JOI News
Fall/Winter 2005
from the Joint Oceanographic Institutions' U.S. Science Support Program associated with the Integrated Ocean Drilling Program
Advancing global understanding of the Earth
IODP INTEGRATED OCEAN DRILLING PROGRAM

An Ongoing Journey: Teaching for Science, Learning for Life

Leslie Peart, JOI

One April evening a number of years ago, I stopped at the Bayfront Auditorium to present a science fair award on behalf of the Texas State Aquarium. In my remarks I told the young researchers "science can really take you places," for in two days I would journey from my longtime Corpus Christi home to Seward, Alaska to open a new aquarium and research center.

Today I'm on the road again. This time it's just a quick trip from Washington, D.C. to New York City. Short as this excursion may be, it's all a part of a bigger journey—one that began in the '60s when a handful of forward-thinking scientists pooled their efforts in an attempt, known as Project Mohole, to reach the Earth's mantle by drilling through the seafloor. So here we are, preparing to meet with America's largest precollege science textbook publishers and considering the role of Joint Oceanographic Institutions (JOI) in the journey from research to global understanding of the Earth.

The road from research results to broad based scientific understanding by the general public requires careful planning and consideration for the route, the resources, and the reality of the goals ahead. Several longstanding programs—most notably the Distinguished Lecturer Series, the JOI/U.S. Science Support Program (USSSP) internships, and the Schlanger Ocean Drilling Fellowships—have provided a base for JOI's 2005 education endeavors by continuing to serve the undergraduate, recent graduate and graduate student communities. From that starting point, JOI's education staff have recently planned and implemented activities to expand those audiences exposed to scientific ocean drilling to include middle and high school teachers and students. The groundwork has also been laid to incorporate intermediate and late elementary school audiences in upcoming years.

Charting a Course

Now trademarked, *Teaching for Science, Learning for Life*™ embodies JOI's science education philosophy and strategy. Large exciting programs like scientific ocean drilling have the capacity to engage students in earth systems science, as well as in physics, chemistry, biology and other disciplines. In fact, activities that address more than one discipline and comprise themes from the *Initial Science Plan* for the Integrated Ocean Drilling Program (IODP) are given top priority as JOI develops new materials.

Real science processes are highly appealing to students at all levels and can be used to demonstrate and teach career awareness, scientific methods, teamwork and problem-solving techniques for a lifetime of learning, decision-making and good citizenship. In addition, JOI has been taking steps to target family audiences and lifelong learners through museum exhibits in key locations and traveling exhibits throughout the United States. For instance, JOI will participate in the Smithsonian's new Ocean Hall, which is scheduled to open to the public in

Now trademarked, "Teaching for Science, Learning for Life™" embodies JOI's science education philosophy and strategy.

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Brandon Dugan (Logging Scientist, Rice University) and Peter Flemings (Co-Chief Scientist, The Pennsylvania State University) disassemble the T2P tool (used to rapidly measure in situ pressures) for data download during IODP Expedition 308, Gulf of Mexico Hydrogeology.

JOI News

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JOI News, formerly named the *JOI/USSAC Newsletter*, is issued by Joint Oceanographic Institutions (JOI) and is available free of charge.

JOI is a consortium of 20 premier oceanographic research institutions that serves the U.S. scientific community through management of large-scale, global research programs in the fields of marine geology and geophysics and oceanography. Known for leadership of U.S. scientific ocean drilling initiatives and growing involvement in ocean observing, JOI has helped facilitate discovery and advance global understanding of the Earth and its oceans through excellence in program management.

JOI manages the U.S. Science Support Program (USSSP) associated with the Integrated Ocean Drilling Program (IODP). Funding for USSSP is provided through a cooperative agreement between JOI and the National Science Foundation (NSF). The U.S. Advisory Committee (USAC) for Scientific Ocean Drilling offers guidance to JOI regarding the needs of the U.S. scientific community.

Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of NSF or JOI.

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IODP
INTEGRATED OCEAN DRILLING PROGRAM

Drill Bits

JOI and IODP Activity at the Fall AGU Meeting in San Francisco

Learn more about scientific ocean drilling and ocean observing activities at the American Geophysical Union's (AGU) annual Fall meeting, December 5 to 9, 2005, in San Francisco. Joint Oceanographic Institutions (JOI) will host an exhibit at booths 629, 631, and 633, and IODP Management International (IODP-MI) will have a display at booths 320, 322, and 324.

During the AGU conference, an Integrated Ocean Drilling Program (IODP) Town Hall Meeting will be held on Thursday, December 8 at the Moscone Center, West Hall, Level 3, Room 3006. Following refreshments, the program will start at 6:15 p.m. This Town Hall Meeting will explore four important topics: 1) IODP drillships; 2) the series of ocean-drilling expeditions known as the Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE)—the debut for the new Japanese drillship, *Chikyu*; 3) a report recently released by the IODP Management Forum that recommends measures to streamline the drilling proposal process while welcoming in new proponents; and 4) an overview of the 2006 long-range planning workshops designed, in part, to fulfill targets in the IODP *Initial Science Plan*.

In addition, scientific drilling will have a significant presence during the technical portion of the AGU conference—especially in sessions relating to paleoceanography and paleoclimatology. Research made possible by three generations of scientific ocean drilling—the Deep Sea Drilling Project, the Ocean Drilling Program, and IODP—will be presented in over 200 papers. Conducted by scientists worldwide, the work is in a range of disciplines and will be featured in over two dozen sessions (for details visit the website www.usssp-iodp.org/science_support/workshops/specialagu.html). For example, Leslie Peart, JOI, will report on the pilot program *School of Rock* (see page 6 of this newsletter) in the education session *ED23: The Benefits and Challenges of Integrating Scientific Research and Education*; and initial results from IODP Expedition 308, Gulf of Mexico Hydrogeology, will be presented during the session *OS09: Sedimentation, Overpressure, and Slope Stability Along Deepwater Continental Margins.*

Wanted: Intern Candidates

JOI is seeking qualified U.S. applicants for a one-year internship, beginning summer 2006, at the JOI office in Washington, DC. The intern position focuses on scientific ocean drilling and specifically provides assistance to the U.S. Science Support Program (USSSP) and IODP. JOI encourages applications from recent college graduates with a science background who are interested in learning about ocean-going research and science program management. Candidates should be prepared to work in an office environment and handle multiple tasks. Excellent written and verbal communication skills are essential. For the term appointment, the intern will be a salaried JOI employee with full benefits. Specific start and end dates are negotiable. Applicants should submit a cover letter, resume, and the names of three references to Carl Ebeling (cebeling@joiscience.org, 202-232-3900 x1619) by March 15, 2006. For more information about JOI and the science programs it manages, visit: www.joiscience.org.

JOI Staffing Update

The past year has seen many new staff members welcomed to Joint Oceanographic Institutions reflecting the corporation's growth and evolution. For example, the Ocean Research Interactive Observatory Netoworks (ORION) Project Office was established, a Communications and Development Department was set up, and education activities are constantly on the rise. For a full listing of JOI's current staff including titles, contact information, and short bios, visit: www.joiscience.org/contact.html.

A few new staff members that readers of this newsletter may soon come to know, if they don't know them already, are mentioned below. Carl Ebeling, Senior Program Associate, is a key contact point on a number of activities for the U.S. Science Support Program (USSSP) such as the Schlanger Ocean Drilling Fellowship. Andrea Johnson, who previously held this position, continues to work for JOI as an offsite contractor on projects such as this newsletter. Jon Corsiglia, Communications Program Associate, has primary responsibility for relations with the press under Susan Boa, the new Director of Communications and Development. Amy Page, Manager of Meetings and Administration; Julie Farver, Meeting/Travel Coordinator; and Strat Cavros, Operations Associate for contractual issues, are other personnel ready to help you and answer your questions.

NSF and JOI Town Hall Meeting at 2006 Ocean Sciences Conference

The National Science Foundation's Ocean Sciences Division (NSF/OCE) and JOI are jointly sponsoring a Town Hall Meeting at the Ocean Sciences Meeting to highlight scientific ocean drilling and ocean observing. The 2006 Ocean Sciences Meeting—which is sponsored by the American Geophysical Union (AGU), the American Society of Limnology and Oceanography (ASLO) and The Oceanography Society (TOS)—will be held February 20 to 24 in Honolulu, Hawaii (www.agu.org/meetings/os06). The Town Hall Meeting will provide an overview of various programmatic activities from the NSF/OCE, developments in ocean observing from the Ocean Research Interactive Observatory Networks (ORION) Project Office, and developments in scientific ocean drilling from the JOI perspective. The meeting, for which the exact time and location have not yet been set, is also a chance for scientists to communicate with NSF/OCE leadership.

AAAS Climate Change Forum

JOI has organized a symposium, "Climate Change, Risk Management, and the Next 100 Years," to be held during the upcoming annual meeting of the American Association for the Advancement of Science (AAAS) in St. Louis, Missouri (February 16 to 20, 2006). Once finalized, the exact time and location of the symposium will be posted at www.joiscience.org along with other details about the session. Social systems have evolved to spread and manage risk though insurance (flood or drought risk), portfolio diversity (investment risk), building codes (earthquake risk), and even change of lifestyle (ozone depletion risk). However, prudent management is best achieved with knowledge of the system creating the risk. Will the Earth warm gradually or will non-linear effects lead to abrupt climate change? This symposium will seek to assess the state of knowledge about climatic change, and speakers will provide different perspectives on actions that should be taken by government, business, and society to respond to long-term threats posed by climatic warming.

Teaching for Science, Learning for Life

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2008, and the Science Museum of Minnesota's traveling Water Planet exhibit.

Vital components of JOI's mission are to promote geoscience literacy and create future generations of science leaders. To pursue such lofty ambitions, it's been necessary to both jumpstart and multiply the impact of JOI's small and fledgling education department. In addition to myself, Director of Education, the other JOI education staff are Matt Niemitz, Education Program Associate and the originator of our new trademark; Dylan Sullivan, a visiting Truman Fellow; and Nancy Felix, a JOI/USSSP Intern. Other JOI staff—primarily Carl Ebeling, USSSP Senior Program Associate, and Alyssa Edwards, JOI/USSSP Intern—manage existing programs such as the Schlanger Ocean Drilling Fellowship and the Distinguished Lecturer Series.

Starting at the Top

To maximize the impact of JOI's education efforts, we started at the top with the National Science Teachers Association (NSTA), the nation's largest science education organization. JOI has become a regular and highly visible participant in NSTA's most important event—its national conference—and a number of related activities.

To make a splash at the 2005 national meeting in Dallas, Texas, a thematic and theatrical exhibit booth was designed. It incorporated a new photo mosaic poster (created by Matt Niemitz) as its centerpiece, and JOI staff, wearing coveralls donated by shipboard technicians from the *JOIDES Resolution*, invited conference attendees to examine scientific ocean drilling cores and samples. This engaging and eye-catching exhibit led to interaction with approximately 2000 individual classroom educators.

JOI also participated in the Informal Science Night hosted by the NSTA Informal Science Committee and Discovery Channel, an evening designed to attract a smaller and more focused group of educators through hands-on activities. The evening's activities were followed by an exclusive exhibitors' event that resulted in renewed relationships with the Informal Science Committee, the Exploratorium, Dragonfly TV and other potential partners in JOI's education efforts. In addition, JOI sponsored a luncheon and talk by Dr. Mark Leckie, University of Massachusetts, who was one of three featured speakers at the National Earth Science Educator's Earth Science Resource Day. This latter event in itself resulted in an invitation for Dr. Leckie and JOI to participate in training programs for earth science teachers in Montgomery County, Maryland (a school district ranked among the nation's best) and the inclusion of IODP in the county's new curriculum.

Another conference accomplishment was that—after much effort on the part of Andy Baker, a former JOI/USSSP Intern—JOI personnel were able to meet with executives from Macmillan McGraw-Hill publishers. This meeting resulted in three subsequent meetings, including a teacher focus group and a tour of the *JOIDES Resolution* during its Mobile, Alabama, port call in June 2005. Not only are the textbook publishers a means of "starting at the top," but also their target states are the same four that JOI has chosen to focus on initially—California, Texas, New York, and Florida.

JOI's presence at NSTA's national conference hooked an even more important audience by leading to an invitation to host the annual dinner for NSTA's National Congress for Science Education at the Science Museum of Minnesota in St. Paul. The NSTA Council and Board attended the dinner, which was held in August 2005, along with 150 delegates representing all of NSTA's state and affiliate organizations. The event which included a reception and talk by Dr. Jeff Fox, Director, Integrated Ocean Drilling Program, Texas A&M University, that introduced JOI and IODP to many of the nation's most influential science educators and decision makers. With attendees from every state and numerous science education organizations, the evening has led to a cascade of requests for materials, workshops, partnerships and future conference events. For example, Dr. Fox was asked to address the Alberta Science Teachers Association at their annual meeting this fall.

JOI's education department has also been seeking opportunities via other conferences and associations, including the Conference for the Advancement of Science Teaching (CAST), the National Marine Educators Association (NMEA), and the National Earth Science Teachers Association (NESTA). In fact, April and May 2005 found JOI staff writing, editing, and orchestrating the summer edition of NESTA's quarterly journal, *The Earth Scientist*. Because NESTA pre-college educators (approximately 1000) are likely candidates to use IODP data and resources, we developed creative and colorful new material for the journal. This material—focused on the theme of "Hundreds of Cruises, Thousands of People, Endless Discoveries"—is also available on JOI's education website, www.joilearning.org.

Only the Highlights

This article shares some of the highlights of JOI's new approach to education. Our efforts to produce science education resources that are innovative and user-friendly are ongoing. New education materials, such as classroom activities, career, lab and science briefs, and instructional posters, are planned quarterly and will be available at www.joilearning.org (see page 5 for examples). Opportunities for teachers to gain hands-on experience at sea are discussed on page 6 of this newsletter.

New materials will typically coincide with key conferences or workshops, related expeditions, and opportunities for publication. Our most recent offering, *A Bolt from the Blue*, a new poster about methane hydrates was released during Expedition 311, Cascadia Margin Gas Hydrates. This poster will be submitted to the American Chemical Society's publication for high school students and/or a science teachers' publication. Gas hydrates were chosen as a poster topic because they crosscut disciplines—ranging from earth and environmental science to chemistry—and can be presented in a relevant manner to students at the upper high school and early undergraduate college levels.

Challenges

JOI is rapidly growing and expanding its available geosciences education products, opportunities, and programs. IODP's upcoming 2006 drilling hiatus—while we

await the operational phase of the drillship *Chikyu,* of the Japan Agency for Marine-Earth Science and Technology, and the new U.S. Scientific Ocean Drilling Vessel—brings with it a chance to reflect upon our pilot activities in 2005. It is also a chance to refocus our priorities, protocols and procedures for accelerated growth and success once active drilling expeditions resume.

A formal assessment of our activities is a vital component of the refocusing process. JOI has made an award to The College of Exploration (www.coexploration.org), a cutting-edge organization that has also provided assessment for the National Oceanographic and Atmospheric Administration (NOAA) and the Centers for Ocean Sciences Education Excellence (COSEE), for a strategic evaluation to guide our planning.

Other challenges include short- and long-term funding, and JOI's corporate integration with the Consortium for Oceanographic and Research and Education (CORE). Coordinating parallel and similar education efforts with partner institutions, organizations and countries to develop a sustainable and effective program that advances global understanding of the Earth will be even more challenging. One successful example, illustrating the direction we wish to head, is a project that developed from discussions at the Japan/U.S. Public Understanding of Research symposium sponsored by Texas A&M University's Institute for Pacific Asia. Two museum educators—one from Japan and the other from the U.S.—are sailing on Expedition 312 and translating research for a variety of public audiences (families, teachers, students) in Japan and the U.S.

Priorities

JOI will continue to produce, disseminate, pilot and assess new materials and programs—including training teacher "operatives" to communicate with other educators. We will seek funding and identify strategic partners, especially among JOI member institutions. Our priorities include assessing our educational offerings, an interactive exhibit booth, museum exhibits, a workshop associated with a new education advisory structure, and two pilot workshops at IODP core repositories held in conjunction with the Distinguished Lecturer Series. Once our decision-making framework is complete, we can better evaluate and act upon both new and unexpected opportunities.

Leslie Peart is the Director of Education at Joint Oceanographic Institutions, Washington, DC.

Education Resources

Classroom Activities

These activities are designed to address the National Science Education Content Standards for earth, environmental and/or chemistry courses. All are available at www.joilearning.org.

What You See is What You Get

This inquiry-based activity allows students to practice simple visual and geological observation using core photos obtained by the Integrated Ocean Drilling Program (IODP) and available through the IODP website.

Adaptable for intermediate to high school audiences in earth and ocean science courses.

All Caged Up

This inquiry-based activity on methane hydrates allows students to model two clathrate structures commonly found in methane hydrates, challenging them to learn about gas laws, hydrogen bonding and chemical formation.

Adaptable for middle and high school or early college audiences in chemistry and/or earth science courses.

Continents and Currents

This inquiry-based activity allows students to visualize how the continental drift and seafloor spreading associated with plate tectonics change the circulation pattern of oceanic currents and impact climate regionally and globally.

Adaptable for intermediate and early middle school audiences in geography or earth and ocean science courses.

Don't Try This at Home

In this inquiry-based activity about methane hydrates, easy demonstrations foster class-wide discussion, enabling students to design an experiment to test the behavior of gases and to apply the universal gas law.

This activity is adaptable for intermediate and early high school audiences in chemistry or earth science.

A Reader's Guide to Climate Change

Students are challenged to think critically and interpret data from the *Ocean Drilling Program Highlights* booklet, enabling them to compare and contrast evidence of past climate change to current concerns of global climate change.

Adaptable for advanced high school to college audiences in environmental, earth or ocean science courses.

Ocean Drilling - Measure for Measure

In this activity—based on ratios and scale measurement—students calculate scales of distance and length as used by ocean drilling scientists, using specially printed metric measuring tapes that are available from JOI.

Adaptable for late elementary and middle school audiences in math and/or earth and ocean science.

Other Resources

A few of the other resources available at www joilearning.org are listed below.

Hard-Core Writing

Students learn what scientific ocean drilling cores are, who collects them, and what they can tell us about earth processes and history. Pencils with an image of a classic core from Ocean Drilling Program Leg 171B are available from JOI.

Adaptable for all grade levels and appropriate for all earth, ocean and/or space science courses.

On-Line Lectures

Students learn about complex research resulting from scientific ocean drilling by viewing a series of lectures given by prominent scientists from universities across the U.S.

Adaptable for high school and undergraduate audiences in chemistry, geology, environmental, and earth and ocean science courses.

Shipboard Diaries

Experience life on board the the scientific drilling research vessel, *JOIDES Resolution,* through the eyes of "Teachers at Sea," Jon Rice (Expedition 301) and Alan Gelatt (Expedition 309) by reading their colorful on-line journals.

Teacher journals are adaptable for all grade levels and are appropriate for all science courses.

www.joilearning.org

Teaching Teachers at Sea

Leslie Peart, JOI

What better place is there than at sea to experience the full flavor of scientific ocean drilling? For this reason, exposing teachers to shipboard science, many meters of core, and salty air has been a high priority for IODP. Since IODP was launched in 2003, four teachers have been mentored by shipboard scientists while at sea. Of the four, two sailed on the *JOIDES Resolution*—one during Expedition 301 to the Juan de Fuca Ridge, and the other during Expedition 309 to the East Pacific Rise. The remaining two educators sailed on icebreakers to the Arctic Ocean during Expedition 302. As a result, we have enriched educators and new teaching resources developed by them during these expeditions.

The teachers sailing on the *JOIDES Resolution*—Alan Gelatt (Exp. 309) and Jon Rice (Exp. 301)—were participants in the *Teacher at Sea* program, sponsored by the JOI Alliance. To read their online journals and learn more about the *Teacher at Sea* program, visit www.iodp-usio.org/education/TAS.html. During the Arctic Coring Expedition (Exp. 302), teachers Kathy Couchon and Erik Zetterberg were sponsored by the *Teacher Armada* (www.armadaproject.org) and the European Consortium for Ocean Research Drilling (ECORD), respectively.

Although two-month-long drilling expeditions have made monumental impacts on the teachers who have participated, the JOI Alliance is exploring a creative new way to teach teachers at sea—one that is less time consuming and involves more educators. As you read this newsletter, fourteen museum and classroom educators will have recently returned from participating in the pilot program *School of Rock Ocean-Going, Hands-On Expedition for Earth and Ocean Science Educators*. This program is an all-educator expedition conducted during the *JOIDES Resolution's* transit prior to Expedition 312, with talented and experienced participants drawn from an applicant pool of sixty educators from thirty states.

School of Rock *participants and Leslie Peart, JOI Education Director, prepare to set sail on the* JOIDES Resolution *from Victoria, Canada. The pilot program for educators is being conducted during a transit prior to Expedition 312.*

During the *School of Rock*'s time at sea, the teachers replicated lab analyses with cores from previous expeditions and were mentored by U.S. Implementing Organization (USIO) technicians, JOI education staff, and community scientists Dr. Mark Leckie (University of Massachusetts) and Dr. Kristen St. John (James Madison University). A suite of new activities are being developed and tested by these teachers who will present their work in twenty workshops across the United States during 2006. I look forward to telling you more about this pilot program in a future newsletter!

In addition to providing a special experience for its participants, we hope that the *School of Rock* pilot program will attract funding from a variety of sources and will serve as a prototype for teacher training expeditions aboard the new U.S. Scientific Ocean Drilling Vessel when it begins scientific operations in 2007. Together, the *Teacher at Sea* program and the *School of Rock* will offer interested educators a variety of options to experience cutting-edge science where it's at its most exciting—at sea.

"Teachers at Sea" with IODP

Jon Rice: Expedition 301, Juan de Fuca Ridge

Dr. Jonathan Rice, an 8th grade science teacher from Chester, Vermont, squeezed an eight-week research expedition into his summer teaching break in 2004 to become the first teacher to sail aboard the *JOIDES Resolution* during the Integrated Ocean Drilling Program (IODP). His views and impressions of shipboard life and science during Expedition 301 are recorded in a shipboard journal which will unquestionably speak to other educators and students. Inspired by the multidisciplinary expedition which probed an active mid-ocean ridge hydrothermal system, Jon also developed a laboratory brief series—useful for both educators and sailing scientists—which is now posted on the website for the U.S. Implementing Organization (www.iodp-usio.org/education/lab_briefs.html) Jon's memories of the expedition include lots of teamwork and problem solving; "No matter how often drilling or scientific 'crises' were encountered, the technicians, crew, staff, and scientists would troubleshoot and find a solution."

Alan Gelatt: Expedition 309, Superfast Spreading

In July and August 2005, Alan Gelatt, a high school and undergraduate educator from Romulus, New York, sailed as *Teacher at Sea* during Expedition 309. Along with maintaining a shipboard journal, Alan—mentored by curator Paula Weiss—developed a 3' X 5' poster featuring high-resolution core photos with related lab activities for secondary and early college students. The poster, planned for distribution in 2006, is designed to integrate core study and analyses related to the science objectives for the expedition, which penetrated in situ basaltic ocean crust. In Alan's words, "Being able to look at and handle core that was from about 4900 meters below sea level was wonderful. I teach about this type of rock in my classroom, and buy samples to use, but here was the chance to see it being brought up, discuss it with experts and be involved as it was being described. Being around others equally excited by rocks and working with them will now add to my classroom experience."

For information about the Teacher at Sea *program, bios of past participants, and links to the teachers' online expedition journals, visit www.iodp-usio.org/education/tas.html.*

Microbial Communities in Old Subsurface Ocean Crust

Cara Santelli
MIT/WHOI
Faculty Advisors:
Katrina Edwards
Wolfgang Bach

Recent studies (Banerjee and Muehlenbachs, 2003; Fisk et al., 1998; Thorseth et al., 1992) have suggested that the biosphere extends deep into ocean crust. Over geological time scales, microorganisms found in these basaltic environments could substantially impact geochemical processes such as mineral dissolution, mineral precipitation, lithification, and elemental cycles. The extent to which microbial activity has contributed to the chemical evolution of the crust, its mineral deposits, and overlying seawater composition, however, remains unclear largely because the extent of this biotope and the physiologies of any microorganisms inhabiting this environment are not fully understood.

Most evidence supporting an endolithic community in ocean crust comes from petrographic studies of basalt glass from drill cores of oceanic lithosphere, with supporting evidence from stable isotope and microbeam chemical analyses. While the results of these studies are central to the understanding of ocean crust as a microbial habitat, very little definitive molecular or physiological evidence has been uncovered.

The major goal of my Schlanger Fellowship research was to determine the endolithic communities comprising the subsurface ocean crust biosphere in order to better understand the role and impact of microorganisms on subsurface weathering. To this end, I performed 16S rRNA gene sequence analyses of many volcanic basement drill-core samples. As part of my fellowship, I participated as a microbiologist on ODP Leg 205 to the Costa Rica Convergent Margin. Additionally, through collaborations made possible by the expedition, I gained access to samples collected on ODP legs 192 and 206 by Neil Banerjee (Staff Scientist, IODP-USIO).

For my study, I obtained basalt and basaltic glass samples from Hole 1184A (Leg 192), Hole 1253 (Leg 205), and Hole 1256D (Leg 206). All three sites lie in the Pacific Ocean; however, their crustal age and geological/physical settings vary significantly. Therefore, the samples represent a variety of different regimes (age, likely fluid flux, extent of alteration, depth, etc.) of the ocean crust environment.

I performed several DNA extraction methods on the samples and made an exhaustive effort to amplify the 16S rRNA genes of the environmental DNA from both bacteria and archaea. However, I was successful in obtaining amplifiable DNA from only a single sample out of 35 total. This sample, from which only bacterial DNA could be amplified, was from ODP Site 1184, Core 45 and contained some of the physical weathering textures consistent with previously defined biological alteration (Banerjee and Muehlenbachs, 2003). Phylogenetic analyses of the clone library from this sample (Table 1) indicate that the most closely related sequences are primarily Proteobacteria with heterotrophic pure culture representatives (such as denitrifying bacteria from activated sludge and phenanthrene degrading bacteria). The results of this sequencing effort contrast with similar studies of young seafloor-exposed basalts (Lysnes et al., 2004, Santelli et al., unpublished data) on two important fronts. 1) The phylotypes revealed from the ODP sample showed limited diversity and all had close relatives represented in pure culture; young seafloor samples show greater diversity and have fewer close relatives represented in pure culture. 2) The phylotypes from the ODP sample clustered with known heterotrophic bacteria whereas the phylotypes from young seafloor exposed samples cluster in part with groups of known Fe-, S-, and Mn- metabolizing microorganisms (oxidation/reduction), and in part with microbial lineages for which little in the way of physiological inferences could reasonably be made. While my definitive conclusions await support from other data sets, at present the most parsimonious interpretation is that the DNA extracted from this sample derives from drilling contamination.

These results show that, like similar studies, it is difficult to extract enough DNA from this environment for any culture-independent analyses. While not producing any conclusive evidence of a subseafloor biosphere, the results of this study, when considered in light of other relevant studies, may suggest either: 1) an insignificant biomass exists in ocean crust older than 15 Ma, or 2) molecular biological and drilling tools are not capable of discerning microbial communities from this environment. Although these results did not provide evidence regarding the types of microorganisms inhabiting the subseafloor, this study provides insight as to the extent of the ocean crust biotope.

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Fisk, M. et al., *Science*, 281:978-980, 1998.

Lysnes, K. et al., *FEMS Microbio. Ecol.*, 50:213-230, 2004.

Thorseth, I.H. et al., *Geochim. Cosmochim. Acta*, 56:845-850, 1992.

Table 1: Subset of the Sequencing Results from ODP Site 1184, Core 45R

Clone	Phylogenetic group	Closest aligned GenBank sequence (organism or clone)	% similarity	Description of related isolate/clone
ODP1184-45B1	Gamma-Proteobacteria	*Acinetobacter* sp. 11 (AY177359)	98%	phenanthrene degrading bacteria
ODP1184-45B3	Gamma-Proteobacteria	*Pantoea* sp. BD 336 (AY530794)	98%	onion seed pathogen
ODP1184-45B9	Beta-Proteobacteria	*Diaphorobacter nitroreducens* (AB064317)	99%	poly(3-hydroxybutyrate)-degrading, denitrifying bacterium from activated sludge
ODP1184-45B63	Beta-Proteobacteria	CLi22 (AF529318)	98%	uncultured beta-proteobacteria from PCE-contaminated site
ODP1184-45B15	Actinobacteria	bromate-reducing bacterium B7 (AF442523)	98%	isolated from drinking water
ODP1184-45B64	Bacteroidetes	*Flavobacteriales* bacterium CF-1 (AY145539)	95%	Weser estuary

IODP Expedition News

Expedition 307

Porcupine Carbonate Mounds

IODP Expedition 307 drilled at Challenger Mound, one of approximately 70 conical structures in the Belgica mound province in the Porcupine Seabight, 100 km west of Ireland. Mound provinces have been found in water depths of 500 to 2000 meters along the European margin, and around the globe. Although some of the Belgica mounds host vibrant cold-water coral ecosystems, most are topped by dead coral rubble, including the 1-km-wide Challenger Mound. During the last ten years the environment and surface of the mounds have been intensively studied, but none have been cored through to the base until now, enabling basic questions about mound composition, initiation and growth to be addressed.

The first core of Expedition 307 is eagerly examined. From left to right: J. Gharib (Univ. Hawaii), T. Frank (Univ. Nebraska, Lincoln), D. Graham (IODP-USIO), V. Samarkin (Univ. of Georgia), S. Sakai (IFREE), P. Léonide (Univ. Provence), and A. Foubert (Univ. Gent).

Expedition 307 recovered 1393 m of core from three sites in 12 days of operations. Site U1317 consisted of a mini-transect of holes up the ~30° slope to the top of Challenger Mound, which is composed of 155 m of Pleistocene cold-water corals in a matrix of coccoliths, clay, and silt. Sites U1316 (1.5 km downslope from the mound) and U1318 (14 km upslope) sampled the late Pleistocene siliciclastics that partly enclose the mound, the Pliocene erosional unconformity on which the mound sits, and the Miocene-Pliocene clay and siltstones beneath the unconformity. In the core lab, a new technique was developed for coral-bearing cores: they were frozen before being split to avoid the dragging or fragmentation of corals that result from conventional core splitting.

Prior to drilling, one hypothesis was that the growth of carbonate mounds is fueled by cold hydrocarbon seeps from below, with methane-oxidizing prokaryote communities producing the extra dissolved inorganic carbon required for carbonate precipitation. However, the expedition did not find the high levels of microbial micrite and extensive early cementation that would have supported this hypothesis; indeed, methane and the largest abundances of prokaryotes were only observed beneath the mound. Instead, the Expedition 307 results favor the hypothesis that mounds are located where currents, controlled locally by seabed morphology, supply food and nutrients to the coral ecosystem. The 10-m-scale facies alternations in the mound, which likely represent glacial-interglacial environmental changes, are a further indication of oceanographic control on mound growth.

Fossil carbonate mud mounds, found throughout the Phanerozoic, have a similar size and shape to the modern mounds, but differ in their composition and early diagenetic features. Moreover, it is difficult to establish the water depth at which the fossil mounds formed; the abundance of modern mounds suggest that formation in deep water may be more common than previously suspected. There is also diversity among modern carbonate mounds. For example, at the northern end of the Porcupine Seabight the mounds are smaller in size but number in the thousands; the young mounds offshore Morocco are found alongside mud volcanoes and methane seeps. Thus this first drilling by Expedition 307 represents a pioneering step in the investigation of these intriguing structures.

—Trevor Williams, IODP-USIO (LDEO) and the IODP Expedition 307 Scientific Party

Expedition 308

Gulf of Mexico Hydrogeology

IODP Expedition 308 left Mobile Bay on June 4 and arrived in Colon, Panama on July 8, 2005. Along the way—on our mission to explore overpressure in the deepwater Gulf of Mexico—we drilled, logged, and made in situ measurements in a "reference" location, Brazos-Trinity Basin#4, where little overpressure was deemed to be present. These measurements were compared with experiments in the Ursa Basin where rapid Pleistocene sedimentation generated severe overpressure. This was the first part of a two-component program to examine how sedimentation, overpressure, fluid flow, and deformation are coupled in passive margin settings.

The expedition's complex operational strategy required an unusual level of planning because the target drill sites were in a known petroleum basin where shallow overpressure had previously hindered drilling. The expedition's success is due to the experience, skill, and patience of staff at Texas A&M University, part of IODP's U.S. Implementing Organization, and Transocean Inc., owner and operator of the *JOIDES Resolution*. For the first time in the history of scientific ocean drilling, pressure and other properties were monitored in real time during logging-while-drilling (LWD) operations. We also used large volumes of dense mud to control subsurface pressures to achieve our scientific goals. These steps were taken to monitor and control "shallow water flow," the condition where overpressured, unconsolidated sands flow into the borehole during drilling. Despite the challenges, operations ran smoothly. There was little down time, logging and coring proceeded without difficulty, and borehole conditions were remarkably stable.

One fundamental achievement of Expedition 308 was to establish temperature and pressure profiles at two locations in Ursa Basin: Site U1322 and U1324. This was accomplished through extensive application of two penetrometer tools that are designed to measure pore pressure and temperature upon insertion into mudstones. We observed pressures approximately halfway between the hydrostatic and lithostatic pressures. To our knowledge, this is the first time during the drilling program that the spatial variation of the pressure field has been documented at this resolution. Other exciting data were also collected. We made the first direct measurements of turbidite deposits in the Brazos-Trinity Basin #4, which have been studied remotely for years, to predict their geometry, lithology, and their relationship to global sea-level change. At Ursa Basin, we cored and logged at least three mass-transport turbidite com-

Expedition 308 (continued)

plexes that span tens of kilometers. In both basins, we gathered a large data set that records the pore-water chemistry and microbiology of overpressured strata. In the months ahead, these data will be coupled with the analysis of the over 100 meters of whole core collected for geotechnical and microbiological analysis. Experiments on these cores, further analysis of our shipboard data, and theoretical modeling will be used to refine a conceptual flow model to describe the hydrodynamics of the Ursa Basin. Expedition 308 details are available at: www.iodp.tamu.edu/publications/PR/308PR/308PR.html.

—Peter Flemings, The Pennsylvania State University and the IODP Expedition 308 Scientific Party

Expedition 309

Superfast Spreading Rate Crust 2

IODP Expedition 309 is the second cruise in a multiphase mission to recover—for the first time—a complete section of the upper oceanic crust. Expedition 309 successfully deepened Hole 1256D, initiated during ODP Leg 206, by 503 meters to a total depth of 1255 meters below seafloor (mbsf). Hole 1256D (6.736°N, 91.934°W) is located in crust that formed 15 Ma at the East Pacific Rise during a period of superfast spreading (>200 mm/a). This site was chosen to exploit the inverse relationship observed from seismic experiments between spreading rate and the depth to axial low-velocity zones, thought to be magma chambers frozen as gabbros. Hole 1256D has become the fourth-deepest hole drilled in oceanic basement since scientific ocean drilling began in 1968 and the second-deepest penetration into in situ ocean crust after Hole 504B.

The uppermost basement in Hole 1256D consists of a massive ponded lava flow (>74 m thick) overlying an interval with flow inflation structures that suggest the lavas erupted onto a subhorizontal surface. Sheet and massive flows dominate the extrusive sequence. Below is a lithologic transition zone in which dike-chilled margins become more common downhole but extrusive textures and vesicles are still encountered. The transition zone also hosts a spectacular mineralized volcanic breccia with glass and basalt clasts in a matrix of sulfides and subgreenschist facies minerals. A distinct change from sheet flows to massive aphyric, non-vesicular, fine-grained basalts with holocrystalline groundmass textures defines the upper boundary to the sheeted intrusives. Further downhole in Hole 1256D, subvertical intrusive dike contacts are common. Whether these massive basalts are dikes or sub-volcanic sills remains unproven, although the Expedition 309 science party prefers the first interpretation.

Hole 1256D is only the second drill hole after Hole 504B to penetrate the transition from low-temperature alteration to high-temperature hydrothermal alteration in a continuous section of oceanic crust. Below ~1028 mbsf, the presence of chlorite, actinolite, prehnite, titanite, and epidote indicate hydrothermal alteration under subgreenschist to greenschist facies conditions. Overall, Hole 1256D rocks are less altered than rocks at most other basement sites. Caliper readings from geophysical wireline logs show good borehole conditions with a diameter typically between 11 and 14 inches. Preliminary interpretation of formation microscanner (FMS) and ultrasonic borehole imager (UBI) images indicate that subvertical dike margins in the sheeted intrusives have true dips towards the northeast, consistent with slight tilting of the lavas toward the axis of the paleoridge.

Expedition 309 (July to August 2005) is followed closely by IODP Expedition 312 (November to December 2005). Despite our grueling pace of advance at 15 m/day, progress in deepening Hole 1256D has been steady. We optimistically anticipate the same benign drilling conditions, good fortune, and highly astute rig-floor operations during Expedition 312 which, with more than 30 days of drilling operations, will deepen Hole 1256D by 500 m—well beyond the depths where geophysical interpretations predict gabbros to occur.

- Neil Banerjee, IODP-USIO (TAMU); Damon Teagle, University of Southampton; and the IODP Expedition 309 Scientific Party

Expedition 309 Shipboard Scientific Party (alphabetical order): N. Banerjee, A. Belghoul, C. Cordier, L. Crispini, F. Einaudi, L. Galli, Y. Gao. A. Gelatt, J. Geldmacher, L. Gilbert, E. Herrero-Bervera, S. Holter, C. Laverne, H. Lledo, S. Durand, T. Sakuyama, T. Sano, C. Smith-Duque, P. Tartarotti, D. Teagle, M. Tominaga, S. Umino, A. Veloso, and D. Wilson.

U.S. Participants on IODP Expeditions

Expedition 310: Tahiti Sea Level

Paterno Castillo	Scripps Inst. of Oceanography
Anne Cohen	Woods Hole Oceanog. Inst.
Julia Cole	University of Arizona
Richard Fairbanks	Lamont-Doherty Earth Obs.
Terrence Quinn	University of South Florida

Exp. 311: Cascadia Margin Gas Hydrates

Timothy Collett	Co-Chief/USGS
Mitchell Malone	Staff Scientist/IODP-USIO
Gilles Guerin	Logging Staff Sci./IODP-USIO
Phillip Long	Pacific Northwest Natl. Lab.
Miriam Kastner	Scripps Inst. of Oceanography
Leena Palekar	Scripps Inst. of Oceanography
John Pohlman	Virginia Inst. Marine Science
Marta Torres	Oregon State University
Anne Trehu	Oregon State University

Exp. 312: Superfast Spreading Crust 3

Jeffrey Alt	Co-Chief/Univ. of Michigan
Neil Banerjee	Staff Scientist/IODP-USIO
David Christie	Oregon State University
Rosalind Coggon	University of Michigan
Nicholas Hayman	Duke University
Stephanie Ingle	University of Hawaii
Stephen Swift	Woods Hole Oceanogr. Inst.
Anahita Tikku	Rensselaer Polytechnic Inst.
Masako Tominaga	Texas A&M University
Douglas Wilson	Univ. California, Santa Barbara

For additional expedition information: www.iodp.org

Expedition 310

Tahiti Sea Level —Underway!

As this newsletter goes to press, Expedition 310—IODP's second Mission Specific Platform expedition—is coring fossil corals off the coast of Tahiti to investigate global sea level rise since the last glacial maximum, approximately 23,000 years ago. From October 1 until November 21, 2005, scientists from nine countries aboard the *DP Hunter* are conducting the most extensive geological research investigation ever undertaken in a coral reef area. For background information and the expedition logbook visit www.ecord.org/exp/tahiti/310.html.

IODP Science Advisory Structure Updates

Science planning for the Integrated Ocean Drilling Program is provided by the Science Advisory Structure (SAS), which involves many scientists and engineers on eight standing committees and panels. The Sapporo, Japan office of IODP Management International Inc. (IODP-MI) works very closely with the SAS by managing the submission and review of drilling proposals, assisting SAS committee chairs, and organizing panel meeings and maintaining public records of SAS activities.

All of IODP's science expeditions are motivated by community input in the form of unsolicited proposals that are nurtured and prioritized by the IODP SAS. The Science Planning Committee (SPC) receives scientific advice on drilling proposals from the international community through the Science Steering and Evaluation Panel (SSEP). The nurturing, development, and evaluation of proposals in concert with proponents are the prime responsibilities of the SSEP. The SSEP also provides the SPC with evaluations of high priority drilling proposals, as well as advice on longer-term thematic development. The Science Planning and Policy Oversight Committee (SPPOC)—as the highest-level committee of the IODP SAS—formulates scientific and policy recommendations with respect to the IODP. It conducts IODP long-range planning, as well as short- and long-term evaluation and assessment of the program as to its accomplishments and evolution as compared to the scientific goals and objectives.

Following SAS consideration, two panels (the Technology Advice Panel and the Industry Liaison Panel) were disbanded and two new entities were recently established. The Engineering Development Panel was formed to provide advice on matters related to the technological needs and engineering developments necessary to meet the scientific objectives of active IODP proposals and the IODP *Initial Science Plan*. The Industry-IODP Science Program Planning Group will identify subjects of cooperative scientific research between the IODP and selected industries and will promote development of IODP drilling proposals to address these objectives within the context of the *Initial Science Plan*.

Other SAS panels include the Environmental Protection and Safety Panel, the Site Survey Panel, and the Scientific Technology Panel (formerly known as the Scientific Measurements Panel). Visit www.iodp.org/sas/ for additional information, including panel mandates, full membership lists, meeting schedules, and SAS reports and meeting minutes.

A number of new U.S. members rotated onto the SAS panels this fall. See the table below for a full listing of the U.S. members serving in the Science Advisoy Structure. Nominations, including self-nominations, for U.S. SAS panel membership are accepted each May and June by the U.S. Science Support Program at Joint Oceanographic Institutions.

U.S. Panel Members in the IODP Science Advisory Structure

Science Planning and Policy Oversight Committee (SPPOC)
Larry Mayer, University of New Hampshire
Susan Humphris, Woods Hole Oceanographic Inst.
Ken Miller, Rutgers, The State Univ. of New Jersey
Nick Pisias (Chair), Oregon State University
David Rea, University of Michigan
David Scholl, U.S. Geological Survey/Stanford Univ.
Eli Silver, University of California, Santa Cruz
alternate:
Neal Opdyke, University of Florida

Science Planning Committee (SPC)
Keir Becker (Chair), RSMAS, University of Miami
Barbara Bekins, U.S. Geological Survey
Tim Byrne, University of Connecticut
Bob Duncan, Oregon State University
Patricia Fryer, University of Hawaii
Greg Mountain, Rutgers, The State University of New Jersey
Terry Quinn, University of South Florida

Science Steering and Evaluation Panel (SSEP)
Wolfgang Bach, Woods Hole Oceanographic Inst.
Jerry Dickens, Rice University
Ben Flower, University of South Florida
Craig Fulthorpe, University of Texas at Austin
Jeff Gee, Scripps Institution of Oceanography
Barbara John, University of Wyoming
Samantha Joye, University of Georgia
Julia Morgan, Rice University
Richard Norris, Scripps Institution of Oceanography
Greg Ravizza, University of Hawaii
Demian Saffer, The Pennsylvania State University
Lori Summa, ExxonMobil
Mike Underwood (Co-Chair) , University of Missouri
Alicia Wilson, University of South Carolina

Scientific Technology Panel (STP)
Paterno Castillo, Scripps Inst. of Oceanography
Beth Christensen, Adelphi University
Timothy Lyons, University of California, Riverside
Kevin Mandernack, Colorado School of Mines
Liz Screaton, University of Florida
Geoff Wheat, University of Alaska/Monterey Bay Aquarium Research Institute
Roy Wilkins, University of Hawaii

Site Survey Panel (SSP)
Suzanne Carbotte, Columbia University
James Corthay, ExxonMobil Corporation
Earl Doyle, Shell (retired)/consultant
Alistair Harding, University of California, San Diego
Stanley Locker, University of South Florida
Dale Sawyer (Vice-Chair), Rice University
David Twichell, U.S. Geological Survey

Environmental Protection and Safety Panel (EPSP)
Robert Bruce, BHP Petroleum
Hans Juvkam-Wold, Texas A&M University
Barry Katz (Chair), ChevronTexaco
Donald Potts, University of California, Santa Cruz
Jerome Schubert, Texas A&M University
Craig Shipp, Shell International E&P
William Winters, U.S. Geological Survey

Engineering Development Panel (EDP)
Mark Alberty, British Petroleum
Peter Flemings (Chair), Pennsylvania State University
Jack Germaine, Massachusetts Inst. of Technology
Leon Holloway, ConocoPhilips
Stephen Sears, Louisiana State University
Bill Ussler, Monterey Bay Aquarium Research Inst.
Richard Von Herzen, Woods Hole Oceanographic Institution (retired)

Industry-IODP Science Program Planning Group (IS-PPG)
Martin Perlmutter, ChevronTexaco
Kurt Rudolph, ExxonMobil Exploration
Ralph Stephen (Chair), Woods Hole Oceanog. Inst.
Others to be named

For more information on the SAS panels, please visit: www.usssp-iodp.org/advisory_committees

The Bering Strait, Rapid Climate Change, and Land Bridge Paleoecology

Sarah Fowell, David Scholl

The Bering Strait connects the Pacific and Atlantic oceans via the Arctic Ocean. The strait is currently only 50 meters deep. During low sea-level stands produced by continental glaciations it was emergent, forming the Bering Land Bridge connection between North America and Asia. This is the only area on Earth where the circulation between ocean basins has been blocked and a migration corridor between continental landmasses has been opened by falling sea levels of the Plio-Pleistocene. Thick sediment sequences (> 3 km) in the Norton and Hope basins, immediately south and north of the strait, respectively (Figure 1), are likely to contain records of regional marine transgressions and regressions that include intercalated terrestrial sediment. Collection of cores and proxy records from these basins has the potential to resolve key questions regarding land bridge paleoecology and global climate change.

A workshop to select and prioritize drilling sites in Bering Sea shelf basins was supported by the U.S. Science Support Program, with travel for international participants provided by the International Arctic Research Center. Forty-six participants met in Fairbanks, Alaska on June 20-22, 2005, to discuss key scientific questions and identify prospective drilling sites. Terrestrial and marine climate and environmental proxies, dating techniques, and appropriate platforms were discussed in breakout groups. Workshop products will include scientific rationale for drilling in the region, recommended drilling sites, and proposals submitted to the Integrated Ocean Drilling Program. An overview of the scientific discussion at the workshop follows.

Studies of global freshwater transport have demonstrated a net flux of water from the North Pacific to the North Atlantic Ocean through the Bering Strait at a rate which accounts for nearly one-third of the total freshwater input to the Arctic Ocean. Models indicate that increased flow of fresher North Pacific water through the submerged Bering Strait can suppress North Atlantic Deep Water formation. The opening and closing of the strait clearly has global climatic implications with regard to the cause and duration of glacial and interglacial climatic oscillations. However, the numerous and sometimes contradictory models cannot be adequately tested because an accurate chronology of emergence and submergence is lacking. Reconstruction of the sea level history of the Bering Strait—including the exact timing of the opening and closing of the land bridge, the rates of associated sea level changes, and the presence or absence of sea ice—is essential to understanding its role as a trigger or pacemaker of northern hemisphere climate changes.

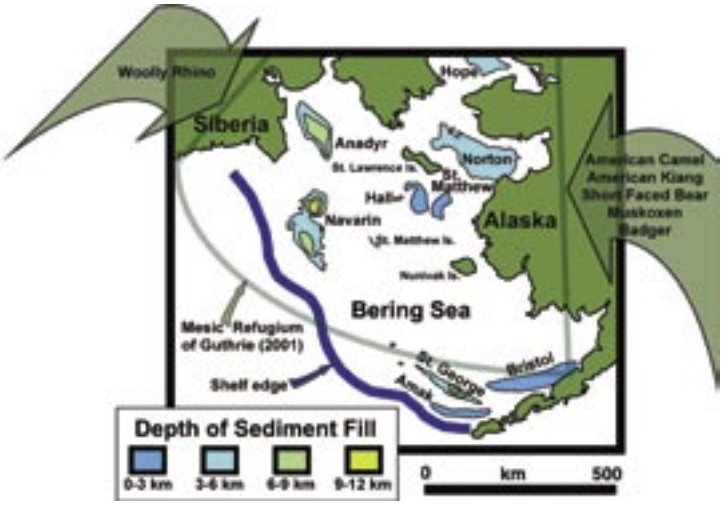

Fig 1. Bering Shelf basins and depth of sediment fill (after D. Worrall, GSA Special Paper 257, *1991). Steppe-adapted mammals may have been prevented from crossing the land bridge by a mesic refugium with a greater proportion of tundra vegetation (data from R.D. Guthrie,* Quaternary Science Reviews, *20:549-574, 2001).*

The Bering Strait and the Bering Land Bridge served as filter bridges for marine and terrestrial animals, plants, and humans that passed between the Bering and Chuckchi seas or between Eurasia and North America, respectively, during the late Quaternary period. Previous exchanges of species between Asia and North America during the Miocene and Late Cretaceous indicate that the Bering Strait region experienced intervals of emergence prior to the Plio-Pleistocene. Competition from foreign species has been cited as a causal factor in Cretaceous, Eocene, and Pleistocene extinctions. Evidence exists that a north-to-south and/or east-to-west ecological gradient was present across the Pleistocene land bridge. If so, was it a biological filter, facilitating the migration of some species while limiting the ranges of others? Were similar gradients present during the Eocene or Cretaceous?

Volcanoes in the Aleutians, Wrangells, and Kamchatka are known to erupt explosively. Identifying and dating tephras will enhance the chronology of Cenozoic eruptions and their role in global climate variations. Geochemical characterization of tephras from Bering Strait cores will provide a detailed record of the frequency, magnitude, and timing of regional volcanic eruptions. Furthermore, the dating of ash deposits will permit precise correlation of terrestrial and marine deposits throughout the region.

Workshop participants concur that to address unresolved questions regarding global ocean circulation and rapid climate changes and to permit reconstruction of the flora, fauna, and climate of the central Beringian lowlands, scientific drilling must target expanded basinal sections that contain both marine and terrestrial sediment.

When complete, a full workshop report will be available at: www.usssp-iodp.org/science_support/workshops/past_workshops.html

Authors

Sarah Fowell, University of Alaska, Fairbanks (ffsjf@uaf.edu)
David Scholl, U.S. Geological Survey and Stanford University, Geophysics (dscholl@usgs.gov)

Full Steam Ahead

News from the National Science Foundation

Rodey Batiza and Jamie Allan
Program Directors, NSF/ODP

The selection process for the U.S. Scientific Ocean Drilling Vessel (SODV) is nearly complete as this newsletter goes to press; the announcement will be available on www.joiscience.org. The outlook for funding the $58 million requested for the vessel in the FY2006 budget looks promising, as both the U.S. House and Senate have passed budgets containing the full amount requested for all ongoing Major Research Equipment and Facility Construction projects. The total cost of converting the riserless vessel is estimated to be $115 million. The SODV, which is expected to begin IODP drilling sometime in FY2007, will have enhanced drilling capabilities, improved scientific capacity, and greater habitability, as discussed in detail on page 13. John Walter, of the National Science Foundation's Ocean Drilling Program (NSF/ODP), has primary responsibility for the SODV activity at NSF.

IODP-MI and the JOI Alliance continue to request community input to the design of the new U.S. drilling vessel. To assist with this effort, the JOI Alliance created a briefing book that describes the vision for the onboard facilities of the future riserless platform. This briefing book, which encompasses drilling and coring capabilities, onboard scientific research capabilities, and issues of habitability, is available online at www.joialliance.org/MREFC/briefing_book/default.html. Although the formal response period to the briefing book questionnaire is closed with the received responses compiled, additional comments continue to be welcome. You may send comments to members of the SODV Program Advisory Committee, Science Lab Conversion Design Team, and the SODV Independent Oversight Committee. The members of these recently constituted committees are listed on page 13 of this newsletter.

The search for a new Director of the Ocean Sciences Division of NSF is underway, with interviews of three candidates completed. Carolyn Ruppel will remain for up to another six months as the "rotator" in the NSF/ODP Program. The job ad for her replacement, with a new closing date of December 31, 2005, is posted at www.nsf.gov/pubs/2005/e20050126/e20050126ipa.txt.

On another front, the new NSF seismic survey vessel, the *R/V Marcus Langseth* will undergo a shipyard conversion, which is expected to be complete in June 2006. Meanwhile, design work has begun for a new University-National Oceanographic Laboratory System (UNOLS) deep submersible to replace the *DSV Alvin*. More information is available at www.unols.org.

Following an August 15 proposal deadline, NSF has been considering requests for Expedition Objective Research (EOR) support, a program whereby U.S. participants may seek funding for expedition-related research projects prior to or immediately after IODP expeditions. In addition, NSF continues to actively support site survey and equipment research for IODP drilling proposals through its Grants Program. This program averages about $8 to 10 million/year, with the awards in FY 2005 less than usual and the awards in FY 2006 expected to be more than usual. See the table below for recent awards. Additional support for U.S. scientists to participate in IODP planning activities, pre-drilling activities, instrument development, and participation on drilling expeditions is provided through the U.S. Science Support Program (USSSP), administered via NSF's Cooperative Agreement with JOI (www.usssp-iodp.org).

Expedition Objective Research Funding Available

NSF/ODP encourages Expedition Objective Research (EOR) proposals from participants in Integrated Ocean Drilling Program (IODP) expeditions to address the scientific objectives of specific drilling expeditions. Resulting EOR grants may begin during the period between the Co-Chief Scientists' approval of the expedition sampling plan and the end of the sample moratorium period.

EOR Proposal Deadlines:
February 15, 2006
August 15, 2006

For questions and/or additional information, please contact:
Carolyn Ruppel (cruppel@nsf.gov) or
Rodey Batiza (rbatiza@nsf.gov)

www.geo.nsf.gov/oce/programs/drilling.htm

Proposals Funded by National Science Foundation Ocean Drilling Program Grants during the Past Year

Completed:

Forearc basin sequence stratigraphy (Fulthorpe [UTIG], IODP Proposal 537-CDP5)
Paleoceanography of Alaska fjords (Mix [OSU] and Jaeger [U. Fl.], IODP Proposal 597-Full)
Atlantic Deep Water Bottom Current in the early Eocene (Norris [SIO], IODP Proposal 661-Pre)
Storegga slide coring (Holbrook [U.Wyo.] and Paull [MBARI], IODP Proposal 557-Full2)
Chicxulub Crater (Gulick [UTIG] in partnership with UK NERC, IODP Proposal 548-Add2)
North Atlantic temperature monitoring (Harris [U. Utah], IODP Expedition 306)

Underway or Expected to Soon Begin:

Juan de Fuca CORKs/osmosamplers (Becker [U. Miami], IODP Expedition 301)
South Pacific Paleogene (Lyle [Boise State], IODP Proposal 567-Full)
Mid-Atlantic Ridge megamullions (Tivey [WHOI], IODP Proposal 532-Full)
Louisville hotspot chain (Lonsdale [SIO], IODP Proposal 636-Full2)
Nankai CDP survey (Moore [U.H.] in partnership with JAMSTEC, IODP Proposal 603-CDP3)
Costa Rica onshore-offshore seismics (MARGINs, Holbrook [U.Wyo.], IODP Proposal 537-CDP5)
Seismic CORKs (Stephen [WHOI], Small Grant for Exploratory Research)
New techniques for studying deep microbes (Spivack [URI], Small Grant for Exploratory Research)
Imaging the Sabine Bank paleo-reef (Austin [UTIG], Small Grant for Exploratory Research)

Proposal Target Dates: February 15 and August 15
www.nsf.gov/funding/pgm_summ.jsp?pims_id=13524

The Future U.S. Scientific Ocean Drilling Vessel

Kelly Kryc, JOI*

The JOI Alliance is pleased to announce that, as this newsletter goes to press, it is wrapping up negotiations to contract a drillship to serve as the U.S. Scientific Ocean Drilling Vessel (SODV) for the Integrated Ocean Drilling Program. With the guidance of the SODV Advisory Structure (see table), the selected drillship will be converted into a scientific platform with state-of-the-art technology designed to provide a creative environment for scientists, engineers, technicians, educators, and crew who participate in IODP expeditions.

What can science party members expect? Gone are the days of cozy four-person staterooms and eight-person bathrooms that helped make the Ocean Drilling Program (ODP) experience memorable! Instead, the converted drillship will have no more than two people to a stateroom and no more than four people sharing a bathroom. Noise and vibration throughout the ship will be diminished compared to the ODP days. And what about the surprising—but most frequently asked—question regarding a sauna? The answer is, "yes." There will be a modern recreation area on the vessel that includes a sauna.

Habitability issues aside, the science capabilities proposed for the U.S. SODV are what will really turn heads. At a minimum, there will be a 50% increase over ODP in shipboard lab space, which will ensure better core flow through the labs and a greater variety of scientific instrumentation. Some of the enhancements being considered include X-ray fluorescence (XRF) scanning, X-ray computed tomography (CT) scanning, a U-channel cryogenic magnetometer, an inductively coupled plasma mass spectrometer (ICP-MS), a particle size analyzer, and multiple-parallel sensor tracks to expedite core flow.

Improved core flow through the labstack is important, because the new drillship will have the potential to collect more cores, and with better recovery, than ever experienced in the history of scientific ocean drilling. This will be accomplished with a new and enhanced drilling instrumentation system, a sub-sea camera system with improved handling, and a new drill string with upgraded drilling tools. Faster transit speeds (due to an improved vessel hull and other machinery) will translate to more time on station. It is also possible that the ship will have an increased capacity for consumables resulting in greater cruising range and station duration.

If you have not received news of the final vessel selection via e-mail or otherwise by the time you receive this newsletter, you can find the formal announcent at www.joiscience.org (or it will be there soon!). Although the JOI Alliance is excited about the drillship contract award as an important step, the modification process will make whatever vessel is chosen virtually unrecognizable compared to its "before" condition. The drilling platform is just that, a platform to house a new U.S. "floating university" to serve the IODP for the next decade. And, to complement all that is new, we look forward to the familiar old spirit of teamwork and international cooperation.

Kelly Kryc (kkryc@iodp.org), formerly Assistant Director, Ocean Drilling Programs at Joint Oceanographic Institutions, is now Executive Program Associate at IODP-MI. Her duties will include developing long-range planning workshops with IODP's Science Planning and Policy Oversight Committee (SPPOC).

Scientific Ocean Drilling Vessel (SODV) Advisory Structure

2005 to 2006

SODV Independent Oversight Committee

Rannie Boyd, Chair, Naval Architect
Stan Christman, retired Drilling Expert
Susan Humphris, Woods Hole Oceanographic Institution
Harold Tobin, New Mexico Institute of Mining and Technology
Ken Miller, Rutgers, The State Univ. of New Jersey

This group serves as a high-level independent assessment body confirming the SODV program status for NSF's required Baseline Reviews. It assesses project progress against the Program Execution Plan.

SODV Program Advisory Committee

Peggy Delaney, Chair, University of California, Santa Cruz
David Christie, Oregon State University
Christopher House, The Pennsylvania State Univ.
Page Chamberlain, Stanford University
Juan Garcia, retired Drilling Expert
Tom Janecek, IODP-MI, non-voting member

This committee is charged with assessing the design plans for the SODV's onboard science and drilling capabilities. It also ensures that the final plans reflect the needs of the science community.

Science Laboratories Conversion Design Team

Mark Leckie, University of Massachusetts, Amherst
David Smith, University of Rhode Island
Clive Neal, University of Notre Dame

This commitee oversees specific shipboard spaces for research and analysis such as: core receiving areas, core analysis labs, and sample analysis labs. Its goal is to optimize the use of lab space and identify appropriate state-of-the-art research equipment.

Information Technology Conversion Design Team

Richard Oliver-Goodwin, Office of Marine Affairs, Lamont-Doherty Earth Observatory
Peter Knoop, University of Michigan

This committee provides guidance for the design of the SODV cyber infastructure. Its goal is to bring the latest network and computer display capabilities to the SODV so that visiting scientists have a robust onboard computing environment.

SODV Program Advisory Committee: Reports to Stuart Williams (JOI)
SODV Independent Oversight Committee: Reports to Steve Bohlen (JOI)
Science Laboratories and IT Conversion Design Teams: Report to Science Technical Coordinator, Bill Mills at Texas A&M University

U.S. Advisory Committee Welcomes New Members

Beginning October 1, the U.S. Advisory Committee for Scientific Ocean Drilling welcomed five new members to replace outgoing members: Dave Christie, Mark Leckie, John Mahoney, Greg Mountain, and Jill Whitman.

Steve Hovan

Steve Hovan is a Professor in the Geoscience Department at Indiana University of Pennsylvania. Since completing his graduate work at the University of Michigan in 1993, he has become strongly committed to undergraduate education through teaching and research experiences. In the lab, his interests include the paleoclimatic record of terrigenous inputs to the deep sea, particularly those involving eolian dust transport. Using a variety of geochemical and sedimentological indices, he has been trying to map zonal wind patterns throughout the Cenozoic and understand how changing wind patterns are related to other global paleoclimatic and paleoceanographic systems. Steve has sailed aboard Ocean Drilling Program (ODP) Legs 138, 167 and 199 and on numerous site-survey cruises. When not in the classroom or lab, he enjoys playing racquetball, gardening, landscaping, watching college football, and relaxing on a boat with a fishing rod.

Ian MacGregor

Ian MacGregor has been involved with ocean drilling since the start of the Deep Sea Drilling Project (DSDP), serving as the first Chair of the *Igneous and Metamorphic Petrology Panel*. He sailed aboard the *Glomar Challenger* in the western Pacific (Leg 20) as co-chief scientist with Bruce Heezen and in the Philippine Sea (Leg 31). He also served as Chief Scientist of the Office of Scientific Drilling, the National Science Foundation (NSF) group that negotiated the transition from DSDP to ODP. After being educated at Aberdeen University, Scotland, Queen's University, Canada, and Princeton University, NJ, Ian spent 20 years as a professor at the Southwest Center of Advanced Studies (now the University of Texas at Dallas) and the University of California, Davis. He spent another 20 years as a science administrator (Division Director of the Earth Sciences, NSF). His research focused on understanding the petrology and geochemistry of the upper mantle. Ostensibly retired, he has turned his attention to children's education. He has worked as a science advisor for the international GLOBE program, as well as developing science curricula and children's stories with colleagues at the National Science Resources Center, Smithsonian Institution. He is married with six children and ten various and nefarious grandchildren.

Jerry McManus

Jerry McManus is an Associate Scientist at Woods Hole Oceanographic Institution. As a paleoceanographer, he is interested in the sedimentary record of climate and ocean circulation, including the processes affecting the creation and preservation of sedimentary archives, the relative influence of internal and external forcing on climatic stability, the role of ocean circulation in rapid climate change, and quantitative reconstruction of the rates and magnitudes of past changes. To pursue his interests in climate variability, he has sailed to the North Atlantic and South Pacific on ODP Legs 151, 162, and 202. While a USSSP-sponsored graduate fellow, USSAC pursuaded him to sail for two months giving him only a few days ashore following his return from another extended cruise. A born and bred New Yorker, Jerry received all his degrees in geology (BA, MA, and PhD) from Columbia University. When not teaching, working with students, or conducting research activities, Jerry tries to keep up with his 9-year-old twins, Aidan (a Yankee fan) and Brennan (a Red Sox fan).

Clive Neal

Clive Neal is an Associate Professor of Geological Sciences at the University of Notre Dame, where he has taught since 1990. He served on the IODP' *Scientific Measurements Panel* and sailed on three ODP cruises (Legs 183, 192, and 197). Currently, he is on the design team for the new U.S. Scientific Ocean Drilling Vessel. A major thrust of his research focuses on the origin and evolution of large igneous provinces. However, he has published over 60 peer-reviewed journal articles on subjects ranging from ocean drilling to Moon rocks (and meteorites) to the platinum content of road dirt! He is also director of the Notre Dame Inductively Coupled Plasma Mass Spectrometry Facility. Clive was educated in the United Kingdom, receiving a BS in Geology from the University of Leicester in 1982 and a PhD in Geochemistry from the University of Leeds in 1986, after which he undertook a postdoctoral research fellowship at the University of Tennessee. What free time he has is spent trying to keep up with his three children and four grandchildren.

Kristen St. John

Kristen St. John is an Associate Professor at James Madison University, where she arrived from Appalachian State University in early 2005 to accept a new position in Geoscience Education. Towards her education charge, Kristen is involved in a Virginia-wide program of summer courses for earth science teachers. She is also the associate editor of the *Journal of Geoscience Education* for the National Association of Geoscience Teachers. Kristen's research areas are marine sedimentology and paleoceanography, focusing on reconstructing Pleistocene ice-rafted debris histories. She sailed on ODP Legs 163 and 173 and most recently she was a sedimentologist for the IODP Arctic Coring Expedition 302. Following undergraduate studies at Furman University (1992), Kristen received her MS (1995) and PhD (1998) in Geological Sciences from Ohio State University. She met her husband, electronic technician Larry St. John, during ODP Leg 173. They have two children Helen (age 5), who is a kindergarten ring leader and part-time princess, and Will (age 1), a charmer, comedian, and champion eater.

A Sea Change for US(S)AC

A Letter from the Chair

Before reading this column, you may want to brace yourself, or at least have a seat. I must report a change that might be both shocking and unsettling, temporarily raising the anxiety level of U.S. scientists involved with ocean drilling…

USSAC has changed its name. (There you go—sometimes the direct approach is the best one!) This was a difficult decision, which we agonized over for years, consulted analysts about for expert advice, and performed several focus group studies to confirm the wisdom of this change.

We are proud to announce the new name for the committee—USAC. Such a dramatic change needs some explanation, especially given the bold move of dropping an entire "S" off of the acronym. But speaking seriously now, this change is not as subtle as it appears, and it is driven by the clear direction in which USAC is heading in terms of its function of interfacing between "insiders" (anyone reading this column) and "outsiders" (everyone else). For this reason, the formal committee name was changed to the "U.S. Advisory Committee (USAC) for Scientific Ocean Drilling."

This new identity more closely reflects the committee's function. As you are probably aware, USSAC stood for the "United States Science Advisory Committee." A rather awe-inspiring name if it were actually true. In fact, upon being elected to chair this committee, a series of press releases went out including to my city newspaper, which used this title and a misquotation of me to state that "Filippelli is in charge of about 40% of U.S. science activities." Not only will my neighbors never let me live that down, but misrepresenting our true role to our academic colleagues and co-workers can undermine the work that we actually do.

Changing the group's name to the U.S. Advisory Committee (USAC) for Scientific Ocean Drilling is also in line with its fervent and active acronym decimation policy. An obvious convenience for insiders but an equally obvious way to confuse the wider community, we are working hard to eliminate the ubiquitous use of acronyms, even at USAC meetings. (OK, sometimes acronyms are useful in context.) This is one of several initiatives that we are supporting to make the Integrated Ocean Drilling Program as relevant, as compelling, and as inclusive as possible. USAC strives for a "highly permeable membrane" between those active in scientific ocean drilling and those with interests and potential contributions to the program.

Other efforts to expand participation include significantly enhanced education and outreach activities aimed at groups not currently engaged in scientific ocean drilling, and implementing thematic working groups targeting disciplines like microbial ecology and metagenomics. As part of this effort, Joint Oceanographic Institutions has been establishing a presence, through symposia and exhibits, at national meetings where scientific ocean drilling is less well known (AGU/ASLO/TOS Ocean Sciences Meeting, National Science Teachers Association, American Association for the Advancement of Science). Last but not least, careful consideration has been put into nominating new USAC members with experience beyond scientific ocean drilling.

So, who would have known that so much thought went into losing an "S"? By these and related actions, the U.S. Advisory Committee (USAC) for Scientific Ocean Drilling continues its ongoing efforts to capture the voice of the broader scientific community—meaning you and others who never knew this newsletter or the U.S. Science Support Program for IODP existed.

As always, USAC welcomes your input, and please let us know if you do not hear your voice in our message.

Cheers,

Gabe Filippelli, USSAC Chair

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JOI News

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USSSP Supported Workshops

Tectonics, Circulation, and Climate in the Caribbean Gateway

Dates: March 30 to April 1, 2006
Where: Austin, Texas
Application deadline: January 30, 2006
Co-Conveners: Paul Mann (University of Texas Institute for Geophysics), Larry Peterson (RSMAS, University of Miami), and André Droxler (Rice University)

Since the Cretaceous, the Caribbean Sea has been a critical gateway between major ocean basins in both an east-to-west direction (Atlantic to Pacific connection) and in a north-to-south direction (North Atlantic to South Atlantic connection including the Caribbean and the Loop Currents, and the Gulf Stream). As its complex tectonic history becomes better constrained, we can also more critically evaluate the Caribbean's crucial role as an inter-seaway "valve" that controlled paleoceanography and paleoclimate on a regional and global scale. For example, closure of the Caribbean valve in the late Miocene and early Pliocene between the Atlantic and Pacific, when the Panama arc collided with northwestern South America, is widely recognized to have triggered a major change in interoceanic circulation with climatic effects that included strengthening of northern hemisphere glaciations.

This workshop will discuss and plan potential scientific ocean drilling expeditions in the Caribbean Sea. The principal workshop goals are to formulate key scientific questions, evaluate existing geologic and geophysical data, use these data to identify and prioritize drilling sites, discuss drilling platform options, and begin coordinating subsequent geophysical surveys, proposals, and multi-proxy analyses. Researchers from diverse geoscientific specialties, including chemical and physical oceanography, paleoclimatology, paleomagnetic studies, sedimentology, stratigraphy, structure/tectonics, and thermochronology, are sought; international and student/postdoc applicants are also encouraged to apply. The U.S. Science Support Program will provide limited travel support for U.S.-based scientists.

Interested parties should direct questions and applications (an e-mail with contact information and a brief statement of interest) to Paul Mann (paulm@ig.utexas.edu, tel: 512-471-0452) by January 30, 2006. The number of participants will be limited to optimize workshop goals. Applicants will be notified by February 15, 2006.

Workshop Support Available

Support from JOI's U.S. Science Support Program is available for workshops to generate fresh ideas for advancing the study of earth processes and history through scientific ocean drilling.

USSSP encourages
- broad community involvement
- multidisciplinary approaches
- relevance to IODP's *Initial Science Plan*
- graduate student participation

To discuss ideas, contact
Holly Given,
USSSP Director
hgiven@joiscience.org
(202) 232-3900 x1611

Conveners receiving awards must produce a report summarizing the goals and results of the workshop.

Proposal Deadlines: October 1 and April 1
For more information: www.usssp-iodp.org/workshops