

Fieldwork

USGS Responds to Deepwater Horizon Oil Spill in the Gulf of Mexico

By Helen Gibbons

At approximately 10 p.m. on April 20, 2010, a devastating explosion occurred on the British Petroleum (BP) Deepwater Horizon drill rig, claiming the lives of 11 men. The drill rig, which sank on April 22, was located in the Gulf of Mexico about 50 miles off southeastern Louisiana. Federal authorities, both military and civilian, have been working onsite and around the clock to respond to and mitigate the impact of the resulting oil spill.

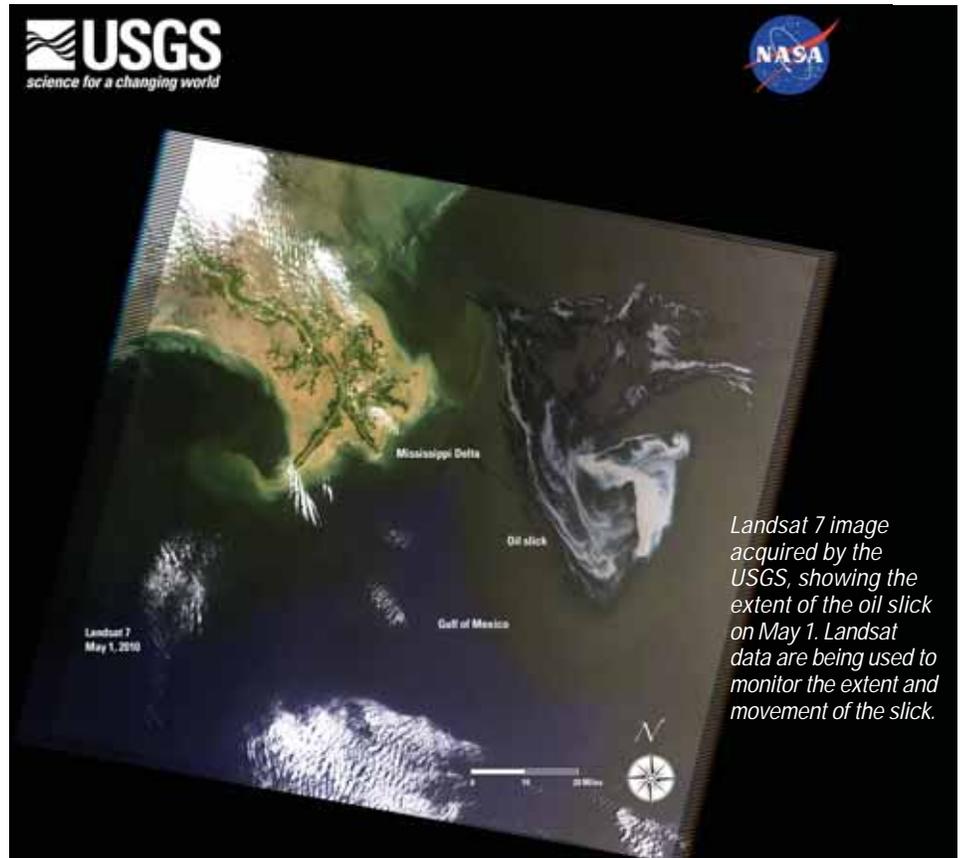
U.S. Geological Survey (USGS) personnel from all levels of the organization have been contributing to the recovery effort. USGS Director **Marcia McNutt**

(Deepwater Horizon continued on page 2)



Rear Adm. **Mary Landry** (left), Federal on-scene coordinator for the Deepwater Horizon incident, speaks with U.S. Secretary of the Interior **Ken Salazar** as they conduct an aerial reconnaissance of the Gulf Coast on April 30, 2010, aboard a Coast Guard HC-144A Ocean Sentry aircraft. U.S. Coast Guard photograph by Petty Officer 3rd Class **Cory J. Mendenhall**.

U.S. Department of the Interior
U.S. Geological Survey



Landsat 7 image acquired by the USGS, showing the extent of the oil slick on May 1, 2010. Landsat data are being used to monitor the extent and movement of the slick.



*Gas from the damaged Deepwater Horizon wellhead is burned by the drillship Discoverer Enterprise May 16, 2010, in a process known as flaring. Gas and oil from the wellhead were being brought to the surface via a tube that was placed inside the damaged pipe. U.S. Coast Guard photograph by Petty Officer 3rd Class **Patrick Kelley**.*

Sound Waves

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Submission Guidelines

Deadline: The deadline for news items and publication lists for the August issue of *Sound Waves* is Wednesday, June 16.

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).

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U.S. Geological Survey Earth Science Information Sources:

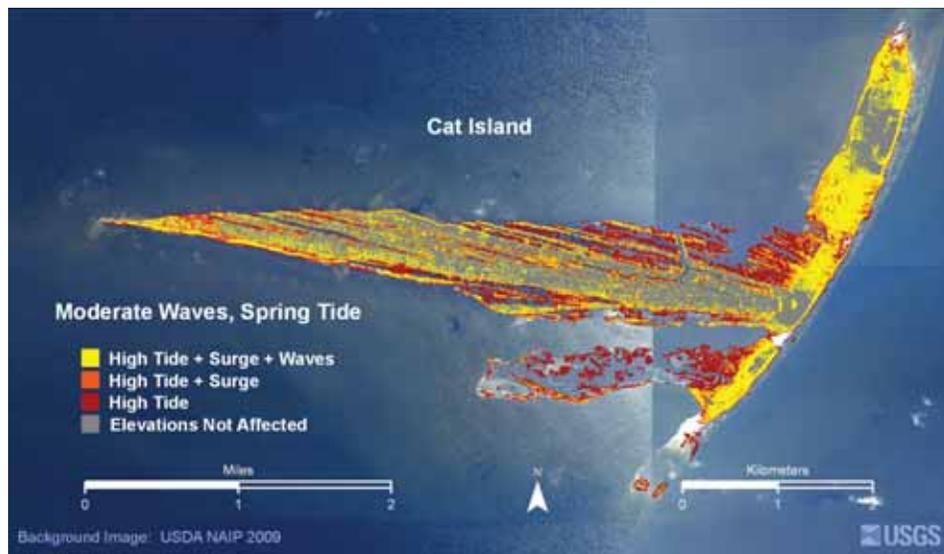
Need to find natural-science data or information? Visit the USGS Frequently Asked Questions (FAQ's) at URL <http://www.usgs.gov/faq/>

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

(*Deepwater Horizon continued from page 1*)



Cat Island, Mississippi, showing areas likely to be inundated or overwashed under conditions of moderate waves and spring tide. The risk of oil deposition on barrier islands can be identified by comparing island elevations to models of storm surge and wave runup. (For more information and link to a location map, please visit <http://coastal.er.usgs.gov/hurricanes/deepwaterhorizon/>.)

was asked by Secretary of the Interior **Ken Salazar** to help coordinate the joint efforts of Federal scientists and BP engineers working at the BP command center in Houston, Texas, on several technological challenges and approaches to securing the damaged wellhead, capturing the leak, and controlling the spill.

Director McNutt, a distinguished scientist and administrator, has considerable experience in oceanography and applied ocean science. Most recently, before being confirmed as Director of the USGS, she served 12 years as President and CEO of the Monterey Bay Aquarium Research Institute (MBARI), which has a reputation for performing pioneering work in deep-sea engineering using autonomous and remotely operated vehicles.

In a Department of the Interior (DOI) press release issued May 7, **Secretary Salazar** noted that **Director McNutt**, in addition to her own expertise, “has access to the knowledge and expertise of thousands of USGS scientists and technicians.”

Many of these scientists and technicians, from USGS offices around the Gulf of Mexico and beyond, have been gathering scientific data and information about the environmental impacts of the oil spill on affected coastal habitats. Their efforts include:

- Collecting satellite imagery to assess the impact on wetlands and coasts
- Developing maps showing National Oceanic and Atmospheric Administration (NOAA) projections of the oil-spill trajectory with respect to DOI lands
- Collecting samples to ascertain the sources and levels of toxicity to soils and water systems
- Conducting tests to determine the causes of mortality of wildlife
- Developing models that depict how local tidal and current conditions will interact with seafloor bathymetry to carry oil over barrier islands
- Providing decision-support tools to help DOI land managers mitigate the effects of the oil spill and assist in restoration efforts

For the latest information about the coordinated response to the oil spill, please visit “Deepwater Horizon Response—the Official Site of the Deepwater Horizon Unified Command” at <http://www.deepwaterhorizonresponse.com/>. For updates on USGS contributions, please visit “USGS Responds to Deepwater Horizon Oil Spill” at http://www.usgs.gov/deepwater_horizon/. ❁

Past Decade of Extreme Storms Leaves Coasts Vulnerable

By Abby Sallenger, Hilary Stockdon, and Ann Tihansky

Impacts on the coastline of the northern Gulf of Mexico from a decade of extreme storms have left many coastal areas vulnerable to future storm events, according to the U.S. Geological Survey (USGS) Coastal Change Hazards Program. Over the past 10 years, 58 percent of the U.S. Gulf of Mexico coastline has been hit by hurricane-force winds. Major hurricanes like Ivan, Katrina, Rita, and Ike have pummeled and eroded beaches and sand dunes along the Gulf Coast. These coastal features are commonly the first line of defense for coastal communities and ecosystems against extreme storms.

“Recent hurricanes have caused significant erosion of coastal features and, in some places, lowered barrier-island elevations. It is important to understand how such lowering of beaches and dunes can increase the vulnerability of coasts to future storms,” said **Abby Sallenger**, USGS oceanographer in St. Petersburg, Florida.

“The vulnerability of barrier islands or coasts to inundation during extreme storms is determined, in part, by the elevation of the seaward-most sand dunes or beach berm. The dunes act as an important line of defense, taking the brunt of waves and storm surge and somewhat reducing the impact on coastal communities. On engineered coastlines, seawalls or other structures may be used to provide this protection,” said **Hilary Stockdon**, another USGS oceanographer in the St. Petersburg center.

One aspect to improving preparation for, emergency response to, and recovery after extreme storms is predicting the types of coastal change that may occur when a hurricane makes landfall. The Coastal Change Hazards Program studies the response of coastal environments to extreme waves, storm surge, and currents. USGS scientists coordinate with other State and Federal agencies in predicting the likely interactions between waves,

storm surge, and coastal topography during extreme storms. Accurate predictions can improve response times and provide valuable information to the public, coastal managers, and emergency-response teams.

A paper published in the February 2010 edition of *Eos (Transactions of the American Geophysical Union)* describes how this predictive ability was tested on Hurricane Ike in 2008.

“Using observations of coastal morphology and models of storm surge, we were able to predict the vulnerability of the Galveston coastline to extreme coastal changes during the landfall of Hurricane Ike,” said **Nathaniel Plant**, lead author of the study. Examples of predictions of coastal-change impacts for Hurricane Ike are posted online at <http://coastal.er.usgs.gov/hurricanes/ike/coastal-change/post-landfall-assessment.html>.

For more information about the USGS Coastal Change Hazards Program, visit

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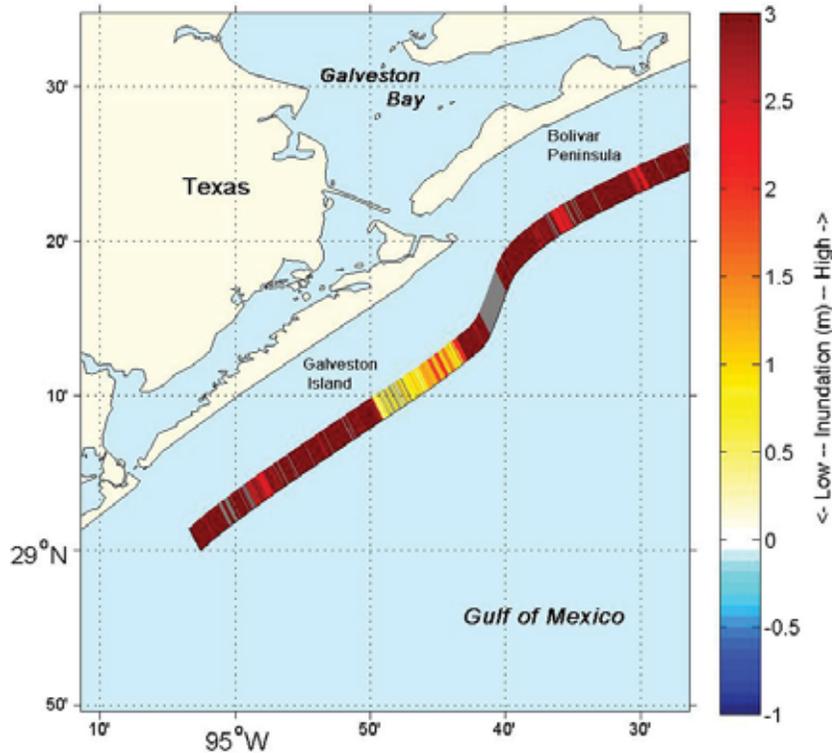


Gulf of Mexico, showing coastlines affected by hurricanes from 2000 to 2009.

(Vulnerable Coasts continued from page 3)

<http://coastal.er.usgs.gov/hurricanes/>. The full citation for the recent paper is: Plant, Nathaniel, Stockdon, Hilary, and Sallenger, Abby, 2010, Forecasting hurricane impact on coastal topography: Eos (American Geophysical Union Transactions), v. 91, no. 7, p. 65, doi:10.1029/2010EO070001 [<http://dx.doi.org/10.1029/2010EO070001>].

Assessment of inundation potential (storm surge minus dune elevation) for Galveston, Texas, using modeled storm surge based on Hurricane Ike storm conditions and landfall location. In most areas, severe inundation (red colors) and coastal change were expected because updated surge estimates exceeded the elevations of the primary dunes/berms. (From <http://coastal.er.usgs.gov/hurricanes/ike/coastal-change/post-landfall-assessment.html>).



Climate-Change Impacts on Wildlife Will Be Studied: Fish and Wildlife Face Significant Risks as the Climate Changes

By Douglas Beard and Jessica Robertson

Our Nation's fish and wildlife are expected to be significantly affected now and in the future as the climate continues to fluctuate.

New research by the U.S. Geological Survey (USGS) will help us better understand future climate conditions and impacts to species and their habitats. Projects include studies of alterations in Florida's ecosystems, potential impacts on Great Lakes fish, sea-level-rise impacts on San Francisco Bay marshes, and the effects of melting glaciers on Alaska's coastal ecosystems.

"The USGS has funded 17 new projects through the National Climate Change and Wildlife Science Center," said USGS Associate Director for Biology **Susan Haseltine**. "Our future holds new climate conditions and new habitat responses, and managers need projections based on sound science to assess how our landscapes may change and to develop effective response strategies for species survival."

Several projects are summarized below, and descriptions of all projects are posted on the National Climate Change and Wildlife Science Center's Web site at <http://nccw.usgs.gov/2009RFP-projects.html>.

Preserving Florida's Unique Land

Florida has diverse ecosystems and a unique climate. To understand how it will fare in the face of climate change, modelers must develop scenarios that take this uniqueness into account. USGS scientists are doing just that by creating Florida-specific models regarding which species and habitats will increase or decline based on potential rainfall and temperature changes, as well as the impacts of human-induced land-use and land-cover changes.

What's the Future for Great Lakes Fish?

The Great Lakes support a multibillion-dollar fishing and tourism industry, but

little is known about how climate change could affect fish species in the lakes. USGS scientists and collaborators are updating models to predict 50 to 100 years into the future how water level, water temperatures, and ice cover will change in the Great Lakes. Scientists will explore how warmer water temperatures may affect fish growth and consumption rates and will forecast algal production and fish variability in Lakes Michigan and Huron.

San Francisco Bay Marshes Under Siege

San Francisco Bay marshes are at risk from sea-level rise, storms, altered salinity, changes in sediment load, and more. These changes threaten plant communities and such species as the salt marsh harvest mouse, the California clapper rail, and the California black rail, which are all listed as either endangered or threatened under the U.S. Endangered Species Act. USGS

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(Climate Change continued from page 4)

scientists are developing models for this area to predict how much sea level will rise, how species and habitats will be affected, and whether marshes can grow at sustainable rates.

Climate on the Move: What Will Happen Where

What if managers could map where particular climate conditions will likely occur in the future, or visualize how



The Great Lakes are partly covered by ice and snow in this satellite image acquired March 9, 2003. Image courtesy of National Aeronautics and Space Administration (<http://rapidfire.sci.gsfc.nasa.gov/gallery/?2003068-0309/GreatLakes.A2003068.1650.1km.jpg>).



California clapper rail, San Francisco Bay, California. Photograph by Don Roberson.

habitats will respond and move? USGS scientists are working to make these happen, helping to protect our Nation's natural resources. They are creating climate models for North America and smaller scaled models for the contiguous United States and Alaska. Data will be incorporated into an online Web interface where managers can download information and produce maps of projected future climate conditions.

Camouflage Trying to Keep Up with Climate Change

Many species undergo a seasonal change of coat color to match the presence or absence of snow. As the climate changes and snowpack declines, species may have white coats on non-snowy backgrounds. One animal that could be affected is the snowshoe hare, which is prey for the Canada lynx, a threatened species under the U.S. Endangered Species Act. Animals could face population decline, or they could respond by adapting or moving. USGS scientists are tracking snowshoe hares to evaluate their responses, using data to make projections for the next 30 to 50 years.

Melting Glaciers Affecting Ecosystems in the Gulf of Alaska

It is well documented that glaciers that drain into the Gulf of Alaska are melting rapidly in response to climate change. As a result, the flow of freshwater into the gulf is being altered, and impacts are felt across coastal ecosystems. For example, fish feed on phytoplankton and zooplankton, and these organisms could be negatively affected as melting glaciers influence the timing and magnitude of the supply of fresh water, nitrate, and iron. Scientists are studying these processes and impacts, with particular focus on the Copper River, which is fed by nearby mountain glaciers and is the Gulf of Alaska's largest freshwater source.

Trout and Salmon at Risk in the West

Some native trout and salmon populations in the Western United States

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Terminus of thinning and retreating Schwan Glaciers in the Copper River drainage, north-central Chugach Mountains, Alaska. Note ice-marginal lake that has formed in front of the retreating, debris-covered terminus. View southward; photograph by **Bruce F. Molnia**, USGS.

are at risk for extinction, with many proposed for or listed under the U.S. Endangered Species Act. The recovery of these species is a challenge because climate change is likely to raise water temperatures, alter wildfire occurrences, and increase demand for water resources. USGS scientists are studying how climate change will influence fish habitats, and are providing data to managers to help them assess extinction risks and formulate appropriate response strategies.

Islands and Seabirds Faced with Sea-Level Rise

As the climate continues to change, sea-level rise may inundate low-elevation Pacific islands. The Northwestern Hawaiian Islands provide habitat for the largest assemblage of tropical seabirds in the world (14 million birds and 22 species) and 11 endangered species of terrestrial

*Black noddy (Anous minutus) on Tern Island, French Frigate Shoals (Northwestern Hawaiian Islands). Photograph courtesy of U.S. Fish and Wildlife Service, taken by **Duncan Wright**, June 15, 2006.*

birds and plants. Even small increases in sea level may result in critical habitat loss. USGS scientists are mapping current species distribution and identifying the areas and species that are most vulnerable to sea-level rise.



Thirsty Plants in the Arid Southwest

A warmer climate can bring dryer conditions, threatening plant species in the arid Southwestern United States, as well as the wildlife that depend on these plants for habitat and food. USGS scientists will expand on existing models that outline climate-change impacts on plant populations and include as many as 30 plant species. Focus will be placed on plants supporting wildlife of greatest concern. These models will also be used to project changes in wildlife populations.

The National Climate Change and Wildlife Science Center and other scientific program elements of the USGS will work closely with eight regional Climate Science Centers being established by the Department of the Interior (DOI). These centers will provide scientific information, tools, and techniques needed to manage land, water, wildlife, and cultural resources in the face of climate change. The USGS and the DOI centers will also work closely with a network of Landscape Conservation Cooperatives in which Federal, State, tribal, and other managers and scientists will develop conservation, adaptation, and mitigation strategies for dealing with the impacts of climate change. ❁

Natural-Gas Potential Assessed in Eastern Mediterranean

By Chris Schenk and Jessica Robertson

An estimated 122 trillion cubic feet (tcf) (mean estimate) of undiscovered, technically recoverable natural gas is present in the Levant Basin Province in the eastern Mediterranean region. “Technically recoverable” resources are defined as those producible by using currently available technology and industry practices.

This study is the first U.S. Geological Survey (USGS) assessment of the Levant Basin to identify its potentially extractable resources.

“The Levant Basin Province is comparable to some of the other large provinces around the world, and its gas resources are bigger than anything we have assessed in the United States,” said USGS Energy Resources Program Coordinator **Brenda Pierce**. “This assessment furthers our understanding of the world’s energy potential, helping inform policy and decision makers about future energy supplies.”

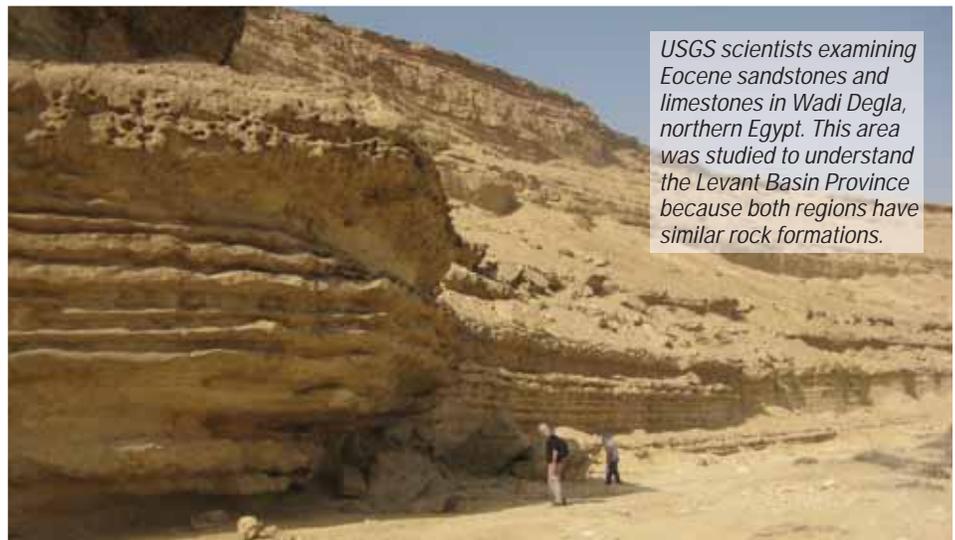
Natural gas is used for various purposes, primarily electricity generation in the industrial, residential, and commercial sectors.

Worldwide consumption and production of natural gas was 110 tcf in 2008, according to the Energy Information Administration. The three countries with the largest annual natural-gas consumption in 2008 were the United States (23 tcf), Russia (17 tcf), and Iran (4 tcf).

Russia’s West Siberian Basin is another large natural-gas province, with an estimated 643 tcf. The Middle East and North Africa region also has several large provinces, including the Rub Al Khali Basin (426 tcf), the Greater Ghawar Uplift (227 tcf), and the Zagros Fold Belt (212 tcf).

Some natural-gas accumulations in the United States include the Southwestern Wyoming Province with an estimated 85 tcf, the National Petroleum Reserve Alaska Province (73 tcf), and the Appalachian Basin Province of the eastern United States and the Western Gulf Basin Province of Texas and Louisiana (70 tcf each).

All of these estimates are mean estimates of undiscovered, technically recoverable gas resources. The Levant Basin Province also holds an estimated 1.7 bil-



lion barrels of undiscovered, technically recoverable oil. Worldwide consumption of petroleum in 2008 was about 31 billion barrels.

The USGS conducted this assessment as part of a program directed at estimating the undiscovered, technically recov-

erable oil and gas resources of priority petroleum basins around the world. To learn more about this assessment, please read USGS Fact Sheet 2010-3014 at <http://pubs.usgs.gov/fs/2010/3014/> and visit the Energy Resources Program Web site at <http://energy.usgs.gov/>.

Fourth Graders Exclaim: USGS Open House in Florida “Superfantabulous” and “F.U.N. FUN”

By **Ann B. Tihansky**

Last fall, the U.S. Geological Survey (USGS) St. Petersburg Coastal and Marine Science Center in Florida held its 11th annual Earth Science Day for fourth graders (November 6) and 11th annual Open House (November 7, 2009). More than 1,000 fourth-grade students from 14 schools throughout the Tampa Bay area participated in the Earth Science Day event. Center staff and volunteer National Honor Society high-school students guided the fourth graders through the facility and the exhibits.

Letters received from students who attended demonstrate how much impact such a field trip can have on a young mind. The opportunity to spend a day at a research facility interacting with scientists as they explain their work is likely the kind of inspiration that led many of today’s scientists into their present careers. The excited fourth graders say it best. Here are some excerpts from their letters:

“Thank you for using your time to teach us the wonderful world of science. I am a BIG fan of science. One of the things I want to be when I get a job is a scientist. The trip was amazing. So thank you. By the way, I liked the goody bags!”

—**Brenna**

“I liked all the many adventures I had. I learned many scientific things. I had been to the Geowall 3D, the Wave Simulation, the Flooding of Louisiana, How to Track a Hurricane, the Ground Water Station, and the Laser Light Tracker. I loved all of them!”

—**Ritesh**

“It was so much fun and yet I learned so much!”

—**Derek**

“One of my favorite lessons was watching the 3D tour to look at where earthquakes were and what tsunamis came [from] the earthquakes. I was glad to know that Florida has not had many earthquakes.



Theresa Burress (left) and Barbara Strait worked at the Educational Resources table, handing out publications, posters, and more.



A young Earth scientist carefully collects a core sample with help from Jim Flocks. See a short video of Flocks explaining sediment coring at <http://soundwaves.usgs.gov/2010/05/video.html>.

Another fun area was the hurricane place where we watched how wind from hurricanes forces the water to move more. At first it is calm, but then gets stronger.”

—**Aidan**

“It was cool learning about reefs and how the planes use a radar to track elevation. I loved the laser light reflecting off the water. I never knew that water reflects two lights.”

—**Aidan**

“I loved the wave simulation. My other favorite thing was the 3D earthquake simulation. What you were teaching us is so much fun. THANK YOU A BUNCH USGS WE LOVED IT ALOT”

—**Rachel**

“I chose LIDAR technology for my favorite because the instructor was very good at telling us how they actually use this kind of technology in the ocean reefs. This was useful to me because this lesson taught me to look at coral reefs in a different way. Thank you for the treat bags, we all LOVED them.”

—**Josh**

“I liked the Twister booth because while it was educational it also had a game that was lots of fun! I thought the idea to use coral instead of boring color pads was very cool and clever! Everyone enjoyed spinning the colossal spinner.”

—**Alexandra**

“Our guide was amazing. He was a great reference. He knew everything it seemed. We saw nine exhibits.”

—**Garrett**

“My favorite booth was the one about ATRIS. I thought that it would be really cool to have a job like that.”

—**Marshall**

“One booth was about sand and what is in it. I learned that every beach has different kinds of sand in it. I took a sample of some sand from a core and put it in a bag.”

—**Lillian**

The next day, the facility was open to the public, and more than 400 visitors explored the exhibits and enjoyed one-on-one discussions with scientists. Educators were invited to attend so that they could meet with scientists and take advantage of free maps, publications, and posters for their classrooms. **Barbara Strait**, from

(Open House continued on page 9)

(Open House continued from page 8)



Using a before-and-after matching game, **Karen Morgan** teaches students about coastal-change hazards from extreme storms, such as hurricanes.

USGS Eastern Region Communications, participated in the event and provided additional educational materials.

The focus of the Open House was “Understanding Climate,” following the American Geological Institute’s 2009 Earth Science Week theme. Many booths focused

on how science is tied to climate-related issues. The Open House Outstanding Science Communication Award was presented to USGS booths that best addressed the theme. Points were awarded for visually effective, technically innovative, and engaging displays that best shared scientific



concepts while encouraging inquiry about understanding climate. Winners received \$1,000 toward travel costs to attend a scientific meeting of their choice. The three winning displays and their presenters are:

- “Bird’s Eye View: Using Lasers to Map Coastlines and Coral Reefs”—**Amar Nayegandhi, Emily Klipp** (see “Lidar” video clip at <http://soundwaves.usgs.gov/2010/05/video.html>)
- “Causes of Sea-Level Rise”—**Kara Doran, Joe Long, Nathaniel Plant**
- “Diggin’ the Past”—**Noreen Buster, Jim Flocks** (see “Diggin’ the Past” video clip at <http://soundwaves.usgs.gov/2010/05/video.html>)

The annual Open House in St. Petersburg is a community forum that reaches a broad public audience to educate and raise awareness about scientific topics and issues. Exhibits hosted by institutions and agency partners that specialize in resource management or science education complemented the USGS exhibits. Many of these exhibitors are institutions located within the C.W. Bill Young Marine Science Complex in downtown St. Petersburg, including the State of Florida’s Fish and Wildlife Research Institute, the National Oceanic and Atmospheric Administration (NOAA)’s National Marine Fisheries Service and National Weather Service, the U.S. Coast Guard (USCG) and USCG Auxiliary, the University of South Florida (USF)’s College of Marine Science, the Florida Institute of Oceanography, and the U.S. Fish and Wildlife Service. Additional participating organizations included the Boy Scouts of America, Clearwater Marine Aquarium, Friends of the Tampa Bay National Wildlife Refuges, Gatorama, the Gulf of Mexico Coastal Ocean Observing System, the Oceanography Camp for Girls, the Pier Aquarium, the Museum of Science and Industry, the Science Center of Pinellas, the SCUBAnauts, the

(Open House continued on page 10)

At her award-winning exhibit, “Causes of Sea-Level Rise,” **Kara Doran** engages students in a discussion about how changes in climate may affect a low-lying coastal community.

Outreach, continued

(Open House continued from page 9)

Suncoast Seabird Sanctuary, Tampa Bay Watch, and the Southwest Florida Water Management District, which provided funding for buses to transport the students to the Earth Science Day event.

The Open House is available to the general public, and Earth Science Day is available for fourth-grade classes at schools within the local Tampa Bay area. Earth Science Day attendance is on a first-come, first-served basis that also factors

in group size, scheduling, and timing. Learn more at <http://coastal.er.usgs.gov/openhouse/>. View a short video of the 2009 event at <http://soundwaves.usgs.gov/2010/05/video.html>.

To close, here are a few more comments from the kids:

“I had an awesome time and wished I could have stayed a lot longer. This was one of my favorite field trips ever. Thank

you for all the cool flyers and booklets that we got to take home.”

—**Jonathan**

“I got to learn a lot, especially about coral, just like brain coral, branch coral, finger coral, flower coral and lettuce coral. When we left, the students received a bag with all this information in it. I want to be a marine biologist when I grow up, so the bag was helpful. Maybe I can persuade my parents to bring me back tomorrow!”

—**Mackenzie**

“I liked the part when we looked at the 3D projector and learned about what happens under an earthquake that makes a tidal wave. That made it one of the best field trips ever.”

—**William**

“The tsunami exhibit is really cool. I didn’t really know how one formed and I found out that a huge tsunami happened on my daddy’s birthday! I learned here that a tsunami can wipe out a whole town!!”

—**Brooke**

“My favorites (displays) were the LIDAR and wave simulation booths. Using the rope and seeing the laser pointer were fun. Again, I had a superfantabulous time, like everyone else.”

—**Luke**

“I think that the field trip was outstanding, really. I am saying this was F.U.N. FUN.”

—**Bryson** ☼



Emily Klipp (left) and **Amar Nayegandhi** present a multimedia demonstration about lidar (light detection and ranging) technology, “Bird’s Eye View: Using Lasers to Map Coastlines and Coral Reefs,” that was one of three exhibits to win the Open House Outstanding Science Communication Award. A map of benthic habitats along the Florida Keys reef tract, constructed by **Barbara Lidz**, **Chris Reich**, and **Gene Shinn** from interpretation of seismic profiles and aerial photomosaics, lines the wall at left. See a short video of **Klipp** explaining how lidar works at <http://soundwaves.usgs.gov/2010/05/video.html>.

Meetings

Vulnerability of River Deltas and Low-Land Coasts to Sea-Level Rise

By **S. Jeffress Williams**

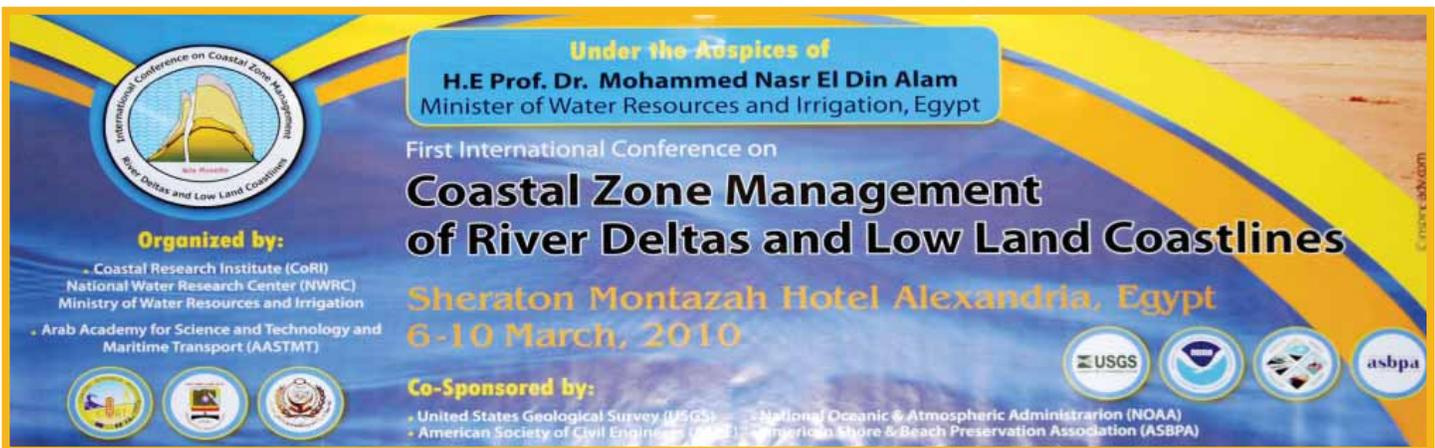
The U.S. Geological Survey (USGS) has more than 30 years of experience in conducting a wide variety of scientific studies to increase our understanding of the geologic history and evolution of the Mississippi River Delta of Louisiana. These studies have included mapping the

geologic characteristics and framework of barrier islands, wetlands, and offshore continental-shelf regions; repeat mapping of coastal change by lidar (light detection and ranging); and process modeling of the effects of storms on coasts and delta-plain wetlands.

River deltas are particularly sensitive to the effects of climate change, such as sea-level rise; and urban areas, such as Cairo and New Orleans, are highly vulnerable. The Intergovernmental Panel on Climate Change (IPCC) reported in its 2007 fourth

(River Deltas continued on page 11)

(River Deltas continued from page 10)



Attendees of the First International Conference on Coastal Zone Management of River Deltas and Low Land Coastlines, with close-up view of conference banner.

assessment that nearly 300 million people live in a sample of 40 deltas worldwide, including all the large deltas. As the report states, “Deltas, one of the largest sedimentary deposits in the world, are widely recognized as highly vulnerable to the impacts of climate change, particularly sea-level rise and changes in runoff, as well as being subject to stresses imposed by human modification of catchment and delta-plain land use.” Similar conclusions about the vulnerability of the world’s river deltas were reported in 2009 in a paper by **James Syvitski** and others in *Nature Geoscience* (v. 2, p. 681-686; <http://dx.doi.org/10.1038/NNGEO629>). In particular, the authors found that the Mississippi and Nile River deltas are at “great risk” to sea-level rise.

To address some of these issues and to start the process of planning for sea-level rise, the USGS assisted in organizing the

First International Conference on Coastal Zone Management of River Deltas and Low Land Coastlines, held March 6-10, 2010, in Alexandria, Egypt.

The conference was organized by members of Egypt’s Coastal Research Institute of the National Water Research Center under the umbrella of the Ministry of Water Resources and Irrigation, along with the Arab Academy for Science, Technology and Maritime Transport, as well as many international experts, including U.S. scientists **Orville Magoon** (President of the Coastal Zone Foundation; U.S. Army Corps of Engineers, retired) and **S. Jeffress Williams** (USGS Scientist Emeritus). **Professor Nabil Ismail** acted as an International Coordinator for the conference, which was cosponsored by the American Society of Civil Engineers (ASCE), the USGS, the American Shore and Beach Preservation Association

(ASBPA), and the National Oceanic and Atmospheric Administration (NOAA).

The main objective of this conference was to bring together engineers, scientists, and government agencies and officials from around the world to exchange views and discuss recent developments in coastal-zone management. It was also intended to generate propositions for sustainable solutions to help Egypt alleviate adverse impacts of climate change and adapt to climate-change effects within the framework of integrated coastal-zone management.

During the 4-day conference, three keynote lectures were delivered by international experts: **Ronald Waterman**, **Ismail Mobarak**, and **S. Jeffress Williams**. **Williams’** talk, titled, “The Mississippi River and Nile River Delta Plains: Effects of Sea-Level Rise, Storms, and Subsidence Under Changing Global

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Meetings, continued

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Climate,” focused on the Mississippi River Delta and the results of research by **Williams** and other USGS scientists. A total of 47 technical papers were presented in 12 sessions covering 12 themes related to the management of river deltas and low-land coastal zones. Approximately 275 persons working in coastal science, engineering, and management came from 15 countries on four continents to attend the conference. All of the keynote lectures and technical papers will be available in a conference proceedings posted on the Web site at <http://www.nwrc-egypt.info/>.

During discussions in the conference sessions, attendees exchanged a broad range of ideas and reached several conclu-



S. Jeffress Williams delivers a keynote lecture titled “The Mississippi River and Nile River Delta Plains: Effects of Sea-Level Rise, Storms, and Subsidence Under Changing Global Climate.”

sions and recommendations for sustainable coastal-zone management.

Scientific and technical conclusions and recommendations include:

1. Global sea-level rise is occurring as a result of global climate change and land subsidence; however, the degree of its threat can vary spatially and temporally.
2. The Nile Delta coast is naturally protected in many places along the Mediterranean; nevertheless, coastal conditions can change over time and therefore require a comprehensive monitoring program and maintenance.
3. Fragmented local coastal protection is neither technically efficient nor environmentally sustainable; therefore, regional solutions in the framework of integrated coastal-zone management must be adopted.
4. Hydrodynamic simulation or physical modeling should be used to ensure that proposed coastal protections are sustainable.
5. Building with nature is a concept worth considering because it works for both nature and humans; hence, soft-engineering methods—for example, those that incorporate habitat for fish and wildlife—are highly encouraged.

Management recommendations include:

1. Enhance cooperation and teamwork among concerned agencies and stakeholders, at national and international levels.
2. Develop and implement programs of awareness for governmental officials, scientists, and the public to spread knowledge about coastal and

climate risk. Such knowledge is necessary for successful integrated coastal-zone management, planning implementation, and water-resources management and conservation.

3. Develop a comprehensive scientific and technical database of coastal and climate data in cooperation with all concerned parties. Flexible information sharing and accessibility to these data will help the cooperating parties achieve sustainable development.
4. Ensure effective capacity building (steps to improve organizational structures and strengthen individual skills) and human-resources development, from local to national and international levels.

Legislative recommendations include:

1. Adapt required adjustments in legislation concerned with coastal-zone management processes.
2. Enforce existing laws and coordinate among different local authorities to successfully implement national integrated coastal-zone management.

By the end of the 4 days, the conference organizers concluded that the themes and content of the First International Conference on Coastal Zone Management of River Deltas and Low Land Coastlines are of paramount political, social, and environmental importance; therefore, they recommended that such a conference be held every 3 years. Plans are being made to convene the next conference in 2013 at a venue to be determined. For the 2013 conference, the organizers will solicit even wider contributions and stronger support from different levels of government and institutions, both national and international. ❁

Awards

Best Poster Award from Pacific Section AAPG

By Helen Gibbons

U.S. Geological Survey (USGS) scientist **Holly Ryan** and her coauthors **Jacob Covault** (Chevron Energy Technology Co.), **Homa Lee** (USGS emeritus), and **Charles Paull** and **David**

Caress (Monterey Bay Aquarium Research Institute) were chosen to receive the 2009 H. Victor Church Memorial Award from the Pacific Section of the American Association of Petroleum Geologists

(AAPG). This award is given annually in recognition of the best scientific poster presented at the annual Pacific Section AAPG meeting. The winning poster,

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(Best Poster continued from page 12)

“Tectonic Influence on the Generation of Cyclic Steps by Turbidity Currents Offshore San Mateo Point, Southern California Borderland,” appeared at the organization’s May 2009 meeting in Ventura, California (read poster abstract at <http://www.searchanddiscovery.net/abstracts/html/2009/pacific/abstracts/ryan.htm>). The award was presented at the May 2010 meeting in Anaheim, California.

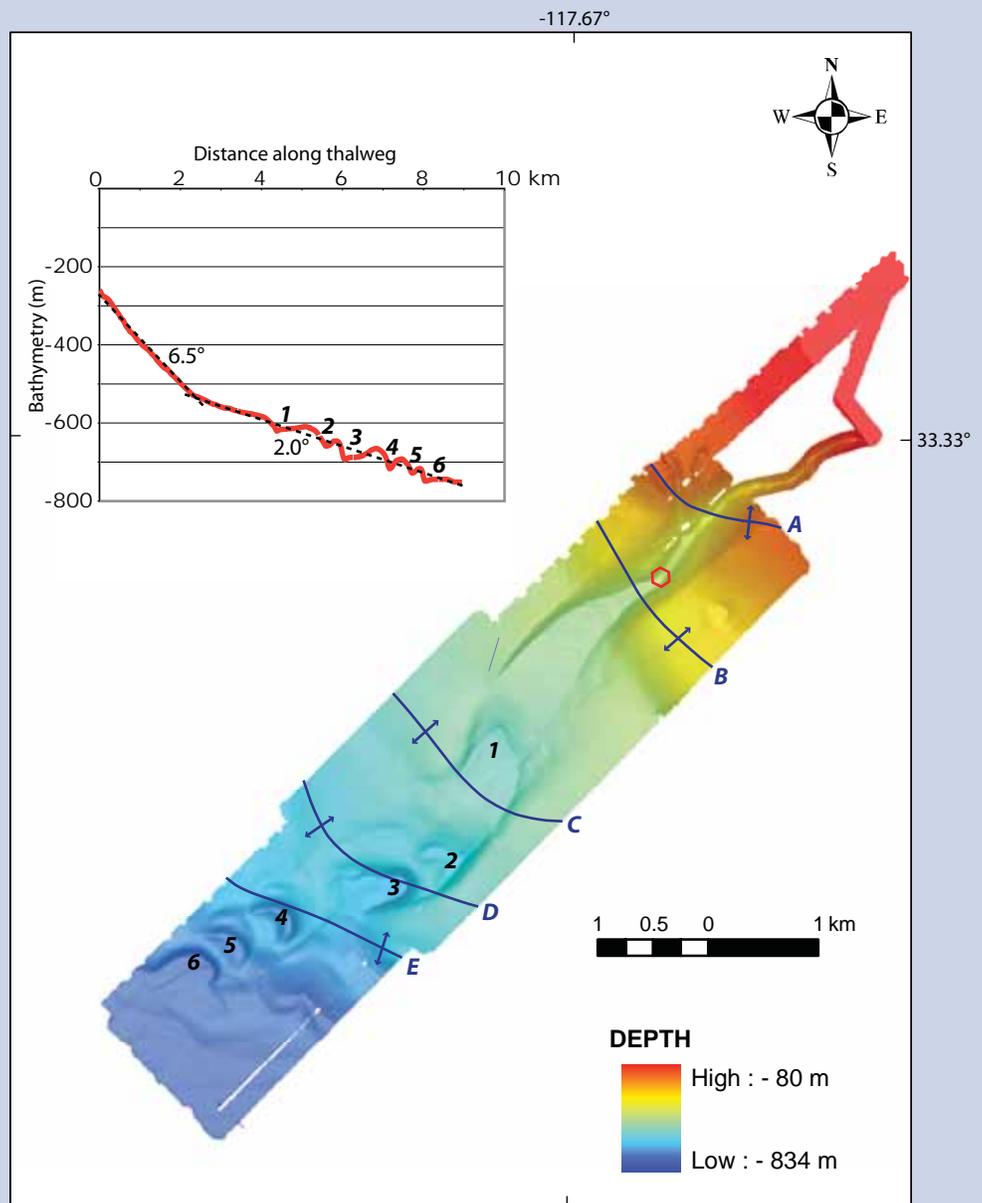
The H. Victor Church Memorial Award was established to build a lasting memorial to the technical prowess of **H. Victor Church**, a petroleum geologist who compiled an impressive record as an explorer and oil finder during a career that spanned more than 50 years. The focus of the award is on creative thinking toward new ideas in exploration, development geology, or foundational geology. Peers

judge the posters at each session, and scores are compiled and reviewed by the convention judging committee to determine the overall winner.

The names of previous recipients are posted at <http://psaapg.org/honordetails.aspx?hid=3>.

Congratulations to the award winners! 🌟

Multibeam-sonar map of a turbidity-current channel off southern California, excerpted from the award-winning poster. Map was constructed from data collected by Monterey Bay Aquarium Research Institute's Autonomous Underwater Vehicle (AUV), which can fly as low as 30 m above the seafloor and is preprogrammed to fly in a "lawnmower pattern," collecting overlapping swaths of bathymetric (depth) data. Inset shows a bathymetric profile along the channel thalweg (the line connecting the deepest points along the channel). Slope decreases from 6.5° to 2.0° near red hexagon on map. Large scour features that are net-erosional cyclic steps are numbered 1 through 6 on map and inset; antiforms that cross the channel in the subsurface are lettered A through E on map. Scour features (steps) 1, 3, and 4 appear to have migrated upslope from the crests of buried antiforms C, D, and E. For additional information, read poster abstract at <http://www.searchanddiscovery.net/abstracts/html/2009/pacific/abstracts/ryan.htm>.



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- Barnard, P.L., Hansen, J.E., and Hoover, Daniel, Nearshore bathymetric evolution on a high-energy beach during the 2009-10 El Niño winter
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Publications, continued

(Publications Submitted continued from page 14)

- [extended abs.]: Coastal Sediments '11, Miami, Fla., May 2-6, 2011.
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