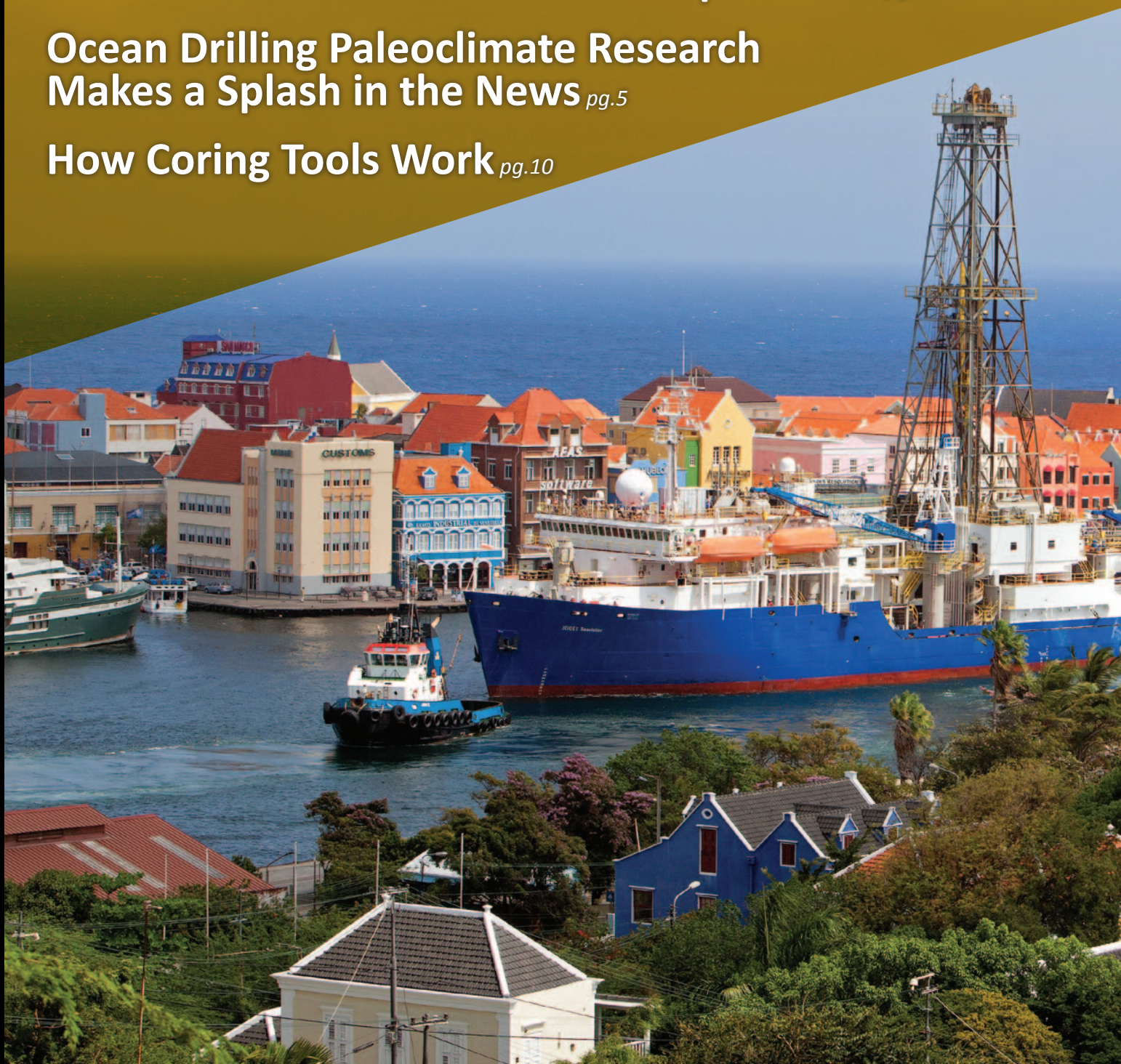
SUMMER 2012

CORE DISCOVERIES

The Newsletter for US Scientific Ocean Drilling



INSIDE THIS ISSUE

On the cover: The JOIDES Resolution *enters port in Willemstad, the capital of Curaçao, Dutch Antilles, in April 2012. (Photo courtesy of IODP-USIO).*

The Integrated Ocean Drilling Program (IODP) is an international research program dedicated to advancing scientific understanding of the Earth through drilling, coring, and monitoring the subseafloor. The U.S. Science Support Program (USSSP) supports the involvement of the U.S. scientific community in IODP and is funded by the National Science Foundation (NSF). The *JOIDES Resolution* is a scientific research vessel managed by the U.S. Implementing Organization of IODP (USIO). Together, Texas A&M University, Lamont-Doherty Earth Observatory of Columbia University, and the Consortium for Ocean Leadership comprise the USIO. IODP is supported by two lead agencies: the U.S. NSF and Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT). Additional program support comes from the European Consortium for Ocean Research Drilling (ECORD), the Australia-New Zealand IODP Consortium (ANZIC), India's Ministry of Earth Sciences, the People's Republic of China (Ministry of Science and Technology), and the Korea Institute of Geoscience and Mineral Resources.

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For more information about IODP, visit: *www.iodp.org*

For more information about USIO and USSSP, visit: *www.oceanleadership.org/programs-and-partnerships/*

UPCOMING EVENTS/ MEETINGS/WORKSHOPS

Observatories in Scientific Ocean Drilling Workshop
September 11-12, 2012
Houston, Texas
http://iodp-usssp.org/workshop/observatories/

Workshop on Ultra-Deep Drilling Into Arc Crust
September 17-21, 2012
Kona, Hawaii
http://www.jamstec.go.jp/ud2012/

Short Course on Shipboard Sedimentology: Data Collection, Integration, and Synthesis
October 1-4, 2012
College Station, Texas
http://iodp-usssp.org/workshop/sed-short-course/

Southwest Pacific Ocean Workshop
October 9-12, 2012
Sydney, Australia
http://drill.gns.cri.nz/DrillNZ/Latest-News/Upcoming-events/IODP-SW-Pacific-Workshop

Geological Society of America
November 4-7, 2012
Charlotte, North Carolina
http://www.geosociety.org/meetings/2012/

Upcoming SAS Meetings

Site Characterization Panel
August 7-9, 2012
Barcelona, Spain

Scientific Technology Panel
September 4-6, 2012
Portland, Oregon

EXPEDITION UPDATES

Chikyu Sets Out for Rescheduled Shimokita Expedition

Last March, the *Chikyu* was slated to embark on Expedition 337 (Deep Coalbed Biosphere off Shimokita), but plans had to be postponed after the Tohoku earthquake and tsunami struck on March 11. (For more detail on how the ship and her crew coped with the disaster, see the Spring 2011 issue of *Core Discoveries*.) Fortunately, Expedition 337 was rescheduled for this summer; the ship set sail from Hachinohe on July 26.

Expedition co-chiefs Fumio Inagaki (Japan Agency for Marine-Earth Science & Technology) and Kai-Uwe Hinrichs (University of Bremen) are leading an international team of 32 scientists. The expedition's primary goals are to study a deeply buried coalbed and its ecological relationship to nearby subseafloor communities, and to understand how subseafloor biogeochemical processes contribute to the planet's overall carbon cycle. The crew will work to extend a borehole that currently stretches about 500 meters below the seafloor (mbsf) to 2,200 mbsf. If successful, this will set a new record for penetration depth in scientific ocean drilling.

Many continental margins host vibrant microbial communities, but this study site just off the Shimokita Peninsula has an especially dense population within just the first few hundred meters below the seabed. While no life has yet been detected deeper than about 1600 mbsf, scientists suspect that this coalbed – which could provide a food source for microbes – might provide the first known exception.

JOIDES Resolution Returns to Costa Rica for CRISP 2

The *JOIDES Resolution* will set sail on Expedition 344 (Costa Rica Seismogenesis Project A Stage 2), also known as CRISP 2, this fall. The team will pick up where Expedition 334 (CRISP 1) left off last year. CRISP 1 was the first expedition to drill an erosive convergent margin for scientific study, establishing several boreholes along the margin between the Cocos and Caribbean plates off the southern Pacific coast of Costa Rica.

CRISP 1 did not reach the framework rock of the upper plate, which is the main input into the seismogenic zone. The CRISP 2 team hopes to sample this material, which should reveal much about the nature of the margin's seismic activity.

In contrast to accretionary convergent margins, which transfer sediments to the overlying plate as the subducting plate travels deeper, erosive margins like the Cocos-Caribbean boundary drag large amounts of sediment directly into the Earth's interior. Because this process removes mass from the upper plate, it can cause the overlying ground to subside and can potentially affect seismic activity. While accretionary margins have been studied more extensively, scientists still have much to learn about erosive margins.

The ship is scheduled to leave Balboa, Panama on October 23. Co-chiefs Robert Harris (Oregon State University) and Arito Sakaguchi (Japan Agency for Marine-Earth Science & Technology) will lead a team of 31 scientists representing 11 countries.

EDUCATION & DIVERSITY NEWS

Deep Earth Academy Doubles Up on Spring School of Rock Workshops

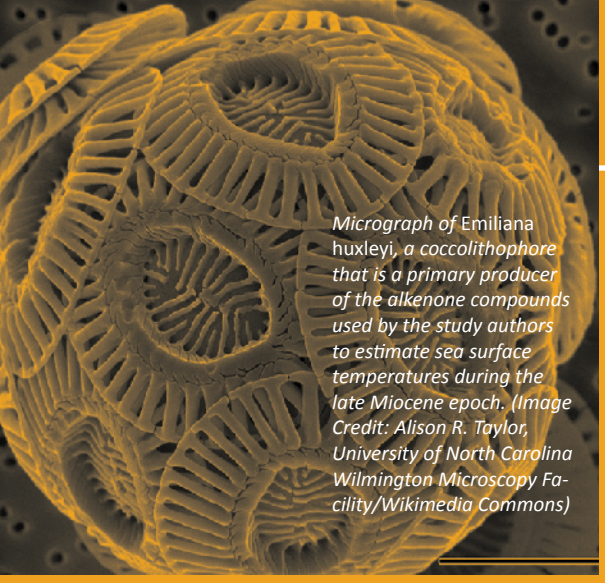
May and June were busy months for Deep Earth Academy (DEA), with not one but two School of Rock workshops held back-to-back. The first, part of DEA's "Ship to Shore Science" Informal Science Education grant, brought together 11 participants from four selected pilot projects and other key strategic partners to learn about the *JOIDES Resolution*, to immerse themselves in ocean drilling science and geology and to lay the foundation for the development of their projects. Held May 23 – June 2, the program began with several days on the ship in port in Curaçao, and also included several local geology field trips. When the ship set sail for Bermuda for the start of Expedition 342 (Paleogene Newfoundland Sediment Drifts), the group experienced the *JOIDES Resolution* at sea and continued their planning and science exercises. The instructional team included Jon Snow from the University of Houston, Jon Lewis from Indiana University of Pennsylvania and Leslie Sautter from the College of Charleston.

Immediately following that program, Deep Earth Academy spearheaded a second School of Rock workshop funded largely by a planning grant from NSF's Opportunities for Enhancing Diversity in the Geosciences (OEDG) program. Participants included faculty from minority-serving institutions – primarily two-year colleges. This program, a collaboration between the U.S. Implementing Organization and the American Meteorological Society, James Madison University (JMU) and Los Angeles Valley College (LAVC), took place June 3-7 in College Station, Texas at the Gulf Coast Repository. Instructors included Kristen St. John (JMU), Jackie Hamms (LAVC) and Larry Krissek (Ohio State University). Participants completed several lab exercises from the newly published textbook *Reconstructing Earth's Climate History* and provided feedback for a followup OEDG proposal.

IODP-USIO Diversity Internship Marks Second Year with Multiple Summer Interns

Hailing from three different institutions, this year's awardees for the U.S. Implementing Organization (USIO) Diversity Internship include Hazel Tesoro (Mills College), Catherine Yeh (Hofstra University), and Amanda Duchesne (Dartmouth College). Tesoro worked with the Communications group at Consortium for Ocean Leadership in Washington, D.C. to help effectively communicate science news and information related to scientific ocean drilling expeditions, science results, and other activities.

Cosponsored by Lamont-Doherty Earth Observatory's Summer Internship program at Columbia University, Yeh and Duchesne worked with a mentor on research projects that use scientific ocean drilling data and cores.



Micrograph of Emiliana huxleyi, *a coccolithophore that is a primary producer of the alkenone compounds used by the study authors to estimate sea surface temperatures during the late Miocene epoch. (Image Credit: Alison R. Taylor, University of North Carolina Wilmington Microscopy Facility/Wikimedia Commons)*

RESEARCH HIGHLIGHTS

Today's Climate More Sensitive to CO_2 Than at Any Time in Past 12 Million Years

Many studies of Earth's climate history have documented a strong correlation between global climate and atmospheric carbon dioxide: during warm periods, high concentrations persist, and colder times correspond to relatively low levels.

A study in the June 7 issue of *Nature* documented an exception to this trend in the late Miocene, about 12-5 million years ago. During this time, climate was decoupled from atmospheric carbon dioxide concentrations. Temperatures across much of the North Pacific were 5-8°C warmer than today, while carbon dioxide concentrations remained low – near values recorded just prior to the industrial revolution.

Led by Jonathan LaRiviere and Christina Ravelo at the University of California, Santa Cruz, the team used microfossil evidence from cores drilled by the *JOIDES Resolution*. Their results suggest that differences in large-scale ocean circulation patterns caused the warmth of the late Miocene. Several major differences in the boundaries of the Pacific – the world's largest ocean basin – could have contributed. For example, the Central American Seaway remained open, the Indonesian Seaway was much wider than it is today, and the Bering Strait was closed.

"This study highlights the importance of ocean circulation in determining climate conditions. In addition, it tells us that the Earth's climate system has evolved and that climate sensitivity is possibly at an all-time high today," explains Ravelo. "This means that the ocean and climate systems are poised to readily respond to even small changes in carbon dioxide."

Scientists Use Ocean Drilling Data to Connect Ancient Seawater Chemistry Change with Climate

A study in the July 20 issue of *Science* suggests that the collision of India and Eurasia approximately 50 million years ago triggered a large-scale change in the chemistry of the world's oceans. Moreover, this change in chemistry might be responsible for the overall cooling trend of the past 45 million years.

Perhaps best known for creating the Himalaya Mountains, the collision also enhanced dissolution of the most extensive belt of water-soluble gypsum on Earth, stretching from modern-day Oman to Pakistan, and well into Western India – remnants of which are exposed in the Zagros Mountains in Iran.

The study, by Ulrich Wortmann of the University of Toronto and Adina Paytan of the University of California, Santa Cruz, relies heavily on samples collected on board the *JOIDES Resolution*. The results suggest that the dissolution or creation of massive gyspum deposits will change the sulfate content of the ocean, which in turn will affect the amount of sulfate aerosols in the atmosphere – and thus climate.

"When India and Eurasia collided, it caused dissolution of ancient salt deposits, which resulted in drastic changes in seawater chemistry," says Paytan. "This may have led to the demise of the Eocene epoch – the warmest period of the modern-day Cenozoic era – and the transition from a greenhouse to icehouse climate, culminating in the beginning of the rapid expansion of the Antarctic ice sheet."

To the left of this image, taken from the Space Shuttle Atlantis, are the Zagros Mountains of Iran – which host remnants of what was once the largest belt of water-soluble gypsum on Earth. A recent study suggests that the collision of India and Eurasia some 50 million years ago enhanced the dissolution of salts in this deposit, resulting in a large-scale alteration of seawater chemistry and global climate. (Credit: Image Science & Analysis Laboratory, NASA Johnson Space Center)

BUILDING U.S. STRATEGIES FOR 2013-2023 SCIENTIFIC OCEAN DRILLING

Scientific ocean drilling is poised to create significant breakthroughs in the next decade. Building on considerable community input and recent ocean drilling discoveries, seventy-three representatives of the U.S. scientific community assembled for the Building U.S. Strategies for 2013-2023 Scientific Ocean Drilling workshop, April 30 – May 2, 2012 in Denver, Colorado. The workshop served to prioritize the scientific challenges outlined in the *2013-2023 Science Plan for the International Ocean Discovery Program (IODP)* and to identify new approaches for more efficient planning of scientific ocean drilling expeditions.

Participants enthusiastically endorsed all of the *2013-2023 Science Plan* challenges. Four challenges were judged to provide the strongest opportunities for transformative science results that address questions of broad interest to both the scientific community and society:

CHALLENGE 1: How does the Earth's climate system respond to elevated levels of atmospheric CO_2?

CHALLENGE 5: What are the origins, composition, and global significance of deep subseafloor communities?

CHALLENGE 8: What are the composition, structure, and dynamics of Earth's mantle?

CHALLENGE 12: What mechanisms control the occurrence of destructive earthquakes, landslides, and tsunami?

The workshop participants also proposed an innovative model for implementing the *2013-2023 Science Plan*, including strategic scheduling of the *JOIDES Resolution* to use transits efficiently and to increase scientific return. In particular, several of the top priorities require drilling sites along transects; this strategy provides opportunities to combine diverse scientific objectives into single expeditions. Early announcement of ship tracks, with a commitment to visit every ocean basin at least once in the 2013-2023 program, would aid the scientific community in developing cooperative strategies early in the planning process.

Interdisciplinary science has always been a hallmark of scientific ocean drilling, and workshop participants were energized by discussions about collaboration across research themes. The participants also recognized that full-time operation of the *JOIDES Resolution*, access to other drilling platforms, and contributions and collaborations with international partners are essential for making significant progress in all of the challenges outlined in the *2013-2023 Science Plan*.

The workshop confirmed strong U.S. community support for continued flexibility in the program, allowing for the development and implementation of novel, high-quality science proposals and innovative new technological developments. Scientific ocean drilling is critical to the future of ocean and earth science research, and the U.S. community is committed to maximizing the benefits from this important and unique research capability.

COMMUNITY SPOTLIGHT

MARTA TORRES

Like many in her native Costa Rica, Marta Torres grew up loving the ocean. The irresistible tug of the sea inspired her to pursue a Ph.D. in Marine Geochemistry at Oregon State University, which she completed in 1988. Today she has come full-circle as a professor at OSU.

A postdoctoral position brought her to Texas A&M University in 1989. Although she had used core samples in her graduate work, this was her first substantial exposure to the Ocean Drilling Program (ODP). She has since been on about a half dozen expeditions, through both ODP and the current Integrated Ocean Drilling Program (IODP). She has participated from onshore as well, contributing to Science Advisory Structure (SAS) committees and mentoring countless graduate students.

"I think scientists are the luckiest people because we have the opportunity to ask questions about the world around us," Torres explained. "I'm never watching the clock wondering when I can go home. If anything, I wish I had more time!"

But it's not all work, even on expeditions. Torres fondly recalled one Christmas at sea when crew members from the Philippines and a co-chief from Germany sang traditional songs from their home countries. To her, sharing such a widely celebrated holiday with people from all over the world made it special.

"You become part of a larger family," Torres said. "There are many unexpected but valuable 'random acts of kindness.' People share vitamins and candy bars, and comfort others when they get bad news from home. We're all out there sharing more than just the science."

To young, aspiring scientists, Torres advises getting involved with the program early. "There is no more valuable experience for young students to interact with established, experienced scientists," she said. "Take advantage of these opportunities. You won't regret it."

This October, Torres will sail aboard the *JOIDES Resolution* once again, on IODP Expedition 344 (Costa Rica Seismogenesis Project 2) as an inorganic geochemist.

LETTER FROM THE NSF

Dear Colleagues,

On July 16, 2012, the National Science Board authorized a request by the National Science Foundation (NSF) for a one-year contract extension to continue operations and management of the *JOIDES Resolution*. This will enable high-priority scientific operations to continue while NSF conducts a robust re-competition process.

Following the re-competition – and contingent on the availability of funds from NSF and its international partners – NSF would seek approval from the National Science Board in December 2013 for a Cooperative Agreement to continue support for operation of the *JOIDES Resolution* for the new International Ocean Discovery Program.

The 25 international partners of the current Integrated Ocean Drilling Program have come together to design a new management structure and business model for the next drilling program that retains both multi-platform capabilities and transformative science goals. More details on this framework are available at: *http://iodp.org/doc_download/3485-new-iodp-framework-17-august-2012*.

While the management structure has changed considerably, the U.S. community will see little change in the way they participate in the program. They will continue to have access to the *Chikyu* and Mission Specific Platforms (MSPs) through berth-sharing agreements and will be heavily involved in the new IODP advisory structure, including the new U.S. Facility Board and the IODP Forum. As in the past, samples and data will also be available to all community scientists.

Finally, a goal of the new program is to develop more efficient ship tracks for the *JOIDES Resolution* that minimize transits and maximize science output. Along these lines, the *JOIDES Resolution* is scheduled to end the current program in the western Pacific Ocean. We intend to have the ship remain in the Western and Southwestern Pacific and Indian Ocean region through FY 2016. We strongly encourage the community to submit drilling proposals for these areas to provide for a breadth of high-priority drilling targets.

Sincerely,

The NSF Team

Rodey Batiza, Jamie Allan, Thomas Janecek, Jim Beard, and Leonard Pace

LETTER FROM THE USAC CHAIR

Dear Colleagues,

The approval of the National Science Board (NSB) to continue operating the *JOIDES Resolution* is very welcome news! (See page 7.) The decision comes after years of community planning – most recently the energetic and successful Building U.S. Strategies workshop (see page 6).

NSB's approval affirms the innovative science and fundamental strengths of the scientific ocean drilling programs. We have fostered teams of scientists, students, engineers, and educators who value a truly collaborative and multidisciplinary approach to understanding Earth systems. Thank you for your hard work and dedication in achieving this milestone for the community and all those who use scientific ocean drilling data, samples and results in their research.

Now is an opportune time to submit your proposals for IODP expeditions. The *JOIDES Resolution* will start the new program in the western Pacific and Indian Oceans. After that, proposal pressure will principally determine the exact circumnavigation track of the ship. The next proposal submission deadline is October 1 (*www.iodp.org/drilling-proposals*).

If you are in the early stages of developing your expedition ideas, the U.S. Science Support Program (USSSP) has funding available for planning meetings and workshops. A workshop may focus on a specific scientific topic or integrate multiple themes within a geographic region; ideally it will lead to new proposals for future ocean drilling. The next USSSP workshop proposal deadline is also October 1 (*http://iodp-usssp.org/funding/workshops/*).

Let's get the International Ocean Discovery Program off to a flying start!

All the best,

Anthony Koppers
Chair, U.S. Advisory Committee
for Scientific Ocean Drilling

USAC MEMBERS

Anthony Koppers (Chair)
Oregon State University

Gary Acton
University of California, Davis

Ivano Aiello
Moss Landing Marine Laboratories

Gail Christeson
University of Texas at Austin

Gerald Dickens
Rice University

John Jaeger
University of Florida

Jon Lewis
Indiana University of Pennsylvania

Heath Mills
Texas A&M University

J. Casey Moore
University of California, Santa Cruz

Craig Moyer
Western Washington University

Yair Rosenthal
Rutgers University

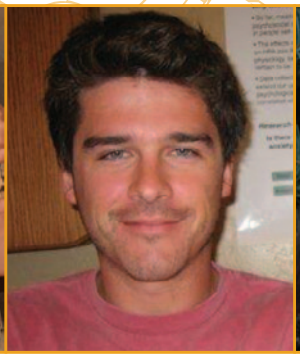
Anja Schleicher
University of Michigan

DRILL BITS

2012-2013 Schlanger Ocean Drilling Fellows Announced

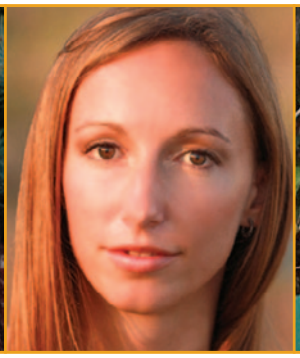
The U.S. Science Support Program is pleased to announce the 2012-2013 Schlanger Ocean Drilling Fellows. Each year, the program awards $30,000 stipends to several outstanding graduate students who conduct research related to scientific ocean drilling. This year's fellows – selected for the quality of their proposed projects – will focus on topics that include sedimentation, climate change and microbiology. Next summer, the fellows will travel to the Ocean Leadership headquarters in Washington, D.C. to present their results. **The 2012-2013 Schlanger Fellows are:**

Laurel Childress
Northwestern University



Joseph Russell
University of Delaware

Karla Knudson
U of California, Santa Cruz



Tasha Snow
University of South Florida

Yi Ge Zhang
Yale University

Interested in applying for a Schlanger Fellowship? The next application deadline is November 15, 2012:

http://iodp-usssp.org/research/schlanger-fellowships/

"Rock Star" Teachers Attend Hands-on Workshop in DC

Deep Earth Academy (DEA) hosted a three-day workshop for teachers at the Consortium for Ocean Leadership headquarters August 6-8. The event drew 21 professional educators, representing public schools and informal education programs throughout the Mid-Atlantic region. Hands-on activities, including working with seafloor core models and making smear slides, helped participants learn about the challenges and accomplishments of scientific ocean drilling. DEA staff and guest speakers alike emphasized the need to increase diversity among earth scientists by raising awareness of the various career paths available to those with scientific training.

Chikyu Returns to Japan Trench to Install Observatory

This summer, the *Chikyu* returned to the Japan Trench to install a temperature observatory in one of the boreholes drilled during Expedition 343 (Japan Trench Fast Drilling Project). The sensors will record the frictional heat caused by the 2011 Tohoku earthquake, allowing scientists to determine the fault's strength 800 meters below the seafloor. With the observatory installed, the primary objective of Expedition 343 is now complete, representing a milestone achievement for scientific ocean drilling. Later this year, the *Kaiko 7000II* ROV will collect the sensors and the team will begin analyzing the data. For more information, please visit: *www.jamstec.go.jp/chikyu/exp343/e/*.

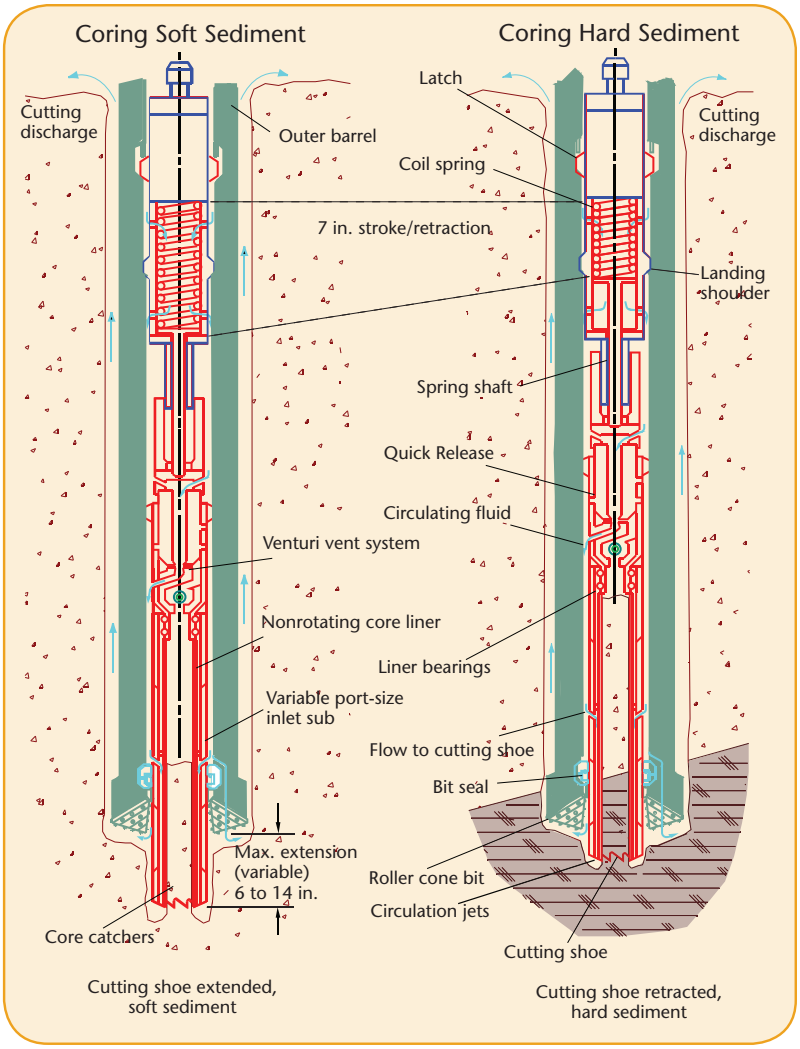
From the rig floors of the drilling platforms to the desks of member offices worldwide, IODP is a dynamic yet complicated program. This section is designed to explain the "ins and outs" of different aspects of IODP. In each issue, we will select one or two topics to highlight – we invite you to test your IODP knowledge and to learn something new about the program.

Coring Tools

When scientific ocean drilling began with the Deep Sea Drilling Project (DSDP) in 1968, the plan was to use off-the-shelf technology from the oil drilling industry. However, it quickly became clear that new tools and strategies would be needed to retrieve cores suitable for the breadth of ocean drilling research. Innovations that began with DSDP continued with its successor programs, the Ocean Drilling Program (ODP) and the Integrated Ocean Drilling Program (IODP).

The first tool used was a rotary coring system, called the Rotary Core Barrel (RCB). As its name implies, the cutting action for the RCB comes from the rotation of the drill string and bit. Although it can work well for coring hard rocks, the RCB is not ideal for soft sediments, especially when good quality, high resolution data are required – e.g., for paleoclimate and paleoceanography studies.

A solution came in the form of the Hydraulically-Actuated Piston Corer (HPC), which worked by firing the coring tool into the sediment in front of the bit, minimizing the disruption of sediment layers. The improved version of the tool in use today, the Advanced Piston Corer (APC), together with advancements in methodology, have enabled piston coring depths well in excess of 400 mbsf. Moreover, the APC includes instruments that can measure temperature *in situ* and can orient cores with respect to the Earth's magnetic field.



For sediments that are too firm for the APC but not hard enough to require the RCB, engineers developed the Extended Core Barrel (XCB). Similar to the RCB, the XCB relies on rotation of the drill string, but the core barrel extends in front of the bit. This tool can reach penetration depths of about 1000 meters in some sedimentary formations, and includes the ability to sample the top of the hard rock "basement" if desired.

More information about these standard coring tools, including other tools developed for specific objectives, is available on the USIO web site: *http://iodp.tamu.edu/tools/*

LETTER FROM THE USIO

Gerardo Iturrino

Dear Colleagues,

Over the last two years, the U.S. Implementing Organization (USIO) logging group at the Lamont-Doherty Earth Observatory (LDEO) has devoted considerable effort toward building several innovative downhole measurement tools for use in future IODP expeditions.

One of these tools, the Multi-Function Telemetry Module (MFTM), allows data collected by third-party tools to be transmitted back to the surface in real time. As part of the Deep Exploration Biosphere Investigative tool (DEBI-t) collaboration, the MFTM allowed the DEBI-t to use existing recording systems to transmit real-time data while being deployed in series with Schlumberger and LDEO tools. Prior to Expedition 342 (Paleogene Newfoundland Sediment Drifts), the MFTM was also used as part of the Motion Decoupled Hydraulic Delivery System (MDHDS) project. During an MDHDS deployment in Hole U1402A off the New Jersey coast, the MFTM successfully transmitted *in situ* formation temperature and pressure signals from the Temperature-2-Pressure (T2P) penetrometer for approximately 30 minutes. In May 2013, a short expedition to the Cascadia Margin will use the MFTM to monitor the instrumentation from the Simple Cabled Instrument for Measuring Parameters *In situ* (SCIMPI) string before deployment.

Other tool developments at LDEO include the replacement of the Magnetic Susceptibility Sondes (MSS) tool suite. The MSS' deep-reading sensor was successfully deployed during Expedition 340T (Atlantis Massif) and Expedition 340 (Lesser Antilles Volcanism and Landslides). The general results showed very good correlation between magnetic susceptibility logs and lithologies with high magnetic mineral contents, as well as marked differences between hemipelagic sediments and turbidites. The entire MSS tool suite has been pressure tested and is ready for use in future IODP expeditions. Finally, a new Multisensor Magnetometer Module (MMM) with sufficient magnetization range to function in both hard rock and sedimentary formations is under development and should be ready by late 2013.

We invite you to check our log database (*http://brg.ldeo.columbia.edu/logdb/*) for new and exciting results from the latest IODP expeditions as well as data from our new developments.

Best regards,

Gerardo Iturrino
Manager of Engineering and
Technical Services, USIO-LDEO

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INDICIA

FSC INFO

IODP Expedition Schedule

	Expedition	#	Port of Origin	Dates
	JOIDES Resolution			
	Costa Rica Seismogenesis Project A Stage 2 (CRISP-A2)	344	Balboa, Panama	23 Oct. – 11 Dec. 2012
	Hess Deep Plutonic Crust	345	Puntarenas, Costa Rica	11 Dec. 2012 – 12 Feb. 2013
	Tie-Up			12 Feb. – 25 May 2013
	SCIMPI	341S	Victoria, Canada	25 – 29 May 2013
	Southern Alaska Margin Tectonics, Climate & Sedimentation	341	Victoria, Canada	29 May – 29 July 2013
	Transit	346T		29 July – 20 Aug. 2013
	Asian Monsoon	346	Valdez, Alaska	20 Aug. – 28 Sept. 2013
	Chikyu			
	Deep Coalbed Biosphere off Shimokita	337	Hachinohe, Japan	26 July – 30 Sept. 2012
	NanTroSEIZE Plate Boundary Deep Riser - 2	338	Shingu, Japan	1 Oct. 2012 – 13 Jan. 2013
	Mission-Specific Platforms			
	Baltic Sea Paleoenvironment	347	TBD	TBD (Spring/Summer 2013)

Expedition dates, ports of origin, etc. are subject to change.

Please see http://iodp.tamu.edu/scienceops/ and http://www.iodp.org/expeditions/ for the most up-to-date ship operations schedules.