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IODP Planning Status

contributed by John Farrell

Summer's here, but where are we in the planning process for the Integrated Ocean Drilling Program (IODP), the successor to the Ocean Drilling Program (ODP)? This article provides you with a lot of background information, a snapshot (as of early July) of the status of the planning efforts, and a dollop of opinion. The piece is divided into four main parts: (a) international planning; (b) national planning; (c) status of the current ODP management entities; and (d) a call to action.

In short, I think most would agree that significant progress has been made on many aspects of IODP planning over the past year. The next 12 to 18 months promise to be even more interesting, as several major decisions are made. ODP phase-out planning is moving ahead, and many people, ranging from funding agency planners to front-line research scientists, are optimistic about IODP. So, keep your fingers crossed (despite the fact that we're scientists) and continue to participate as we create the future together.

International Planning

What's IODP?

IODP will be an international program of scientific research that uses multiple platforms, in an integrated fashion, to drill, core, and log in oceanic settings to investigate a wide range of earth system processes. The Program, which builds upon the 35-year legacy of accomplishments by the Deep Sea Drilling Project and the ODP, is slated to begin less than 15 months from now, on October 1, 2003 (just after ODP scientific operations conclude with Leg 210). The initial phase of IODP is proposed to extend 10 years, to September 30, 2013. When fully operational in 2008 (i.e., all anticipated vessels are in use), IODP will be a significantly larger program than its precursors, with an annual operating budget of approximately $160M, three times that of the ODP. See www.iodp.org for more information.

Who's Planning?

An International Working Group (IWG) of government funding agency representatives is developing the IODP based on the advice of many, including the IODP Planning Sub-Committee (IPSC) (www.iodp.org/ipsc). The IWG membership and terms of reference are available at www.iodp.org. Co-chairs from the US National Science Foundation (NSF) and Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT), currently Margaret Leinen and Daisuke Yoshida, lead the IWG, which has met 11 times since 1997. NSF and MEXT have assumed "lead agency" status for IODP, which means that the US and Japan will have equal membership rights and responsibilities, contribute core capabilities (e.g., the drilling platforms described below), determine total program costs, and contribute equally to them, as defined in a memorandum. Other IODP member countries will have the rights, privileges and financial commitments defined in a similar memorandum, and in accordance with international law, as well as international obligations, national laws and so on. The IWG Support Office (www.iodp.org/iwgso/iwg_sup.html), located at Joint Oceanographic Institutions, Inc. (JOI), and staffed by representatives from JOI and the Japanese Marine and Science Technology Center (JAMSTEC), provides administrative support to the IWG.

What's the Science?

The IODP will be based on the science presented in the *Initial Science Plan for the IODP, Earth, Ocean and Life* written by you, members of the international scientific community. The research themes emphasized in this plan include the deep biosphere and the sub-seafloor ocean, processes and effects of environmental change, and solid earth cycles and geodynamics. The plan, available from www.iodp.org, outlines priority areas for investigation. However, the specific subjects to be investigated will be defined through proposals submitted by the international scientific community. As described below, the office that supports the interim IODP science advisory structure has already received 85 such drilling proposals.

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Inside

What's the foundation?

The IWG has developed governing principles (at www.iodp.org), which describe IODP membership, the program itself, drilling platforms, implementation, and the management structure. The principles have been codified into two fundamental and overarching memoranda that will serve as the basis for the IODP. The first, between lead agencies, currently Japan and the US, defines the IODP in terms of purpose, commitment, scientific planning, operational framework, program costs and funding, participation in scientific activities and operations, an oversight council, data, information, and intellectual property rights, and administrative provisions. The second memorandum is between the lead agencies and other organizations/countries, dubbed "regular members."

A mature draft of the lead agency memorandum was presented at the IWG meeting in Stockholm (June 5-6), and hopes are that after further refinement, the memorandum will be inked in early 2003. That signing can be considered the official inauguration of the IODP as a program, although it won't officially start until October. The importance of this Japan-US agreement cannot be overstated; it's the foundation of the international collaboration, and it will define the character and culture of the program. The first public draft of the second memorandum was also presented and discussed at the IWG meeting.

As in ODP, the IODP will consist of various entities, including: (a) sponsors (government funding agencies, or their representatives); (b) an international Science Advisory Structure, analogous to JOIDES, and composed of volunteer scientists and engineers; and (c) a management structure involving several contractors with tiers of subcontractors, platform operators, and others. Details are below.

Multiple platforms?

You bet. The core assets of IODP will be a non-riser vessel provided by the US, on a lease basis, with capabilities similar to the ODP's *JOIDES Resolution*, and a riser vessel (*"Chikyu,"* meaning Earth), owned and operated by Japan. These countries will have legal and financial responsibility (including mobilization and demobilization costs) for their respective vessels. Collectively, and in an attempt to accomplish all the science identified in the *IODP Initial Science Plan*, the Europeans have expressed their desire to bring mission-specific platforms (MSP) to the program, capable of operating in ocean regions where the riser and non-riser vessels cannot. Such vessels or platforms would likely include those that can operate in the ice-covered Arctic and in shallow water depths (roughly less than 30 m). As indicated in the IODP principle on platforms, financial support for the operation of MSPs will become the responsibility of the sponsoring IODP members.

Fig. 1: On January 18, 2002, the hull of the Japanese riser-equipped drillship, the *Chikyu*, was launched in Tamano City, Okayama Prefecture, Japan. The ceremony was attended by over 3,000 people, including the International Working Group for IODP (IWG). Her Imperial Highness, Princess Sayako, performed the launching ceremony.

Chikyu

On January 18, 2002, Her Imperial Highness, Princess Sayako of Japan launched the hull of the *Chikyu* with much celebration and fanfare in the Tamano shipbuilding yard of Mitsui Engineering & Shipbuilding Co., in Okayama Prefecture. Over 3000 people attended the ceremony that was held only 268 days after the initial laying of the keel. See details, including a QuickTime movie at www.jamstec.go.jp/jamstec-e/odinfo/index.html. Outfitting of accommodations, laboratories, and other components is now underway in Tamano. Some lab equipment for measuring and analyzing cores, such as CT scanners, will be installed this fall. Tests of the vessel's dynamic positioning system will be completed at the end of this year off Shikoku, By March 2003, *Chikyu* will move to the Mitsubishi Heavy Industries, Ltd. shipyard in Nagasaki for installation of the drilling system, derrick, and the blowout preventer. Ship construction should be completed by April 2005. Sea trials, shakedown, and other tests will then be conducted. Current expectations are that the 57,000 ton vessel, 210 m long, and 38 m wide, will be ready for the international drilling community's use by late 2007 or early 2008. When finally completed, *Chikyu* will support a crew of 150 and will be capable of drilling 7 km below the seafloor in water depths of 4 km, sufficient to reach the mantle. The drilling of each riser site is expected to require roughly 4 to 6 months (and you thought a 2-month tour on the *JR* was long!).

Non-riser vessel

The NSF has assembled an in-house "acquisition team" to develop a request for proposals (RFP), planned to be released in late 2002, to provide a non-riser vessel as the US contribution to IODP. John Walter, of NOAA, is part of this team as a visiting scientist/engineer. He has experience with government contracting and ship acquisition. In developing the RFP, the NSF will consider the recommendations from the Conceptual Design Committee, a subcommittee of the US Science Advisory Committee (USSAC). NSF intends to make a non-riser vessel available to IODP in early 2005. Obviously, much will occur in the two years spanning the release of RFP release and vessel deployment. NSF will select a successful bidder, an implementing organization, to operate the vessel. Most anticipate that an existing vessel will be identified and refit, rather than newly built.

Follow the money

There will be three general categories of expenditures for IODP: capital outlays, annual operating expenses, and national (domestic) expenditures. Strictly speaking, the last is ex-

ternal to IODP, but is essential, nonetheless, for these funds will be used to support participation of scientists from each member country in the international IODP.

Capital Expenditures

Capital expenditures for the IODP include the cost of constructing and outfitting the *Chikyu*, and refitting a non-riser vessel; no such expenditures have been identified for the MSPs. *Chikyu* construction will cost on the order of 60 billion yen, which equals about $540M at current exchange rates. Public statements by NSF officials have indicated that up-front capitalization of the non-riser refit will not likely exceed $90M, and may be significantly less.

Operating Expenses

Current estimates of the annual operating budgets of the IODP are presented in Table 1. These costs mirror the multi-year implementation of IODP, as platforms enter the program. For comparison, the annual operating budget of ODP in US fiscal year 2002 is $46.2M.

POCs and SOCs

In simple terms, the total operating expenses of IODP will be divided into two categories, platform operating costs (POCs) and science operating costs (SOCs), as defined in the principles. POCs support the basic operation of the drilling vessel or platform. For example, in ODP, the POCs would primarily consist of the funds provided to the *JOIDES Resolution* operator (Overseas Drilling Limited). This year, those funds total $24.9M, which is about 54% of the program's total cost. Annual POCs are estimated to be $30M for the non-riser vessel, $58M for the *Chikyu*, and $10M for MSPs.

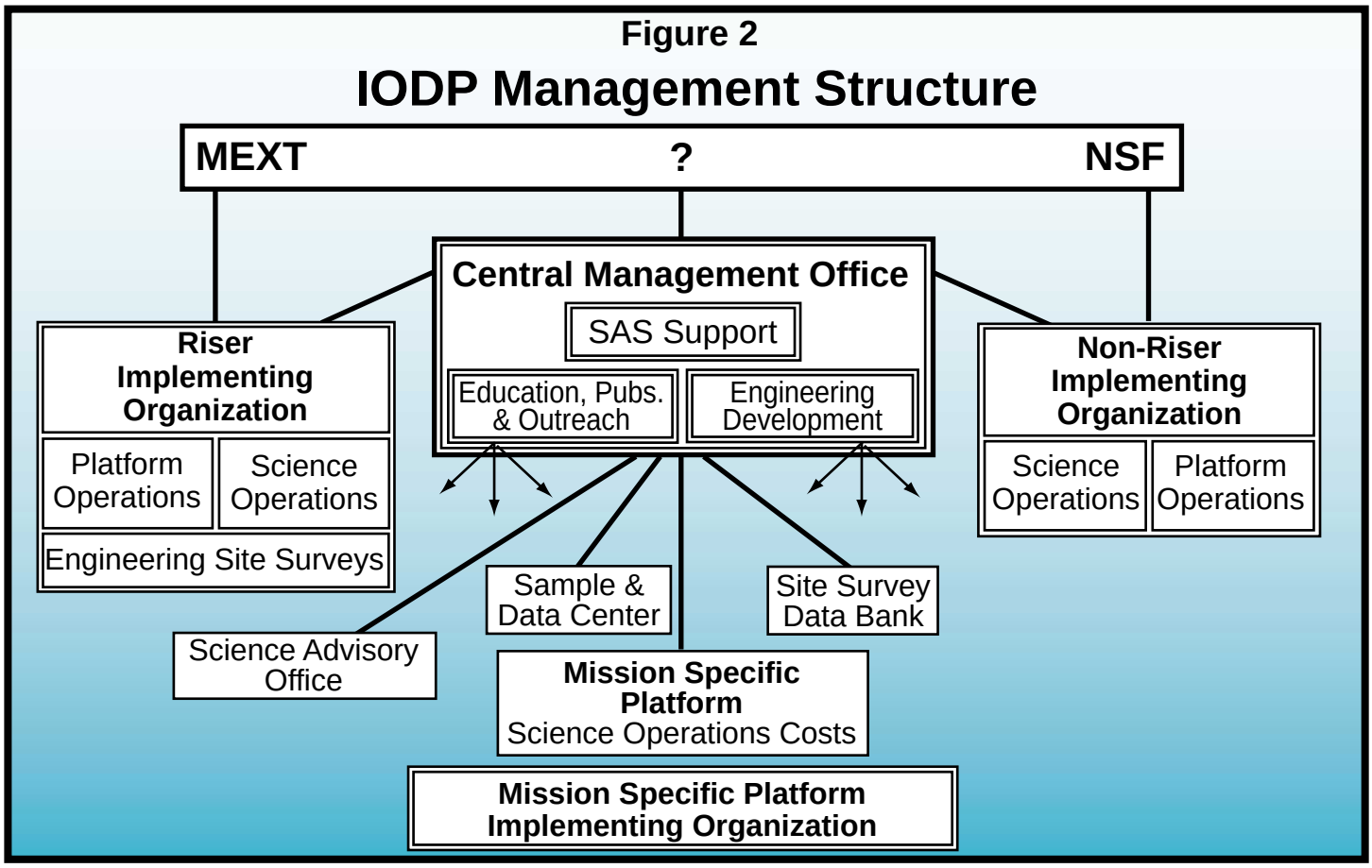
According to the IODP principles, "SOCs will provide for those activities onboard program platforms necessary to the proper conduct of the scientific research program and those shore-based activities required to properly maintain and distribute samples and data, support seagoing activities, and administer and manage the program." Examples of SOCs include technical services, computer capability, data storage and distribution, core curation, logging, engineering and tool development, publications, and so on. The current level of SOCs has been determined by the lead agencies and is reported in Table 1.

Why is there a need for this Dr. Seuss-like differentiation into POCs and SOCs, which wasn't so apparent in ODP? In ODP, NSF served as the banker by collecting and commingled the financial contributions from all member countries and providing them to JOI as the prime contractor. In IODP, only the SOCs will be commingled. Financial contributions by IODP members that are not lead agencies will be used only for SOCs. Japan will directly pay the POCs for the *Chikyu* to the Japanese operator, and in harmonious balance, NSF will similarly pay a US entity, yet to be determined, to operate the non-riser vessel. Ditto for Europe, if they contribute MSPs. In IODP, NSF will again serve as the banker, but this time they will collect and commingle SOCs funds from members and, through a contract, allocate them to a US-incorporated legal entity that establishes a Central Management Office (CMO) to disperse these funds.

One of the more intriguing developments that will occur over the next 6 to 15 months will be the creation of the CMO. From recent discussions, it appears that a CMO will be established through some yet-to-be-decided sole-source arrangement, rather than through a competitive process. If so, it will be interesting to see the extent to which the CMO entity is authorized to independently determine the distribution of SOCs on a competitive basis. The alternative is that the lead agencies may proscribe the SOC distribution to the riser and non-riser implementing organizations (IOs). For example, will provision of technical services be independently assigned to each IO, or might they be awarded to others (i.e., third parties), perhaps a centralized service provider, determined through a competitive process? What about publications, scientific logging, information services, core curation, engineering development, and other services/functions? It's clear that in many of these cases, there are platform-specific components to be considered, but to what extent will these services be integrated, across platforms as opposed to decentralized into two or three separate, yet necessarily related providers for each service? The IODP Planning Sub-Committee (IPSC) strongly recommended commingling of funds at the highest possible level, and true integration of program elements

TABLE 1: IODP COSTS IN $M

US fiscal year	MSP POCs	Non-riser POCs	Riser POCs	MSP SOCs	Non-riser SOCs	Riser SOCs	CMO SOCs	TOTAL	Platforms in Use
2004	$10	$0	$0	$2.5	$5	$6	$7	$30.5	MSP
2005	$10	$30	$0	$3.5	$15.5	$8	$12	$79	MSP, NR
2006	$10	$30	$0	$3.5	$15.5	$8	$12	$79	MSP, NR
2007	$10	$30	$0	$3.5	$15.5	$8	$12	$79	MSP, NR
2008	$10	$30	$58	$4.5	$18	$23	$16.8	$160.3	MSP, NR, R



and services. Though such integration may be challenging to achieve, IPSC recommended that it would be essential in creating a strong and cohesive international program.

National Expenses

The final expense, is that borne by individual nations to support the participation of their scientists in the international IODP. Traditionally, these expenses cover the cost of activities such as national support programs, regional geophysical studies and site surveys in support of drilling proposal development, and post-cruise research efforts.

Membership has its privileges (and its price)

In ODP, the annual fee for each full member is $3M US, with the NSF contributing the remainder of the annual operating expenses. The recently created associate membership status enables others to pay less, but receive less accordingly. The basic fee for membership in IODP will be an "IODP participation unit," which is defined as the total cost of the annual operating expenses divided by a number that is divisible by three (in practice probably 21, 24, or 27), thus, ideally, enabling the US and Japan to each acquire a third of the units, leaving the final third for the European countries, Canada, Australia, China, and others. For each participation unit, a member is entitled to one representative on each panel or committee of the science advisory structure, and two scientific participants per "cruise leg," or equivalent, for each IODP platform. Staffing does not have to be distributed evenly. In other words, more than two participants on a cruise leg may be acceptable if offset by reduced participation in other legs. Members may acquire additional participation units by "buying" more and/or by providing MSPs. A member with at least one unit will have the same rights in data as the lead agencies for activities conducted using IODP SOCs. A member with at least one unit will also have the right to a royalty-free license for all patents resulting from developments supported by IODP SOCs.

IODP Entities

In addition to the funding agencies, as currently represented on the IWG, and as the financial well-spring of the IODP, the key components in the new program will include a Central Management Office (CMO), Implementing Organizations (IOs), and a Science Advisory Structure (SAS) (Figure 2).

Funding Agencies

The funding agencies will form an IODP Council, a non-voting consultative body analogous to the ODP Council. In general, this body will serve as a forum to exchange views among the funding agencies. Specifically, members will review IODP accomplishments, status, plans, and resource requirements. They will make recommendations, as appropriate, on planning and operation of the IODP, as well as receive audit, fiscal and management reports. Each member country will be entitled to have a representative on the Council that will meet annually. The Chair will rotate among lead agencies every year.

Science Advisory Structure (SAS)

The SAS (e.g., scientific, technical, and safety panels and committees that generally meet twice a year) will conduct scientific planning and provide advice and guidance for IODP, just as JOIDES has for ODP. Because planning is required in advance of the actual initiation of the IODP, the IWG established an interim SAS (iSAS), which commenced in late 2001 and will end on September 30, 2003, when it evolves into SAS. An iSAS Office was established in Japan last year, and much information about the office and iSAS is available at: www.isas-office.jp.

In brief, the functions of iSAS are to plan for IODP and facilitate the transition from ODP; to make recommendations on the IODP SAS; to develop guidelines to format and evaluate science proposals and site surveys; and to examine, review, and nurture potential drilling proposals for IODP. The iSAS Office is actively soliciting and receiving proposals. Of the active ODP proposals in the JOIDES Office, 67 have been transferred to the iSAS Office. Since then, two calls for proposals have resulted in the submission of 32 responses, including 7 new proposals, 3 addenda, 15 revised proposals and 7 re-submitted proposals. Of the current total 85 proposals, 29 are pre-proposals and 56 are full proposals. Less than 10 of the proposals would require a MSP, 2 or 3 would require the *Chikyu*, and the remaining 70 or so could be accomplished with the non-riser vessel.

The IODP SAS will construct the annual science program that the CMO will use to develop and manage an implementation plan. The final configuration (i.e., post-1997) of the various JOIDES panels and committees maps easily onto the set of iSAS panels and committees, although minor name changes appear, and one new panel has been constituted. For example, the JOIDES Science Committee, chaired by Keir Becker, is generally equivalent to the interim Planning Committee (iPC), co-chaired by Ted Moore and Hajimu Kinoshita. The JOIDES Technical Development Committee has become the interim Technical Advisory Panel. A mirror for the Executive Committee is being discussed, but will not be established until other aspects of the management structure are in place. For now, iPC reports directly to the IWG. The mandate for a new group, the interim Industry Liaison Panel, has been approved, and membership selection is nearly finished. This panel was created in an attempt to develop stronger ties between the scientific and engineering communities in both academia and industry. Representation on all but the technical advice panels (iPPSP, iTAP, and iILP) is approximately 1/3 Japan, 1/3 US, 1/3 other IWG members, reflecting the preferred model of the lead agencies for international participation in IODP.

Central Management Office

The CMO will be a core element of IODP that maintains ties to all other IODP components. Although overly simplistic, the CMO is somewhat analogous to JOI, in its role of management prime contractor of ODP. Through a formal arrangement with the lead agencies, the CMO will develop and manage the implementation plans for the IODP science program. The CMO's principal task will be to receive advice on the priorities and plans from the SAS, to solicit and receive plans from the IOs that are responsive to this advice, and, after negotiation with these entities, to submit an annual IODP program plan to the lead agencies that is consistent with their budget guidance.

The CMO will be created and managed by a legal entity (probably a non-profit organization) that, according to the IWG, will be "unbiased, independent, and committed to IODP science." NSF and MEXT (as lead agencies for IODP) may determine the process by which international parties will be selected to form the entity. It will probably have a board of directors that reflects the financial contribution of the IODP members, and a staff, led by a President, to manage the CMO's tasks and responsibilities. At present, IODP planners think that the CMO needs to be initiated by April of 2003, about 8 months from now.

Through an agreement with the NSF, the CMO will receive commingled SOC funds to disperse to the IOs, and other entities, and to directly conduct or oversee other activities. Unlike the current situation, the funding and authority for the POCs will be directly between funding agency and IO, and thus external to the CMO; whereas in ODP, POCs and SOCs are all commingled and are managed from JOI through subcontracts for operations of science (TAMU) and logging (LDEO) services.

The CMO will have many tasks and responsibilities in IODP (Figure 2). These include: (a) develop and ensure the efficiency of a program plan and SOCs budget for science operations, logging, technical and engineering development, publications, information services, SAS office, sample and data center, site survey data bank and education, outreach, and program promotion; (b) ensure the efficiency of program implementation; (c) seek or promote international cooperation to provide site survey information, advice from the drilling industry and new members for IODP; (d) execute contracts or agreements as necessary with the IOs and others; (e) secure or maintain funding and financial controls and quality control for sample and data archives; and (f) support or assist efforts to create and safely implement detailed drilling plans.

Similar to JOI's role in ODP, the CMO will also support, directly, or through contract, the SAS and the office to support it, a site survey data bank, and logging. The CMO's responsibilities have been expanded over JOI's in that the new office will also oversee engineering development, the combined activity of education and outreach, and a sample and data center. This center, a new entity, will have the following responsibilities: (a) archiving shipboard laboratory and logging data; (b) ensuring the comparability and quality of IODP data; (c) ensuring the consistency and quality of sample and core archiving procedures; (d) promoting access and use of data and samples; (e) serving as a point of contact for samples and data; (f) collecting post-cruise data (this will be a big improvement); (g) ensuring compliance with SAS data and sample guidelines; and (h) IODP data products.

To accomplish these tasks, and based on what we've seen in ODP, the CMO will need to have the following characteristics: (1) staff with scientific, technical, managerial, fiscal, contrac-

tual, and other intellectual abilities to effectively translate science plans into efficient and operationally safe program plans with the best and balanced interests of the international IODP community as a guiding principle; (2) excellent communication and close links to many entities, such as funding agencies, IOs, the SAS, national IODP offices, and other scientific programs; (3) the appropriate level of authority, accountability, and autonomy to accomplish these tasks and responsibilities.

Implementing Organizations

IODP science operations and services on all the platforms will be conducted by entities referred to as "implementing organizations" (IOs), somewhat analogous to Texas A&M University as the Science Operator of the *JOIDES Resolution* for the ODP. They can also be considered contractors. JAMSTEC, or an entity they designate, will become the IO for the riser vessel. NSF will use a competitive process to select the IO for the non-riser vessel. The IOs will receive POCs funding directly from their respective funding agencies to conduct scientific operations (and engineering site surveys, in the case of *Chikyu*). As in ODP, the IOs will have the final responsibility for selecting the scientific teams for each drilling project based on advice from SAS and on nominations and applications from IODP members.

Implementation

Unlike Porsche's Boxster S, this program won't accelerate from 0 to 100 km/h in 5.9 seconds; we're dealing with drilling vessels here, one of which is newly constructed. Full implementation of the IODP (i.e., the time it will take for all drilling platforms to come online) will require about four years.

The academic component of the IODP community has precious little previous experience with riser drilling. We have much to learn about developing scientific projects that require this capability, about the safety and engineering aspects of site selection, and about the techniques of drilling with well control, casing and logging in deep environments, and installation of observatories. It's likely that non-riser drilling will be required to characterize the upper sequence of sites where riser drilling is the ultimate goal. This planning is happening now, for example, based on the drilling proposals recently submitted to the iSAS Office, and on recent planning efforts, such as workshops, either scheduled or proposed, to develop riser drilling projects for the Nankai seismogenic zone, Costa Rica's convergent margin, the Mediterranean, and the Indian Ocean fan systems, among others. For those of you interested in riser-related matters, I recommend the report from IPSC's Technical Advisory Working Group, written by Ted Bourgoyne who has much experience in this arena (www.iodp.org) and an article by Dale Sawyer in the November 1996 issue of the *JOI/USSAC Newsletter* (www.joiscience.org/USSSP/Pubs/Pubs.html).

> " Full implementation of the IODP (i.e., the time it will take for all drilling platforms to come online) will require about four years."

From October 1, 2003 until sometime in 2005, IODP operations will be conducted from mission-specific platforms if recommended by the SAS and if provided and funded by IODP Members. The Europeans are hoping to fund one or more MSP programs in the first year of IODP. High priority science has been identified, and the logistical and operational plans for several of these MSP programs are maturing. At this point, a commitment from the funding agencies is needed. Progress has been made, however, and the next set of steps has been clearly defined, as follows. The IWG granted the iPC the authority to rank MSP drilling proposals this August, in preparation for possible drilling in 2004. iPC's ranking will be submitted to the IWG by September 1, 2002. IWG Members who have a desire to support highly ranked MSPs in 2004 should submit to the IWG co-chairs a plan for providing platform operations, including source of funds and estimated science operation costs, prior to the January 20, 2003, IWG meeting in Villefranche-sur-mer, France. At that gathering, the IWG will consider endorsing or approving such plans based on proposal rankings and projected resources.

As highlighted in the last issue of the *JOI/USSAC Newsletter*, coring of the Arctic's Lomonosov Ridge is one such MSP project currently being considered. It was twice ranked #1 by the JOIDES Science Committee, but was not scheduled as an ODP activity because of several programmatic considerations. Given its high ranking and the possibility of implementation in IODP, JOI has contracted the Swedish Polar Research Secretariat (SPRS) to conduct logistics and operational planning. JEODI (Joint European Ocean Drilling Initiative, www.jeodi.org) representatives are working closely with JOI and SPRS representatives to ensure that planning and possibly implementation occur as smoothly as possible during the transition from ODP to IODP.

Finally, current expectations are that IODP operations of the US non-riser vessel would begin sometime between October 2004 and April 2005. MEXT and JAMSTEC have stated that the *Chikyu* will be made available for international IODP operations in late 2007. This means that as of October 1, 2007, IODP should be fully implemented.

National Planning

United States

International planning of IODP must reach a certain point before NSF can establish specific initiatives to support US participation in that program. However, some activities, such as the USSAC planning retreats and the Conceptual Design Committee have occurred in the recent past, and as IODP materializes further, attention will shift domestically. The USSAC—currently chaired by Peggy Delaney—has been spearheading the national planning effort, consistent with their mandate of "long-term planning." USSAC, in consultation with NSF and JOI program managers, has initiated or led several activities, and will continue to do so as IODP develops. Warren Prell will take over for Peggy on October 1, 2002, as the new chair.

Conceptual Design Committee

Although concluding their work some time ago, the CDC, a subcommittee of USSAC, is-

sued their report, a recommendation to NSF on the conceptual design for the non-riser vessel, in March 2000. NSF forwarded the report (available at www.iodp.org) to IPSC, which vetted it internationally before presenting their findings to the IWG in 2001. The report, and the international response, will serve as background material for the Request For Proposals (RFP) that NSF will release this calendar year in search of an IO for the non-riser vessel.

Making the case for US participation

Last September, JOI/USSAC published "Understanding our Planet through Ocean Drilling: A Report from the United States Science Advisory Committee" (UPOD). The purpose of this document was to establish the rationale for US participation in the IODP and to complement the motivations expressed in the *IODP Initial Science Plan*. To create greater impact for a broader audience, including policy makers, a brochure titled "United States Participation in the Integrated Ocean Drilling Program" was distilled from the document. The design elements of the brochure parallel those of the *ISP*, and in September 2001, 5000 copies were printed and distributed. Both the UPOD document and the affiliated brochure are available online at www.joiscience.org/USSSP/UPOD.html.

Conference on US Participation (CUSP)

US scientists are anticipating national participation in IODP, potential changes in how NSF supports the full range of activities conducted by US scientists, and the creation of a successor program to the US Science Support Program (USSSP). As such, a USSAC subcommittee, chaired by Warren Prell and Peggy Delaney, agreed to submit a written recommendation to NSF this October regarding all aspects of US participation. To assist in this effort, JOI/USSAC sponsored a Conference on US Participation (CUSP) on June 12-14, 2002, in Washington DC. Over 60 participants attended. Most were from the US, but others, from Canada and Japan, also participated. Details are available at www.joiscience.org/USSSP/iodp/default.html.

The purpose of the conference was to: (a) formulate the characteristics, elements, and tasks of the entire US program required to foster and sustain the full range of research and educational activities needed for successful US participation in the IODP; and (b) identify and describe the optimal structure and resources for this program as well as the key entities, their connections, and their respective sets of authority, responsibility, and accountability. The participants explored ideas and specific mechanisms to broaden further the base of participation in IODP. Such expansion will also help ensure a dynamic program that responds to emerging opportunities.

Presently, support for US participation in the ODP and for drilling-related research is provided by the NSF, specifically by the Ocean Drilling Program, now under the Marine Geosciences Section within the Division of Ocean Sciences. This program sustains investigations of potential drilling regions (regional geological and geophysical field studies), the feasibility and initial development of downhole instruments and techniques, downhole geophysical and geochemical experiments, and studies leading to long-range definition of future drilling objectives. Support for post-drilling studies are submitted through other NSF programs such as Marine Geology and Geophysics, Earth Sciences, and Polar Programs.

Additional support for US scientists is provided through the USSSP through a cooperative agreement between NSF and JOI. This program consists of the following elements: planning activities (e.g., workshops) and participation in the planning structure (e.g., JOIDES meetings); support for US scientists participating on the drillship and for necessary follow-up studies related to the publication of initial drilling results; site surveys and data synthesis to develop the context for drilling; educational programs; development of instrumentation for downhole experimentation; dissemination of results; support of USSAC to interact with the scientific community and NSF; and administration.

IODP GeoSCAN (Geophysics Site Characterization And Needs)

One of the challenges facing IODP is the geophysical surveying needed to help provide the scientific basis for drilling and to characterize specific drilling sites, particularly those targeted for riser operations. To address this topic and related issues, such as safety and engineering needs, JOI/USSSP will sponsor a workshop and informational session that will be held in conjunction with the December AGU meeting in San Francisco. The GeoSCAN meeting, led by Nathan Bangs and others, will be open to all interested participants, and limited travel support for US scientists will be made available from JOI/USSSP (see the GeoSCAN ad on page 17).

The primary objectives of the GeoSCAN workshop are to: (a) inform the scientific community about IODP drilling opportunities and requirements; (b) explore new geophysical techniques for site survey work; (c) examine the community's capability to meet the new program's needs; and (d) stimulate proposals for regional geophysical studies and site surveys. Participants will learn about riser drilling and anticipated site survey needs, including the data required to determine feasibility, address safety issues, and define drilling targets. The general science necessary to develop future drilling projects will also be discussed to generate feedback for the IODP interim Site Survey Panel and for proponents of IODP projects, as well as to inform US funding agencies about survey needs. The meeting will include presentations and discussion of drilling platforms, geophysical techniques, overviews of developing drilling projects, future funding, and other relevant topics.

Planning workshops for riser drilling

JOI/USSSP has received several workshop proposals, involving international participation, to plan scientific drilling projects that would require the use of the *Chikyu*. Harold Tobin and Gaku Kimura will lead the "NanTroSEIZE" workshop to be held July 21-23, 2002, in Boulder, Colorado. The workshop will focus on drilling and instrumenting the Nankai Trough seismogenic zone. Specific goals are: (a) to explore and further define the scientific opportunities created by access to the seismogenic zone of a subduction megathrust in a great earthquake and tsunami generating region; and (b) to develop a robust science

plan for carrying out this multi-faceted project at the Nankai subduction zone. Other currently proposed planning efforts focus on the Indian Ocean Fan Systems (Peter Clift and Peter Molnar), the Costa Rica convergent margin (Kevin Brown and Roland von Huene), and the deep biosphere (Martin Fisk).

Outreach

JOI/USSSP has conducted many activities in the last year, such as: (a) establishing a strategic presence on Capitol Hill, spearheaded by JOI's president Steve Bohlen and Kasey White, JOI's outreach coordinator; (b) conducting educational initiatives (e.g., posters, CD-ROMs, distinguished lecturer series, fellowships, internships, videos, supporting development of an online educational curriculum, titled "The Seafloor Chronicles," undergraduate student trainee program); (c) promotion (presence at national meetings, promotional activities at the San Diego *JOIDES Resolution* port call [September 6-10], *JOI/USSAC Newsletter*, website and listserver information); and (d) planning assistance (workshops, hosting IWG Support Office, publishing and distributing reports).

JOI/USSSP staff represented ODP in an "Ocean Technology Fair," part of a week-long event on Capitol Hill to celebrate World Oceans Day in early June. This event showcased ocean research for policymakers, scientists, and businesses. JOI/USSSP staff also attended a meeting held by AGI to discuss ways to make Earth Science Week more successful. Earth Science Week will be held October 13-19, 2002.

JOI/USSSP co-sponsored a joint ODP/IODP booth at the American Geophysical Union (AGU) Meeting, May 27-31, 2002, in Washington, DC. USSSP will also contribute to an ODP exhibit booth at the Geological Society of America (GSA) annual conference, October 27-30, 2002, in Denver, Colorado. USSSP plans to host an ODP Town Meeting on October 26 in conjunction with the GSA meeting to update the scientific community about plans for the future. In addition, USSSP will contribute to an ODP/IODP exhibit booth at the fall AGU Meeting, December 6-10, 2002, in San Francisco, CA, and will likely host another ODP/IODP Town Meeting at that time.

The USSSP component of the JOI website (www.joiscience.org) continues to provide information to the scientific ocean drilling community. Maintaining, updating, and upgrading the website will continue as an integral component of JOI/USSSP activities. Recent additions to the site include background information for CUSP and other planning workshops such as NanTroSEIZE.

The JOI/USSSP email listserver has become a mainstay for rapid communication with a broad cross section of the US scientific ocean drilling community, and, to a lesser extent, the international community. Since January 2002, 20 messages have been sent via the listserver to notify the US community about JOI/USSSP internship opportunities, Schlanger Ocean Drilling Fellowships, the Distinguished Lecturer Series, as well as various workshop and employment opportunities. The email list, which includes over 1800 email addresses, is moderated at JOI to ensure that all the messages are relevant to USSSP, ODP, or other matters related to scientific ocean drilling. To be added to the listserver, or to distribute a message, please contact info@joiscience.org.

JAPAN

Of all the countries participating in scientific ocean drilling, Japan's growth will be the greatest in the transition from ODP to IODP. The dramatic increase in Japan's commitment to scientific ocean drilling, highlighted by a $540M ship and equal partnership with the US, provides the nation a unique opportunity to grow their community of marine geologists, geophysicists and other scientists.

To encourage this growth, Japan created an Institute for Frontier Research on Earth Evolution (IFREE) that initiated activities in April 2001. The objective of IFREE is to understand and clarify earth system changes in four programmatic themes: (1) mantle-core dynamics; (2) geochemical evolution; (3) plate dynamics; and (4) paleoenvironment. IFREE's initial focus will be on the most recent 200 million years of Earth history, but their long-term goal is to study earth processes over all time intervals. Details are at www.jamstec.go.jp/jamstec-e/IFREE/

Japan's national scientific ocean drilling program, named Ocean Drilling in the 21st Century (OD21), is divided into four groups: (1) Ship Operation and Science Support Group; (2) Planning and Coordinating Group; (3) Science Planning Group; and (4) Ship Construction and Engineering Group. Details are available at www.jamstec.go.jp/jamstec-e/odinfo/index.html.

"The dramatic increase in Japan's commitment to scientific ocean drilling, highlighted by a $540M ship and equal partnership with the US, provides the nation a unique opportunity to grow their community of marine geologists, geophysicists and other scientists"

There have been a few other developments. Japanese representatives have announced that a new core repository and shore-based laboratory, which will mirror the lab aboard the *Chikyu*, will be constructed at Kochi University and opened within two years. This facility, named Marine Core Research Center, will be accessible to the international community. JAMSTEC has established a new organization, the "Center for Deep Earth Exploration (CDEX), that will carry out the scientific operations of *Chikyu*. CDEX will begin their efforts in October, and Asahiko Taira, an Associate Executive Director in JAMSTEC, will be inaugurated as the CDEX Director. Japan has also announced that an international contractor for drilling operation training cruises of *Chikyu* conducted the first seismic surveys this spring at the Sanriku-oki and Tokai-oki areas. Another survey will be conducted later in the year. The first drilling tests of *Chikyu* may be conducted in these areas. Finally, JAMSTEC is developing an advanced database system for *Chikyu* core data that will be compatible with the Janus database used in ODP. The prototype of the system is available on a website for testing by iSCIMP and SCIMP members.

EUROPE

Before delving into another set of acronyms, I think it worth noting that European countries, both those historically involved in scientific ocean drilling, and those new to this community, have taken a remarkable position in considering membership in IODP. They are attempting to create a framework within which they can combine forces to join IODP as a single unified European member. This approach, perhaps paralleling efforts Europe wide (witness the growing acceptance of the Euro, and the expanding influence of the European Union), is invigorating, for it portends strong and unified participation by a key component of the global community. Three cheers (for all 15 nations)! On a nation-by-nation basis, commitments are coming forward. For example, the United Kingdom's NERC Science and Technology Board committed to joining IODP, in principle, for 5 years from its inception in 2003. The commitment of £9 million is contingent on NERC not experiencing further budget reductions in the UK Government Comprehensive Spending Review in 2002.

Return of the JEODI and creation of ECORD

In January 2001, the European Commission chose to fund the Joint European Ocean Drilling Initiative (JEODI), which is, for the cognoscenti, a "Thematic Network" under the Fifth Framework. JEODI, officially established on September 1, 2001 as a two-year effort, and supported at a level of approximately $900K, marshals the efforts of 15 European members states to develop a distinctive European component to IODP. John Ludden is the lead PI on the project, and the rest of the driving force behind this initiative are, by and large, the senior leadership of European scientific ocean drilling, including past and present European representatives on JOIDES Science and Executive Committees and on the iSAS iPC.

JEODI has been addressing many aspects of European participation that all relate to Europe's anticipated provision of mission-specific platforms to IODP. JEODI is divided into nine "work package groups" that concentrate on coordination, platforms, the science program, links with other global programs, Arctic drilling, logging, lab facilities, public outreach and overall management. Some specific activities include planning workshops (e.g., Brussels, "Alternate Drilling Platforms: Europe as the Third Leg of IODP," January 8-9, 2001, report available from www.jeodi.org/Brussels/brussels_page.html and Lisbon, "Alternate Platforms as part of the Integrated Ocean Drilling Program (IODP)," May 10-12, 2001, see www.jeodi.org/Lisbon/Lisbon_general.html). JEODI is also attempting to work closely with industry in terms of mutual investigation and pursuit of scientific objectives.

> "European countries…are attempting to create a framework within which they can combine forces to join IODP as a single unified European member."

Representatives from ten European funding agencies have also unified. On January 6-7, 2002, the agencies formally created the European Consortium for Ocean Research Drilling (ECORD) by signing a "Heads of Agreement" document. The interim council that leads the ECORD effort will seek funds from the European Union (EU) for participation in IODP as a third lead agency, together with the NSF and MEXT. If successful, the EU will provide the POCs for mission-specific platforms and the financial contributions from individual European member nations will be commingled and contributed towards the total SOCs expenses. The interim council held their fourth meeting on June 3, in Stockholm, just prior to an IWG meeting.

The council is developing their own set of European principles for ECORD as well as structure with derivative entities, such as a European Management Agency (EMA), a European Science Operator (ESO), and a European Science and Operations Committee (ESOC). In brief, the EMA will be an entity that serves as a lead representative on behalf of all the other European funding agencies to the IODP. Among other activities, the EMA will prepare and sign binding memoranda of understanding, develop and administer contracts, and, provide funds to the ESO for mission-specific platform operations, and in general provide European oversight of IODP. The ESO will be appointed by the council, and contracted by the EMA to provide, on a contract basis, MSPs and related scientific support within IODP. Until IODP begins, JEODI will act as the interim ESO for ECORD. Finally, the ESOC will, for lack of a better analogy, serve in a capacity similar to USSAC. The committee, which reports to the council, consists of senior scientists and will provide scientific, technological, and operational advice and guidance, conduct planning, and nominate European SAS representatives . The council is preparing a call for expressions of interest for the EMA and ESO with a fall deadline.

On May 31st, John Ludden and JEODI colleagues, on behalf of ECORD, submitted an expression of interest to the European Commission's "network of excellence" in the theme of sustainable development, global change, and ecosystems, part of the European Union's 6th Programme Framework (still with me?). This proposal seeks funding to enable European participation in the IODP.

CANADA

Canada, with the population of California, took a bold, positive step to secure full membership (i.e., one participation unit) in IODP. In May 2001, the Atlantic Canada Petroleum Institute (ACPI, www.acpi.ca), acting under the auspices of Dalhousie University, was selected by an ODP Canada review committee (which reports to the Canada ODP Council) to lead the effort to develop a proposal to the Canadian Foundation for Innovation (CFI) for membership funds. After receiving a positive response to their preliminary proposal, the team submitted a full proposal on February 4, 2002. The proposal also requested funding from the Natural Science and Engineering Research Council (NSERC) to support domestic costs.

We were deeply disappointed to learn on June 20th that the CFI decided against funding Canadian membership in IODP (www.innovation.ca/media/index.cfm?websiteid=227). Interestingly, among the six programs that the CFI chose to support from the "interna-

tional access fund," is Canada's Neptune program (www.neptunecanada.com), which plans to collaborate with the US in laying sensors around the Juan de Fuca plate. We applaud the Canadian effort to secure IODP funding from the CFI, and we wish them the best of luck in pursuing IODP membership through another avenue.

> "The importance of this Japan-US agreement cannot be overstated; it's the foundation of the international collaboration, and it will define the character and culture of the program."

Others IWG members

Funding agency representatives from China, Australia, Chinese Taipei, and Korea have attended IWG meetings. Each has expressed interest in IODP and some an intention of becoming a member. At the grass roots level, participation by Chinese scientists appears to be growing significantly. Impressive scientific results are being produced from Leg 184 (South China Sea) and from the rapidly deposited sequence cored under the Kuroshio Current (Leg 195), among others. Representatives from these countries have made generally positive statements, but comments regarding commitment are reserved. In an attempt to bolster support for ocean drilling in these countries, JOIDES and iSAS meetings have been held in these countries, and activities during *JOIDES Resolution* port calls have helped raise awareness.

> "At the grass roots level, participation by Chinese scientists appears to be growing significantly. Impressive scientific results are being produced from Leg 184 (South China Sea) and from the rapidly deposited sequence cored under the Kuroshio Current (Leg 195), among others."

Status of the current ODP management entities

Many in the scientific community have asked about the future of JOIDES (advisory), JOI (management), TAMU (science operations), LDEO-Borehole Research Group (logging), and the LDEO Site Survey Databank as scientific ocean drilling transitions from ODP to IODP. The answers are not clear in all cases, but here's what's generally known. First and foremost, much of the future for these entities, in terms of ODP, has been mapped out in a 5-year ODP Program Plan that was submitted to NSF in March. This plan spans from October 1, 2003, until September 30, 2008. The first year is the last of ODP scientific operations, and the remaining four years will be used to conduct wind-down and phase-out activities. This 4-year period is necessary because of the long tail on ODP activities, especially post-cruise research, publishing, financial closeout, and final report and audit. The NSF is currently considering this plan. The final version will likely be approved and funded before October 1, 2003. Second, many parts of the current ODP management and operations structure are, at this point, individually positioning themselves to become a part of the IODP. This is where future intentions grow unclear, largely because the targets of opportunity are not yet adequately defined by the IWG for IODP activities, and by NSF for US-specific activities.

National Science Foundation

Before IODP begins, NSF will probably establish an agreement with an entity to manage a domestic program to support US participation in IODP. This program, in essence a successor to the current US Science Support Program affiliated with ODP, will likely have many of the same tasks and responsibilities of the current USSSP, that has been managed by JOI for 18 years. Given the significant differences between ODP and IODP, however, the USSSP-successor program may have a considerably different, and possibly expanded scope of work, emphasis, structure, advisory committee, and budget.

Because each IODP member country is individually responsible for supporting its national IODP scientific R&D costs for shore-based analysis, for research on IODP samples and data, and for non-routine downhole measurements, NSF, with help from the US scientific community will need to develop the means to provide such support. It will include geophysical and geological surveys and research to prepare drilling proposals or identify drilling targets.

At present, the NSF Division of Ocean Sciences (OCE) budgets approximately $6M per year in support of USSSP and approximately $9M per year in support of unsolicited proposals for post-cruise research, but mostly for regional geological and geophysical studies and surveys in support of US drilling proposals. The USSSP The community is making a case, based on scientific objectives, for the level of funding to at least double, to enable US scientists to participate fully and collaborate productively with international partners in all aspects of IODP.

Regarding organization, NSF/OCE has recently restructured by creating a Marine Geosciences Section headed by Bruce Malfait, the former NSF ODP Program Director. Paul Dauphin was similarly promoted to Program Director. Scientific ocean drilling will be conducted within this section as will the Marine Geology and Geophysics core program.

JOIDES

The JOIDES Office, now led by Chris Harrison (EXCOM Chair) and Keir Becker (SCICOM Chair), will close by October 2003, the same time that the JOIDES advisory structure ceases to exist, and the international ODP memoranda of understanding conclude. JOIDES activities are now winding down, and panel work is focusing largely on the transition to IODP and on developing the ODP legacy. Drilling proposals have been forwarded to the iSAS Office, and other materials will be transferred to JOI. For example, JOI will host the JOIDES website, as an archive, after the JOIDES Office closes.

Joint Oceanographic Inst.

JOI, which has been managing research programs on behalf of the scientific community for over 25 years, is the prime contractor to NSF for the ODP, and has responsibilities to oversee the full range of ODP phase-out activities through 2007. Through a cooperative agreement with NSF, JOI will also oversee the termination of the USSSP, slated to end before March 1, 2006.

Although JOI has been planning the ODP phase-out, it also intends to continue serving the community in the future. For example, Paul Stoffa, the Chairman of the JOI Board, stated at AGU last December that JOI plans to respond to NSF RFP to become the IO for the IODP non-riser vessel. This decision was reaffirmed at the Board's January 2002 meeting in Santa Cruz. The Board also plans for the corporation to respond to an announcement of opportunity for a USSSP-successor program.

Regarding the opportunity to become the IO for the non-riser vessel, the JOI Board has initiated an internal process to identify members among the JOI member institutions that are interested in providing such service. The Chairman of the Board is soliciting letters of intent (LOI) in anticipation of the NSF RFP. Based on the wording in the solicitation, the Board has broadly interpreted the anticipated RFP to potentially encompass a wide range of affiliated services and functions that include POCs as well as SOCs. The extent to which these services will fall within the NSF RFP or managed separately from the CMO has yet to be determined. LOIs were called for in one or more of the following areas:

1. Procure, outfit/refit a non-riser vessel;
2. Operate, maintain, and support a non-riser drilling vessel;
3. Scientific and technical staff to support the vessel and its labs;
4. Vessel-specific engineering support;
5. Vessel-specific onboard and shore-based IT/IS support;
6. Vessel specific scientific logging services;
7. Shore-based core curation.

Institutions not planning to submit LOIs have been asked to make their intentions known by May 1. As of July 3, the following 5 institutions have not yet responded, leaving open the possibility that they will submit letters of intent by August 5: the University of Rhode Island Graduate School of Oceanography, Texas A&M University College of Geosciences, Columbia University (Lamont Doherty Earth Observatory), Florida State University, and Oregon State University. The letters will indicate the institutional commitment by describing the qualifications, and the financial, administrative and logistical support being offered, as well as the educational and intellectual resources and activities that will be integrated into the service.

JOI has constituted a "Committee of the Corporation" to evaluate the letters of intent and to conduct site visits to prospective member institutions in early September. The Committee will likely include Peggy Delaney, Terry Edgar, Ross Heath, Barry Katz, Warren Prell, and Dave Scholl. On September 25, the Committee will meet in Washington, DC, to hear verbal presentations, to review the LOI, and to develop written evaluations for the non-conflicted JOI Board members to consider. At their meeting the next day, the Board will hear a presentation by the Committee and will then select potential subcontractor(s) of ship operations and other services. At that point, potential subcontractor(s) and JOI staff will develop writing teams in preparation for the release of the NSF RFP. Within 2 working days of the release of the NSF RFP, the JOI Board will review it and will issue final approval of the subcontractor(s) for the non-riser vessel and related activities. Evaluation by the Board will be based on the following criteria:

1. Knowledge of ocean drilling, drilling engineering, ship operators, ship contracting, procurement and operations;
2. Ability to manage, operate, maintain, and support a non-riser drilling vessel and/or associated activities (i.e., vessel-specific technical support, engineering, logging, IS/IT, core curation) in a safe, cost effective and financially feasible manner;
3. Commitment of shore-based facilities and support services;
4. Commitment of institutional educational and intellectual resources and activities in support of and integrated with operations;
5. Commitment of institutional financial, administrative, and logistical support and the time duration of these commitments;
6. Description of how the proposed activity supports the long-term institutional goals and any proposed growth in the institution, and specifically how these enhance the effectiveness of the US ship operations;
7. Ability to respond to the needs of the international ocean drilling community by bringing best business practices and a diverse workforce with demonstrated scientific and technical capacity to bear on the objectives and goals of IODP; and
8. Past scientific contributions to oceanography and marine geology and geophysics relevant to the IODP and its *Long Range Plan*, institutional plans for growth in these areas and their potential contributions to the needs of the international ocean drilling community.

Finally, there has been speculation about JOI and the CMO, possibly because many of the CMO's tasks and responsibilities are similar to those JOI has for the ODP. In brief, as currently constituted (e.g., a corporate membership and governing board consisting of only US institutions), and in light of the Board's desire for the corporation to become the IO for the non-riser vessel, JOI cannot also become the entity that hosts the CMO. Such duality would violate the CMO characteristic of being unbiased and independent. This does not, however, mean that JOI members (i.e., individual institutions) could not join with parties representing other IODP members to create a legal entity (e.g., new non-profit organization or joint venture) for the purpose of establishing a CMO.

Science and Service Providers (TAMU and LDEO)

TAMU and LDEO are among the JOI institutions that may submit letters of intent to JOI regarding the provision of certain services af-

continued on page 14

ANNOUN

Schlanger Ocean Drilling Fellowship

In February and June 2002, USSAC's fellowship panel considered 37 fellowship proposals. Six one-year shorebased awards were made:

Heather Benway, Oregon State University
"Reconstructing pycnocline intensity in the Gulf of Panama to monitor low-latitude response to Neogene closure of the Panama Isthmus" (Shorebased, ODP Legs 138, 165, & 202)

Nicholas Drenzek, MIT/WHOI
"Spatial and temporal variations in the mixed layer radiocarbon reservoir age through the last glacial maximum" (Shorebased, ODP Leg 165)

Michael Hutnak, Univ. of California, Santa Cruz
"The thermal and hydrothermal state of subducting lithosphere: Costa Rica margin" (Shorebased, ODP Leg 205)

Lorraine Lisiecki, Brown University
"Faster and more accurate construction of composite depth sections using dynamic programming" (Shorebased, ODP Legs 108, 138, & 154)

Matthew Makowski, MIT/WHOI
"Characteristics of aeolian organic matter in a terrestrial-to-marine depositional transect and implications for millennial-scale tropical climate change" (Shorebased, ODP Legs 112 & 201)

Matthew Schmidt, UC, Davis
"Temperature and hydrological changes in the western Caribbean and the central North Atlantic during the last 450 kyr" (Shorebased, DSDP Leg 94 and ODP Leg 165)

Next fellowship application deadlines:
November 15, 2002
April 15, 2003
For information: www.joiscience.org/USSSP/fellowship/fellowship.html

An OCEAN DRILLING PROGRAM Town Meeting

WHERE: Geological Society of America Annual Meeting, Conference Center, Denver, Colorado
WHEN: Exact time and room to be determined

and **Exhibit Booth**

WHERE: Booth 650, GSA Exhibit Hall
WHEN: October 28-30, 9 am - 5:30 pm

JOI/USSSP Supported Shipboard Participants

Leg 199: Central Pacific Paleogene
U.S. Co-Chief: Mitchell Lyle, Boise State Univ
Staff Scientist: Thomas Janecek, Florida St Univ
William Busch, Univ of New Orleans
Kristina Faul, Stanford Univ
Steven Hovan, Indiana Univ of Pennsylvania
Peter Knoop, Univ of Michigan
Luca Lanci, Rutgers Univ
Caroline Lear, Rutgers Univ
Theodore Moore, Univ of Michigan
Catherine Nigrini, Univ of Michigan
Richard Norris, WHOI
Josep Parés, Univ of Michigan
Lacie Quintin, Boston Univ
David Rea, Univ of Michigan
Aradhna Tripati, UC Santa Cruz
Michael Vanden Berg, Univ of Utah

Leg 200: H2O
U.S. Co-Chief: Ralph Stephen, WHOI
TAMU Staff Scientist: Gary Acton
LDEO Logging Staff Scientist: Yue-Feng Sun
R. Scott Calhoun, UC Santa Cruz
Hartley Hoskins, WHOI
James Natland, RSMAS, Univ of Miami
Sarah Sherman, Univ of Hawaii, Manoa

Leg 201: Peru Deep Biosphere
U.S. Co-Chief: Steven D'Hondt, Univ Rhode Island
TAMU Staff Scientist: Jay Miller
LDEO Logging Staff Scientist: Gilles Guèrin
Ivano Aiello, UC Santa Cruz
Barbara Bekins, USGS
Ruth Blake, Yale University
Gerald Dickens, Rice Univ
Kathryn Ford, Univ of Rhode Island
Glen Gettemy, New Mexico Tech
Kai-Uwe Hinrichs, WHOI
Christopher House, Penn State Univ
Richard Mitterer, Univ of Texas at Dallas
Thomas Naehr, TAMU-Corpus Christi
David Smith, Univ of Rhode Island
Arthur Spivack, Univ of Rhode Island
Andreas Teske, WHOI
Juergen Wiegel, Univ of Georgia

Leg 202: SE Pacific Paleoceanography
U.S. Co-Chief: Alan Mix, Oregon State Univ
TAMU Staff Scientist: Peter Blum
LDEO Logging Staff Scientist: Ulysses Ninnemann
Heather Benway, Oregon State Univ
Margaret Delaney, UC Santa Cruz
Liviu Giosan, WHOI
Leah Joseph, Hobart & William Smith Colleges
Steven Lund, UCLA
Jerry McManus, WHOI
Nicklas Pisias, Oregon State Univ
Rebecca Robinson, Princeton Univ
Joseph Stoner, Univ of Colorado, Boulder
Michael Wara, UC Santa Cruz
Wuchang Wei, Scripps

CEMENTS

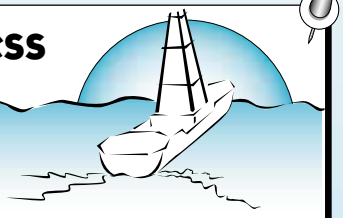
WANTED: IODP Science Proposals

The Integrated Ocean Drilling Program needs you!
Pre-proposals are encouraged.

For details, visit:
www.isas-office.jp

Next deadline: October 1, 2002

Recipe for Success



Congressional Visits

Ingredients:
- Enthusiastic ODP scientist
- Information from JOI Office
- Congressional staff

Estimated time:
- 3 hours

Combine scientist with information on the policy-relevant contributions of scientific ocean drilling. Add to congressional staff. Mix slowly, over low heat until mixture thickens. Serve on a decorative platter.

Yield: Increased Congressional support and awareness of scientific ocean drilling.
Tip: Serve often substituting different scientists for variety.

The JOI office is happy to set up meetings with your Congressional delegation when you are in Washington. Please contact Kasey White at kwhite@joiscience.org or 202-232-3900 x 240 for more information.

JOI/USSAC Distinguished Lecturer Series 2002-2003 Institutions

Barbara Bekins, USGS
"The Subduction Squeegee"

Western Michigan University
University of Tulsa
University of New Hampshire
University of Illinois
Plattsburgh State University

Jerry Dickens, Rice University
"Extreme Climates and Frozen Methane: The Global Carbon Cycle with Gas Hydrate"

Wright State University
Hobart & William Smith Colleges
Wesleyan University
Lawrence University
University of Southern Mississippi

Patricia Fryer, University of Hawaii
"Windows on Subduction Zone Processes"

University of New Mexico
University of Oregon
University of Maine
College of William & Mary
Syracuse University

Alan Mix, Oregon State University
"The Icy Poles or the Muggy Equator: What Drives Natural Climate Change?"

Huston-Tillotson College
University of Minnesota
Radford University
North Dakota State University
California State University

Gregory Mountain, LDEO
"The Ups and Downs of Determining Ancient Sea Level Change"

Lafayette Geological Society
Appalachian State University
Brown University
Miami University of Ohio
Southern Illinois University

David Smith, Univ. of Rhode Island
"Life in Marine Sediments: Probing the Limits of Earth's Deep Biosphere"

Northern Arizona University
Coastal Carolina University
Savannah State University
University of Missouri
Plymouth State College

IODP Planning Status continued from page 11

filiated with the non-riser vessel. Other services, such as the site survey data bank and the science advisory office, are clearly SOCs, and are to be conducted through an arrangement with the CMO.

A Call to Action

What can you, a member of the US scientific community, do to help plan the IODP and make it a successful endeavor? There are many things; I list five.

You're already taking the first step, which is informing yourself. Continue to gather knowledge by talking to others, reading information distributed by JOI, JOIDES, NSF, the iSAS Office, and other sources, watching listserver announcements, visiting promotional booths at scientific conferences, and by any other means possible. The earliest opportunities for participation on IODP expeditions in IODP may very well be those conducted from mission-specific platforms.

Second, support the NSF and congressional efforts to double its budget. "A rising tide lifts all boats." A cliché yes, but apt. In the first week of June, the US House of Representatives voted 397-25 to approve H.R. 4664, the NSF Authorization Act of 2002. This legislation is designed to double NSF research funding over 5 years and authorizes $5.5 billion for the Foundation in fiscal year 2003, $6.3 billion in FY04, and $7.3 billion in FY05. The legislation also requires the NSF Director, Rita Colwell, to develop a list of proposed projects in the Major Research Equipment (MRE) account (where the refit of the non-riser vessel will be included), and to rank the relative priority of each project for funding. This list would be sent to the National Science Board for approval, and then to Congress, along with a detailed report. Contact Kasey White (kwhite@joiscience.org) to learn how

"The lifeblood of scientific drilling programs has always been the drilling proposals developed by you, the community. Commit your ideas to paper and steer your proposal through the advisory structure. Having a proposal turned into a drilling leg is like being awarded a multi-million dollar grant."

to support efforts to raise NSF's budget. She can arrange for you to visit your congressional representative's office in Washington where you can explain to staffers the importance of your NSF-supported science, and its relevance to the nation and world.

Third, write proposals, an act of thinking long-term and acting short term. The lifeblood of scientific drilling programs has always been the drilling proposals developed by you, the community. Commit your ideas to paper and steer your proposal through the advisory structure. Having a proposal turned into a drilling leg is like being awarded a multi-million dollar grant. And what about the riser vessel? It's important to realize the magnitude of challenges we face as a community in planning and conducting riser-drilling operations. The scope of riser proposals will be much broader (e.g., scientific, safety, and engineering surveys) and involved than non-riser projects. We must start now. For details on writing a drilling proposal, visit the iSAS Office website (www.isas-office.jp) Finally, drilling proposals are not the only path forward. USSSP provides opportunities to hold planning workshops. For details, see www.joiscience.org/USSSP/Default.html.

Fourth, share your opinions, suggestions, questions, concerns, and interests with others, especially your representatives. These include members on the US Science Advisory Committee (see the back of any JOI/USSAC Newsletter for a listing, or www.joiscience.org/USSSP/USSAC/USSAC.html), those on JOIDES and iSAS panels and committees, the NSF, the JOI Board of Governors (www.joiscience.org/JOI/Members.html), staff at JOI, TAMU, and LDEO, among others.

Fifth, garner support from your institution for scientific ocean drilling. JOI is presently the embodiment of 16 major oceanographic US academic research institutions. Collectively, the voice becomes stronger. Talk with the senior leadership at your institution. Let them know how important scientific ocean drilling is to you, and ask them how you can help them make the case for support.

The Author

John Farrell is the Director of the US Science Support Program at JOI in Washington DC.

Fig. 3: Maurice Ewing (left), director of Lamont Geological Observatory (now named Lamont-Doherty Earth Observatory), J. Lamar Worzel, assistant director of LGO, and James T. Dean, operations manager, display the oil-bearing core retrieved from the Challenger Knoll in the Gulf of Mexico during the first expedition (Leg 1) of the Deep Sea Drilling Project.

Drill Bits

Trainee Program Continues

Applications to ODP's Undergraduate Student Trainee Program are currently being accepted for ODP Legs 206-210. ODP would like to sail one or two trainees on each of these upcoming legs; however, trainees can only be officially staffed as berth space becomes available. Therefore, notification to applicants may be on short notice. Students may apply for more than one leg to increase their chances of being selected for this incredible opportunity. For information on the US component of the program, visit: www.joiscience.org/USSSP/StudentTrainee/StudTrain.html.

The fourth US Student Trainee, Kimberly Artita, recently sailed aboard ODP Leg 203. Kimberly, who is a junior at the University of Hawaii, plans to use samples and data from the cruise for her senior thesis this fall. Ralph Moberly, also at the University of Hawaii, served as her shipboard mentor and advisor on the cruise.

New Interns Onboard

This summer JOI welcomes Jennifer Anziano and Anthony Goodman, the fourth generation of JOI/USSSP interns. Jennifer, originally of Denver, graduated in May 2002 with a B.A. in Geology from Macalester College in St. Paul, Minnesota. In addition to her work in lab and teaching assistantships, she completed an undergraduate honors thesis on calcite twinning and anisotropy of magnetic susceptibility in lamprophyre dikes in Michigan. Tony, who hails from the San Francisco Bay area, also graduated in May 2002 with a B.S. in Geology from the University of Michigan in Ann Arbor. While he produced an undergraduate honors thesis calculating paleoflow of a submerged channel between lakes Michigan and Huron, Tony is familiar with ODP material, having measured magnetic anisotropy on samples from Leg 199. Both Jennifer and Tony join the ODP program staff for one-year internships, and will be working on projects in support of the US scientific community.

Port Call Update

Plans are now underway for the last ODP port call of the *JOIDES Resolution* in the US: September 6-10, 2002 in San Diego. Currently, the JOI office is working with ODP/TAMU and local hosts to arrange educational activities, press conferences, tours, receptions, and other activities during the ship's port call. If you will be in San Diego and are interested in visiting the ship or leading tours during the port call, please contact Kasey White at kwhite@joiscience.org or 202-232-3900 x 240.

Deep-Biosphere Workshop

A mini-workshop to develop an IODP proposal to investigate the subsurface biosphere is planned for September 5-6, 2002, in Bergen, Norway, prior to the International Symposium for Subsurface Microbiology (ISSM). Workshop participants will be encouraged to consider the opportunities afforded by the riser and non-riser drilling vessels planned for the IODP. The goals of this workshop are to:

- bring new people and ideas to the study of microorganisms in the ocean crust,
- evaluate the sites proposed in an existing JOIDES Proposal 547 (Oceanic Subsurface Biosphere) as well as alternative sites,
- evaluate new techniques,
- consider other drilling platforms,
- base a new proposal on the existing JOIDES proposal, and
- submit a revised drilling proposal to the IODP by October 1, 2002.

The workshop will be limited to twenty participants. Applicants should be prepared to attend both full days of the mini-workshop and be willing to provide written material for the proposal revision by September 27, 2002. Limited JOI/USSSP support is available to US participants.For additional information visit: www.joiscience.org. To apply, contact Martin Fisk (mfisk@coas.oregonstate.edu) by July 26, 2002, with your name, contact information, and a statement about your potential contribution to the workshop.

ODP Legacy Lives On

In recent years, JOIDES SCICOM has increasingly focused its attention on documenting ODP's notable legacy. Their efforts include an "Achievements and Opportunities" document, which is comprised of 16 thematic contributions based on 17 years of scientific ocean drilling. It is being distributed this summer as a special issue of the *JOIDES Journal*. This is a document you may wish to share with your classes this fall. To obtain copies, contact info@joiscience.org. The chapters are also available in pdf format on the JOIDES website: joides.rsmas. miami.edu/legacy/.

Pisias Takes the Helm

JOI extends an enthusiastic welcome to Nicklas Pisias, who joins us as Interim Director of the Ocean Drilling Program. Nick brings with him a detailed knowledge of both the program and position, having acted as Interim Director in 1998. In addition, he has sailed with ODP and its predecessor, the Deep Sea Drilling Project and has accepted a leadership role in the program serving as chair of the planning committee for ODP (1986-1988) and chair of the US Science Advisory Committee (1991-1993).

Nick received his B.A. from San Francisco State College, his M.S. in geological oceanography from Oregon State University, and his Ph.D. in geological oceanography from the University of Rhode Island. He was elected an AGU fellow in 1998. Nick divides his time between JOI and Oregon State University, where he is a professor of marine geology and former Associate Dean the College of Oceanic and Atmospheric Sciences. He recently sailed as a shipboard scientist aboard Leg 202.

Nick fills the position vacated by Daniel Weill at the end of 2001. Dan, who resigned for health reasons, was a great asset to the program during his brief tenure, and we wish him smooth sailing in retirement.

THE SEISMOGENIC ZONE: ON THE IODP HORIZON

contributed by Harold Tobin

More than 90% of all seismic energy worldwide is released in subduction zone earthquakes. Many of these earthquakes, which are frequently accompanied by devastating tsunamis, are generated in the seismogenic zone, a relatively small portion of the subduction zone in which subducting and overriding plates are coupled, allowing accumulation and episodic release of elastic strain. Neither the Deep Sea Drilling Project (DSDP) nor the Ocean Drilling Program (ODP) have had the capability to drill to seismogenic depths at an active convergent plate margin. Now, with the Japanese contribution of the *Chikyu*—a state-of-the-art deep-drilling riser vessel—to the new Integrated Ocean Drilling Program (IODP), the international geophysical community will finally have the combination of technologies necessary to explore the fundamental mechanics of the earthquake cycle.

The August 2001 Nankai IODP Drilling Workshop in Tokyo, attended by 48 scientists from seven countries, produced a preliminary international proposal for IODP drilling in the Nankai Trough Seismogenic Zone (603-Pre: Nankai Trough Seismogenic Zone Drilling and Observatory). Participation of eight U.S. researchers was funded by the U.S. Science Support Program (USSSP). The proposed program will integrate non-riser drilling at reference and shallow thrust sites with riser-based deep drilling and borehole observatory installation to characterize the composition, physical properties, and mechanical state of seismogenic zone rocks at *in situ* conditions.

NANKAI IODP DRILLING WORKSHOP U.S. PARTICIPANTS

Nathan Bangs, University of Texas
Kevin Brown, Scripps Institution
Casey Moore, UC Santa Cruz
Greg Moore, University of Hawaii
Demian Saffer, University of Wyoming
Tom Shipley, University of Texas
* Harold Tobin, New Mexico Tech
Mike Underwood, University of Missouri

* *Lead proponent of the preliminary proposal to IODP.*

Because we lack measurements of ambient conditions and mechanical properties of plate boundary faults at depth, we have limited understanding of the subduction zone plate interactions responsible for devastating earthquakes and tsunamis near heavily populated areas. As a result, the direct sampling of material and physical conditions through drilling into the seismogenic zone of active plate boundary faulting has become a major goal in earthquake mechanics research. Subduction megathrust systems present clear advantages in the analysis of seismogenesis because they are shallowly dipping, amenable to imaging and drilling, and have a crustal and sedimentary input that can be sampled on the incoming plate and tracked to the depths at which earthquakes occur.

WHY THE NANKAI TROUGH?

The Nankai Trough has become a focus for seismogenic zone investigations because it has a 1300-year historical record of recurring great earthquakes (M_w~8.0) and tsunamis, frequently with catastrophic human impact. With approximate 120-year recurrence intervals, Nankai has suffered such earthquakes most recently in 1944 and 1946 (Fig. 1). Current onland geodetic studies suggest that the plate boundary is largely locked, and the relatively low level of microseismicity near the updip limits of the 1946 earthquake implies significant interseismic strain accumulation along the megathrust.

The Nankai Trough is an analog for a number of other sediment-rich subduction zones, such as the Cascadia margin and Eastern Aleutian Trench, which have also generated great earthquakes. Nankai is unique, however, in its combination of an instrumental and historical record of great earthquakes and a plate inter-

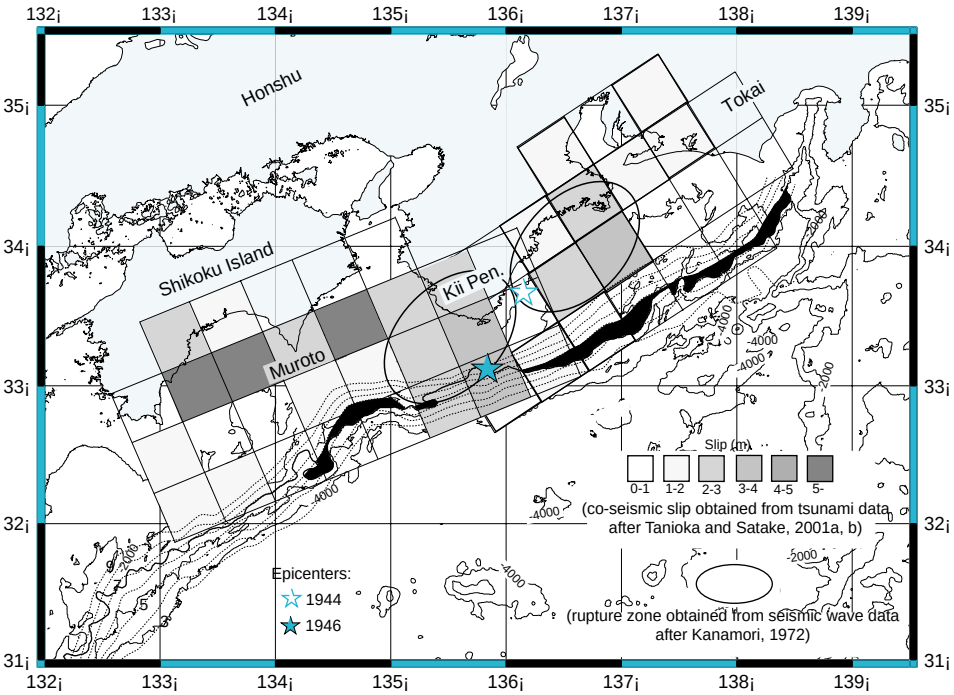


Fig. 1: Location map of Nankai margin,illustrating the coseismic slip areas of the 1944 and 1946 earthquakes.Areas marked in black represent locations with less than 2.5 km water depth and less than 6 km sub-bottom depth to the plate interface. Areas under consideration for proposed drilling include the Cape Muroto, Kii Peninsula,and Tokai regions.

face located within the drilling capacity of the *Chikyu*, at a water depth shallower than 2.5 km and total drilling depth less than 10 km. Excellent seismic imaging of the décollement zone and accretionary prism provides clearly defined deep drilling targets, and decades of detailed drilling, geophysical, geological and theoretical studies in the region have produced a wealth of background information. A relatively high thermal gradient places many diagenetic-metamorphic reactions, implicated in the onset of seismogenesis, within the riser hole depth range. On-land analogues of seismogenic zone rocks are exposed in the Shimanto Complex northwest of the Nankai Trough, accreted under conditions similar to those extant today. The preliminary proposal recognizes three regions as potential candidate sites for an IODP transect.

Hypotheses

The drilling plan is framed around a set of specific hypotheses, developed from the major outstanding questions in fault mechanics and earthquake physics and addressable by a realistic drilling program. These are:

- Systematic, progressive material and state changes control the onset of seismogenic behavior.
- Subduction zone megathrusts are weak faults in the absolute sense; i.e., they slip under conditions of low resolved shear stress.
- Within the seismogenic zone, relative plate motion is primarily accommodated by coseismic, frictional slip.
- Physical properties, chemistry, and state of the fault zone change with time throughout the earthquake cycle (interseismic and coseismic).

Testing these hypotheses will require an integrated program of riser and non-riser drilling along a transect from the trench to seismogenic depths. Such a program will rely heavily on downhole logging to acquire continuous *in situ* physical properties along the boreholes, and on the installation of borehole observatories to take fluid pressure, strain, microseismicity, and other long term measurements. Associated experimental and theoretical laboratory studies constrained by drilling results will also be a critical component of hypothesis testing.

Participation

Scientific operation of the riser vessel *Chikyu* is not slated to begin for several years, and broad participation in the planning of Nankai seismogenic zone drilling will be welcomed well into the future. Another workshop, sponsored by JOI/USSSP and ODP-Japan, will be held in Boulder, Colorado on July 21-23, 2002, to further develop the scientific objectives and project plan in anticipation of a full proposal submission this year. Workshop details and the preliminary proposal are available at www.joiscience.org. The *IODP Initial Science Plan*, including the Seismogenic Zone Initiative, can be downloaded at www.iodp.org/isp.html.

The Author

Harold Tobin is an Assistant Professor of Geophysics and a Research Geophysicist at the New Mexico Institute of Mining and Technology in Socorro, New Mexico.

References

Kanamori,H., *Tectonophysics*, 14:1-12, 1972.
Tanioka,Y., and Satake,K., *Geophysical Research Letters*, 28:1075-1078, 2001a.
Tanioka,Y., and Satake,K., *Earth, Planets, and Space*, 53:235-241, 2001b.

IODP GeoSCAN Meeting
Geophysics Site Characterization And Needs

Spring 2003
(dates TBD)
Washington, DC

One of the challenges facing the Integrated Ocean Drilling Program (IODP) is the geophysical surveying needed to help provide the scientific basis for drilling, and to characterize specific drilling sites. To address this topic and related issues, JOI/USSSP is sponsoring a workshop and informational session for interested scientists in conjunction with the American Geophysical Union (AGU) Annual Meeting in San Francisco. Limited JOI/USSSP support is available to US participants.

The primary objectives of the meeting are to: (1) inform the scientific community about IODP drilling opportunities and requirements; (2) explore new geophysical techniques for site survey work; (3) examine the community's capability to take advantage of IODP opportunities; and (4) stimulate proposals for regional geophysical studies and site surveys. Participants will learn about riser drilling and anticipated site survey needs, including the data required to determine feasibility, address safety issues, and define drilling targets. The general science necessary for developing future drilling projects will also be discussed to generate feedback for the IODP interim Site Survey Panel and for proponents of IODP projects, as well as to inform US funding agencies about survey needs. The meeting's format will include presentations and discussion of drilling platforms, geophysical techniques, overviews of developing drilling projects, future funding, and other relevant topics.

For additional information visit: www.joiscience.org.

New Website Helps Predict Microbial Activity

contributed by Steven D'Hondt and Scott Rutherford

The Ocean Drilling Program (ODP) drillship *JOIDES Resolution* (*JR*) is unique in its ability to sample microbial life deep beneath the seafloor. Consequently, scientists who sail on the *JR* are well-positioned to tackle several fundamental and unresolved questions at the juncture of earth and life sciences: What is the extent and diversity of life in deep-sea sediments and oceanic crust? What are its environmental limits? What is the extent to which subsurface life is independent of Earth's surface? What are the effects of subseafloor microbes on global geochemical cycles?

Over the last three years, the ODP has improved the *JR*'s utility for studies of the subseafloor biosphere. Its drilling assembly has been modified to allow continuous drill-fluid contamination testing (Smith et al., 2000a, b). A fully equipped microbiology laboratory, principally funded by the US National Science Foundation (Teske et al., 1999), has been installed and used on multiple cruises. A separate radiotracer laboratory—for direct study of microbial activities immediately after core recovery—was also recently installed by the Science Operator. These science facilities render the *JR* an appropriate platform for routine microbiological studies of the subsurface biosphere. In effect, every ODP drilling leg is now a cruise of opportunity for microbiologists and biogeochemists.

HTTP://
DESCHUTES.GSO.URI.EDU/
SUBSURFACE

To help ODP's scientific proponents and cruise participants maximize their expeditions for studies of subsurface life, we have created a JOI/USSSP-sponsored website (http://deschutes.gso.uri.edu/subsurface). The website provides ready access to geochemical and geophysical information to help cruise participants assess the kinds of microbial communities and the levels and kinds of microbial activity that are likely to exist in marine sediments of different regions at different depths beneath the seafloor. The website is also intended to help cruise participants identify chemical species and geological regimes that should be examined in greater detail to more fully characterize the geochemical environment and activity of microbes in sediments throughout the world's ocean basins.

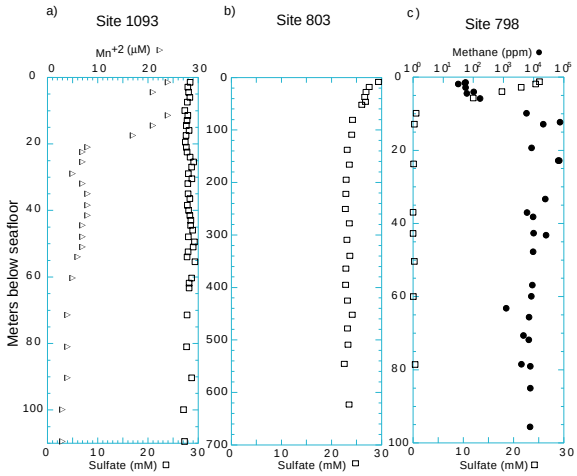


Fig 1: Representative profiles of some biologically affected chemical species: a) Mn^{+2} and SO_4^{-2} profiles from a very low-activity site, b) normal-activity open-ocean SO_4^{-2} profile, and c) ocean-margin SO_4^{-2} and CH_4 profiles.

The first section of the website is based on our compilation of porewater chemical data from Deep Sea Drilling Project (DSDP) Leg 1 through ODP Leg 182. These data may be used to predict burial depths and geographic regions in which specific microbial communities, such as communities with active sulfate reducers, MnO_2 reducers, methanogenic microbes, or anaerobic methanotrophs, can be most effectively targeted and recovered. Data included in this portion of the website include porewater concentrations of SO_4^{-2} and NO_3^- (electron acceptors) and dissolved manganese and iron (inferred to be products of MnO_2 and Fe-oxide reduction) (Fig. 1). The compiled data also include headspace concentrations of CH_4 (a product of methanogenesis and an electron donor). These biogeochemical data are presented in two forms on the website as profiles from individual sites, automatically drafted on demand, and in global maps that integrate data from the entire database. Some of these maps show

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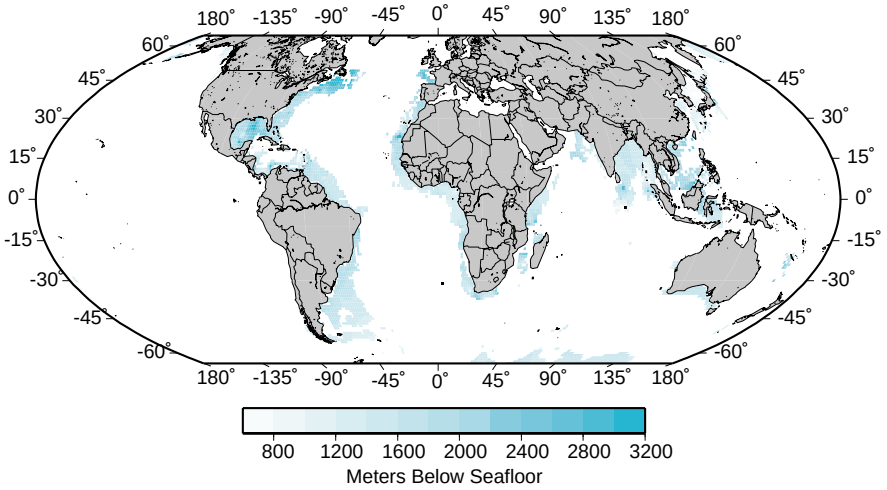


Fig. 2: Estimated depth beneath the seafloor of the 90°C isotherm in sediments.

ODP Basalts Reveal Geomagnetic Paleointensity

Peter Selkin
Ph.D. Institution: Scripps Institution of Oceanography, Univ. of California, San Diego
Faculty Advisor: Lisa Tauxe

While geomagnetic intensity records from DSDP-sampled basaltic glass were compiled at the end of that program, a comparable suite of ODP data long remained unanalyzed. My JOI/USSAC Ocean Drilling Fellowship research sought to fill that void. In addition to analyzing material from all basaltic glass-containing cores through ODP hole 1001, I re-evaluated paleointensity data from DSDP basaltic glass. The combined dataset (Selkin and Tauxe, 2000) more than doubled the number of reliable submarine basaltic glass paleointensity measurements previously available.

Why is basaltic glass an ideal material for paleointensity study? A rock-magnetic study by Pick and Tauxe (1994) showed the glassy rinds of submarine pillow basalts and sheet flows to contain low-Ti, single domain titanomagnetite. Chilled immediately upon extrusion, these rinds acquire a thermoremanence (TRM) at rates comparable to laboratory cooling times. In visibly fresh samples, the magnetic oxides are protected from alteration by the glass itself. Basaltic glass therefore satisfies many of the assumptions that underlie paleointensity experiments. Submarine glasses are superior to those in terrestrial settings because the oceanic crust is comparatively well-dated; timing is further refined by additional tools applied to ODP cores (e.g., biostratigraphy), so the ages of the paleointensities produced in this study are well constrained.

Techniques for estimating the absolute intensity of the ancient magnetic field are based on a simple idea: a population of single-domanin magnetic particles, when cooled below their blocking temperature, will become magnetized in proportion to the ambient magnetic field. The most rigorous paleointensity technique in common use is the stepwise double-heating method of Thellier and Thellier (1959) as modified by Coe (1967). Such an experiment consists of a series of double-heating steps, in which the specimens are heated first in a zero-magnetic-field oven and then in an oven with a known field. In-field steps from earlier in the experiment (so-called "pTRM-check") are periodically repeated to confirm that changes in the samples' magnetization are reversible and are not due to alteration during the experiment.

In order to examine long-term variations in geomagnetic intensity, our ODP basaltic glass results were combined with high-quality results from previously published studies, including paleointensities from DSDP basaltic glass (Juarez *et al.*, 1998) and reliable Thellier paleointensities (with pTRM checks; transitional polarities excluded) in the PINT99 database of Perrin *et al.* (1998). All of the data, averaged by age, are shown in Fig. 1. Strikingly, the long-term average magnetic dipole moment of the earth over the past 300 Myr is roughly 5×10^{22} Am^2, significantly smaller than at present (8×10^{22} Am^2). This mean value does not appear to vary with reversal rate; the distribution of paleointensity values during a period with few reversals (30 to 124 Ma) is statistically similar to that of a period with a high reversal frequency (0.3 to 30 Ma). The average dipole moment over the past 0.3 Ma is higher than the long-term average and more similar to the present value. On average, the 0-0.3 Ma data are spaced much more closely in time than are the 0.3-300 Ma data, so we believe that the 0-0.3 Ma data sample shorter-timescale variation in the geomagnetic field.

Paleomagnetists are developing the ability to characterize variations in the geomagnetic field on scales of hundreds of millions of years. These are the timescales of processes such as mantle convection that might be expected to affect the geodynamo. However, our knowledge of geomagnetic intensity diminishes as we look further into the past. Basaltic glasses from seafloor volcanic rocks may be an excellent reservoir of such information. Deep drilling is the only technique that allows us to sample the igneous portion of ancient ocean crust, making it one of the best sources of material for future paleointensity studies.

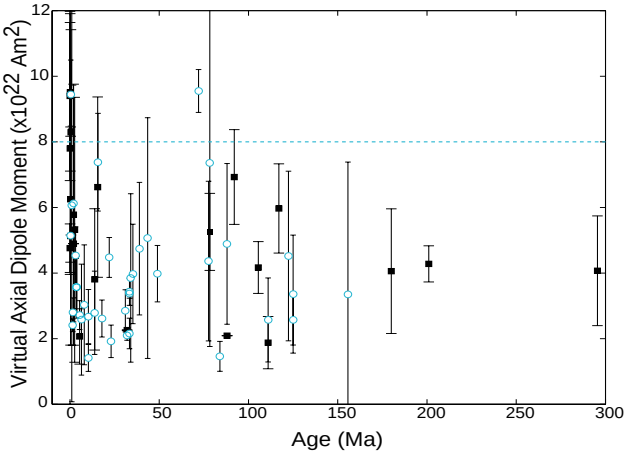


Fig. 1: Paleointensity variations (expressed in terms of Earth's dipole moment) with time from Selkin and Tauxe (2000). Mean values from each location are plotted with 2s error bars. Open symbols are from ODP/DSDP basaltic glass; filled symbols are selected data from the PINT99 database. The dotted line shows Earth's current dipole moment.

References:

Coe, R.S., *J. Geomagn. Geoelectr., 19*, 157-178, 1967.
Juarez, M.T., et al., *Nature, 394*, 878-881, 1998.
Perrin, M., et al., *Eos, 79*, 198, 1998.
Pick, T., and Tauxe, L., *Geophys. J. Int., 119*, 116-128, 1994.
Selkin, P. and Tauxe, L., *Phil. Trans. R. Soc. Lond. A, 358*, 1065-1088, 2000.
Thellier, E., and Thellier, O., *Ann. Geophys., 15*, 285-378, 1959.

MODELING PREDICTS CONTINENTAL SLOPE FLUID FLOW AND STABILITY

Brandon Dugan
Ph.D. Institution:
The Pennsylvania State University
Faculty Advisor:
Peter Flemings

The hydrodynamic system of continental margins controls fluid flow and seafloor stability. This system is influenced by sedimentation patterns, stratigraphic architecture, and fluid pressure. To characterize the hydrodynamics of the United States continental slope offshore New Jersey, I have analyzed physical property data from ODP Legs 150 (Sites 902, 903, 904) and 174A (Site 1073) and have simulated the slope system with a sedimentation-fluid flow model. Model results illuminate the impacts that temporal and spatial variations in sedimentation and permeability have on the flow field and on the stability of this passive continental margin. The analysis predicts that the modern New Jersey slope is stable and that its stability is increasing now that the margin is sediment-starved. The research has revitalized the hypothesis that fluid flow and overpressure drive slope failures and contribute to submarine canyon formation along continental margins (Johnson, 1939).

I use porosity data from ODP sites to document undercompaction, interpret *in situ* fluid pressure, and estimate stability for Miocene through Pleistocene sediments on the New Jersey continental slope. At ODP Site 1073, porosity is 65% at the sea floor and slowly decreases to 45% at 100 metres below sea floor (mbsf) (Fig. 1). Below 100 mbsf, compaction ceases and porosity fluctuates between 45% and 50%. The Miocene strata have a striking increase in porosity to values observed at the sea floor (Fig. 1). An exponential porosity-stress model (Rubey and Hubbert, 1959) predicts that the shallow sediments are hydrostatically pressured and that below 100 mbsf fluid pressure approaches the lithostatic stress. The high porosity Miocene strata are cemented, precluding a porosity-stress inversion; I interpret them to be in equilibrium with the overlying Pliocene sediments. I use the porosity-predicted fluid pressures with the infinite slope approximation to estimate seafloor stability (factor of safety, FS) at Site 1073. This approach compares the frictional forces resisting failure to the gravitational forces driving failure (Lambe and Whitman, 1979). Stable conditions (FS >1) are predicted for the modern slope (Fig. 1).

Combining physical property data with seismic stratigraphy, I constructed a forward model for the New Jersey slope with a permeable Miocene sandy silt aquifer that is rapidly loaded by low permeability Pleistocene silt and clay. The model successfully predicts the observed pressures and stability for the New Jersey continental slope (Fig. 1; Dugan and Flemings, 2000). The model also provides a tool to investigate pressure and stability evolution driven by pulses of rapid sedimentation that occurred during a Pleistocene sea-level lowstand. From the results, I interpret slope failure occurred along the New Jersey continental slope 0.5 million years ago when sedimentation rate was highest (>1 mm/yr at ODP Site 1073). The simulated instability is consistent with soft-sediment deformation and slumps observed in Pleistocene strata investigated by ODP Legs 150 and 174A. Stability of the New Jersey margin has increased since 0.3 Ma as sedimentation rate has decreased and overpressure is dissipating.

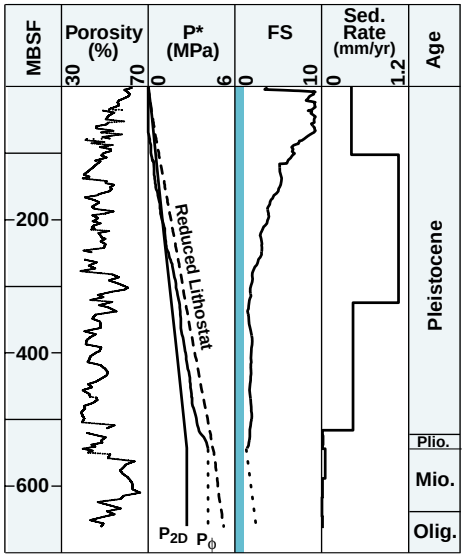


Fig. 1: Observations and interpretations from ODP Site 1073. Porosity was measured shipboard during Leg 174A. P* is overpressure predicted from porosity (P_ϕ) and the overpressure estimated from two-dimensional forward models (P_{2D}). Factor of safety (FS) is based on pressure from porosity and bulk physical properties; the green region represents instability.

Theoretical models and observations along the New Jersey slope identify sedimentation rate as a dominant factor affecting slope stability and describe flow focusing as a mechanism that drives failure on the middle and lower slope. The process-based model describes how lateral fluid flow in an asymmetrically-buried, permeable lens can significantly alter the regional hydrogeology and drive sediment failures. The model was developed for the New Jersey slope but is applicable to other rapidly loaded margins (e.g., Gulf of Mexico, Amazon Fan). This model can also be applied to other flow focusing failures such as those that occur in accretionary prisms and beneath glaciers.

REFERENCES

Dugan, B. and Flemings, P.B., *Science, 289*, 288-291, 2000.
Johnson, D.W., The Origin of Submarine Canyons: A Critical Review of Hypotheses, Columbia University Press, New York, 1939.
Lambe, T.W. and Whitman, R.V., Soil Mechanics SI Version, John Wiley & Sons, New York, 1979.
Rubey, W. and Hubbert, M., *GSA Bulletin, 70*, 167-205, 1959.

Conference on U.S. Participation (CUSP) in IODP Held June 2002

Activities continue full steam ahead in the transition to the Integrated Ocean Drilling Program (IODP), planned to begin October 1, 2003, immediately upon the close of the operational phase of the Ocean Drilling Program (ODP). I am confident that we are moving forward in creating this new program, driven by the strength of the community's scientific vision. The goal of this column is to highlight current advisory structure activities in the international framework related to IODP and, more specifically, United States Science Advisory Committee (USSAC) planning activities for defining US support principles, structures, and mechanisms in IODP.

The interim Science Advisory Structure (iSAS) for IODP continues to develop and expand. The iSAS parallels the familiar JOIDES Advisory Structure to the ODP in many ways, with an interim Planning Committee (iPC), two interim Science Steering and Evaluation Panels (iSSEPs), an interim Site Survey Panel (iSSP), an interim Scientific Measurements Panel (iSCiMP), and a recently formed interim Pollution Prevention and Safety Panel (iPPSP). Panel mandates, membership and other information are available on the iSAS website.

For iSAS Information: www.isas-office.jp/

In addition, several new panels without direct JOIDES equivalents are being crafted, including the interim Technology Advisory Panel (iTAP) and the interim Industrial Liasion Panel (iILP). The goal of iTAP is to map technology to science, and the iILP goal is to better promote ongoing communication and collaboration between IODP and selected industries. The mandates of both these new panels will be available on the iSAS website once they are finalized.

For IODP Information: www.iodp.org

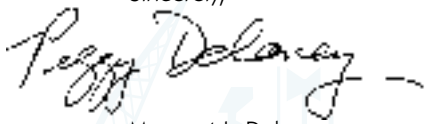
Although we are still in an interim advisory phase, IODP is underway in ways important to the scientific community. Because IODP will function as a proposal-driven program, the iSAS is now accepting proposals for IODP drilling. A significant new development in recent months is that the interim Planning Committee (iPC, or the SCICOM equivalent in iSAS) is authorized to rank Mission-Specific-Platform (MSP) drilling proposals at their August 2002 meeting in preparation for potential drilling expeditions in 2004. The iSSEPs reviewed all full MSP proposals in June 2002 and identified those that qualify as ready for ranking, and these are moving forward to iPC for ranking. The next proposal deadline, for the full range of platforms in IODP, is October 1, 2003. Proposals can be submitted on line, and preliminary proposals and letters of intent are welcome. Detailed guidelines can be found at the iSAS website. Further information about all phases of development of IODP can be found at www.iodp.org, including pictures of the January 18, 2002, launch of the *Chikyu*, the Japanese riser vessel for IODP.

My last column addressed the need for a strong national program to support U.S. participation in IODP. This requires considering scientific ocean drilling activities currently funded by the NSF and those funded by the United States Science Support Program (USSSP). The US Science Advisory Committee (USSAC) is in the process of preparing a report to the US National Science Foundation that will recommend the structure of a US support program for IODP and for drilling-related research (see John Farrell's article on page 1 of this newsletter for the specific charge for this report). To this end, USSAC sponsored the June 2002 Conference on US Participation in IODP (CUSP) to solicit input from the scientific community perspective on these issues. At CUSP, we had an invigorating and thought-provoking series of discussions over two and one-half days about topics including (a) program development and pre-platform activities, (b) platform participation needs, (c) post-platform activities, (d) education and outreach activities, and (e) publication. More information can be found at www.joiscience.org/USSSP/iodp, including background information related to the workshop and its goals. Most importantly at this stage, draft versions of the workshop report and an accompanying questionnaire will be available there for community review and comment during Summer 2002.

For CUSP Information: www.joi-odp.org/usssp/iodp

These are exciting and challenging times. I close by reminding you of the opportunities in the remaining expeditions of the ODP. Information about those legs and how to apply to sail can be found at www.oceandrilling.org. As always, I would be glad to hear your thoughts on any matters related to scientific ocean drilling.

Sincerely,



Margaret L. Delaney
Chair, USSAC

News and Views from NSF

contributed by J. Paul Dauphin, Program Director, NSF/ODP

Now that the final year of Ocean Drilling Program (ODP) operations on the *JOIDES Resolution* has been scheduled, and planning is on track for the Integrated Ocean Drilling Program (IODP) to be launched October 1, 2003, it is important to continue identifying and developing future scientific drilling objectives. This activity is essential if we are to have mature drilling proposals with robust scientific goals ready for drilling when the multiple IODP drilling platforms that we anticipate become available. It is particularly important to begin cultivating those objectives that will require deep drilling and/or the hole stability characteristics envisioned with riser drilling. These targets will undoubtedly require more thorough site characterization than what is required for non-riser drilling, which translates to significantly longer lead times.

The Ocean Drilling Program in the Division of Ocean Sciences at the National Science Foundation (NSF/ODP) encourages you to submit proposals that will lead to future drilling in IODP. It is our intent to support proposals selected for award at funding levels and duration adequate to accomplish their objectives. This is in keeping with NSF's response to the Government Performance and Results Act of 1993 (GPRA) of striving to increase average award levels and duration. NSF's performance plan for FY2003 (www.nsf.gov/od/gpra/start.htm) calls for increasing averaged annualized award sizes to $125,000 and durations of three years. Given adequate funding of the agency, these funding goals are scheduled to increase with time. NSF/ODP fully intends to strive for compliance of these goals.

To help identify what is required for site development of riser drilling programs, JOI/USSSP will be sponsoring a workshop to take place this fall. (See GeoSCAN ad on page 17.)

Position Opening

National Science Foundation,
Division of Ocean Sciences

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Associate Program Director/ Program Director, Marine Geology and Geophysics

Scientists with PhDs in paleontology or paleoceanography are strongly encouraged to apply.

This position will be filled on a visiting scientist, temporary, or IPA basis.

For application information:
www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=e20020095

For technical information:
Bill Haq (703-292-8580, bhaq@nsf.gov)

One of the intents of the workshop is to inform the U.S. scientific drilling community about the complexities of riser drilling and to stimulate the submission of proposals to NSF that will lead to riser drilling.

Regarding IODP planning, it is also important to note that at the January 2002 meeting of the International Working Group (IWG), the interim Planning Committee (iPC) was approved to rank Mission Specific Platform (MSP) proposals for drilling in 2004. Thus, interested IWG members may submit plans for providing platform operations. As of the most recent proposal deadline, 85 proposals have been submitted or transferred to the interim Science Advisory Structure (iSAS) office and at least 12 of these proposals would require the use of MSPs.

Since the previous newsletter, where we reported that Bruce Malfait was the acting head of the new Marine Geosciences Section in the Division of Ocean Sciences, Bruce has been officially selected to fill that position. A search has been underway to fill the Program Director position that has been vacated by Bruce's promotion and hopefully selection of a suitable candidate will occur soon.

A couple of other personnel matters in ODP: First, we are pleased to announce that Brad Clement, who came to us May 2001, from Florida International University as a visiting scientist, has extended his term at NSF for at least one more year; and that John Walter, from the National Oceanographic and Atmospheric Administration (NOAA), has joined us as a second visiting scientist/engineer. John will concentrate on IODP planning-specifically the acquisition of the non-riser drill ship.

NSF is presently engaged in reviewing the program plan for the final phase of ODP, which includes the final year of operations, FY 2003 and a phase-out period extending from FY 2004 to FY 2007. This review culminates with a request to the National Science Board in September 2002 for authorization to complete this last phase.

THE U.S. SCIENCE ADVISORY COMMITTEE

MEMBERS

Nathan Bangs *(term ends 9/30/04)*
Institute for Geophysics
The University of Texas at Austin
4412 Spicewood Springs Road, Bldg 600
Austin, TX 78759-8500
phone: (512) 471-0424; fax: (512) 471-8844
nathan@utig.ig.utexas.edu

Barbara Bekins* *(term ends 9/30/03)*
US Geological Survey
Mailstop 496
345 Middlefield Road
Menlo Park, CA 94025
phone: (650) 329-4691; fax: (650) 329-5590
babekins@usgs.gov

Timothy Bralower *(term ends 9/30/02)*
Department of Geology, CB#3315
University of North Carolina
Mitchell Hall, Room 107, South Columbia St.
Chapel Hill, NC 27599-3315
phone: (919) 962-0704; fax: (919) 966-4519
bralower@email.unc.edu

Margaret Delaney, Chair* *(term ends 9/30/02)*
Ocean Sciences Department
University of California, Santa Cruz
1156 High Street
Santa Cruz, CA 95064-1077
phone: (831) 459-4736; fax: (831) 459-4882
delaney@cats.ucsc.edu

Peter deMenocal *(term ends 9/30/03)*
Lamont-Doherty Earth Observatory
Columbia University
Palisades, NY 10964
phone: (845) 365-8483; fax: (845) 365-2312
peter@ldeo.columbia.edu

Earl Doyle *(term ends 9/30/04)*
13811 Placid Woods Court
Sugar Land, TX 77478-2658
phone: (281) 494-1037; fax: (281) 242-8774
ehdoyle@alltel.net

Jeffrey Gee* *(term ends 9/30/03)*
Geosciences Research Division-0220
Scripps Institution of Oceanography
University of California
LaJolla, CA 92093-0220
phone: (858) 534-4707; fax: (858) 534-0784
jsgee@ucsd.edu

Albert Hine* *(term ends 9/30/04)*
College of Marine Science
University of South Florida
St. Petersburg, FL 33701
phone: (727) 553-1161; fax: (727) 553-1189
hine@seas.marine.usf.edu

Jonathan Martin *(term ends 9/30/02)*
Department of Geology
University of Florida
P.O. Box 112120
241 Williamson Hall
Gainesville, FL 32611-2120
phone: (352) 392-6219; fax: (352) 392-9294
jmartin@geology.ufl.edu

Tommy Phelps *(term ends 9/30/02)*
Environmental Sciences Division
Oak Ridge National Laboratory
P.O. Box 2008-6036
Oak Ridge, TN 37831-6036
phone: (865) 574-7290; fax: (865) 576-8543
tkp@ornl.gov

Warren Prell* *(term ends 9/30/03)*
Department of Geological Sciences
Brown University
324 Brook Street, Box 1846
Providence, RI 02912
phone: (401) 863-3221; fax: (401) 863-2058
warren_prell@brown.edu

Carolyn Ruppel *(term ends 9/30/03)*
School of Earth and Atmospheric Sciences
Georgia Institute of Technology
221 Bobby Dodd Way
Atlanta, GA 30332-0340
phone: (404) 894-0231; fax: (404) 894-5638
cdr@piedmont.eas.gatech.edu

John Sinton *(term ends 9/30/02)*
Department of Geology and Geophysics
University of Hawaii
1680 East-West Road
Honolulu, HI 96822
phone: (808) 956-7751; fax: (808) 956-5512
sinton@soest.hawaii.edu

Deborah Smith *(term ends 9/30/02)*
Department of Geology and Geophysics, MS 22
Woods Hole Oceanographic Institution
266 Woods Hole Road
Woods Hole, MA 02543
phone: (508) 289-2472; fax: (508) 457-2187
dsmith@whoi.edu

Ellen Thomas *(term ends 9/30/04)*
Department of Earth and Environmental Sciences
Wesleyan University
265 Church Street
Middletown, CT 06459-0139
phone: (860) 685-2238; fax: (860) 685-3651
ethomas@wesleyan.edu

Membership term is three years.
*USSAC Executive Committee

LIAISONS

J. Paul Dauphin
Program Director, ODP
National Science Foundation
4201 Wilson Boulevard, Room 725
Arlington, VA 22230
phone: (703) 292-8581; fax: (703) 292-9085
jdauphin@nsf.gov

Thomas Davies
Manager, Science Services
Ocean Drilling Program, Texas A&M University
1000 Discovery Drive
College Station, TX 77845-9547
phone: (979) 862-2283; fax: (979) 845-0876
davies@odpemail.tamu.edu

John Farrell
Program Director, JOI/USSSP
Joint Oceanographic Institutions
1755 Massachusetts Avenue, NW, Suite 700
Washington, DC 20036-2102
phone: (202) 232-3900 x211; fax: (202) 462-8754
jfarrell@joiscience.org

JOI/USSAC NEWSLETTER

Executive Editor: John Farrell
Managing Editor: Andrea Johnson
Assistant Editor: Christina Riesselman

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JOI/USSAC NEWSLETTER

Joint Oceanographic Institutions
1755 Massachusetts Avenue, NW, Suite 700
Washington, DC 20036-2102 USA

NEW WEBSITE, CONTINUED FROM PAGE 18

the global distribution of ODP and DSDP sites where concentrations of the individual chemical species were measured in porewater samples. Additional SO_4^{-2} and CH_4 maps exhibit global patterns of edited concentration data (D'Hondt et al., 2002).

The second section of the website contains our estimates of the subseafloor depths of several microbiologically important isotherms in deep-sea sediments throughout the world. These estimates are based on a global compilation of heat-flow data from geophysical ocean surveys (Pollack et al., 1993) and global estimates of marine sediment thickness (Divins and Eakins, in preparation; Divins and Rabinowitz, 1991; Hayes and LaBrecque, 1991; Ludwig and Houtz, 1979; Mathhias et al., 1988). Because there are distinct temperature limits for different microbial classes, estimates of subsurface temperatures may be useful for identifying drilling targets of special microbiological interest. For example, they may be used to predict geographic regions and sediment depths where active microbial communities in deep-sea sediments might be mesophilic, thermophilic, or hyperthermophilic. They might also be used to inform the search for anaerobic communities strongly supported by chemolithotrophy and the search for the upper thermal limit to life in deeply buried deep-sea sediments. Toward these ends, the website contains global maps of estimated sediment depths for several isotherms that may be useful for studies of subseafloor microbial communities (30°C, 60°C, 90°C, and 120°C isotherms) (Fig. 2).

We hope that this website serves, however modestly, to help ocean-drilling scientists refine their plans for exploration of the subseafloor biosphere.

THE AUTHORS

Steven D'Hondt, Professor, and Scott Rutherford, Post-doctoral Scientist, are at the Graduate School of Oceanography, University of Rhode Island.

REFERENCES

D'Hondt, S., S. Rutherford, and A.J. Spivack, *Science*, 295, 2067-2070, 2002.

Divins, D.L., and B. Eakins, Total Sediment Thickness Map for the Southeast Pacific Ocean. International Geological-Geophysical Atlas of the Pacific Ocean, in preparation.

Divins, D.L., and P.D. Rabinowitz, Total sediment thickness map for the South Atlantic Ocean, in International Geological and Geophysical Atlas of the Atlantic and Pacific Oceans (GAPA), pp. 147-148, Intergovernmental Oceanographic Commission, 1991.

Hayes, D.E., and J.L. LaBrecque, Sediment Isopachs: Circum-Antarctic to 30S, in Marine Geological and Geophysical Atlas of the Circum-Antarctic to 30S, p. 29-33, American Geophys. Union, Washington, D.C., 1991.

Ludwig, W.J., and R.E. Houtz, Isopach Map of the Sediments in the Pacific Ocean Basin, color map with text, Am. Assoc. Pet. Geol., Tulsa, OK., 1979.

Mathhias, P.K., et al., Sediment Thickness map of the Indian Ocean, Map 505, Am. Assoc. Pet. Geol., Tulsa, OK., 1988.

Pollack, H.N., et al., Heat Flow from the Earth's Interior: Analysis of the Global Data Set, *Reviews of Geophysics 31(3)*, 267-280, 1993.

Smith, D.C., A.J. Spivack, M.R. Fisk, S.A. Haveman, H. Staudigel and ODP Shipboard Science Party. ODP Technical Note 28, 19 p, 2000a.

Smith, D.C., et al., *Geomicrobiology Journal, 17*, 207-219, 2000b.

Teske, A.P., et al., 1999. Development of an Interdisciplinary Program for Deep-Biosphere Research on the Ocean Drillship *JOIDES Resolution*. NSF-LExEn Proposal 9978310.