offices cofosted a workshop at the University of Florida (UF) on the basics of Swarm modeling. Partners in organizing the workshop included the Land Use and Environmental Change Institute (LUECI) and the UF Department of Geography. The workshop was led by **Paul Box**, an alumnus of the UF Department of Geography (now at Utah State University's Department of Geography and Earth Resources), who taught the workshop free of charge as "a way of giving back" to the department. **Box** has been an avid developer of Swarm and has specialized in using Swarm coupled with GIS to simulate complex biologic processes in the landscape.

After an introduction to agent-based simulation, **Box** demonstrated some of the models he has developed, including those for fire fuels and spreading of invasive species. The rest of the workshop was devoted to hands-on training of the 21 participants in the Swarm software itself. Participants included several graduate students and faculty members from various UF departments and disciplines. The workshop was also open to and included USGS personnel.

Ann Foster, head of the GIS group in the USGS Gainesville East office, and **Alisa Coffin** and **Kristy Capobianco**, contract employees at the USGS and graduate students in the UF Department of Geography, were instrumental in organizing the workshop. They also coordinated with the staff of LUECI and the UF Department of Geography to produce the workshop CD-ROM, which each participant received. For more information about this event, please contact **Alisa Coffin** at 352-372-2571, ext. 27. ☼

USGS Recognized for ArcIMS Data

By Jane Denny

The U.S Geological Survey (USGS)'s Coastal and Marine Geology Program's Internet Map Server (IMS), maintained



by **Valerie Paskevich** at the USGS Woods Hole Science Center, is highlighted in "What's New" on the Environmental

Systems Research Institute (ESRI)'s Geography Network (at URL <http://www.geographynetwork.com/>). The Geography Network was established by ESRI to provide a base from which geospatial data could be accessed and shared among a global network of users and providers. The Coastal and Marine Geology Pro-

gram's general research objectives, along with a sampling of the program's research activities currently stored within the IMS, are displayed on the Geography Network. The USGS was recognized by ESRI as a major source of coastal and marine geospatial data. Thanks to **Valerie** for all of her efforts!✿

Staff and Center News

Coral Reefs in Peril—USGS Scientist Interviewed for Television Report

By Jennifer Leigh Oates

The current condition of coral reefs is a subject of serious concern and was the topic of discussion on March 17 when U.S. Geological Survey (USGS) scientist **Robert Halley** was interviewed by Tampa Bay's Channel 10 reporter **Cliff Michaelsen** at the USGS Center for Coastal and Watershed Studies in St. Petersburg, FL. The interview was arranged to provide feedback from a local expert about a report published in February 2004 by the Pew Center on Global Climate Change, titled "Coral Reefs and Global Climate Change: Potential Contributions of Climate Change to Stresses on Coral Reef Ecosystems," 10th in a series of reports examining the potential impacts of climate change on the environment.

Halley said that the Pew Center's report appeared to be accurate and agreed with the diagnosis set forth in the report of the current conditions affecting coral reefs. The reporter also filmed **Halley** explaining how the Submersible Habitat for Analyzing Reef Quality (SHARQ) works. The SHARQ is a large-scale underwater incubation chamber that enables scientists to measure changes in water chemistry in and around sea-floor communities. By researching the metabolic rates of sea-floor communities, scientists hope to learn how to better protect coral reefs, seagrass beds, and sand and hard-bottom communities.

A more broad-ranging report—the "Preliminary Report of the U.S. Commission on Ocean Policy, Governors' Draft"—



*The submersible SHARQ system for analyzing underwater-habitat quality. **Kim Yates** and **Bob Halley** received a patent on October 22, 2002, for their development of the SHARQ.*

was released to the public on April 20. The last time a comprehensive review of the Nation's ocean policies was conducted by a congressionally authorized commission was 35 years ago by the Stratton Commission. The Stratton Commission's report led to the creation of several major pieces of legislation, including the Coastal Zone Management Act and the establishment of the National Oceanic and Atmospheric Administration (NOAA). The Commis-

sion on Ocean Policy's draft is currently under review by numerous scientists in the USGS Coastal and Marine Geology Program.

The Commission on Ocean Policy's report is available at URL <http://oceancommission.gov/documents/prelimreport/>, and the Pew Center's report at URL http://www.pewclimate.org/global-warming-in-depth/all_reports/coral_reefs/index.cfm.✿

Recent Publications

- Auster, P.J., Lindholm, J., and Valentine, P.C., 2003, Variation in habitat use by juvenile Acadian redfish (*Sebastes fasciatus*): Environmental Biology of Fishes, v. 68, p. 381-389.
- Baldwin, S.M., Mecray, E.L., Koopmans, D.J., and Buchholtz ten Brink, M.R., 2004, The distribution of sewage sludge, traced by elevated silver and copper concentrations, along the Hudson Shelf Valley [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 41 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70632.htm].
- Baldwin, W.D., and Buynevich, I., 2004, Multiple shallow channel structure on GPR profiles provide clues to recent coastal drainage along South Carolina's grand strand [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 81 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70411.htm].
- Bossak, B.H., and Elsner, J.B., 2004, Plotting early 19th century hurricane information: Eos (American Geophysical Union Transactions), v. 85, no. 20, p. 199.
- Buynevich, I., and O'Connell, J., 2004, Beyond the charts; the geological legacy of the historic North River inlet, Massachusetts [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 51 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_69032.htm].
- Buynevich, I.V., and Donnelly, J.P., 2004, Geological signatures of barrier breaching and overwash, southern Massachusetts, U.S.A. [abs.]: International Coastal Symposium, 8th, Itapema, Brazil, March 14-19, 2004, p. 9.
- Carnahan, L.A., Hoare, A.M., Hallock, P., Lidz, B.H., Reich, C.D., and Shinn, E.A., 2004, Foraminifera as bioindicators of heavy metal pollution in Biscayne Bay, Florida [abs.]: Annual Marine Benthic Ecology Meeting, 33d, Mobile, AL, March 25-28, 2004, Program and Abstracts (unpaginated).
- Chuvilin, E.M., Kozlova, E.V., Boldina, O.M., and Winters, W.J., 2004, Stability of methane gas hydrate formed in marine sediment from the northern Gulf of Mexico [abs.]: Minerals of the Ocean—Integrated Strategies, St. Petersburg, Russia, April 25-20, 2004, Abstracts, p. 216-218.
- Clayton, T., Morton, R., and Peterson, R., 2004, Coastal classification; an example from west Florida: Sustainable Beaches Summit, Sandestin, FL, March 29-31, 2004, Proceedings, p. 90-94.
- Cleary, W.J., Fitzgerald, D.M., Buynevich, I., Marden, T., Knierim, A., and Doughty, D., 2004, Inlet-associated marsh island; north inlet, South Carolina [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 52-53 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70950.htm].
- Colman, S.M., 2003, Limnologic comparison of two small, varved lakes based on seismic-reflection data [abs.]: Eos (American Geophysical Union Transactions), v. 84, no. 46 (Fall Meeting supp.), abstract PP32B-0290 [visit URL <http://www.agu.org/meetings/fm03/waisfm03.html> and search on "colman"].
- Cross, V.A., Simms, R., Belew, S., Rudin, M., and Sappington, M., 2003, Lake Mead images over time: U.S. Geological Survey Open-File Report 02-479, poster.
- Crusius, J., Whittle, P., Kramer, D., Pieters, R., McNee, J., and Pedersen, T.F., 2003, Assessing metal removal mechanisms in oxic pit lakes using nutrient additions; Main Zone Pit Lake, Houston, B.C.[abs.]: Geological Society of America Annual Meeting, Seattle, WA, November 2-5, 2003, Abstracts with Programs, v. 35, no. 6, p. 270 [URL http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_64859.htm].
- Dugan, B.E., Germaine, J., Winters, W.J., and Flemings, P.B., 2004, Laboratory constraints and models of pressure, hydrate, and stability in shallow Mississippi canyon sediments (MC 855), deepwater Gulf of Mexico [abs.]: American Association of Petroleum Geologists Annual Convention, Dallas, TX, April 18-21, 2004, AAPG Bulletin, v. 88, no. 13 (supp.) [URL <http://www.searchanddiscovery.com/documents/abstracts/annual2004/Dallas/Dugan.htm>].
- Edgar, N.T., and Cecil, C.B., 2003, Influence of climate on deep-water clastic sedimentation; application of a modern model to an ancient system: Society for Sedimentary Geology (SEPM) Special Publication 77, p. 185-191.
- Edgar, N.T., and Crane, M., 2003, Sea-level change in Tampa Bay [abs.]: Tampa BASIS 4—Bay Area Scientific Information Symposium, 4th, St. Petersburg, Fla., October 27-30, 2003, Abstracts, p. 31.
- Edgar, N.T., Cecil, C.B., Mattick, R., Chivas, A.R., De Deckker, P., and Djajadihardja, Y., 2003, A modern analogue for tectonic, eustatic, and climatic processes in cratonic basins; Gulf of Carpentaria, northern Australia: Society for Sedimentary Geology (SEPM) Special Publication 77, p. 193-205.
- Edgar, T., Brooks, G., Cronin, T., Hollander, D., Runnels, R., Sutton, P., Werzinsky, Y., and Willard, D., 2001, Historical and prehistorical record of Tampa Bay environments: U.S. Geological Survey Open-File Report 01-422, 2 p.
- Fisher, M.A., Normark, W.R., Langenheim, V.E., Calvert, A.J., and Sliter, Ray, 2004, Marine geology and earthquake hazards of the San Pedro Shelf region, southern California: U.S. Geological Survey Professional Paper 1687, 33 p.
- Frye, D., ten Brink, U.S., Paul, W., Peal, K., and von der Heydt, K., 2003, Real-time seismic data from the coastal ocean: Oceans 2003 Marine Technology and Ocean Science Conference, San Diego, CA, September 22-16, 2003, Proceedings, v. 1, p. 81-85.

(Recent Publications continued on page 16)

(Recent Publications continued from page 15)

- Gayes, P.T., Schwab, W.C., Driscoll, N.W., Baldwin, W.E., Harris, M.S., Wright, E.E., Katuna, M.P., and Park, J.Y., 2003, Spatial and temporal complexities in coastal systems; lessons learned from long term beach monitoring and integrated geological framework studies in South Carolina [abs.]: Geological Society of America Annual Meeting, Seattle, WA, November 2-5, 2003, Abstracts with Programs, v. 35, no. 6, p. 469 [URL http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_66023.htm].
- Hallett, B.W., Poppe, L.J., and Brand, S.G., 2003, Petrography and character of the bedrock surface beneath western Cape Cod, Massachusetts [abs.]: Geological Society of America Annual Meeting, Seattle, WA, November 2-5, 2003, Abstracts with Programs, v. 35, no. 6, p. 325 [URL http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_58444.htm].
- Harris, M.S., Wright, E., Gayes, P.T., Ojeda, G., Dufrene, T.A., Bush, D.M., Katuna, M.P., Putney, T.R., Schwab, W.C., and Baldwin, W.E., 2003, Digital shorelines and GIS; a semi-quantitative evaluation of framework geologic influences on historical shoreline change rates [abs.]: Geological Society of America Annual Meeting, Seattle, WA, November 2-5, 2003, Abstracts with Programs, v. 35, no. 6, p. 490 [URL http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_66959.htm].
- Himmelstoss, E.A., Fitzgerald, D.M., and Rosen, P.S., 2003, Bluff evolution and geomorphology of the Boston Harbor Drumlins [abs.]: Boston Harbor Islands Science Symposium, Boston, MA, October 7, 2003, Poster Session.
- Johnstone, E.A., Starr, M.S., Gayes, P.T., Baldwin, W.E., Schwab, B.C., Driscoll, N.W., Buynevich, I., and Harris, M.S., 2004, Shoreface architecture in a sediment starved system; update from intertidal vibracores and shore perpendicular chirp data [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 46 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70782.htm].
- Kalnejais, L., Martin, W., Francois, R., and Bothner, M.H., 2003, Cycling of silver, lead and copper in coastal marine sediments [abs.]: Eos (American Geophysical Union Transactions), v. 84, no. 52 (Ocean Sciences Meeting supp.), abstract OS42F-07 [visit URL <http://www.agu.org/meetings/os04/waisos04.html> and search on "kalnejais"].
- Kellogg, C.A., and Stone, R.P., 2004, A pilot study of deep-water coral microbial ecology: ASLO/TOS Ocean Research Conference, Honolulu, HI, February 15-20, 2004, Abstract Book, p. 78 [URL <http://www.aslo.org/meetings/honolulu2004/abstracts/379.html>].
- Koopmans, D.J., Mecray, E.L., Baldwin, S.M., and Buchholtz ten Brink, M.R., 2004, The distribution and persistence of metal contaminants in surface sediments of the New York Bight [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 42 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70743.htm].
- List, J.H., Birkemeier, W.A., Ruggiero, P.S., and Long, C.E., 2003, An experiment on the large-scale coastal response to storms [abs.]: Eos (American Geophysical Union Transactions), v. 84, no. 52 (Ocean Sciences Meeting supp.), abstract OS32F-07 [visit URL <http://www.agu.org/meetings/os04/waisos04.html> and search on "list"].
- Marden, T., Fitzgerald, D.M., Buynevich, I., Johnsen, C., and Knierim, A., 2004, State-of-the-art animation depicts the evolution of a historical inlet, Georgetown County, South Carolina [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 52-53 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70949.htm].
- McBride, R.A., Buynevich, I., and Robinson, M.M., 2004, High-resolution geologic evidence of a former, wave-dominated tidal inlet system; old Currituck inlet, Virginia [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 52-53 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_71037.htm].
- Pendleton, E.A., Williams, S.J., and Thieler, E.R., 2004, Coastal vulnerability assessment of Assateague Island National Seashore (ASIS) to sea-level rise: U.S. Geological Survey Open-File Report 2004-1020 [URL <http://pubs.usgs.gov/of/2004/1020/>].
- Poag, C.W., 2004, Coring the Chesapeake Bay impact crater: Geotimes, January 2004, p. 22-25 [http://www.geotimes.org/jan04/feature_Chesapeake.html].
- Polloni, C.F., Danforth, W.W., Foster, D.S., and ten Brink, U.S., 2004, Mapping the Puerto Rico Trench, an example of data integration into GIS with extraction to new displays, animations and publications [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 78 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70126.htm].
- Raabe, E.A., and Katz, B.G., 2004, Suwannee River Basin and Estuary Initiative; executive summary: U.S. Geological Survey Open-File Report 2004-1198, 6 p. [URL <http://gulfsoci.usgs.gov/suwannee/>].
- Rinehimer, J., Kineke, G., and Warner, J.C., 2004, Spring-neap variations of lateral sediment trapping processes in a model of the Hudson River Estuary [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 46 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_71025.htm].
- Ruppel, C., Hutchinson, D.R., Dugan, B.E., and Hart, P., 2004, Predicting the

(Recent Publications continued on page 17)

(Recent Publications continued from page 16)

- subsurface distribution of gas hydrate in the northern Gulf of Mexico [abs.], *in* American Association of Petroleum Geologists Annual Meeting, Dallas, TX, April 18-21, 2004, Proceedings: American Association of Petroleum Geologists Bulletin, v. 88, no. 13 (supp.) [URL <http://www.searchanddiscovery.com/documents/abstracts/annual2004/Dallas/Ruppel.htm>].
- Schwab, W.C., and Mayer, L.A., 2003, Geoscience for ocean management; who needs a map of the sea floor anyway? [abs.]: Southeast Coastal Ocean Science Conference and Workshop, Charleston, S.C., January 27-31, 2003, Proceedings, p. 15.
- Scotti, A., Butman, B., Beardsley, R.C., Alexander, P.S., and Anderson, S.P., 2004, Using ADCPs to map the current field associated with short-wavelength internal waves; challenges and opportunities [abs.]: Eos (American Geophysical Union Transactions), v. 84, no. 52 (Ocean Sciences Meeting supp.), abstract 0S42D-04.
- Shinn, E.A., Marot, M., and Holmes, C.W., 2004, Solving the whiting problem with short-lived isotopes; still no fish [abs.], *in* American Association of Petroleum Geologists Annual Meeting, Dallas, TX, April 18-21, 2004, Proceedings: American Association of Petroleum Geologists Bulletin, v. 88, no. 13 (supp.) [URL <http://www.searchanddiscovery.com/documents/abstracts/annual2004/Dallas/Shinn.htm>].
- Snyder, F., Dutta, N., Hutchinson, D.R., Hart, P.E., Lee, M.W., Dugan, B.E., Coffin, R., Evans, R., and Jones, E., 2004, Seismic analysis and characteristic of gas hydrates in the northern deepwater Gulf of Mexico [abs.], *in* American Association of Petroleum Geologists Annual Meeting, Dallas, TX, April 18-21, 2004, Proceedings: American Association of Petroleum Geologists Bulletin, v. 88, no. 13 (supp.) [URL <http://www.searchanddiscovery.com/documents/abstracts/annual2004/Dallas/Snyder.htm>].
- Song, J., ten Brink, U.S., and Bucknam, R., 2003, Rupture parameters for the pre-historic Seattle fault earthquake from modeling shoreline uplift [abs.]: Eos (American Geophysical Union Transactions), v. 84, no. 46 (Fall Meeting supp.), abstract S42A-0148 [visit URL <http://www.agu.org/meetings/fm03/waisfm03.html> and search on "ten brink"].
- Swithinbank, C.W.M., Williams, R.S., Jr., Ferrigno, J.G., Foley, K.M., and Rosanova, C.E., 2003, Coastal-change and glaciological map of the Bakutis Coast area, Antarctica; 1972-2002: U.S. Geological Survey Geologic Investigations Series Map I-1200-F, scale 1:1,000,000, 10 p.
- ten Brink, U.S., and Lin, J., 2003, Stress interaction between subduction earthquakes and forearc strike-slip faults [abs.]: Eos (American Geophysical Union Transactions), v. 84, no. 46 (Fall Meeting supp.), abstract T42C-08 [visit URL <http://www.agu.org/meetings/fm03/waisfm03.html> and search on "ten brink"].
- ten Brink, U.S., Danforth, W.W., Llanes, P., Polloni, C.F., Smith, S., Parker, C.E., and Uozumi, T., 2004, Application of seafloor mapping tools to the study of the Puerto Rico Trench, the deepest part of the Atlantic Ocean [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 132 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70144.htm].
- Thieler, E.R., and Schwab, W.C., 2003, Coastal sediment budgets and the role of the inner continental shelf [abs.]: Geological Society of America Annual Meeting, Seattle, WA, November 2-5, 2003, Abstracts with Programs, v. 35, no. 6, p. 37 [URL http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_63111.htm].
- Thieler, E.R., and Schwab, W.C., 2003, On the importance of geologic framework in understanding coastal processes [abs.]: Geological Society of America Annual Meeting, Seattle, WA, November 2-5, 2003, Abstracts with Programs, v. 35, no. 6, p. 469 [URL http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_63125.htm].
- Thieler, E.R., Hammar-Klose, E.S., Himmelstoss, E.A., O'Brien, T.F., and Murray, A.B., 2004, Morphologic response of the North Carolina Inner Shelf to Hurricane Isabel, September 2003 [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 107 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_69181.htm].
- Thieler, E.R., Riggs, S.R., Hoffman, C.W., List, J.H., McNinch, J.E., Mallinson, D., and Wehmiller, J., 2004, Regional geologic mapping of the coastal zone to identify and quantify coastal hazards [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 148 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_69394.htm].
- Todd, B.J., Kostylev, V.E., Valentine, P.C., and Longva, O., 2004, Marine geology and benthic habitat of German Bank, Scotian Shelf, Atlantic Canada [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 132 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_69639.htm].
- Todd, B.J., Rainey, W.A., McCall, C.W., Valentine, P.C., and Longva, O., 2003, Moraines document ice retreat on German Bank, Gulf of Maine [abs.]: Canadian Quaternary Association and Canadian Geomorphology Research Group Annual Meeting, Halifax, Nova Scotia, Canada, June 8-12, 2003, Abstracts and Program, p. A122.
- van de Flierdt, T., Frank, M., Halliday, A.N., Hein, J.R., Hattendorf, B., Günther, D., and Kubik, P.W., 2004, Tracing the history of submarine hydrothermal inputs and the significance of hydrothermal hafnium for the seawater budget—a combined Pb-Hf-Nd isotope approach: Earth and Planetary Science Letters, v. 222, p. 259-273.
- Warner, J.C., and Sherwood, C.R., 2003, Estuarine turbidity maximum dynamics; sensitivity to turbulence closure [abs.]:

(Recent Publications continued on page 18)

(Recent Publications continued from page 17)

- Estuarine Research Federation Biennial Conference, 17th, Seattle, WA, September 14-18, 2003, Conference Abstracts, p. 142.
- Warner, J.C., Schoellhamer, D.H., Ruhl, C.A., and Burau, J.R., 2004, Floodtide pulses after low tides in shallow subembayments adjacent to deep channels: *Journal of Estuarine, Coastal, and Shelf Science*, v. 60, no. 2, p. 213-228 [URL <http://www.sciencedirect.com/science/article/B6WDV-4C1FC02-1/2/b12becbd11f037389e37fc4bbd9e3480>].
- Whittle, P., Kramer, D., Pieters, R., Crusius, J., Pedersen, T.F., McNee, J., and Martin, A., 2003, Metal removal from mine pit lake waters through the induction of biological sulfide generation; a limnocorral study [abs.]: Geological Society of America Annual Meeting, Seattle, WA, November 2-5, 2003, Abstracts with Programs, v. 35, no. 6, p. 270 [URL http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_66645.htm].
- Williams, S.J., Jenkins, C., Reid, J., Penland, S., Flocks, J.G., Kindinger, J.L., and Poppe, L.J., 2004, Regional-scale sediment maps of U.S. Continental Margins: insights to sedimentary character and processes, aggregate resources [abs.]: Geological Society of America, Northeastern Section (39th Annual) and Southeastern Section (53d Annual) Joint Meeting, Tysons Corner, VA, March 25-27, 2004, Abstracts with Program, v. 36, no. 2, p. 131 [URL http://gsa.confex.com/gsa/2004NE/finalprogram/abstract_70162.htm].
- Winters, W.J., Waite, W., Dugan, B.E., Mason, D.H., and Pecher, I.A., 2004, Strength and physical properties of sediment containing laboratory-formed and natural gas hydrate [abs.], in American Association of Petroleum Geologists Annual Meeting, Dallas, TX, April 18-21, 2004, Proceedings: American Association of Petroleum Geologists Bulletin, v. 88, no. 13 (supp.) [URL <http://www.searchanddiscovery.com/documents/abstracts/annual2004/Dallas/Winters.htm>].

Publications Submitted for Director's Approval

- Bossak, B.H., Morton, R.A., and Sallenger, A.H., Toward predicting coastal vulnerability to natural hazards; a GIS-based approach utilizing NASA's experimental airborne advanced research LIDAR (EAARL): American Shore and Beach Preservation Association (ASBPA) Annual Meeting, New Orleans, September 13-15, 2004.
- Brock, J., Yates, K., and Halley, R., Integration of coral reef ecosystem processes and remote sensing, chap. in Richardson, L.L., and LeDrew, E.F., eds., Remote sensing of aquatic ecosystems: Kluwer, Inc.
- Cohen, A.S., Palacios-Fest, M.R., McGill, J., Swarzenski, P., Verschuren, D., Sinyinza, R., Songori, T., Kakagozo, B., Syampila, M., O'Reilly, C., and Alin, S., The Lake Tanganyika Biodiversity Project's paleolimnological investigations of anthropogenic environmental change in Lake Tanganyika; I. An introduction to the project: Paleolimnology.
- Collie, J.S., Asch, R., and Valentine, P.C., Biomass in the bank; effects of fishing reserves on the benthic fauna inside a closed area [abs.]: International Council for the Exploration of the Sea Annual Science Conference, Vigo, Spain, September 22-25, 2004.
- Fisher, M.A., Greene, H.G., Normark, W.R., and Sliter, Ray, Neotectonics of the offshore Oak Ridge Fault south of Ventura, southern California: Geophysical Research Letters.
- Fisher, M.A., Normark, W.R., Greene, H.G., Lee, H.J., and Sliter, Ray, Geology and tsunamigenic potential of submarine landslides in Santa Barbara Channel, southern California: *Geological Society of America Bulletin*.
- Flocks, J., Kulp, M., Ferina, N., Dreher, C., FitzGerald, D., Kindinger, J., and Penland, S., Understanding the shallow stratigraphic architecture of the Louisiana coastal zone; the key to identifying potential sources for shoreline renourishment [abs.]: American Shore and Beach Preservation Association (ASBPA) Annual Meeting, New Orleans, September 13-15, 2004.
- Foxgrover, A.C., Higgins, S.A., Ingraça, M.K., Jaffe, B.E., and Smith, R.E., 150 years of sediment deposition, erosion, and geomorphologic change in south San Francisco Bay [abs.]: California Bay-Delta Program (CALFED) Biennial Science Conference, 3d, Sacramento, CA, October 4-6, 2004.
- Gibbons, Helen, USGS Western Coastal and Marine Geology Team, 2004: U.S. Geological Survey Fact Sheet.
- Hallock, P., Lidz, B.H., Carnahan, E., Daniels, C., and Hoare, A.M., Three low-cost tools for reef monitoring and risk assessment; distinguishing local from global stresses: International Coral Reef Symposium, 10th, Okinawa, Japan, June 28-July 2, 2004.
- Hapke, C.J., Reid, Dave, and Richmond, B.M., Mapping long-term coastal change on the U.S. west coast [abs.]: American Shore and Beach Preservation Association (ASBPA) Annual Meeting, New Orleans, September 13-15, 2004.
- Higgins, S.A., Jaffe, B.E., Smith, R.E., and Fuller, C.C., Spatial analysis of sediment ages in north San Francisco Bay; a GIS tool for assessing the legacy of buried contaminants [abs.]: California Bay-Delta Program (CALFED) Biennial Science Conference, 3d, Sacramento, CA, October 4-6, 2004.
- Jaffe, B., Hutzel, A., Takekawa, J., Newby, S., and Sullivan, S., New LIDAR and bathymetric surveys of south San Francisco Bay for salt pond restoration planning [abs.]: California Bay-Delta Program (CALFED) Biennial Science Conference, 3d, Sacramento, CA, October 4-6, 2004.
- Jaffe, B.E., Smith, R.E., and Foxgrover, A.C., Sediment delivery control on intertidal mudflat and subtidal habitats in north San Francisco Bay [abs.]: California Bay-Delta Program (CALFED) Biennial Science Conference, 3d, Sacramento, CA, October 4-6, 2004.
- Kindinger, J., Flocks, J., Kulp, M., Williams, J., Penland, S., and Jenkins, (Publications Submitted continued on page 19)

Publications, continued

(Publications Submitted continued from page 18)

- C., Collection, analysis, and integration of geologic data in the Louisiana coastal zone to support ecosystem restoration [abs.]: American Shore and Beach Preservation Association (ASBPA) Annual Meeting, New Orleans, September 13-15, 2004.
- Lorenson, T.D., Collett, T.S., and Whiticar, M.J., Origin of gases in permafrost associated gas hydrate—examples from Alaska and Canada [abs.]: American Association of Petroleum Geologists Hedberg Research Conference, Vancouver, B.C., Canada, September 12-16, 2004.
- McGann, Mary, and Bay, S.M., Abundance of benthic foraminifer *Bulimina denudata* positively correlates with amphipod survival rates in pollution study off Los Angeles, California, USA [abs.]: International Society of Environmental Micropaleontology, Microbiology and Meibenthology International Congress, 4th, Isparta, Turkey, September 13-18, 2004 [extended abstract].
- Miller, T.L., Morton, R.A., and Moore, L.J., The national assessment of historical shoreline change; a summary of recent shoreline comparisons, analyses, and products: American Shore and Beach Preservation Association (ASBPA) Annual Meeting, New Orleans, September 13-15, 2004.
- Parsons, Tom, Bruns, T.R., and Sliter, Ray, Structure and mechanics of the San Andreas-San Gregorio fault junction, San Francisco, California: Geology.
- Poppe, L.J., Smith, S.M., Lewis, R.S., and DiGiacomo-Cohen, M.L., Glacial features and sediment transport processes in easternmost Long Island Sound, Connecticut and New York [abs.]: Geological Society of America National Meeting, Denver, CO, November 7-10, 2004.
- Puleo, J.A., Mouraenko, Oleg, and Hanes, D.M., 1D wave bottom boundary layer model comparison; specific eddy viscosity and turbulence closure models: American Society of Civil Engineers Proceedings, Waterways, Ports, and Harbor Division Journal.
- Sallenger, A., Guy, K., and Morgan, K., Accuracy of USGS/NASA/LDNR topographic lidar data acquired on Louisiana barrier islands during 1998, 2001, and 2002: U.S. Geological Survey Open-File Report.
- Schwab, W.C., and Haines, J.W., USGS role in mapping the nation's submerged lands: U.S. Geological Survey Open-File Report 2004-1246.
- ten Brink, U.S., and Lin, J., Stress interaction between subduction earthquakes and forearc strike-slip faults; modeling and observations: Journal of Geophysical Research. ☼