

FALL  
2014

# CORE DISCOVERIES

The Newsletter for  
US Scientific Ocean Drilling

Expedition 348 Sets New Drilling Record *pg. 5*

Rare Samples Help Piece Together the  
Formation of Earth's Marine Crust *pg. 9*

Gerardo "Gerry" Iturrino  
(1962-2014) *pg. 11*

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*On the Cover: Members of the science party for Expedition 351 (Izu-Bonin-Mariana Arc Origins) examine "archive" halves of core samples laid out on the description table. Unlike the "working" halves of the same cores, which provide samples for immediate study, the archive halves are kept intact for reference. (Image by Adam Bogus)*

The International Ocean Discovery Program (IODP) is an international research program dedicated to advancing scientific understanding of the Earth through drilling, coring, and monitoring the seafloor. The US Science Support Program (USSSP) supports the involvement of the US scientific community in IODP and is funded by the US National Science Foundation (NSF). The *JOIDES Resolution* is a scientific research vessel managed by the US Implementing Organization of IODP (USIO). Together, Texas A&M University, Lamont-Doherty Earth Observatory of Columbia University, and the Consortium for Ocean Leadership compose the USIO. IODP is supported by: the US National Science Foundation (NSF); Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT); 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); the Korea Institute of Geoscience and Mineral Resources (KIGAM); and Brazil's Ministry of Education (CAPES). For more information, visit [www.iodp.org](http://www.iodp.org).

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For more information about IODP, visit: [www.iodp.org](http://www.iodp.org)

For more information about USIO and USSSP, visit: [www.oceanleadership.org/programs-and-partnerships/](http://www.oceanleadership.org/programs-and-partnerships/)



## UPCOMING EVENTS/MEETINGS/WORKSHOPS

### IODP Primer Short Course: An Introduction to the Ocean Drilling Programs

December 14, 2014

San Francisco, California

<http://usssp-iodp.org/workshop/iodp-primer-2014/>

### GeoPRISMS Mini-Workshops on New Zealand Primary Sites

December 14, 2014

San Francisco, California

<http://geoprisms.org/meetings/agu-2014-mini-workshop-registration/>

### Oceanic Plate Drilling Workshop: Ridge to Subduction

December 14, 2014

San Francisco, California

[www.jamstec.go.jp/ods/e/topics/ocean\\_p\\_d\\_ws/index.html](http://www.jamstec.go.jp/ods/e/topics/ocean_p_d_ws/index.html)

### American Geophysical Union Fall Meeting

December 15-19, 2014

San Francisco, California

<http://fallmeeting.agu.org/2014/>

### IODP, ICDP, and ANDRILL Town Hall

December 16, 2014, 6:00pm

Plaza Rm A, Hilton Union Square (333 O'Farrell St.)

San Francisco, California

### IODP Science Evaluation Panel

January 12-14, 2015

La Jolla, California

[www.iodp.org/facility-boards](http://www.iodp.org/facility-boards)

### U.S. Advisory Committee for Scientific Ocean Drilling

January 28-30, 2015

Seattle, Washington

<http://usssp-iodp.org/committees/usac/>

### Drilling the Cretaceous-Palaeogene Tropical South Atlantic

February 2-4, 2015

Newcastle, United Kingdom

[www.ecord.org/pdf/South\\_Atantic%20Drilling\\_flyer.pdf](http://www.ecord.org/pdf/South_Atantic%20Drilling_flyer.pdf)

### Workshop for Scientific Drilling in the Indian Ocean Crust and Mantle

May 13-16, 2015

Woods Hole, MA

<http://web.whoi.edu/indian-ocean-drilling/>



## EXPEDITION UPDATES

### *JOIDES Resolution* Sets Out for Back-to-Back Expeditions in the Bay of Bengal

The *JOIDES Resolution* will spend the northern winter in the Bay of Bengal, with two expeditions focused on the climatic and geologic history of the region.

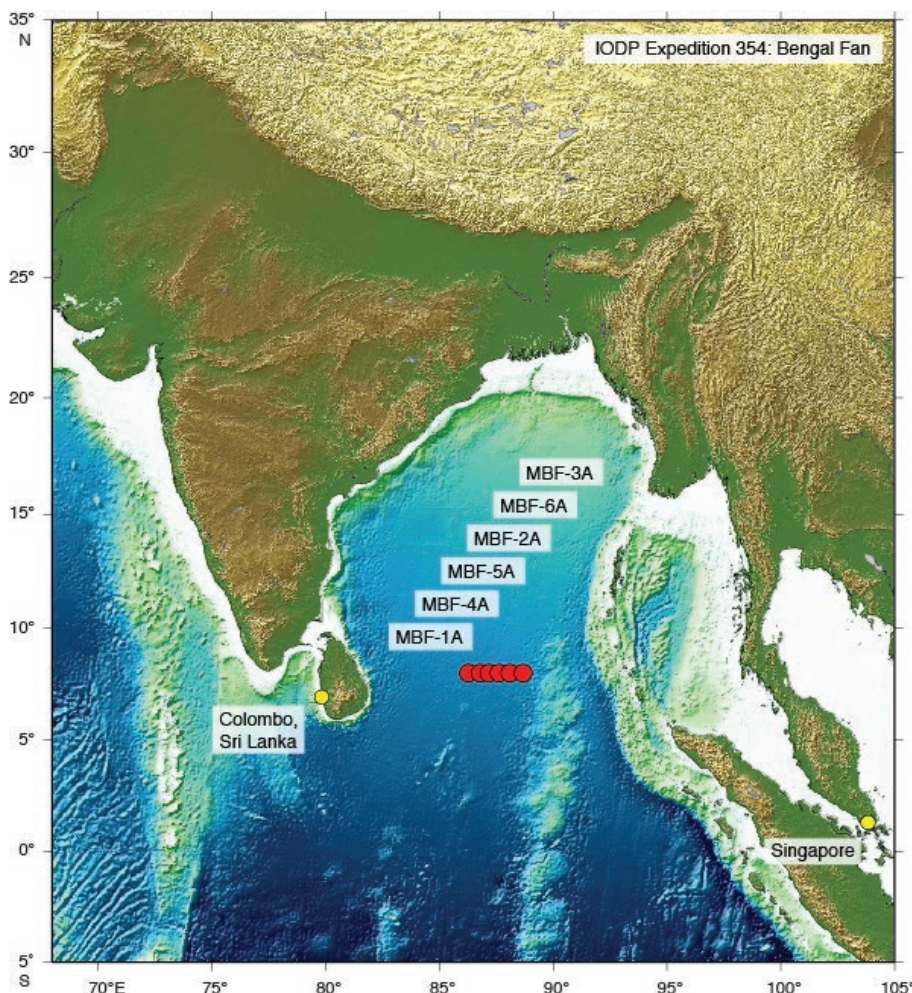
Expedition 353 (Indian Monsoon Rainfall) set sail from Singapore on November 29, 2014. Led by co-chiefs Steven Clemens (Brown University) and Wolfgang Kuhnt (Christian-Albrechts-Universität zu Kiel), the goal of this expedition is to obtain sediment sections from within the core region of Indian monsoon precipitation. Six sites in the Bay of Bengal and Andaman Sea will target Late Cretaceous-Holocene sediments to better understand the physical and climatological mechanisms underlying changes in monsoonal precipitation, erosion, and run-off across multiple time scales.

The scientific objectives are: 1) to establish the sensitivity and timing of changes in monsoon circulation relative to external insolation forcing and internal boundary conditions including the export of latent heat from the southern hemisphere, the extent of global ice volume, and greenhouse gas concentrations; 2) to understand the timing and conditions under which monsoonal circulation initiated and evolved; 3) to determine the extent to which Indian and East Asian monsoon winds and precipitation are coupled and at what temporal and geographic scales; and 4) to better deconvolve the effects of tectonics and climate change on erosion and runoff.

After a brief port call in Singapore, Expedition 354 (Bengal Fan) will begin on January 29, 2014. Led by co-chiefs Christian France-Lanord (Centre National de la Recherche Scientifique) and Volkhart Spiess (University of Bremen), the team will drill a transect of sites across the middle Bengal Fan to obtain a Neogene and late Paleogene record of Himalayan mountain building and climate. The objectives are to investigate interactions among the growth of the Himalaya and Tibet, the development of the Asian monsoon, and processes affecting the carbon cycle and global climate.

One deep penetration site aims to document the early stages of Himalayan erosion, the India-Eurasia collision, and the development of the Himalaya and Tibet. The transect will constrain the Neogene development of the Asian monsoon, its impact on sediment supply and flux, and allow quantitative studies of the interrelations of climate change and sediment accumulation. Sediments obtained will document: 1) uplift history through erosional flux and deposition patterns and detailed geochronology of minerals; 2) Himalayan evolution from isotopic tracing of particle origin and age; and 3) environmental and climate conditions through sediment granulometry, mineralogy and geochemistry, organic matter composition and oxygen isotopes of microfossils.

Education and Outreach Officers will join both of these expeditions, providing daily updates through Facebook, Twitter, and the blog page at [www.joidesresolution.org](http://www.joidesresolution.org), while coordinating a busy schedule of live Ship-to-Shore conversations. For more information on Education and Outreach opportunities, please contact Sharon Cooper: [scooper@oceanleadership.org](mailto:scooper@oceanleadership.org).



# SCIENTIFIC DRILLING OPPORTUNITIES DURING TRANSITS

**Gail Christeson, Brandi Kiel Reese, Damon Teagle, Debbie Thomas**

Steering Committee, Transect Drilling During Transits Workshop

The *JOIDES Resolution* Facility Board (JRFB) has announced a long-term, global circumnavigation plan that will take the ship to regions that have encountered little recent drilling activity. We propose that the community exploits transits of the southern oceans to take advantage of this opportunity. Specific targets should be geographic locations or time periods that can fill gaps in existing observations, such as high-sedimentation-rate samples of key times in Earth's climate history, known changes in ocean chemistry or magnetic field, the 15 to 110 Ma gap in ocean crust cores, or virtually unexplored microbial provinces.

Hypotheses that drive the drilling program require numerous drill sites worldwide, and no single two-month expedition can achieve this. However, individual strategically planned holes drilled during transits can have a transformative impact on our understanding of multiple Science Plan Challenges, and may ultimately build transects across the ocean basins. Preferably, each hole would serve multi-disciplinary goals by piston coring sediments, drilling basement until bit destruction, and developing a curation protocol for dedicated microbiological sampling.

Flexibility will be essential for transit drilling to succeed. Many important drilling targets, which could simultaneously address high-priority questions within each of the major drilling themes, will require time commitments that fall between the traditional 3-day APL and a full 56-day expedition. We encourage the community to take advantage of the new proposal guidelines allowing investigators to submit a proposal for operational time of a few weeks; individual transit drilling efforts can be combined to form geographic transects.

Multidisciplinary objectives will require innovative staffing solutions. Modern seismic reflection data may be sparse in some regions, especially in the southern oceans, and will require flexibility in evaluating site characterization data. However, with careful planning, the drilling community can opportunistically tackle key targets when ship tracks allow, leading to essential progress toward longstanding scientific ocean drilling goals.





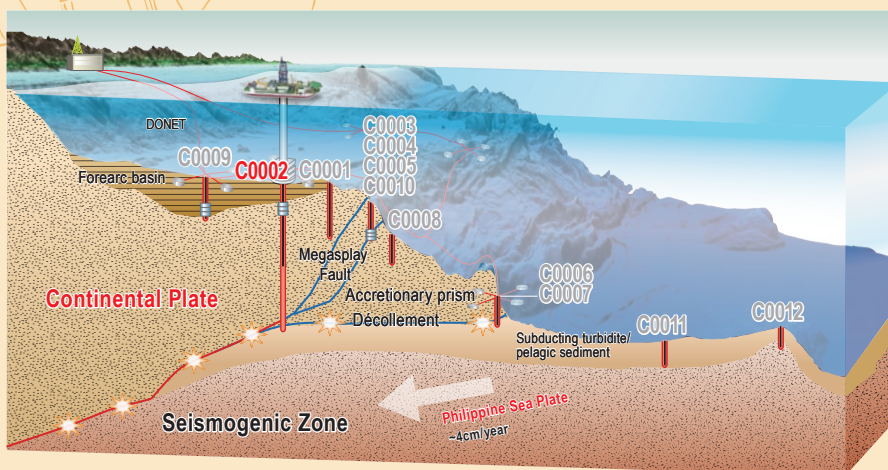
# DRILL BITS

## Three Brazilian Workshops Target Southern Atlantic

With the *JOIDES Resolution* set to sail around the tip of South America in the coming years, the international ocean drilling community has been busy planning expeditions for the Southern Atlantic Ocean. Brazil, one of IODP's newest member countries, recently hosted three workshops focused on the region. The workshops explored the biotic evolution of the Amazon and the origins of the transcontinental Amazon River and Amazon Fan; the Rio Grande Rise and other large igneous provinces; and the paleoceanography of the Brazilian equatorial margin. Reports for two of these workshops are available on the US Science Support Program's website ([www.iodp-usssp.org](http://www.iodp-usssp.org)); the final will be available as soon as it is released.

## Expedition 348 Sets New Drilling Record

Completed this past winter, Expedition 348 is the most recent expedition of NanTroSEIZE (Nankai Trough Seismogenic Zone Experiment), a complex ocean drilling project that is sampling and instrumenting one of the planet's most active earthquake zones. The expedition reached a depth of 3058.5 meters below the seafloor – setting a new world record for depth in scientific ocean drilling. In the process, the team obtained the first data and samples ever collected from an accretionary prism. Read more about NanTroSEIZE at [www.jamstec.go.jp/chikyu/nantroseize/e/index.html](http://www.jamstec.go.jp/chikyu/nantroseize/e/index.html)



## 2014-15 Schlanger Scientific Ocean Drilling Fellows Announced

The US Science Support Program is pleased to announce the 2014-2015 Schlanger Ocean Drilling Fellows. Each year, the program awards \$30,000 stipends to several outstanding graduate students conducting IODP-related research. The 2014-2015 Fellows are:

**Michelle Drake**, University of California, Santa Cruz

**Alan Foreman**, University of California, San Diego

**Dalton Hardisty**, University of California, Riverside

**Justine Sauvage**, University of Rhode Island

**Xingchen (Tony) Wang**, Princeton University

Fellows may use the award to cover the cost of tuition, research expenses, and travel to field expeditions and/or scientific meetings. For more information, visit <http://usssp-iodp.org/research/schlanger-fellowships/current/>



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.

## Core Repositories

The International Ocean Discovery Program (IODP) maintains three main core repositories: the Bremen Core Repository (BCR) in Germany, the Gulf Coast Repository (GCR) in Texas, and the Kochi Core Center (KCC) in Japan. The GCR, located on the Texas A&M University campus in College Station, holds cores from the Pacific Ocean, the Caribbean Sea and Gulf of Mexico, and the Southern Ocean.

The GCR alone houses roughly 130 kilometers of core under refrigeration at 4°C. The sediment cores date from the present back 170 million years, making the collection a rich geological library available to examine and sample. In addition, the GCR stores collections of thin-sections, smear slides, and residue. The repository is currently producing high-resolution images of all its thin-sections. These can be accessed at <https://rosetta.iodp.tamu.edu/>.

Microbiology is becoming an increasingly important facet of IODP’s explorations. The GCR houses a collection of microbiological samples at -80°C. Lists of these samples can be found at <http://iodp.tamu.edu/curation/samples.html>. The GCR also houses the San Andreas Fault Observatory



at Depth (SAFOD) Core Collection. This collection can be sampled and analyzed according to the Earthscope Data Policy; for more information follow this link: <http://earthscope.org/science/observatories/safod/>

The main function of the GCR is to provide services to the international scientific community. Geoscientists of all disciplines are welcome to schedule a visit to the GCR to study or sample core, or to request samples to be taken and shipped by GCR staff. Visitors have access to six computerized sampling stations, photographic equipment, and a microscope lab. Scientists may obtain samples by submitting a request here: <http://iodp.tamu.edu/curation/samples.html>

Another function of the GCR is to host tours and promote the educational use of cores and data. The repository maintains close links with the Texas A&M College of Geosciences and provides instruction for several geology courses each year. Additionally, nearly 800 high school students, middle school students, and other interested groups tour the repository every year.





## COMMUNITY SPOTLIGHT

### GABE FILIPPELLI

Creative, interdisciplinary thinking is a way of life for Gabe Filippelli (Indiana University-Purdue University Indianapolis). While many of his IODP peers focus on specific niches, Filippelli has forged a dynamic career by collaborating with soil scientists, urban health researchers, and foreign policy experts, to name a few. Although he recognizes some tradeoffs, Filippelli wouldn't have it any other way.

"I tell my students to develop a core competency, to be really good at something," Filippelli explains. "Mine is general-purpose geochemistry. People like me will never win a medal from the National Academies; those go to people who focus on one thing and nail it. But there are so many rewards to being diverse."

Filippelli recalls one key example. An expert in marine biogeochemical cycling, he knows that older marine sediments often become depleted in key nutrients. To his surprise, nobody had yet applied the same analyses to terrestrial soils and lake sediments. Doing so has yielded some critical discoveries, including further insight into why older islands in volcanic arcs (e.g. Hawaii) become depleted of nutrients relative to their younger siblings.

He has also used geochemical techniques to study toxins in the urban environment, helping to track how lead and mercury find their way into peoples' homes and food supplies. This work was originally inspired by a Master's student with a keen interest in the topic, and has since taken off in a big way.

"It's amazing how much students can inspire and inform their professors," Filippelli notes, "If the professor listens to and works with them."

Filippelli recently shared his expertise with the US State Department as a Jefferson Science Fellow, working primarily on marine resource issues in Namibia and South Africa. Although the yearlong residence phase concluded in mid-August 2014, he will continue advising periodically for the next five years.

## LETTER FROM THE NSF

Dear Colleagues,

The International Ocean Discovery Program is in full swing. The Science Support Office at Scripps is up and running, the Facility Boards are planning operations, the new Science Evaluation Panel and the IODP Forum have held their first meetings, and the *JOIDES Resolution* has completed four exciting expeditions this year. The transition to the new IODP has been successful thanks to the hard work of community scientists, the platform operators, and the funding agencies.

On the NSF front, the new Cooperative Agreement with Texas A&M University as the *JOIDES Resolution* Science Operator (JRSO) is in effect as of October 1. In addition, the current U.S. Science Support Program is in the final year of its Cooperative Agreement, and NSF convened a panel in September to review proposals for the next phase. A decision is expected very soon.

The NSF-ODP team has moved from the OCE Marine Geoscience Section into the OCE Integrative Programs Section. This move signals a more facility-centered approach to managing the *JOIDES Resolution*, allowing us to work more closely with other OCE large facility Program Officers to ensure safe, effective and efficient vessel operations. This move also will have some ramifications regarding funding pathways for US researchers. Grant support from NSF-ODP will now focus on moratorium-based awards that increase the scientific value of – and facilitate further research on – expedition cores and data. See the new NSF-ODP description (PD 14-5720) at [nsf.gov](http://nsf.gov) or call one of us for more details.

Finally, we are greatly saddened by the untimely passing of Gerry Iturrino. Gerry worked for 18 years as a research scientist at Lamont-Doherty Earth Observatory. He sailed many times aboard the *JOIDES Resolution* and played an important role in the modernization of the ship. Gerry's enthusiasm for ocean drilling – and for life – was very infectious. He will be missed by all whose lives he touched.

Sincerely,

The NSF-ODP Team

James Allan and Thomas Janecsek

## EDUCATION NEWS

### ‘School of Rock’ Arrives in France

Fifty European teachers attended an education workshop organized by IODP France on April 9-11, 2014, at the International School Valbonne Sophia Antipolis, called “Understanding Earth with Ocean Cores.” Modeled after the IODP-US School of Rock program, the workshop provided opportunities to learn about IODP expeditions directly from researchers, as well as practical hands-on sessions with former education officers. The event helped teachers gain a better understanding of the IODP program, and began building a new European teacher network for IODP/ECORD.



Special thanks to former European Education Officers Jean-Luc Berenguer (France, Exp 345), Susan Gebbels (UK, Exp 345), and Helder Pereira (Portugal, Exp 339), who helped organize and deliver the workshop. For more about the program and participants, please visit: <https://geoazur.oca.eu/spip.php?article1390>

### A Big Summer for US School of Rock Workshops

IODP-US Education held two School of Rock workshops this summer. The first, held in mid-June at Indiana University of Pennsylvania, focused on undergraduate educators and featured a finale event at the Carnegie Science Center in Pittsburgh June 15. The second was held in mid-August at the University of Delaware in Lewes, and focused primarily on District of Columbia Public Schools teachers working to implement Next Generation Science Standards. Both programs featured instruction from program scientists, hands-on labs, and methods to integrate IODP resources into lesson plans. To learn more about School of Rock, visit: <http://joidesresolution.org/node/3298>



### JOIDES Resolution “Visits” Long Beach, CA

The *JOIDES Resolution* (virtually) sailed into the Aquarium of the Pacific in Long Beach, CA on Sept. 6 for a day of hands-on activities, including a children’s book reading and a live chat with scientists on the ship, then underway on Expedition 352 (IBM Forearc). A team of 12 volunteer scientists and educators – all of whom had previously sailed or participated in a School of Rock workshop – made the event a great success.



# RESEARCH HIGHLIGHT

## Rare Samples Help Piece Together the Formation of Earth's Marine Crust

### Study highlights geology of young rock at fast-spreading mid-ocean ridges

How exactly does molten rock from the Earth's mantle form new ocean crust in the deep sea? This has long been one of the great puzzles in geochemistry and geophysics. Now, a team of researchers has studied the first significant sample of primitive rock from deep within the crust, retrieved last year on board the *JOIDES Resolution*. The data is providing some critical answers to some basic questions.

Expedition 345 (Hess Deep Plutonic Crust), co-led by Kathryn Gillis (University of Victoria, Canada) and Jonathan Snow (University of Houston), recovered the first continuous core section of rock formed nearly two and a half miles beneath the surface of the crust – mostly layered gabbros. The cores come from Hess Deep, a large rift valley in the eastern equatorial Pacific. Like an onion sliced and pulled apart, revealing its deeper layers, Hess Deep is perhaps the best place in the world to study these young crustal rocks.



This rock - an olivine gabbro - hosts clinopyroxene oikocrysts (large yellow minerals). The textures and contrasting grain sizes of the minerals reveal much about the crystallization history of the rock and how melt migrates through the lower crust, evolving to form the magma that eventually erupts onto the seafloor. A striking feature of this image is how the free plagioclase grains (elongate, grayish minerals) are aligned and wrap around the clinopyroxene oikocrysts, while the plagioclase grains within the oikocrysts show no preferential orientation. This shows that the lower crust deforms due to tectonic forces while it is being constructed. (Width of photo = 4.2 cm; Image courtesy Kathryn Gillis)

In most places, gabbros are buried beneath a thick layer of sediment and other rocks, making them nearly impossible to access. Until now, one of the best opportunities to study gabbro was in ophiolites – sections of ocean crust that had been lifted up on land. However, it is difficult to track the origin of ophiolites, making it hard to draw conclusions about the formation of ocean crust in today's Earth.

Hess Deep Rift is located about 600 miles west of the Galapagos Islands, and is the best location in the world to observe the geology of the deep seafloor formed at a fast-spreading ridge. The crust exposed at Hess Deep formed at the East Pacific Rise about 1.2 million years ago. The expedition proved technically challenging, requiring the crew and engineers on board the *JOIDES Resolution* to drill in nearly 3 miles of water into nearly bare rock, with no sediment to keep the drill bit in place.

The effort definitely paid off: Expedition 345 was the first to recover a significant section of primitive, layered oceanic gabbros. These layers, evidenced by differing shades of grey, are defined by changes in the mineralogy and/or texture of the rock.

These layered gabbros were one of the last remaining missing rock types found in oceanic crust. This allowed the team to construct the first composite bulk composition of fast-spreading ocean crust. This information will help future efforts to determine the role that layered gabbros play in building the crust – and in broader global geochemical cycles.

Unexpectedly, the team discovered the mineral orthopyroxene as an early crystallizing phase in these rocks. This is very rare in primitive gabbro, and suggests that some of the melts that migrate from the mantle into the lowermost part of the ocean crust can vary in composition. This is surprising, because when melt erupts onto the seafloor as lava, it has a uniform composition. This suggests that, somewhere along the way, the melts mix thoroughly in the lower crust before they exit as lava.

## LETTER FROM THE USAC CHAIR



Dear Colleagues,

The International Ocean Discovery Program now has a full year under its belt, and just completed a very productive series of expeditions under challenging drilling conditions in the Izu-Bonin-Mariana arc. Results from these expeditions will make it possible to refine our current understanding of subduction initiation and evolution in the western Pacific. After a short tie-up for maintenance this fall, the *JOIDES Resolution* will turn toward expeditions in the Indian Ocean and the Arabian Sea. I am pleased to see a strong community response to participate on these expeditions, especially from students and early career researchers.

Looking further ahead, the regional model for operating the *JOIDES Resolution* requires us to identify compelling scientific targets to guide the future track of the ship toward the southern and central Atlantic Ocean. A notable goal during this process is to maximize the science that can be accomplished during transits by drilling compelling targets en route. These expeditions would fall outside of the “standard” two-month operational mode; I encourage you to read the workshop report on page 4 to learn more about this approach. When formulating proposal ideas for transits, consider drilling targets that may only require a few sites or holes, or that may require samples from a geographically distributed suite of sites. Such transit-based proposals will greatly aid the community in long-term planning for the *JOIDES Resolution*, and can help ensure that your own science goals will be addressed with this platform.

Please feel free to contact me with questions about submitting proposals and the long-term ship track.

All the best,

**John Jaeger**

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

## USAC MEMBERS

**John Jaeger (Chair)**

University of Florida

**Hugh Daigle**

University of Texas at Austin

**Liviu Giosan**

Woods Hole Oceanographic Institution

**Matt Hornbach**

Southern Methodist University

**Barbara John**

University of Wyoming

**Lawrence Kressek**

Ohio State University

**Beth Orcutt**

Bigelow Laboratory for Ocean Sciences

**Sandra Passchier**

Montclair State University

**Peter Sak**

Dickinson College

**Amelia Shevenell**

University of South Florida

**Evan Solomon**

University of Washington

**Joseph Stoner**

Oregon State University







In Memoriam:

## Gerardo “Gerry” Iturrino (1962-2014)

This year, the IODP community lost an accomplished scientist, technological innovator, and dear friend to many. Gerardo “Gerry” Iturrino passed away unexpectedly on March 12, 2014. To commemorate his life and scientific legacy, *Core Discoveries* asked some of his friends and colleagues to share their fondest memories.

### Greg Myers, (formerly) Consortium for Ocean Leadership:

“Gerry was a dear friend who has left a permanent impact on my personal and professional life. For those who knew Gerry, he was more than a colleague; you felt he was a family member. He was an accomplished scientist first, and later, a seasoned developer of technology. He had a propensity for being involved in projects that were very challenging, expensive, and had a low probability of success, yet he persevered. Gerry was passionate about many things, but at the top of his list was his family. I and many others will remember him as a special human being who took on impossible tasks, yet always remained dedicated to what was most important: his family.”

### Carl Brenner, Lamont-Doherty Earth Observatory:

“Gerry was both a colleague and a close friend. I will always remember his conscientiousness and his generosity. He was an enthusiastic and outgoing worker - someone you could always count on to take care of the things he said he would handle. He was also a loyal and generous friend, and an incredibly diligent father. In addition, he really seemed animated by the desire to be inclusive - to reach out to people who might not be part of a conversation or social circle and pull them in.”

### Dave Goldberg, Lamont-Doherty Earth Observatory:

“Many mornings, while chatting with Gerry in his office, I would fiddle with one or another of the bits and pieces that he had around... shards of broken instruments, a new connector that was never replaced, cut-off lengths of cable, a compressed styrofoam cup with “1996 - 2400m - NE Pacific” written on it. All sorts of keepsakes, every one a memento of Gerry’s challenges and victories at sea, and simple daily displays of his love and care for the drilling program.”

### Henry Dick, Woods Hole Oceanographic Institution:

“Gerry Iturrino was still a graduate student at Duke University when he sailed with me on ODP Leg 118 in 1987. He was incredibly cheerful, proficient, and a wonderful shipmate - as he was every other time I sailed with him. In our travails, his infectious laugh and wonderful smile sustained us. What is noteworthy is Gerry’s remarkable contribution to our understanding of the lower ocean crust. He was there from nearly the beginning, as a principal player in developing a real understanding of the ocean crust and mantle that was quite different from what we all learned in the textbooks. We owe him a great debt for his contributions - scientifically and personally - to one of the greatest scientific endeavors ever.”



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Washington, DC 20005

INDICIA

## FSC INFO

## IODP Expedition Schedule

Expedition	#	Port of Origin	Dates
<b>JOIDES Resolution</b>			
Indian Monsoon	353	Singapore	29 Nov. 2014 – 29 Jan. 2015
Bengal Fan	354	Singapore	29 Jan. – 31 Mar. 2015
Arabian Sea Monsoon	355	Colombo, Sri Lanka	31 Mar. – 31 May 2015
Indonesian Throughflow	356	Fremantle, Australia	31 July – 30 Sept. 2015
*Maldives Monsoon	359	Darwin, Australia	30 Sept. – 30 Nov. 2015
*Indian Ridge Moho	360	Colombo, Sri Lanka	30 Nov. 2015 – 30 Jan. 2016
*Southern African Climates	361	Port Louis, Mauritius	30 Jan. – 31 Mar. 2016
*Sumatra Seismogenic Zone	362	Colombo, Sri Lanka	31 July – 30 Sept. 2016
*Western Pacific Warm Pool	363	Singapore	30 Sept. – 30 Nov. 2016
<b>Mission-Specific Platforms</b>			
Atlantis Massif Seafloor Processes	357	TBD	Oct/Nov 2015
*Chicxulub K-T Impact Crater	364	TBD	2016
*Antarctic Cenozoic Paleoclimate	TBD	TBD	2017

*\*These expeditions are approved, subject to availability of funds*

*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.*