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Sound Waves

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Fieldwork

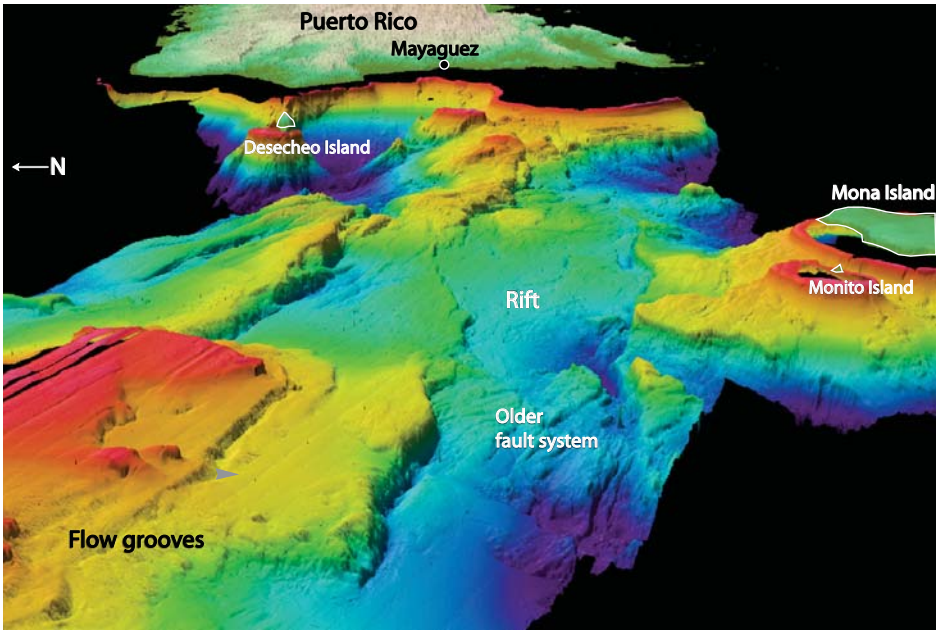
New Bathymetric Map of Mona Passage, Northeastern Caribbean, Aids in Earthquake- and Tsunami-Hazard Mitigation

By Uri ten Brink

The Mona Passage between Puerto Rico and the Dominican Republic in the northeastern Caribbean is an area long known for its strong and shifting currents, abundant marine mammals and fish, and pirates and smugglers. All are there because the Mona Passage is an area of shallow banks over which a vigorous exchange of waters takes place between the Atlantic Ocean and the Caribbean Sea. The Mona Passage is also the site of a devastating earthquake and tsunami that hit western Puerto Rico in 1918, and the site of frequent small earthquakes. Prompted by the likelihood of further tsunamis and earthquakes, the U.S. Geological Survey (USGS), the Woods Hole Oceanographic Institution, and the National Oceanic and Atmospheric Administration (NOAA) undertook the task of mapping in detail the sea floor under the waters of the Mona Passage, to identify active faults and submarine landslides and to better understand their underlying causes.

Mapping of the sea floor was carried out aboard the NOAA ship *Nancy Foster* between March 14 and 26, 2007. The data were collected by using a Simrad EM-1002 multibeam-sonar system in water depths of 50 to 1,000 m. Multibeam-sonar systems emit acoustic (sound) energy in a fan shape that sweeps over a swath of sea floor as the ship moves forward. The time it takes for echoes to return to the system is used to calculate the depth to closely spaced points within overlapping swaths. During the March cruise, data were processed in near-real time to create a 30-m grid (in which all the measurements within each 30- by 30-m cell were averaged to a single value)

(Mona Passage continued on page 2)



Perspective view of the bathymetry of the Mona Passage, looking eastward toward Puerto Rico. Depths indicated by color, from red (shallowest) to purple (deepest); black indicates sea floor not mapped during this study. Small islands are outlined in white to make them more visible. Vertical exaggeration, 6:1; illumination from northeast.

► *Scientists returning to the ship after a visit to Mona Island. The island, with its steep cliffs and flat top, is in the background. Photograph by* ***Kelly Carignan****.*

Sound Waves

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Deadline: The deadline for news items and publication lists for the July issue of *Sound Waves* is Tuesday, May 15.
Publications: When new publications or products are released, please notify the editor with a full reference and a bulleted summary or description.
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Fieldwork, continued

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over about 4,200 km^2 of the sea floor. These data were added to multibeam bathymetric data collected previously by the USGS and NOAA in deeper waters to produce an image of sea-floor topography over a broad area (totaling approximately 164,200 km^2) around Puerto Rico and the Puerto Rico Trench. (Information about some of the earlier mapping is available in the article "Mapping of the Puerto Rico Trench, the Deepest Part of the Atlantic, Is Nearing Completion" in *Sound Waves*, October 2003, at URL **http://soundwaves.usgs.gov/2003/10/fieldwork.html**.) To aid with interpretation, the data were also entered into a geographic-information-system (GIS) database, which includes additional types of data, and were displayed as three-dimensional surfaces.

First results show a rift zone that extends westward from southern Puerto Rico and overprints an older and partly eroded tilted-block structure. This rift and an additional fault system extending westward from northwestern Puerto Rico are probably the only currently active faults. The map also unexpectedly revealed abundant evidence for concentrated water flow through certain parts of the passage and erosion of the underlying rocks. The important contribution of ocean currents to shaping the sea-floor topography of the passage through massive erosion of the carbonate platform and creation of conspicuous flow marks and sand waves could only be appreciated through these new high-resolution data.

The scientists and crew got an intimate look at the sea floor under the Mona Passage by hiking, swimming, and diving around Mona Island, a pristine nature re-

(Mona Passage continued on page 3)

*Iguana, a common inhabitant of Mona Island. Photograph by **Uri ten Brink**.*

Caribbean region, showing location of the Mona Passage. Read about additional sea-floor mapping in this region in "Mapping of the Puerto Rico Trench, the Deepest Part of the Atlantic, Is Nearing Completion," Sound Waves, *October 2003, URL **http://soundwaves.usgs.gov/2003/10/fieldwork.html**.*

(Mono Passage continued from page 2)

serve on an uplifted piece of the sea floor in the middle of the passage. The scientific party on board included **Uri ten Brink**, **Bill Danforth**, **Brian Andrews**, and **Claudia Flores** from the USGS Woods Hole Science Center; **Jason Chaytor** from the Woods Hole Oceanographic Institution; **Chris Chamberlin** from NOAA's Pacific Marine Environmental Laboratory; **Brooke McMahon** from NOAA's Office of Coastal Survey; and **Kelly Carignan** from NOAA's National Geophysical Data Center. Special thanks are due to Commander **James Verlaque** and the crew of the *Nancy Foster* for their professional support and friendly conduct, to **Melissa (Missy) Partyka** and Lieutenant Junior Grade **Tracy Hamburger** for their scientific support, and to Lieutenant Commander **Alan Hilton** for his logistical support.

Beam Time at the Stanford Linear Accelerator Awarded to USGS Scientist

By Jim Hein and Helen Gibbons

U.S. Geological Survey (USGS) geologist **Jim Hein** was recently awarded coveted beam time at the Stanford Synchrotron Radiation Laboratory (SSRL), part of the Stanford Linear Accelerator Center (SLAC) in Palo Alto, California. On the basis of peer-reviewed proposals, **Hein** was awarded 120 hours of beam time to study processes involved in the acquisition of metals from seawater by marine iron-manganese oxide crusts (Fe-Mn crusts). Synchrotron radiation consists of high-intensity (extremely bright) X-rays or light produced by electrons circulating at nearly the speed of light in a storage ring. The analyses to be completed at SSRL will include:

- X-ray absorption near-edge spectroscopy (XANES), a technique for resolving the chemical forms of metals. The XANES data will yield information about the metals' reactivity and environment of formation.
- extended X-ray absorption fine-structure spectroscopy (EXAFS), the only viable technique for determining the local structure around metals at concentrations as low as 50 parts per million (ppm). The EXAFS data will show whether the metals are associated with the Fe minerals or the Mn minerals that compose the crusts, and how the metals are bound to these minerals, such as whether the bonds are weak or strong.

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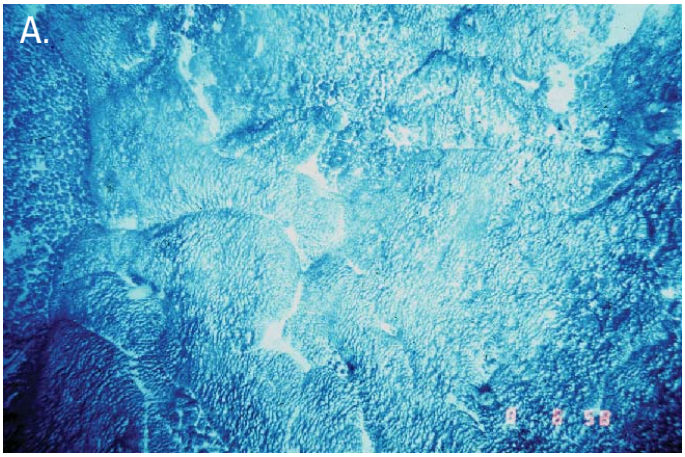
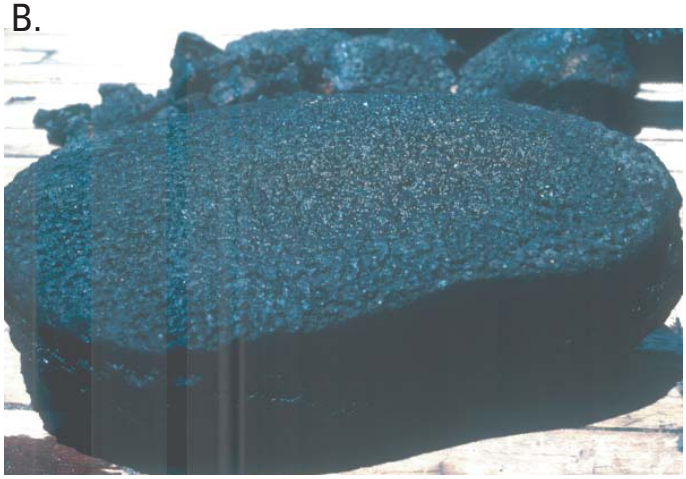
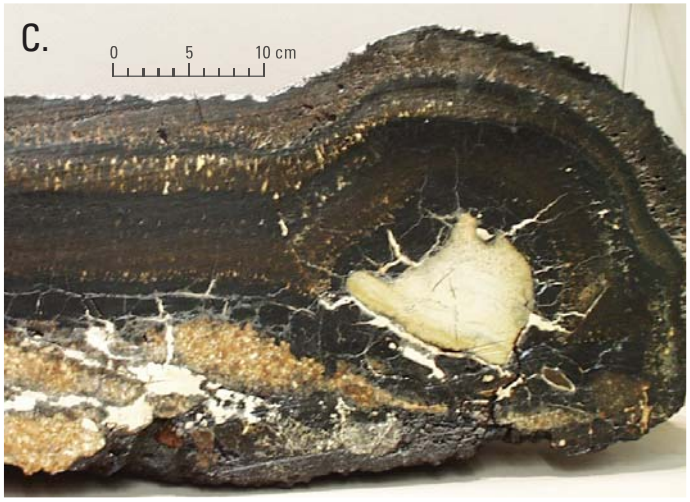






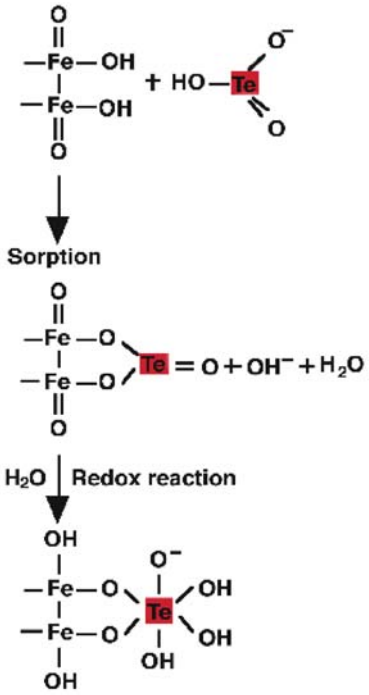
Crust samples. A, *Crust pavement (approx 3 by 4 m) on the upper flank of Horizon Seamount, central Pacific Ocean; 2,000-m water depth.* B, *Large sample (1.5 by 0.9 by 0.3 m) of cobalt-rich crust and substrate rock.* C, *Same sample as in* B, *cut through the long axis. The crust, which began to grow on the substrate rock about 70 million years ago, shows distinct growth layers. A mudstone cobble (light tan) occurs within the crust on the right side.*

(Beam Time continued from page 3)

Fe-Mn crusts are important for two reasons: They record as much as 70 million years (m.y.) of changes in ocean chemistry linked to changes in the Earth's climate, and they are potential sources of the valuable metals that they concentrate from seawater. Fe-Mn crusts form pavement-like deposits, as much as 25 cm thick, on hard-rock substrates throughout the ocean basins. They form by direct precipitation from cold ambient bottom waters onto the flanks and summits of seamounts, ridges, and plateaus where the rocks have been swept clean of sediment at least intermittently for millions of years. The crusts form at water depths of about 400 to 4,000 m, with the thickest and most metal-rich crusts occurring at depths of about 800 to 2,500 m. Crusts have an extremely high mean surface area (300 m^2/g) and remarkably slow growth rates (1-6 mm/m.y.), which allow for the adsorption of abundant elements from seawater.

Fe-Mn crusts contain approximately equal proportions of Fe and Mn and are especially enriched in tellurium (Te), Mn, cobalt (Co), lead (Pb), bismuth (Bi), and platinum (Pt) relative to those metals' concentrations in the Earth's lithosphere and in seawater. Fe-Mn crusts may have an economic potential for Co, Mn, Pt, Te, titanium (Ti), nickel (Ni), rare-earth elements, thallium (Tl), and other elements.

Te is the metal most strongly (50,000 times) enriched in Fe-Mn crusts and will be used as a model compound in these initial experiments at SSRL. **Hein** and his partners in the project hypothesize that the profound enrichment of Te is due to its adsorption as Te(IV) and subsequent oxidation to Te(VI) on the surface of the Fe oxyhydroxide (FeOOH) part of Fe-Mn crusts. (Te(IV) is a form of Te that can bond to anions with a total of 4 negative charges; Te(VI) is a more stable form that can bond to anions with a total of 6 negative charges.) Another reason the scientists chose Te as a model compound is that the adsorption of Te onto Fe-Mn crusts likely controls Te's concentration and dominant chemical form—Te(IV) or Te(VI)—in the global ocean. However, little is known about the mechanisms by which Te is sequestered by Fe-Mn oxides and Fe-Mn colloids (very tiny suspended particles) in the water column, and then stabilized in Fe-Mn crusts—questions that will be answered by this research.



Schematic representation of the surface reactions that take place during sorption of Te(IV) on the FeOOH surface and its subsequent oxidation to Te(VI).

Te has many important industrial uses, arguably the most important of which is the newly emerging, cutting-edge solar-cell technologies for which Te is a critical component. According to **Ken Zweibel** of the National Renewable Energy Laboratory: "Finding enough tellurium for CdTe [cadmium-telluride, a compound whose physical characteristics make it an ideal material for the production of solar cells] is the largest barrier to the multi-terawatt use of CdTe for electricity. It is widely regarded as the lowest cost photovoltaic technology with the greatest potential…. This is actually important to the United States and the world."

In addition, understanding the surface geochemical reactions of Te (and other metals) on naturally occurring Fe-Mn crusts has far-reaching applications, from improved understanding of global-ocean chemical balances to the development of new techniques for extracting metals from ores. Furthermore, Te is a geochemical analog to selenium (Se), both having the same range of reaction states in natural systems. Se is known to be an essential nutrient over a small concentration range and toxic at higher concentrations, whereas Te seems to have no important biological function. Understanding the processes that control the concentrations and ratios of these two elements in natural systems may have significant environmental applications.

Partners in the project include **Andrea Koschinsky** of the International University of Bremen, Germany, **John Bargar** of SSRL, and **Alex Halliday** of Oxford University, UK.❁

Tar Balls Washed Onto Central California Beaches by Storms

By Fran Hostettler

In February 2007, unusually large numbers of mystery tar balls washed up on beaches in central California, from Monterey Bay north to Half Moon Bay and San Francisco. Calls came in to State officials asking where these sticky globs of tar might have come from and whether they posed a threat to wildlife or the affected beaches. The California Department of Fish and Game (CDFG) was asked to analyze samples of the tar balls to determine whether they were of natural origin or possibly from an oil spill from a passing tanker. CDFG concluded that the tar balls most probably originated from natural offshore seeps and were disbursed by recent storms.

Geochemists at the U.S. Geological Survey (USGS) in Menlo Park, California, received several telephone calls from local reporters asking whether they had

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any additional information about the origin of the mystery tar balls. In conjunction with the U.S. Minerals Management Service (MMS), the USGS has conducted a 10-year study, initiated by **Keith Kvenvolden** and now supervised by **Tom Lorenson**, on tar and oil seeps along the southern California coastline. (To learn about some of this work, read "Beginning the Search for Offshore Oil Seeps Near Point Conception, California," in *Sound Waves*, September 2001, at URL **http://soundwaves.usgs.gov/2001/09/fieldwork2.html**.) The USGS research group was asked by MMS to collect and analyze samples from the recently tarred beaches in central California to determine whether the new tar balls fit into the group's database.

Fran Hostettler and **Bob Rosenbauer** collected tar residues from Moss Landing, Asilomar, and Half Moon Bay beaches. Chemical analysis by **Hostettler** and chemometric mathematical matching by **Ken Peters** indicated that the mystery tar balls were indeed from natural sources offshore California. The tar balls likely originated in the Santa Barbara Channel or the offshore Santa Maria basin. Analyses showed that although these recent tar samples are similar to each other—that is, all are from the Miocene Monterey Formation—they are not all identical but rather came from several different seeps. Therefore, the USGS scientists could exclude a single-seep source or a human-caused spill. Apparently, winds associated with the large storm systems that had recently swept through the area helped blow the tar balls to shore. Ocean currents like the Davison Current from southern California are known to flow northward in the winter and so are a natural transport system for the floating tar balls. USGS work in past years identified tar balls washed up on beaches from the Monterey Bay National Marine Sanctuary northward to Point Reyes as originating from the same southern California seeps. No natural seeps are known to occur within or north of the Monterey Bay National Marine Sanctuary, and so when tar shows up on central or northern California beaches, it is suspect in terms of possible human-caused oil spills. However, the tar balls that washed up in February appear to be attributable entirely to natural processes. ❁

*This tar ball, collected at Moss Landing State Beach on February 14, 2007, by volunteers **John Hostettler** and **Bob Seese**, may have originated from a seep in the offshore Santa Maria basin west of Casmalia (see map).*

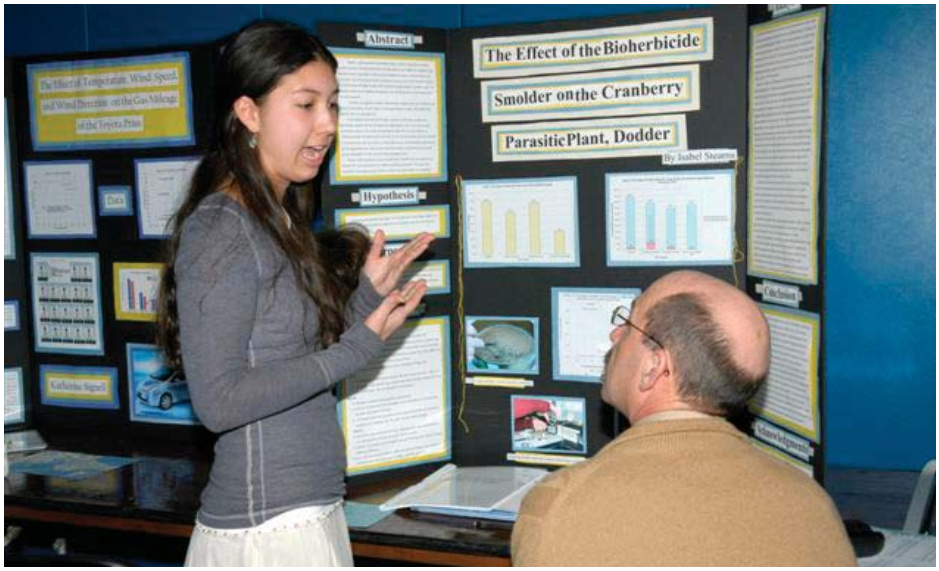
*Tar ball collected at Asilomar State Beach on February 14, 2007, by volunteers **John Hostettler** and **Bob Seese**. This sample may have originated from a seep in the offshore Santa Maria basin, but its chemistry differs somewhat from that of the Moss Landing State Beach sample and links it to "wander-prone" samples the USGS group collected from 1997 to 2003, from Surf Beach near Casmalia north to Drakes Beach, Point Reyes, and Angel Island in San Francisco Bay.*

Map of California, showing some of the areas where USGS researchers have collected tar balls for geochemical analysis.

USGS Scientists Volunteer to Judge Local Science Fairs in Falmouth, Massachusetts

By Adrian Green, Kate Ackerman, and Brian Buczkowski

During February and March 2007, many scientists from the U.S. Geological Survey (USGS)'s Woods Hole Science Center participated as judges in local schools' science fairs throughout Falmouth, Massachusetts. Each year, students may choose to enter a science fair in hopes of presenting the winning project, as well as receiving scholarship money funded by science institutions in the area. This year, project topics ranged from environmental and ecological studies to geology and tectonics. Many projects at the high-school level dealt with complex topics, such as studying varying degrees of eutrophication in ponds relative to the population density around the pond, analyzing marine-mammal vocalizations, and investigating the evolution of marine Cyanobacteria. At the middle-school level, the projects were highly creative, with one person hoping to test the hypothesis "Are apples and oranges really that different?"



*A student from Falmouth Academy explains her science-fair project to an attentive judge. Photograph by **Susan Moffat** (faculty member, Falmouth Academy).*

As judges, the scientists interviewed the students, evaluated their projects, and offered feedback on how to improve their methods and further expand their research. In addition to scientists from the USGS Woods Hole Science Center, volunteer judges came from other scientific institutions in Woods Hole, including the Woods Hole Oceanographic Institution, the Marine Biological Laboratory, and the National Oceanic and Atmospheric Administration. USGS scientists who judged projects created by students at the Falmouth Academy were **John Bratton**, **Brian Buczkowski**, **Jason Chaytor**, **Debbie Hutchinson**, **Marinna Martini**, **Elizabeth Pendleton**, **Dave Twichell**, and **Richie Williams**. **Kate Ackerman**, **Seth Ackerman**, **Matthew Arsenault**, **Wayne Baldwin**, **Michael Bothner**, **Jason Chaytor**, **John Crusius**, **Adrian Green**, **Hyun-Sook Kim**, **Kevin Kroeger**, **Kathy Scanlon**, **Bill Waite**, **Richie Williams**, and **Bill Winters** judged science fairs held by Falmouth public schools, including Falmouth High School, the Lawrence School (grades 7 and 8), and Falmouth elementary schools.

Students Learn About Scientific Careers by Job Shadowing at National Wetlands Research Center

By Susan Horton

The U.S. Geological Survey (USGS)'s National Wetlands Research Center (NWRC) in Lafayette, Louisiana, is well known for its job-shadowing program for local students interested in careers in science and technology. Recently, on three different days, NWRC hosted 12 middle- and high-school students from Lafayette, Iberia, and Vermilion Parishes.

On the basis of the students' interests, USGS contractor **Susan Horton** (with IAP World Services, Inc.) designed schedules that allowed each student to spend time with biologists, geographers, and computer scientists in order to gain a realistic perspective of these careers. The scientists, both USGS employees and IAP World Services contractors, talked honestly with the students, sharing their life stories, educational choices, career paths, and, most importantly, the passion they feel for their work.

In the words of 8th-grader **Katie May** from Edgar Martin Middle School:

"I just wanted to thank you for letting me job-shadow at the Wetlands Center. It was a great opportunity for me, and I enjoyed it. I think that my favorite part was working with the amphibians that you have there. It gave me a kind of hands-on experience with handling animals. I hope that you keep doing job shadowing

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at the Wetlands Center because I know that anyone else who would come to job-shadow would have a blast. Tell the rest of the scientists that I visited thank you for showing me what it is really like to do their jobs. Once again, thank you for letting me come and job-shadow. I will never forget it."

*Job-shadow students **Quintin Brown** (left) and **Brock Minvielle** help biologist **Samantha Hill** assemble the microphone for a remote-recording device known as a "frog logger." The microphone, protected by a plastic 2-liter soda bottle and connected to a personal digital assistant (PDA), allows researchers to remotely record the calls of frogs in their natural habitats and later analyze the recordings to determine species types and population densities.*

Staff assisting with computer-science job shadowing included **Chris Cretini** (USGS), **Adrienne Garber**, **Dayna Price**, and **Joey Richard** (contractors) and **Kevin Suir** and **Liz Hollerman** (student interns). Those assisting in the biological sciences included **Lori Randall**, **Ches Vervaeke**, **John McCoy**, and **Jacoby Carter** (USGS) and **Samantha Hill**, **Amy Bunch**, **Sergio Merino**, **Melissa Collins**, **Carrie Jobe**, **Kim Zeno**, and **Will Hedge** (contractors). Also, scientists **Joy Merino**, **Patty Rosel**, and **Nikki Vollmer** of the National Marine Fisheries Service generously spent time sharing their research with students interested in marine biology.

***Lian Richardson** (right), holding a dibble (planting bar) and calipers, is learning about planting trees and taking tree measurements from USGS biologist **John McCoy**. **Lian** is an 8th-grade student at Edgar Martin Middle School in Lafayette, Louisiana, and was one 12 students "shadowing a scientist" at the USGS National Wetlands Research Center.*

Florida Shelf Mapping Workshop Identifies State Priorities

By Lisa Robbins

The submerged Florida shelf covers an area of more than 210,000 km^2, and if you ask fishermen, stakeholders, scientists, and so forth, every inch of it should be mapped! Such an endeavor would take billions of dollars and years of effort. Addressing the need to prioritize the areas on the coast and shelf for mapping, a first-of-its-kind workshop, "Mapping of Florida's Coastal and Marine Resources—Setting Priorities," was held February 7 and 8 at the U.S. Geological Survey (USGS) Florida Integrated Science Center (FISC) office in St. Petersburg, Florida (URL **http://coastal.er.usgs.gov/**). The USGS, the Florida Department of Environmental Protection (DEP, URL **http://www.dep.state.fl.us/**), and the Southeast Regional Partnership for Planning and Sustainability (SERPPAS, URL **http://wrrc.p2pays.org/serppas/index.asp**) cosponsored the workshop. Participants included members from all State agencies, as well as major Federal, academic, and industry partners, who gathered to discuss mapping techniques, inform each other of State and Federal projects and priorities on the coast and shelf, and provide a general consensus of State-agency mapping priorities.

***Jack Kindinger**, Associate Center Director for the USGS FISC office in St. Petersburg, presents the USGS Coastal and Marine mapping program to workshop participants, with assistance from facilitator **Janice Fleischer**.*

Coorganizers **Lisa Robbins** (USGS FISC Center for Coastal and Watershed Studies, St. Petersburg) and **Steve Wolfe** (DEP's Office of Coastal and Aquatic Managed Areas) conceived the workshop idea in similar, converging visions. **Robbins**, who leads the Florida Shelf Habitat Mapping Project (FLaSH Map, URL **http://coastal.er.usgs.gov/flash/**),

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(Florida Mapping continued from page 7)

initiated shelf-habitat mapping last year and learned that there was no consensus on the priority of areas to be mapped in Florida. "State and Federal biologists, geologists, and managers all indicated to me that their needs were widespread and urgent. The most common answer I got was, 'You need to map it all!' Yet we only had a small amount of money allocated for mapping—a drop in the bucket compared to what was needed. I searched for a document that indicated some priorities for the State, and found none. So, we decided to help create one and to facilitate the communication across State and Federal agencies as an objective."

Meanwhile, as the State liaison to SERPPAS, **Steve Wolfe** was participating in meetings that had a similar intent—to create a mechanism by which the Department of Defense (DOD) could use State priorities for shelf mapping to carry out DOD's mapping mission. According to **Wolfe**, "Mapping the waters off Florida's coasts is a priority of Florida's Oceans Council, and the information from that mapping is needed by those agencies whose responsibility is to manage Florida's natural and human resources. It was clear that we needed a means to assess which areas constituted the highest overall priority, the most 'bang for the buck' in terms of responding to agency management needs." **Wolfe**, also the liaison to the Florida Oceans and Coastal Resources Council (FOCRC, URL **http://FloridaoceansCouncil.org/**), and **Robbins**, a member of FOCRC, found that their common needs folded easily into cohosting the workshop. **Camille Destafney**, SERPPAS cohost of the meeting, commented: "SERPPAS focuses on interdependent resources sustainability and protection of ecosystems across boundaries. In order to accomplish this, the mapping of marine [and] coastal regions and identifying of interested stakeholders are key projects. This workshop was an excellent start in this endeavor."

For 2 days, approximately 90 participants packed into the USGS Center for Coastal and Watershed Studies to discuss coastal and shelf mapping issues. The morning of the first day focused on current and new technologies in mapping. The afternoon consisted of 15 presentations of State- and Federal-agency programs and priorities in mapping around Florida. Led by facilitator **Janice Fleischer** of Flash Resolutions, the agenda allowed for significant discussion time and breakout groups, which furthered the objectives of the workshop. The second day focused on the State agencies coming to consensus on priority areas for mapping on the shelf, with breakout groups delving into such issues as:

- common mapping priorities among agencies,
- facilitation of communication among agencies,
- technologies,
- designation of bioregions, and
- baseline mapping data.

Afternoon sessions focused on the presentation of several habitat-classification schemes by **Becky Allee** (NOAA), **Steve Rohmann** (NOAA), and **Dave Palandro** (Florida Fish and Wildlife Conservation Commission), followed by group discussion of plenary questions, such as: How could new data be made available to those needing it, and how should priorities be updated in the future?

The final breakout sessions allowed participants to examine critical next-step issues, such as taking the 13 State priority areas (determined in the morning) and identifying the mapping scales, technologies, and minimum data needed to map these areas successfully. Another breakout group discussed funding, leveraging resources, and facilitation of public/private partnerships. Poster sessions during lunches and breaks allowed participants to discuss techniques and mapping projects in depth. A whitepaper outlining the findings and USGS 5-year plan will be released in summer 2007.

Breakout groups discuss coastal and shelf mapping priorities for Florida, technologies, and baseline-mapping data. Results of each breakout group were presented to the workshop participants for further discussion and refinement.

USGS Cohosts Multiagency Hanalei Watershed Workshop

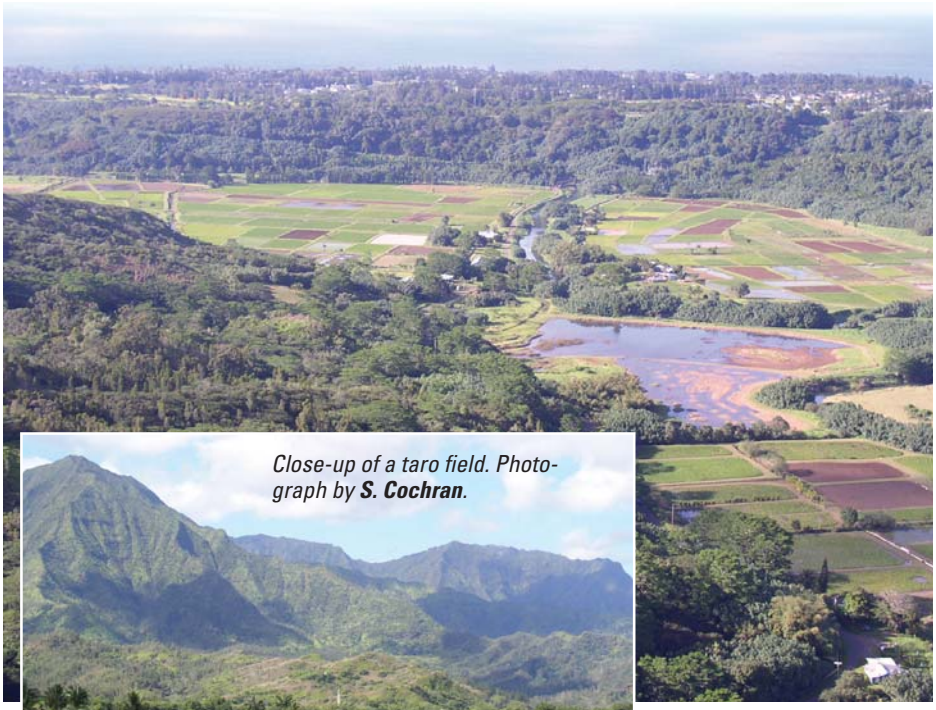
By Susan A. Cochran and Michael E. Field

Scientists from the U.S. Geological Survey (USGS) and other Federal, State, and local agencies convened February 21-22, 2007, in Princeville, Hawai‘i, on the north coast of Kaua‘i, to discuss multidisciplinary studies in the island’s Hanalei River watershed. Cohosted by **Mike Field** of the USGS Pacific Science Center (Santa Cruz, California) and **Carl Berg** of the Hanalei Watershed Hui (URL **http://www.hanaleiwatershedhui.org/**), the workshop was initiated to document the scientists’ collective understanding, better integrate their results, and identify the salient issues that remain to be studied in the multiagency Ridge to Reef Project, a cooperative effort to explain how changing tropical watersheds are affecting coral ecosystems and coastal habitats.

To better understand impacts on the terrestrial and marine ecosystems of Hawai‘i, the organizers fashioned a series of questions designed to focus the knowledge and expertise of the workshop participants on the interplay of processes in the Hanalei River watershed, from Mount Wai‘ale‘ale (the highest point in the watershed) to the reefs of Hanalei Bay:

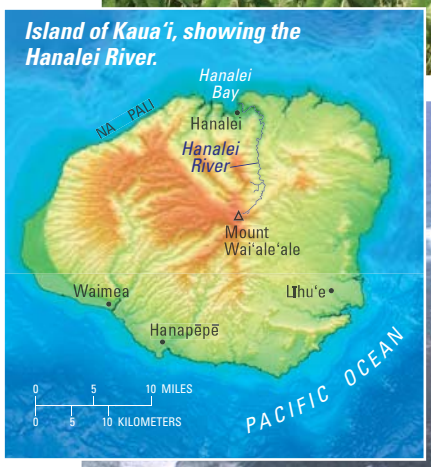
- How is sediment generated in the watershed?
- How is sediment transported in the watershed?
- How is sediment deposited in the lower watershed?
- How is sediment deposited in the bay and beyond?
- What is the flow of nutrients and pathogens via ground water and surface flow?
- How are terrestrial and aquatic ecosystems affected?
- What management actions are needed to improve water quality and reduce pollution threats to corals?

Participants spoke on a range of topics, including such watershed problems as slope failure, invasive species, feral ungulates, and pollution; the effects of these problems on the coral reef; issues for future study; and possible management paths. A collection of abstracts from the workshop will soon be published as a USGS Open-File Report. ❁



*Close-up of a taro field. Photograph by **S. Cochran**.*

*The lower reaches of the Hanalei River are cultivated with taro, which may contribute contaminants and alter streamflow patterns during times of flood. Photograph by **M. Field**.*



Island of Kaua‘i, showing the Hanalei River.

*Sediment and pollutants from the Hanalei River can harm the coral-reef ecosystem in Hanalei Bay. Photograph by **M. Field**.*

Jessica Lacy Accepts Position as Research Oceanographer in the Western Coastal and Marine Geology Team

By Sam Johnson

I am pleased to announce that **Jessica Lacy** has accepted our offer to be a Research Oceanographer in the U.S. Geological Survey (USGS) Western Coastal and Marine Geology Team. In this position, **Jessie** will continue to provide the team with her broad expertise in sediment and contaminant transport, especially in estuarine, wetland, and coastal environments.

Jessie received a B.S. in Environmental Engineering from Humboldt State University, an M.S. in Water Science from the University of California, Davis, and a Ph.D. in Civil and Environmental Engineering from Stanford University. Her dissertation, titled "Circulation and Transport in a Semi-Enclosed Estuarine Subembayment," focused on the hydrodynamics of Honker Bay (part of northern San Francisco Bay). Between degrees, **Jessie** worked for the Massachusetts Department of Environmental Quality Engineering (Wetlands Division), the California State and Regional (San Francisco Bay) Water Boards, and the USGS Water Resources Discipline office in Sacramento, California.

Jessie took a postdoctoral position with the USGS Western Coastal and Marine Geology Team in 2001 to work on coastal-erosion problems in southwestern Washington. She then stayed with the USGS on a term appointment to work on the Puget Sound and Coastal Evolution Modeling projects. She currently leads the Puget Sound Beach and Nearshore Sediment Dynamics task, in which much of her individual work concentrates on

***Jessie Lacy** on the shore of Shaw Island in the San Juan Islands, Puget Sound, Washington. The red flag and buoy behind her are attached to one of her instrumented frames in a seagrass meadow.*

the interaction between aquatic vegetation and hydrodynamics. For this effort, **Jessie** has developed new instrument frames and data-analysis techniques to collect data in and around seagrass meadows, which provide critical fish-spawning and nursery habitat (for example, see article "Eelgrass in Puget Sound—a New Study of Flow, Sediment Transport, and *Zostera marina*" in *Sound Waves*, September 2004, at URL **http://soundwaves.usgs.gov/2004/09/**). **Jessie** is also leader of the Wave Boundary Layer Scale task in the Coastal Evolution Modeling Project. As part of that task, she is the principal investigator in an Office of Naval Research-funded project on ripple evolution, an effort that follows up her work with **Dave Rubin** using a large-scale flume in Japan (see article "Making Waves and Ripples in a Giant Flume in Japan" in *Sound Waves*, April 2005, at URL **http://soundwaves.usgs.gov/2005/04/research.html**).

Jessie also serves as a member of the science panel for the Elkhorn Slough National Estuary Research Reserve Tidal Wetland Project (see URL **http://www.elkhornslough.org/tidalwetland/description.htm**) and is a former member of the science team for the South [San Francisco] Bay Salt Pond Restoration Project (see URL **http://www.southbayrestoration.org/**) and the technical group for Envisioning the Future of the Gulf Coast (see URL **http://www.futureofthegulfcoast.org/**). In these roles, she has helped establish and prioritize research objectives involving the functions, fate, and restoration of wetlands. **Jessie** is a member of the American Geophysical Union, the Estuarine Research Federation, and the American Society of Limnology and Oceanography. We look forward to her continued contributions to USGS coastal and marine research.

Patrick Barnard Becomes the Western Coastal and Marine Geology Team's Newest Research Geologist

By Sam Johnson

It is a great pleasure to announce that **Patrick Barnard** has accepted our offer to be a Research Geologist in the U.S. Geological Survey (USGS) Western Coastal and Marine Geology Team. In this position, **Patrick** will continue to provide the team with his strong expertise in understanding coastal processes, environments, and evolution.

Patrick received a B.A. in Geology from Williams College, an M.S. in Coastal Geology from the University of South Florida, and a Ph.D. in Geological Sciences from the University of California, Riverside. His dissertation, titled "The Timing and Nature of Glaciofluvial Erosion and Resedimentation in the Hima-

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laya: The Role of Paraglacial Processes in the Evolution of High Mountain Landscapes," involved work in Tibet, northern India, and Nepal (a coastal environment about 45 million years ago). **Patrick** also worked for 4 years at Lawrence Livermore National Laboratory while he was completing his dissertation.

Patrick came to the USGS Western Coastal and Marine Geology Team in 2003 as a Mendenhall Postdoctoral Research Fellow, designing a project to develop physically based models of sediment transport, morphologic change, coastal erosion, and formation of sedimentary deposits along the San Francisco coast (see URL **http://geology.usgs.gov/postdoc/profiles/barnard.html**). This work has included imaging and analysis of a spectacular sand-wave field at the mouth of San Francisco Bay (see article in *Sound Waves*, September 2006, URL **http://soundwaves.usgs.gov/2006/09/research.html**). **Patrick's** successful postdoctoral work grew into a task on the team's Coastal Evolution Modeling Project, attracting external support from Federal, State, and local agencies. Meanwhile, **Patrick** has also served as leader of the Coastal Change in the California Urban Ocean task of the California Urban Ocean Project. That task, funded almost entirely by State and local agencies, examines sediment transport, sediment budgets, and coastal erosion along the coast of Santa Barbara and Ventura Counties. For both the San Francisco and Santa Barbara-Ventura efforts, **Patrick** has repeatedly organized and mobilized large field surveys. His integrated approach has included:

- numerical modeling,
- periodic three-dimensional beach surveys,
- bathymetric surveys using jet skis and swath tools,
- onshore and offshore grain-size analysis, using bed-sediment cameras,
- real-time video monitoring,
- subbottom seismic-reflection surveys, and
- instrument deployments to measure waves, currents, and sediment transport.

***Patrick Barnard**, with foggy Golden Gate Bridge in background.*

Patrick is currently a member of the Geological Society of America, the American Geophysical Union, and the American Shore and Beach Preservation Association.

We look forward to his continued contributions to USGS coastal and marine research.

Four New Postdoctoral Fellows Will Research Coastal and Marine Topics

By Helen Gibbons

The U.S. Geological Survey (USGS) will welcome 14 new Mendenhall Postdoctoral Research Fellows in fiscal year 2008 (FY08, starting October 2007). Four of them will conduct research on coastal and marine topics:

- **Nancy Grumet Prouty** (Stanford University) will work with **Michael E. Field**, **Gordon W. Tribble**, and **Robert J. Rosenbauer** on "Historical Land-Use Patterns Recorded by Coral Chemistry: Linkages Between Watershed Change and Ecosystem Health."
- **Marci Robinson** (George Mason University) will work with **Harry Dowsett** and **Alan Haywood** (British Antarctic Survey) on "Multiproxy Analysis of Sea-Surface Temperature and Ocean-Atmosphere Modeling of Future Climate Scenarios."
- **Andrew Schroth** (Dartmouth College) will work with **John Crusius**, **Ken Bruland** (University of California, Santa Cruz), and **Ed Sholkovitz** (Woods Hole Oceanographic Institution) on "Sources and Fluxes of Iron to Northern Gulf of Alaska Surface Waters."
- **Kathy Tedesco** (University of South Carolina) will work with **Richard Poore**, **Terry Quinn** (University of Texas), and **David Hollander** (University of South Florida) on "Holocene Climate and Environmental Variability—Northern Gulf of Mexico."

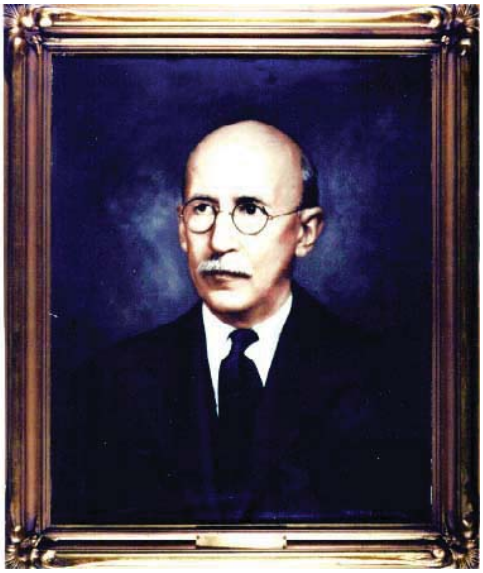
The 14 new Fellows are the 8th group of recent Ph.D. graduates to be hired for 2-year appointments under the Menden-

(Mendenhall Fellows continued on page 12)

(Mendenhall Fellows continued from page 11)

hall Postdoctoral Research Fellowship Program, established in 2001 in honor of **Walter C. Mendenhall**, the fifth Director of the USGS.

Patrick Leahy, USGS Associate Director for Geology, announced the names of the incoming Fellows in March, noting the continued high caliber of young scientists coming to the USGS through the Mendenhall Program and the breadth of their research topics. **Leahy** also praised current and past Mendenhall Fellows, citing their energy and productivity and "the stimulation they provide our permanent staff." Brief descriptions of their research projects are posted on the Mendenhall Program Web site at URL **http://geology.usgs.gov/postdoc/** (scroll down to "Project Profiles" and "Project Summaries").



***Walter C. Mendenhall**, fifth Director of the USGS (from 1931 to 1943), in whose honor the agency established the Mendenhall Postdoctoral Research Fellowship Program (URL **http://geology.usgs.gov/postdoc/**). (Portrait painted by Harris and Ewing, Inc.)*

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