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Collaborative Visualization in Earth and Ocean Sciences

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Is your PowerPoint presentation a bit flat? Worse yet, has your latest image of Earth structure left your audience adrift? Increasingly, the near exponential growth in the number and size of datasets over the past decade has placed an unfair burden on the geoscientist to integrate disparate data streams seamlessly into a coherent picture. The number-crunching aspects of these problems can be overcome through access to the latest supercomputers, but typically only a few investigators can interact with these small screen images at any one time, limiting their usefulness. To overcome this, new visualization technologies have been developed to immerse users into a virtual world by projecting three-dimensional images onto wall-sized cylindrical screens (Figure 1). These systems allow users to combine and explore data and images in innovative ways and are greatly

enhancing scientists' ability to visualize, understand and collaborate on complex datasets.

On March 4th, 2002, Scripps Institution of Oceanography (SIO), San Diego State University (SDSU), and the California Institute for Telecommunications and Information Technology (Cal-(IT)²) along with four California-based companies unveiled the world's first visualization complex dedicated to the Earth and Ocean Sciences. Linked by a 2.4 gigabit-per-second optical network, SIO's Visualization Center and SDSU's Center for Immersive Telecommunications for Global Exchange will empower scientists to collaborate in real-time on large 3-D datasets. Using the networked SIO/SDSU visualization centers, groups of researchers at both institutions are able to send and receive data and images simultaneously, and collaborate on analyzing:

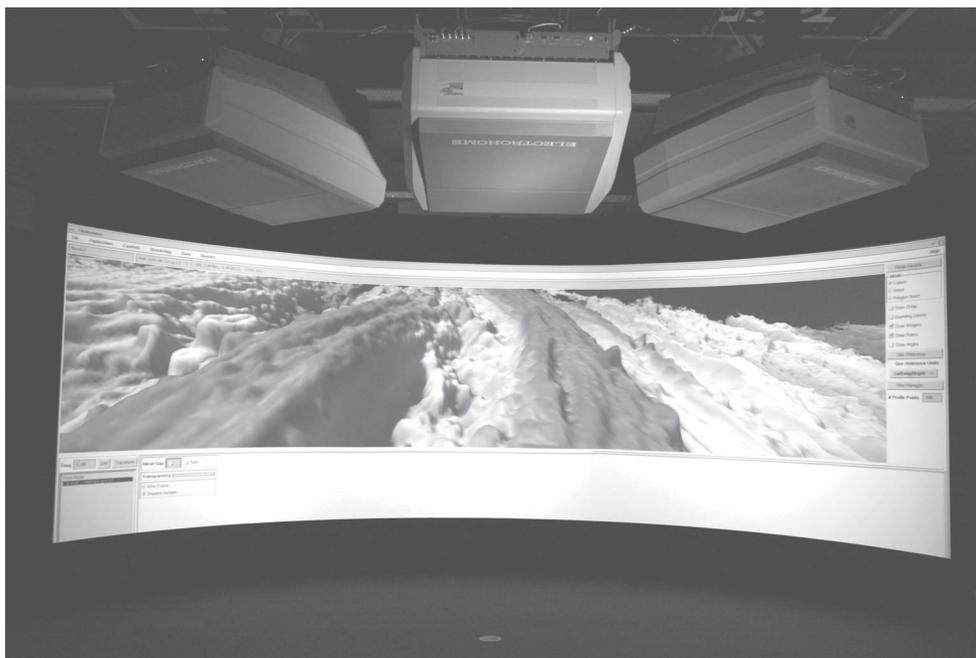


Figure 1. View of the Panoram® cylindrical screen (8'6"x28'4") and three Digital Christie® projectors. Bathymetry of the 9°03'N overlapping spreading center at the East Pacific Rise is displayed using Interactive Visualization Systems' Fledermaus, which enables disparate data types to be simultaneously displayed (e.g. bathymetry, seismic profiles, seafloor imagery, fault scarps, and earthquakes locations to name a few)



Figure 2. View of the Los Angeles Basin in stereo 3-D, highlighting SRTM topography, fault-lines, and earthquake locations.

- Real-time seismic and climate data along the high-tech California coastline
- Earth structure, including its oceans and atmosphere
- Impact of global warming on Earth's climate
- Fault-related deformation and its correlation with earthquake locations
- Structure and dynamics of coastlines
- Real-time hazard analyses to assist emergency response teams
- Detailed planetary topography (e.g. Mars)

The Visualization Center at Scripps (<http://siovizcenter.ucsd.edu>) is built around a Panoram® GVR-120E curved floor-to-ceiling screen (8'6"x28'4") featuring 3.2 megapixel resolution (3,276, 800 pixels). This immersive environment is ideal for groups of up to 60 people who can view these large-format images at the same time. The system is equipped with transmitters and LCD shutter glasses (Figure 2) which permit stereographic 3-D viewing of high-resolution images. The three projectors use advanced technology to automatically blend the edges where their video outputs meet. The Infinite Reality graphics subsystem is driven by a single-pipe SGI® Onyx® 3400 with a

system bandwidth of 44 GBps. The Onyx® is powered by 16 MIPS® R12K processors and 16 GB of addressable memory. The Panoram® visualization system enables simultaneous display of video and audio streams; video and audio sources include the SGI® megadesktop and stereo megadesktop, S-VHS video, DVD video, and video from a Macintosh® or PC.

For instance, one-third of the screen might be displaying S-VHS video from a remotely-operated-vehicle (ROV), while the remaining portion of the screen can be used for an interactive 3-D flight over same parcel of seafloor. The video and audio combinations using this system are numerous! The two centers are linked via Cox® Communications' 44-mile, 2.4 gigabit-per-second optical-fiber network. Networking of the two visualization centers is facilitated by TeraBurst Networks' WAVS® (Wide Area Visualization Solution), based on a high-performance, optical networking platform (OC-48) to enable transmission of massive amounts of data between multiple locations. This is the only technology available that enables video, audio, and data to be transmitted simultaneously over a wide-area optical network to geographically distributed centers.

These two centers for visualization have already had a great impact on our Earth and Ocean Sciences community. Future collaborations at the center are likely to include, to name but a few, strategizing ships tracks for experiments, location of instruments at Integrated Study Sites (RIDGE 2K) or within Focus Sites (MARGINS), and selection of IODP drill-sites. Visualization software packages now available include: Interactive Visualization Systems' Fledermaus and Data Magic; Paradigm Geophysical's Focus 3-D, VoxelGeo and GeoDepth 3-D; IBM Data Explorer's, OpenDX; NCAR's Vis5D; ESRI's ArcView and ArcInfo; and Mathwork's MATLAB.

Graham Kent is Director of the Scripps Visualization Center; Debi Kilb is Science Director of the center; John Orcutt is Director of the Cecil H. and Ida M. Green Institute of Geophysics and Planetary Physics; Eric Frost is Director of the Center for Immersive Telecommunications for Global Exchange. To check on availability and to schedule the facility, please contact Kitty Haak, (e-mail: khaak@ucsd.edu, phone: (858) 534-0229).



Nicaragua/Costa Rica Marine Geophysics Update

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In May and June 2000, a cruise with the R/V Ewing acquired a variety of geophysical data along the Pacific margins of Nicaragua and northernmost Costa Rica in support of the MARGINS Central America focused research. This was chosen as a focus area for both the Seismogenic Zone and Subduction Factory initiatives in part due to the variations in seismogenic and geochemical characteristics from Nicaragua through Costa Rica, which could be compared and contrasted along a contiguous convergent margin with a common subducting plate.

At the time of our cruise, extensive marine geophysical data had been acquired along the Middle America trench and forearc offshore Costa Rica, but MCS data offshore Nicaragua were largely limited to petroleum industry seismic profiles spanning the broad continental shelf and a single, '70s-vintage MCS profile (UTIG NIC-1) crossing the forearc and trench. In the '90s investigators from GEOMAR, Kiel, Germany acquired several wide-angle seismic profiles, including an onshore/offshore dip transect along NIC-1, and an area of swath bathymetry covering much of the trench and a block of the slope off Nicaragua. With the motivation to identify causes of the observed variability throughout the focus area, it became clear that new MCS data were desperately needed offshore Nicaragua as well as contiguous swath bathymetry coverage.

Our survey focused on seismic data acquisition, and we acquired more than 2800 km of 240 channel MCS data and ~580 km of wide-angle seismic data (Figure 1). The wide-angle data were recorded by ocean bottom hydrophone instruments (OBHs), supplied and operated by collaborating researchers from GEOMAR, and by land instruments supplied by PASSCAL and ETH (Zurich, Switzerland) operated by participants from University

of Texas Institute for Geophysics (UTIG), ETH, and INETER (Managua, Nicaragua). The wide-angle data set includes 16+ successful land deployments on two onshore/offshore transects and 39 successful OBH deployments on these two transects and a marine-only strike profile. In addition to acquiring the seismic data, we expanded the swath bathymetry mapping to achieve essentially contiguous coverage in the trench and slope areas

from Costa Rica to Nicaragua, and we mapped areas significantly farther north-west along the trench. We also added important gravity and magnetic coverage across the shelf and trench slope.

At this time (April 2002), conventional (MCS) seismic processing is largely complete, and we have started using pre-stack (time and depth) imaging techniques to improve the reflection images and provide true geometry at shallow to

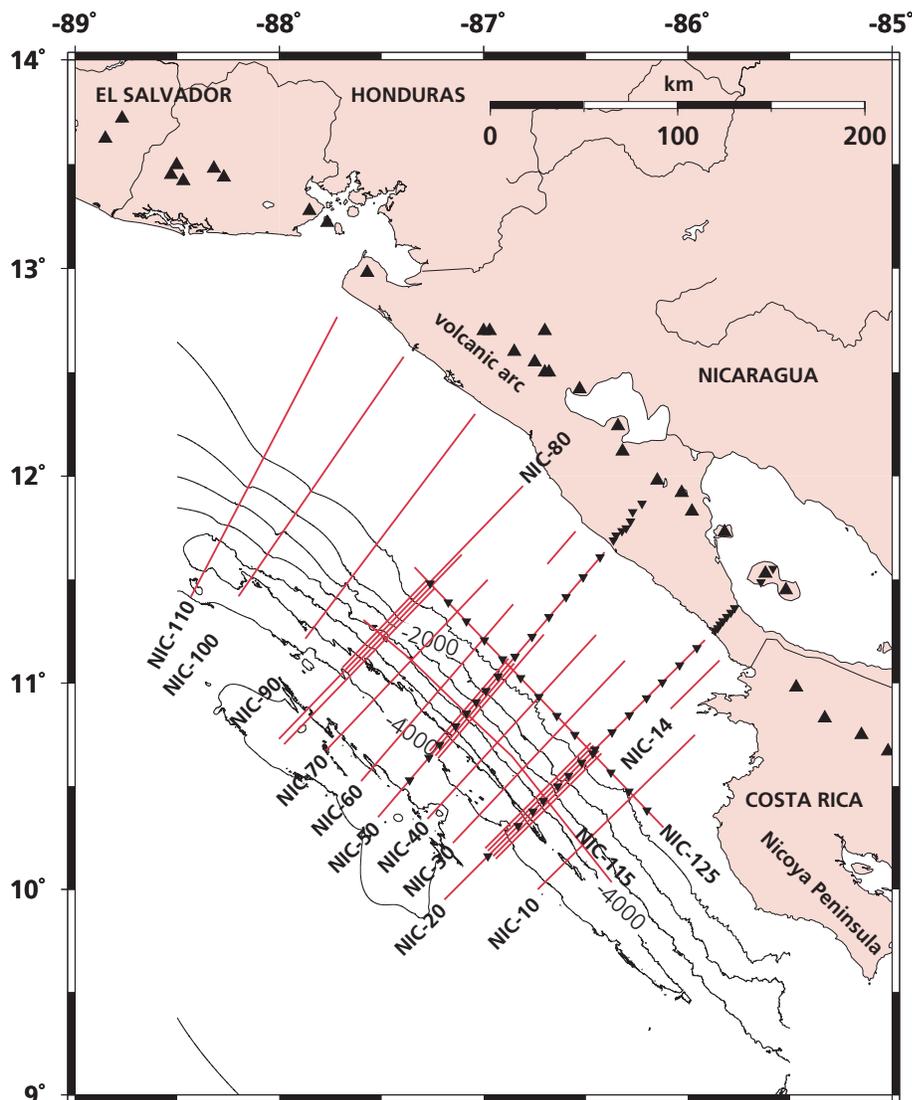


Figure 1. Map showing location of our survey. Includes bathymetric contours, line locations, OBH and land instrument locations, and position of the Central America volcanic arc.

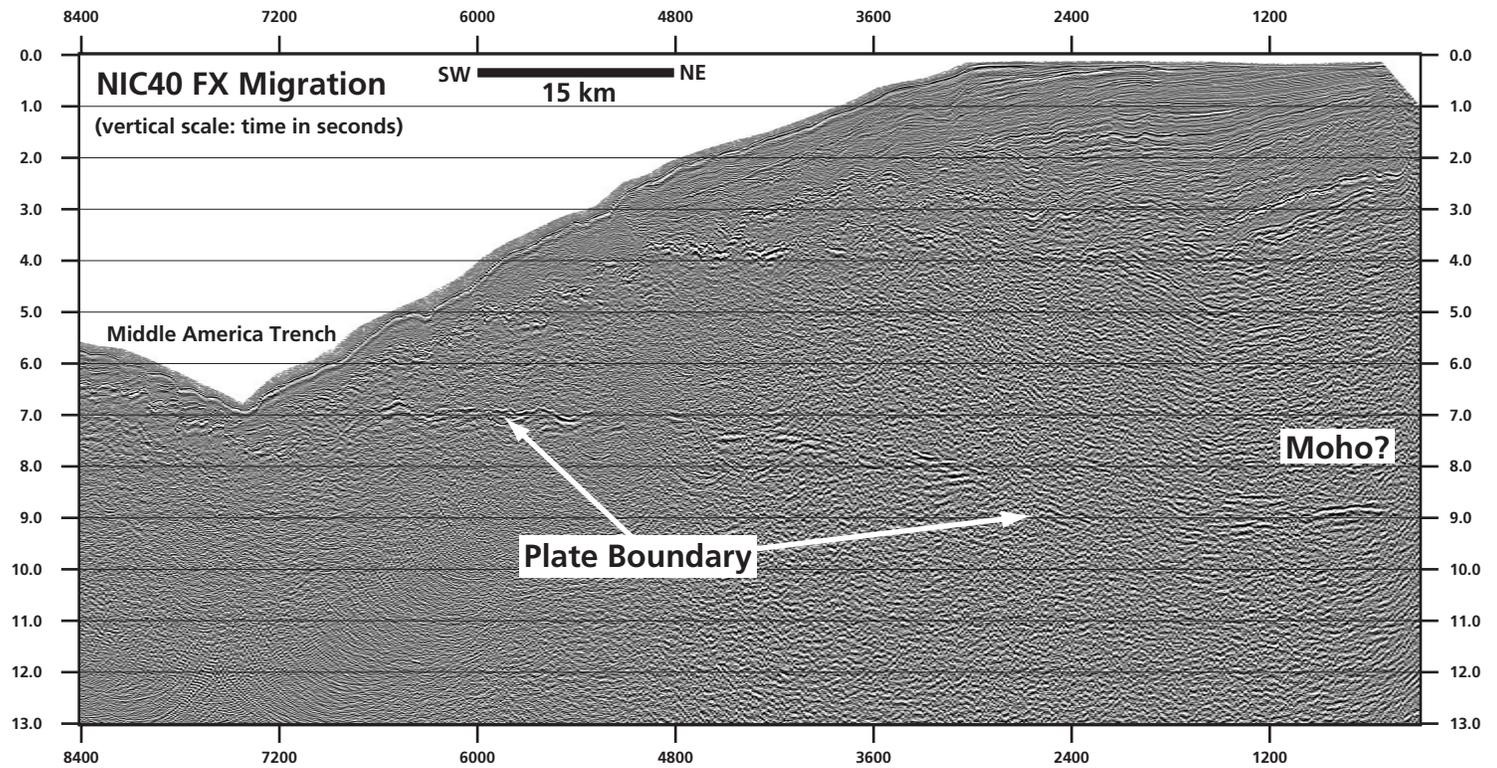


Figure 2. Landward portion of line NIC-40 showing deep reflections marking the Cocos/Caribbean plate boundary and possible base of upper plate crust (Moho).

intermediate depths. We have also developed preliminary velocity models using the wide-angle data sets, which provide a crustal scale perspective of the margin. In the following sections we briefly describe some of the preliminary results of the project. Our objective is to share our preliminary results with the MARGINS community, indicate where we are headed with our research, and stimulate future research, which may be aided by this data set and our results.

Deep Structure

In general, the seismic data exceeded our expectations in depth of reflection penetration and in offset distance of interpretable wide-angle data. On most reflection profiles we image the Cocos/Caribbean plate boundary to depths of at least 20 km and in some cases to greater than 40 km. This means that on at least the six longest profiles we probably image the plate boundary throughout the limits of seismogenic rupture. In addition, some profiles (Figure 2) feature prominent deep reflections above the plate boundary that probably mark the base of the upper plate crust. Our preliminary wide-

angle velocity analysis supports this interpretation, but it has not yet been rigorously confirmed. Ultimately, by knowing the accurate positions of the plate boundary and upper plate Moho, we intend to examine whether the down-dip limit of the interplate seismogenic zone coincides with the intersection of these boundaries as postulated (e.g., one of the controlling factors indicated by Oleskevich et al., 1999 — the other being temperature).

Cocos Plate/Lower Slope Structure

Among the primary objectives of our project is to examine the structural development of the Cocos Plate as it bends into the Middle America trench, and the effects these lower plate structures have on sediment subduction and on deformation of the upper plate. To this end, we filled in many gaps and extended the swath bathymetric coverage previously obtained by GEOMAR. Two of the interesting observations that were suggested by the GEOMAR data set and confirmed with the expanded data set and seismic profiles are that there is a substantial increase in the number of sea-

mounts from offshore Northern Costa Rica to Nicaragua and that the faulting related to plate bending is almost exclusively down to the trench. This fault pattern leads to distinctive half-graben formation with blocks frequently rotated back $\sim 5^\circ$ (i.e. away from the trench) de-

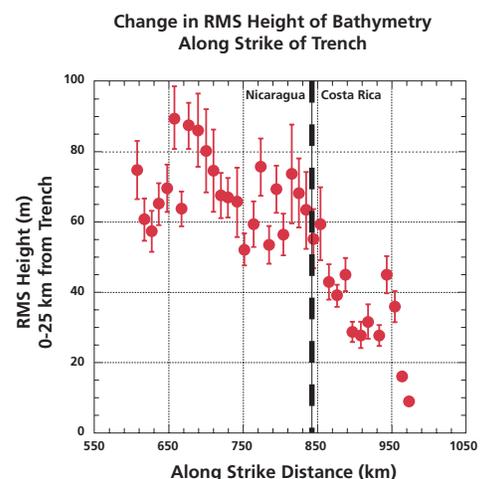


Figure 3. RMS height variation of Cocos plate bathymetry along the Middle America Trench from Nicaragua to northern Costa Rica. This figure demonstrates a clear peak in the magnitude of fault-related bathymetric offsets off central Nicaragua and a precipitous decrease into the area off Costa Rica.

spite the overall bending into the trench, which has a relief of > 2 km and an average seafloor dip near 5° into the trench axis off central Nicaragua. We are performing statistical analyses of the bathymetric data using an automated computer code, which characterizes the orientation and magnitude of bathymetric features. This work, with calibration from the MCS data, documents that the throw on the trenchward dipping normal faults on the Cocos Plate decreases dramatically along strike from central Nicaragua to the trench off the central Nicoya Peninsula (Figure 3). It is possibly significant that this pattern is quite similar to the pattern of geochemical sediment subduction tracers directly landward along the Central America volcanic arc. At this point we can speculate that the fault structure of the Cocos plate leads to very efficient sediment subduction beneath central Nicaragua, but we are working to more rigorously establish whether this is more than an apparent relationship.

One of the related tasks of examining the variability of sediment subduction is to create the best possible images of the subducting half-grabens with the MCS data. This is a particularly difficult problem due to relatively high-velocity material (3–4 km/s) in the upper plate that extends essentially to the trench, creating a velocity inversion as it overrides the subducting sedimentary section. We have started to depth-migrate the MCS data before stack to compensate for these imaging problems. One of our first results using prestack depth imaging is shown in Figure 4. Although the image deteriorates with depth due to loss of high frequencies, we can see that the half-graben structures are subducted intact beneath the lower slope, and there is no indication in the image or the derived velocity model that significant sediment has been accreted to the upper plate. On the contrary, there is strong evidence throughout the data set that the half-graben structures, with surface scarps to at least 500 m, and the numerous subducting seamounts seriously deform the margin wedge below the trench slope, leading to partial collapse and probable tectonic erosion.

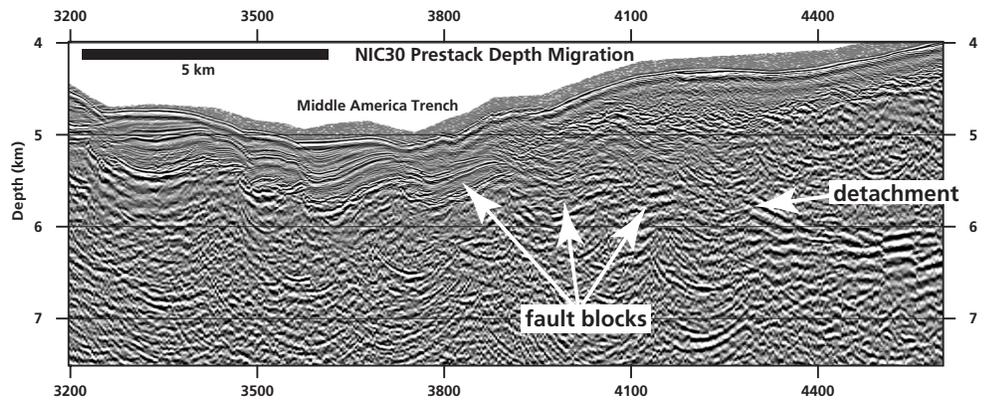


Figure 4. Seismic image of line NIC30 across the trench and lower slope produced by prestack depth migration. This image illustrates the back-rotated fault blocks as they enter the trench and shows that they remain intact as they are thrust beneath the lower slope.

Sandino Forearc Basin

The Sandino forearc basin underlies the shelf offshore the full length of Nicaragua. The basin's sedimentary thickness varies from ~4–5 km at the southeastern end of our survey area to an incredible ~15 km at the northwestern end. Near the coast, and extending onshore, the basin sedimentary section is deformed in compressional and/or transpressional structures along a 10–30 km wide (in the offshore), coast-parallel swath. In contrast, in the seaward portion of the basin, and continuing to the trench slope, the deformation is extensional with both seaward and landward dipping normal faults common. One of the significant observations that we have been able to make on some MCS profiles across the Sandino Basin is that clinoforms, indicative of paleoshelf edge positions, seem to have kept a relatively stable position, compared to the current coastline, since ~ Middle Miocene (age based on the seismic units of Ranero et al., 2000). Continued slow subsidence, probably due to a combination of factors including subduction erosion, trench rollback, and/or gradually steeper

slab position, has allowed preservation of these strata and suggests that radical changes in the trench-forearc system have not occurred over this time. This will be a particularly important area for additional study and for comparison with some of the Costa Rican segments of the margin where subduction erosion is documented (von Huene et al., 2000).

Future Plans

We plan to continue working in the areas described here, focusing on deep reflections, structure of the Cocos Plate and its possible influence on sediment subduction, and imaging the lower slope. We plan also to improve our images in the deformed parts of the Sandino basin and our seismic stratigraphic interpretation across the basin to better document the tectonic development of the region. Ultimately, we will identify and study the key differences and similarities along the length of the Costa Rica/Nicaragua convergent margin.

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From the Chairman's Desk: Spring 2002

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The MARGINS Program continues to grow and has become a viable force in the Earth Science community. The number of funded projects continues to grow and the more advanced initiatives (SEIZE and SubFac) are in the process of creating proposals for IODP riser drilling (e.g. Nankai and Osa peninsula). During 2001-2002, Source-to-Sink joined the other initiatives with the funding of research in the New Guinea focus site.

The MARGINS Office has been and remains very busy in assisting principal investigators in setting up the budgets for workshops and theoretical institutes in addition to organizing AGU town meetings and pending workshops (e.g. the IBM workshop in Hawaii). Significant effort has also been expended on working with Saudi and Egyptian organizations to prepare onshore and offshore proposals for the RCL Gulf of Suez/northern Red Sea focus site. The diplomatic and logistic challenge of working in the Gulf of Suez/northern Red Sea region is significant but progress is being made. Presenting the theme and objectives of the U.S. MARGINS Program at Middle Eastern geological meetings (e.g. Bahrain in April and the Cairo AAPG meeting in October) has and should help tremendously.

Budget issues

The 2001-2002 MARGINS fiscal year has seen the establishment of a data policy and a fellowship scheme. Deadlines for fellowship applications are the same as the MARGINS proposal deadline, 1 November in each year.

In terms of the MARGINS budget, a troubling trend is that, even given the continuing successes of the MARGINS Program involving both NSF-EAR and NSF-OCE/ODP communities, the low level of financial support for MARGINS is

disproportionate to the program's growing importance, national and international image, and success. Equal fiscal participation by all three NSF divisions is absolutely critical to the success of the MARGINS Program with the present internal funding arrangement beginning to compromise the ability of the program to work effectively. It is thus hoped that NSF will see its way to increase significantly the MARGINS budget in the next (and subsequent) fiscal year(s).

As can be seen from the table below, the rate of funding is at a standstill and significantly below original expectations.

The present funding level is particularly disappointing, especially as the international phase of MARGINS negotia-

| | FY98 Award | FY99 Award | FY00 Award | FY01 Award | FY02 Award |
|--------------|------------------|------------------|------------------|------------------|------------------|
| MARGINS | 250,197 | 2,856,521 | 2,877,373 | 5,603,987 | 4,133,038 |
| *margins | 2,806,185 | 1,802,176 | 2,771,639 | 2,126,256 | 499,339 |
| Total | 3,056,382 | 4,658,697 | 5,649,012 | 7,730,243 | 4,632,377 |

Table 1. MARGINS Budget numbers for the fiscal years 1998-2002. "MARGINS" are proposals reviewed by an NSF-MARGINS panel, whereas "*margins" represents funding of margins-related projects independent of the MARGINS Panel.

tions is at a sensitive and crucial stage in project planning and ship operation, and facility costs related to field programs are absorbing precious research funds. If the MARGINS Program has any hope of achieving the fundamental objectives outlined through a host of community workshops and as summarized in the various science plans, there needs to be a marked increase in the MARGINS budget.

Organization of MARGINS

The MARGINS Office routinely fields questions about Steering Committee membership and possible conflicts of interest between Steering Committee members, the NSF-MARGINS Panel and the funding of proposals. Perhaps it is timely to discuss these issues and provide feedback to the community (Figure 1):

THE NSF-MARGINS REVIEW PANEL comprises 6 individuals, on average, and the membership changes dramatically for each session. Because of an obvious conflict of interest, absolutely no member of the MARGINS Steering Committee (including the chair) is allowed to sit on the Panel or even knows the composition of the Panel (until the steering committee meeting months later).

Following the NSF-MARGINS proposal deadline on the 1 November, the Panel convenes in February for its deliberations. The date of the Spring MARGINS Steering Committee meeting is selected only after proponents have been informed about the status of their proposal. Thus, no feedback can occur between the

recommendations of the Panel and the deliberations of the MARGINS Steering Committee.

The objectives of the Spring steering committee meeting are to review, with the program managers, the direction/balance of the program following the last round of successful

funding and to recognize if critical areas are being neglected and why. Sometimes also, a proposal that is critical to MARGINS falls through the cracks and the committee is in a position to help identify such proposals.

Finally, it should always be remembered that active researchers working on the cutting-edge of MARGINS problems will likely serve, at some time, on the steering committee. Their research does not cease because of their committee membership and thus it should be no surprise that members on the committee may also successfully field NSF-MARGINS proposals.

The timing of the Fall Steering Committee meeting is selected in order to help with the planning of AGU town meetings and special sessions.

THE MARGINS STEERING COMMITTEE comprises 15 members who serve a three year term, on average. The committee meets twice a year (Spring and Fall) and their work involves the preparation of white papers and workshop proposals, review the progress of the program according to the various science plans and feedback from program managers, help promote the MARGINS program in the scientific community, and provide advice and feedback to NSF program managers and the MARGINS chair concerning issues and problems that arise during the execution of the program. Each steering committee member is expected to work actively to promote MARGINS in their respective community by recognizing the need for, and theme of

ered for the steering committee chair), and 2) there cannot be institutional duplication by committee members. Expertise on the committee is arranged to cover the generalities of each of the initiatives and focus sites, if at all possible.

I would like to take this opportunity to thank the following members, whose terms finished in either Fall 2001 or Spring 2002, for their unselfish contribution of time and effort to the steering committee and the Earth Science community: Susan Debari, William Dietrich, Simon Klemperer, Chuck Nittrouer, and Brian Taylor. Susan provided the committee valuable advice regarding outreach and education issues while Bill and Chuck invested a huge effort in organiz-

Scott Linneman, Anne Meltzer, John Milliman, Rudy Slingerland and Patricia Wiberg. Scott brings to the committee expertise and knowledge concerning education and outreach issues. Anne Meltzer, through her ties with the Earthscope community, brings a major perspective from the IRIS and Earthscope programs at a time when liaisons with these groups are particularly important. Likewise, Pat, John and Rudy, whose collective expertise ranges across storm-driven transport and the formation of sedimentary strata on the continental shelf, the long-term generation of the stratigraphic record, carbonate depositions systems, quantitative terrestrial geomorphology and sedimentology, are in the position to provide valuable insights into enacting the objectives of the Source-to-Sink initiative.

Finally, I feel it is important to remind MARGINS researchers interested in submitting proposals for work in New Guinea, New Zealand, Mexico and the northern Red Sea that it is crucial to involve local collaborators, researchers and/or students, in the proposal process. In fact, foreign collaboration is a prerequisite for MARGINS funding in foreign focus sites. While NSF does not directly provide for the salaries or travel costs of foreign collaborators, it does so in case of "unique expertise or other circumstances where research support can not be provided by any other means" (i.e. the U.S.-supported research effort cannot be accomplished otherwise). It is suggested that principal investigators include sufficient funds in their proposals to help fund participation by foreign researchers and students in fieldwork, short-term research visits (3-6 months), and tuition fees for foreign students to attend U.S. universities.

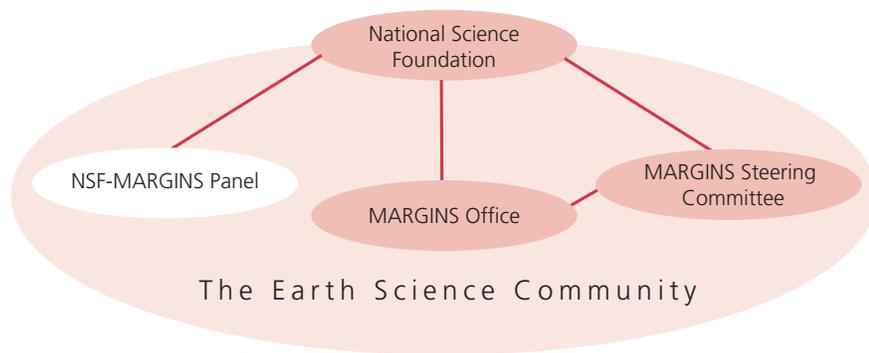


Figure 1. The components of the MARGINS Program and their interrelationships. The Earth Science Community is the fundament of MARGINS. The review panel is selected by the NSF within the community. The Office functions as a point of contact, organizer, and general information center.

workshops and/or theoretical institutes, and to work with their community to prepare the necessary proposals.

Every semester, two people rotate off the committee. Nomination to the committee is either via self nomination, or nominations from the community following a "Call for Nominations" distributed every six months by the MARGINS Office, or via recommendations made by retiring committee members. MARGINS has long adopted a policy with respect to committee membership in order for the committee to remain balanced, dynamic and unbiased: 1) once a person has served on the steering committee, they cannot re-serve (unless they are being consid-

ing the many Source-to-Sink workshops, town meetings and the preparation of seemingly endless Science Plan and Executive Summary drafts and rewrites. Simon is thanked for his help and effectiveness in rewriting the MARGINS data policy and fellowship statements. Brian's contribution is profound given his pivotal role in rescuing the MARGINS Program five years ago and aggressively securing a funding base from NSF. All members are thanked for their sound judgment and advice during the deliberation of a range of committee and community issues.

In turn, I welcome the following new members onto the steering committee:

Workshop on development of a Community Sediment Model

James P. Syvitski¹, Chris Paola², and Rudy Slingerland³

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Quantitative modeling of the dynamics of the Earth's surface has been going on in various forms for many decades. Engineers, faced with management problems involving waterways and coastlines, have traditionally led the quantitative approach; other communities, mainly in the Earth sciences, have come later to modeling and focused more on natural processes and longer time and space scales. Up to now, however, the various groups have carried out their work on specific problems in relative isolation.

On February 20-22, 2002, some 60 researchers representing fields as diverse as glaciology, sedimentary geology, geomorphology, engineering, and geophysics met to launch what we hope will be a new era in quantitative modeling of the Earth's surface. The workshop was funded by the National Science Foundation with financial support from both marine and terrestrial geoscience divisions. The forum was a workshop centered on a new initiative called the *Community Sediment Model (CSM)*, which aims to unite the scattered efforts of these various researchers and research communities in a common framework with a common set of support tools. The expected products for the CSM are (1) a set of flexible, modular modeling tools and protocols, developed by the community, that would be combined to support a wide variety of model approaches, goals, and time and space scales; and (2) a set of sophisticated "stand-alone" models created from these modular components for application in predicting surface processes. These models would support studies of basic science questions related to Earth surface dynamics as well as work on applied problems including river and coastal zone management, assessment of risk from natural hazards, and resource exploration and development. The CSM workshop goal was to produce the blueprint for this effort.

The meeting began with a vision of a "sedimentary modeling environment" comprising a highly flexible suite of community-based software modules aimed at calculating surface fluxes and evolution as well as pre and post processing of the results. Next came a set of talks about the nuts and bolts of what it's like to actually put together something like this by representatives from several research communities with relevant experience, including atmospheric science, glaciology, oceanography and hydrology. We heard about their experiences, in some cases spanning more than two decades, including indispensable information about organization, code structure, management, and sociology — all things the sed-strat-

geomorph community will have to learn about if our effort is to succeed. In addition to the distilled wisdom of our more experienced colleagues, we were heartened to learn about efforts such as the NCAR Earth System Modeling Framework, which may provide templates and specifications that we can use to get started quickly and improve interoperability with other modeling programs. We also heard about the diversity of modeling approaches already in use for surface processes, ranging from classical differential equation based methods to cellular models and hybrids of various kinds.

The following day was spent summing up the state of modeling in various branches of what we may begin

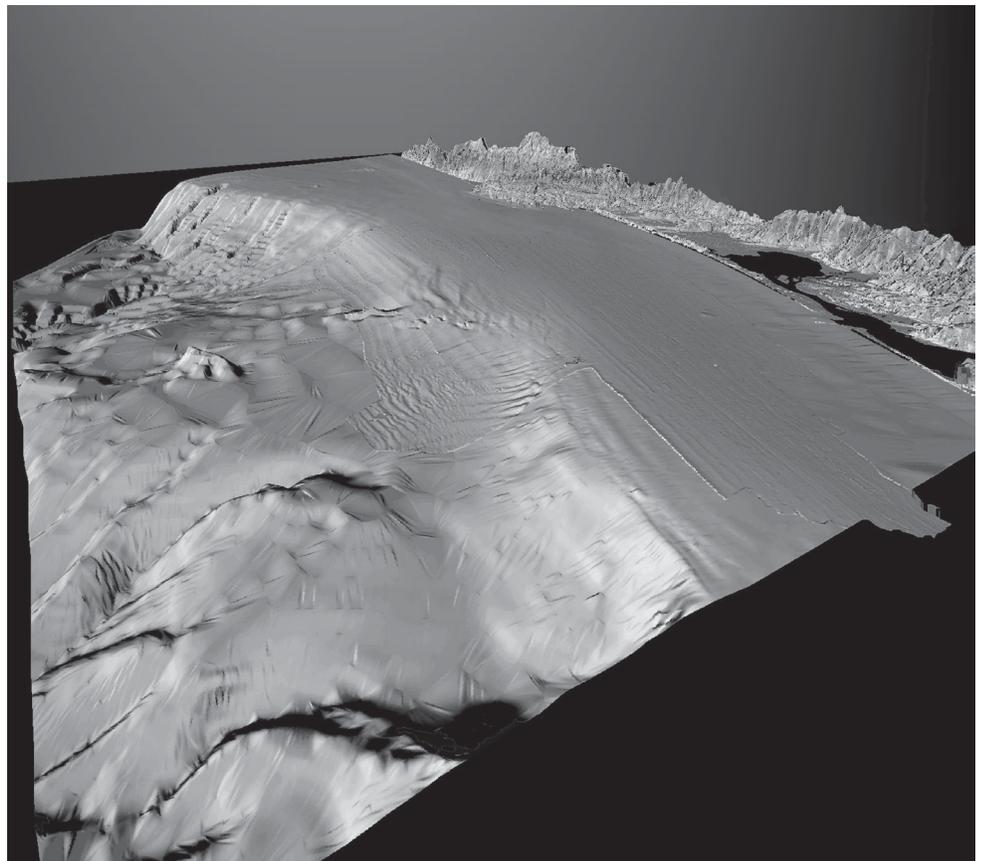


Figure 1. Oblique view of Eureka, CA continental margin using multibeam and digitized NOAA bathymetry. Land area is USGS 30-m DEM. VE = 5x., looking NE. Courtesy James V. Gardner, US Geological Survey, Menlo Park, CA.

calling surface-process science. We attempted to sample the range of environments, scientific problems, and societal applications that the CSM effort would encompass. Again, we were struck by the diversity of approaches and backgrounds of the speakers, which ranged from sedimentary geology and geomorphology through oceanography and civil engineering. Clearly, “surface-process science” is not so much a community as the common ground among several communities. We were reminded of a number of critical aspects of surface dynamics: the range of scales (length and time); the complexity of the phenomena involved (surface dynamics is certainly one of the ‘type fields’ for self-organization and pattern formation); and the profound connections to other fields, including biology, chemistry, geodynamics, atmospheric science, and hydrology. And of course we were reminded of the wide array of potential applications, ranging from risk assessment and land management to resource exploration and implications of global warming.

The final day and a half of the meeting was devoted to developing a blueprint to be used to get the CSM effort off the

ground. Breakout groups addressed time-space scaling; developing a modular architecture; module definition; and development of a virtual CSM laboratory. The details of these deliberations will be cast over the next few months into a White Paper to be written by six of the participants (David Furbish, Chris Paola, Rudy Slingerland, James Syvitski, Greg Tucker, and Pat Wiberg; please feel free to contact any of us if you have comments or questions). While the CSM web site is still being constructed, readers are encouraged to visit the site and view the presentations <http://instaar.colorado.edu/deltaforce/workshop/csm.html>.

The most important summary conclusion of the working-group efforts was strong endorsement for the CSM idea as described in the first paragraph of this report. Beyond that, there was recognition that the CSM effort would likely require several years to develop even a “draft” model suite; a central host institution; support from a variety of agencies (and perhaps industry); and more management effort than any of us would like to contemplate. Nothing approaching the CSM project in scope or level of cross-disciplinary integration has

ever been attempted in the sediment-dynamics community. With good coordination and leadership, the CSM will multiply the effectiveness of numerous individual efforts, and develop the openness between the modelers and field-oriented geoscientists. The manpower and skills are now available and, through advances over the last decade, a critical mass of basic algorithms describing sedimentary processes has been developed.

What’s in a name? If you’d like to dip your toe in the water, you can think about what to call our fledgling effort. “Community Sediment Model” is what we’ve been using, but your input is welcome — if you have a catchy name for a shared set of community-based models and software tools for investigating the dynamics of the surface of our (or other) planet’s surface, let one of us know.

The Community Sediment Model meeting was supported by NSF through the MARGINS Source-to-Sink program. We were pleased to have with us NSF program managers Bilal Haq and Rich Lane and ONR program manager Dawn Lavoie. The meeting was held at INSTAAR, University of Colorado, Boulder.



MARGINS Mailing List Update

Cut or copy this form and mail it to: MARGINS Office, Lamont-Doherty Earth Observatory,
P.O. Box 1000, Palisades, NY 10964, USA, or make changes online at
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MARGINS
Newsletter No. 8, Spring 2002

Nankai Seismogenic Zone Experiment Town Meeting

AGU 2001 Fall Meeting, San Francisco, CA, Thursday, December 13

Conveners: Gaku Kimura¹, Harold Tobin², Hitoshi Mikata³, Shuichi Kodaira³, and Pierre Henry⁴

1. Geological Institute, University of Tokyo, Tokyo 113, Japan

2. Dept. of Earth and Environmental Science, New Mexico Tech, Socorro, NM 87801, USA

3. Japan Marine Science and Technology Ctr (JAMSTEC), Yokosuka, Japan

4. Département Terre-Atmosphère-Océan, École Normale Supérieure, 75231 Paris Cedex 05, France

This “second annual” Nankai Town Meeting was organized as a forum on progress toward the goals of characterizing the seismogenic zone at the Nankai margin, focusing especially on potential IODP drilling. Scientific interest in this margin — one of the two U.S. MARGINS focus areas for seismogenic zone research — has long been high, but reached a new peak at the 2001 AGU meeting with two full days of Nankai devoted sessions.

Drilling and instrumentation of subduction plate boundary fault systems at seismogenic depths is one of the major Initiatives identified in the IODP Initial Science Plan. The goals of such an Initiative include the observation of processes related to the great earthquake cycle and tsunami generation. As the beginning of the IODP era looms closer, and with the riser ship *Chikyu* under construction in Japan, attendees looked to the future, discussing hopes for drilling and observatory installation at Nankai. Accordingly, attention was focused on the preliminary proposal, submitted in October 2001 by 40 scientists from 6 countries, to carry out such a study at the Nankai margin (Proposal 603-Pre: Nankai Trough Seismogenic Zone Drilling and Observatory). This short pre-proposal, the first of its kind to IODP, outlines the necessary drilling-based components of the Initiative, including multiple legs of non-riser drilling to sample trenchward inputs and up-dip portions of

faults, multi-stage riser drilling to 5 to 6 kilometers below the sea floor, and emplacement of a comprehensive suite of borehole instrumentation for long-term monitoring.

The meeting began with refreshments (courtesy of the MARGINS Office) and a presentation on the pre-proposal and the outcome of the first review by i-SSEP (interim Science Steering and Evaluation Panel; the primary IODP scientific review panel). This was followed by several short presentations meant to inform attendees on recent progress toward geophysical and geologic characterization of the Nankai margin.

Hisao Ito then placed the proposed Nankai drilling in the context of other potential deep fault zone drilling projects such as the San Andreas Fault Observatory at Depth (SAFOD; part of the NSF EarthScope initiative), and the Chelungpu (Taiwan) and Gulf of Corinth (Greece) drilling plans. The vision of a coming decade of observatory installations in a number of active faults in diverse tectonic environments quickened the pulse of more than a few jaded scientists.

The discussion which followed focused on the uncertainties associated with proposing and planning such a complex project when IODP decision-making structures are not yet operational. It was generally agreed that detailed planning for both riser and non-riser drilling need to begin very soon. With riser ship delivery likely in early 2007, the time for plan-

ning a riser-based program is getting short, given the extensive geophysical surveys, tool development, and other challenges that must be tackled. Conveners and attendees alike agreed that the full proposal must be developed thoroughly yet quickly, so that it will weather the IODP scientific review process to become an IODP project without undue delay. Accordingly, a Nankai-focused workshop was proposed by the conveners to develop a detailed science plan and full proposal by October 1, 2002, with input from the broadest possible range of disciplines as an essential ingredient. Consensus was reached that it is appropriate to hold this workshop in the U.S. in the summer of 2002. The NanTro-SEIZE workshop is now scheduled for July 21-23 in Boulder, Colorado; please refer to the ad on the facing page for more information about this workshop.



INTERNATIONAL NANTROSEIZE WORKSHOP

Sampling and Instrumenting the Nankai Trough Seismogenic Zone

July 21-23, 2002 in Boulder, Colorado, USA

Application deadline June 7

Motivation for Workshop

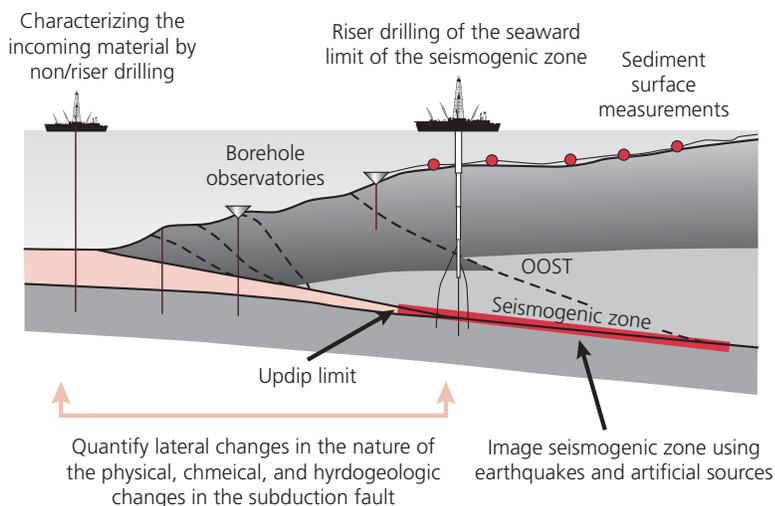
This international workshop is convened for two purposes:

- To explore and better define the scientific opportunities created by access to the seismogenic zone of a subduction megathrust
- To develop a robust experiment plan for carrying out this multi-faceted project at the Nankai Trough

We solicit the participation of all those interested in fault dynamics and earthquake processes from the broadest possible range of specialties, including seismology, structural geology, fault mechanics, borehole geophysics, geodynamics, hydrogeology, and geochemistry.

Great subduction earthquakes are responsible for 90% of global seismic energy release and are among the most destructive natural hazards. A fundamental goal of future ocean drilling is the sampling and long-term instrumentation of a subduction zone plate interface at depth to improve understanding of faulting processes in the seismogenic zone. By 2006, the new drilling ship *Chikyu* will have the capability to access depths of 6-7 km below the seabed and a borehole observatory in the seismogenic zone will become feasible.

In pursuit of this goal, a preproposal was submitted to IODP in 2001 to carry out this experiment at the Nankai Trough off southwestern Japan (available online at the SEIZE section of the MARGINS web site: <http://www.ideo.columbia.edu/margins>). The Nankai Trough is perhaps the world's best studied convergent margin and locus of the longest historical record of great earthquakes and associated tsunamis. Drilling and instrumentation of the plate boundary fault near the up-dip limit of co-seismic rupture will be part of a much larger multi-disciplinary Seismogenic Zone Experiment at the Nankai Trough (shown above), including sampling of the inputs of crust, sediment, fluid, and heat to the seismogenic system. In concert with the San Andreas, Chelungpu (Taiwan), and other fault drilling efforts, the Nankai project promises to offer unique data and opportunities for hypothesis testing to advance our knowledge of fault dynamics.



Workshop Information

The meeting will take place in Boulder, Colorado on 21-23 July, 2002. All those — from any country — potentially interested in attending this workshop are requested to contact Harold Tobin via e-mail to tobin@nmt.edu, before **June 7th**, and provide the following information:

- Name and institutional affiliation
- Contact information (e-mail, postal addresses, and fax)
- Research specialty and a very brief statement of specific interests within NANTROSEIZE

Please mark your calendar for July 21-23 and consider attending to help shape this unique scientific opportunity.

Conveners

| | |
|-----------------|----------------------------------|
| Harold Tobin | New Mexico Tech, USA |
| Gaku Kimura | University of Tokyo, Japan |
| Hitoshi Mikada | JAMSTEC-Deep Sea Research, Japan |
| Pierre Henry | Ecole Normale Supérieure, France |
| Shuichi Kodaira | JAMSTEC-IFREE, Japan |

Central America Town Meeting

AGU 2001 Fall Meeting, San Francisco, CA, Monday, December 10

Conveners: Eli Silver¹, Cesar Ranero², Peter La Femina³, and Jeffrey Marshall⁴

1. Earth Science Department & Institute of Tectonics, University of California, Santa Cruz, Santa Cruz, California 95064, USA

2. Marine Geodynamics, GEOMAR, 24148 Kiel, Germany

3. Marine Geology and Geophysics Division, Rosenstiel School of Marine and Atmospheric Science, Miami, FL 33149, USA

4. Department of Geosciences, Franklin & Marshall College, Lancaster, PA 17604, USA

Two of the primary initiatives of the MARGINS program are the Seismogenic Zone and the Subduction Factory. Central America is a central focus in each of these initiatives. A town meeting was held on Monday, December 10, 6:30 pm-8:30 pm, in Room 133 of the Moscone Center, to discuss the results of the July, 2001 workshop in Costa Rica and to focus on several main initiatives that arose from the workshop. The July workshop was organized into the following sections:

1. Role of incoming plate structure and plate kinematics on earthquake behavior and tsunami generation;
2. Role of fluid, mass, heat, and volatile fluxes on seismogenic behavior;
3. Effect of incoming plate structure on arc geochemistry and volcano behavior;
4. Crust and mantle fluxes and evolution;
5. Effects on local populations

The results of this workshop were published in the Fall, 2001 issue of the MARGINS newsletter, pages 7-10. During the town meeting, three major topics were discussed:

A) A proposal for a deep seismic experiment across the volcanic arc in Central America. Discussion was led by Steve Holbrook (University of Wyoming). The

proposal includes two seismic transects across the arc and one along the arc, the latter including Nicaragua. The cross-arc lines would involve onshore explosion refraction data, offshore MCS/OBS, and onshore-offshore shooting from both the Pacific and Caribbean oceans. The resulting dense sampling would allow accurate imaging and seismic velocity determination beneath the arc, forearc, and backarc, leading to a better understanding of the composition, flux, and fractionation of primary arc magmas in the Central American subduction factory.

B) A proposal was presented to carry out IODP riser drilling off southern Costa Rica, where the seismogenic zone can be reached at relatively shallow depths (4 to 5 km) in water depths less than one km. In preparation for riser drilling, non-riser drilling is required. Drilling in this area allows initial penetration of the seismogenic zone with technology that will be well-tested by the time of the first IODP riser drilling. It will also allow an excellent comparison with drilling planned off Southern Japan, because the latter is an accretionary system and Central America is not. Discussion was led by Roland von Huene.

C) A proposal to carry out extensive aerogravity and aeromagnetic surveying of the offshore and onshore regions of Costa Rica and Nicaragua was presented by Garry Karner (Lamont-Doherty Earth Observatory). The availability of such a complete and extensive data set for the Central American community could be of outstanding benefit in understanding the regional structure, rheology, and lithologic variability in this key region. It was pointed out that aerogravity must be flown significantly more slowly than aeromagnetics and thus the two might be decoupled in practice. Cesar Ranero discussed the fact that much aeromagnetic data already exists for Costa Rica, and he pointed out that the Pacific margin and ocean plates off Costa Rica and Nicaragua are well surveyed with magnetics and with somewhat lower coverage of gravity data, put together by Udo Barckhausen. Cesar Ranero also volunteered to lead the effort for making that data available for workers in Costa Rica. The proposal must await a full evaluation of the available data before it can be pursued. Those interested in any of the above topics should contact the appropriate discussion leader.



Borderlands Workshop

Joann M. Stock

Seismological Laboratory, California Institute of Technology, Pasadena, CA 91125, USA

On March 8-10, 2002, the Southern California Earthquake Center (SCEC) held a workshop on research regarding the California continental borderland and the possible organization of a Borderland Working group within SCEC. This group,

convened by Monica Kohler of UCLA and Tom Jordan of USC, is interested in studying ocean-continent interactions in this transpressional plate boundary environment. A high scientific priority is to understand the onland seismic hazards

due to active faults and folds offshore in the Borderland region.

The purpose of a SCEC Borderland Working Group, once formally established, would be to coordinate onshore-offshore southern California research

MARGINS~NSF post-doctoral Fellowship Program 2002



General Information

The NSF-MARGINS Program provides support for post-doctoral researchers to conduct multi-disciplinary research with MARGINS research groups or individuals based at United States institutions by applying their expertise to problems related to the MARGINS initiatives. The Fellowships are designed so that recipients can choose the research environment most beneficial for their scientific development and that of the MARGINS Program.

Eligibility and Award Information

- Fellowships are awarded for post-doctoral study in fields supported by the four MARGINS initiatives (SEIZE, SubFac, Source-to-Sink, and Rupturing Continental Lithosphere).
- MARGINS particularly wishes to encourage applications from nationals of countries involved in the NSF-MARGINS program, namely Costa Rica, Egypt, Japan, Mexico, New Zealand, Nicaragua, Papua New Guinea, Saudi Arabia, and the USA.
- Fellowships are intended for individuals in the early stages of their professional careers, typically within 5 years of having been awarded their Ph.D. degree.
- Fellowships provide up to two years of support.
- The MARGINS Fellowship award during 2002-2003 will be \$40,000 for a 12-month tenure, \$5,000 for research costs per year, and an annual contribution of \$5,000 as partial reimbursement for expenses incurred in support of the research.
- Application materials must be submitted to the NSF via the Fastlane electronic proposal submission system (<http://www.fastlane.nsf.gov>) by the deadline for the MARGINS Program, which this year is **1 November**.

For a complete description of the fellowship award, conditions, application preparation information and instructions, please review the information posted on the MARGINS web site:

<http://www.ldeo.columbia.edu/margins/postdoc.html>

activities, archive and analyze existing data, and plan new research activities including future experiments within the borderland. A white paper on the borderland research initiative is currently being written, and information about this effort can be obtained from Monica Kohler (kohler@ess.ucla.edu).

The type of experiments needed in the Borderland include ocean observatories (for long-term monitoring of seismicity, crustal motions, biological, environmen-

tal, and biogeochemical markers); OBS and airgun studies using active sources to study the lithospheric architecture; OBS passive studies for earthquake monitoring and receiver functions; heat flow studies; high-resolution gravity; studies to better constrain the geological history; and various techniques of imaging and sampling of active fault systems.

Although the Borderland is not part of any of the current MARGINS initiatives, it encompasses part of the active

Pacific-North America boundary and adjoins to some extent the study area of interest in Rupturing of the Continental Lithosphere in the Gulf of California/Salton Trough region. Many of the scientific questions of interest to the Margins initiative are also relevant to the SCEC Borderlands Initiative, and possible partnership activities between the two groups may become scientifically advantageous in the future.

Funded MARGINS Programs 2002

These are the funded MARGINS Proposals for the fiscal year 2002. This information is also available at the awards database of the MARGINS web site at <http://www.ideo.columbia.edu/margins/MARGINSawards.html>, together with abstracts of all NSF-funded MARGINS Projects.

NSF Award number 0203650

Collaborative Research: Imaging the mantle in the Central American subduction factory

Geoffrey Abers¹ and Karen G. Fischer²

1. Department of Earth Sciences
Boston University
685 Commonwealth Ave
Boston, MA 02215

2. Department of Geological Sciences
Brown University
Box 1846
Providence, RI 02912

This award is for an 18 month deployment of 43 PASSCAL broad band seismometers in Nicaragua and Costa Rica to seismically image the mantle "subduction factory" of the Central American volcanic arc in the region. In addition to the PASSCAL instruments, the PIs will also collaborate with Costa Rican and Nicaraguan seismologists to use data from existing short period and broadband instruments. The experiment will image the mantle wedge with receiver functions and other converted waves, together with regional waveform inversions. Tomographic imaging will be used to try to map the region of slab dewatering (and intermediate depth earthquake generation), melt generation and melt migration in the mantle wedge. Patterns of mantle flow will be interpreted from shear wave splitting data, and crustal structure will be inferred from receiver functions. Overall, the idea is to infer the workings of the subduction factory by combining seismic images of the crust and mantle with the modeled interpretations of large observed differences in magma composition along strike in the arc volcanoes.

NSF Award number 0203830

Hydrologic controls on the initial state of the incoming plate: Costa Rica

Kevin Brown

Scripps Institution of Oceanography
University of California, San Diego
9500 Gilman Drive
La Jolla, CA 92093-0220

Award is for a project to conduct a series of flux meter measurements along transects across hydrological boundaries in the down going plate off Costa Rica. This region is characterized by anomalously low heat flow, except over regions of topographic highs that exhibit anomalously high heat flow values. The flux meter measurements will test the hypothesis that the regions of low heat flow are characterized by downward fluid flow, while the high-heat-flow areas are characterized by upward fluid flow. A second portion of the project will be to return the areas on the accretionary prism where 35 flux meters were deployed as part of a previous study, to collect piston cores and heat flow measurements. Analyses of these cores will result in collocated temperature, chemical gradient, and direct fluid flux data sets that will provide a more complete hydrological picture of the incoming plate and the Costa Rica forearc.

NSF Award number 0203799

Collaborative Research: Frictional and Mineralogic properties of Sediments entering subduction zones: controls on stress state and earthquakes

Kevin Brown¹ and Michael B. Underwood²

1. Scripps Institution of Oceanography
University of California, San Diego
9500 Gilman Drive
La Jolla, CA 92093-0220

2. Department of Geologic Sciences
University of Missouri, Columbia
101 Geology Bldg
Columbia, MO 65211

This study will provide laboratory measurements of the coefficient of friction of natural sediments entering the subduction systems of Nankai, and Costa Rica. The frictional studies will be conducted in a combination of ring shear and direct shear experiments at effective confined stresses between 0.1-50 Mpa. Samples will be characterized by X-ray diffraction (for bulk and clay mineralogy) grain-size, SEM/EDS geochemistry, and wet chemistry (for biogenic silica content). The mechanical properties will be compared with the clay mineralogy to determine the effect of clay minerals on the coefficient of friction. The study will assess the role of the smectite to illite transition and opal to quartz reactions on controlling the up-dip limit of seismogenic activity in subduction zones.

NSF Award number 0203388

Determination of volcanic flux rates and application to understanding regional geochemical trends and element mass balances in Central America

Michael J. Carr

Dept. of Geological Sciences
Rutgers, The State University of New Jersey
610 Taylor Road
Piscataway, NJ 08854-8066

Several important questions about the nature of the subduction process require a transition from existing qualitative subduction signals, such as Ba/La and ¹⁰Be/⁹Be, to quantitative fluxes such as Ba flux in gm/unit arc length/yr. This is accomplished by employing ⁴⁰Ar/³⁹Ar dating techniques to measure the ages of the older units in several large Central American volcanic centers. These new data, along with previously determined volume measurements, enable the determination of average volcanic flux rates for different segments of the arc. Integrating volcanic flux rates with regional geo-

chemical data allows an estimate of element fluxes to be made. From these integrated data several major problems are being addressed, including the physical cause of along-strike variations in subduction signal in Central America, the mass balance of elements cycling through the Central American arc, and the quantity of incompatible elements that are delivered to the deep mantle through subduction.

NSF Award number 0203577

Collaborative Research: Processes controlling depositional signals of environmental change in the Fly River Sediment Dispersal system: rates and mechanisms of flood plain deposition

William E. Dietrich¹ and Gary Parker²

1. *Geology and Geophysics
University of California, Berkeley
313 McCone Hall
Berkeley, CA 94720-4767*

2. *St. Anthony Falls Laboratory
University of Minnesota
Mississippi River at 3rd Ave.
Minneapolis, MN 55414*

This project focuses on two fundamental questions: 1) How does flow and sediment routing through a lowland floodplain system moderate short and longer-term variations in sediment delivery towards offshore depositional environments? and 2) What controls the proportion of a river's sediment load that is deposited on its floodplain? It is hypothesized that net sediment loss to the floodplains was highest during Holocene sea-level rise and, after near stabilization of sea level, the proportion of the sediment load deposited in the floodplain has progressively declined.

These two basic question are being addressed by comparing the flow and sediment routing processes, and the proportion of sediment lost to floodplains on the middle Fly and lower Strickland Rivers. Historically, the Strickland carried about 7 times the load of the Fly and it is hypothesized that this larger load has led to greater channel dynamics, steeper slopes, coarser bed, more elevated floodplain and possibly a lower trapping effi-

ciency than the Fly. A numerical model is being developed that is sufficiently mechanistic that it can address the questions of damping and trapping efficiency on the event and seasonal scale, yet simplified enough that it can also model the co-evolving bed grain size, channel slope and floodplain topography, a crucial capability for understanding the time evolution of trapping efficiency. Though ambitious, many parts of the model have been assembled in previous research. The hydrodynamic model accounts for the effects of floodplain morphology and hydrology. The sediment routing includes effects of channel migration and accounts for the deposition and erosion of sediment by grain size.

A field program is being conducted to document the flood wave damping rates, the sediment trapping efficiency of the Strickland and Fly Rivers, and to parameterize the numerical model. Quantification of floodplain morphology is being done through topographic surveys and analysis of remote sensing imagery. Intensive surveys of the velocity and suspended sediment fields are used to motivate and parameterize the hydraulics and sediment transport model. Short and longer-term (less than 100 years) rate of floodplain deposition is being documented from shallow cores. Extensive flow and sediment monitoring data are being provided by Ok Tedi Mining, Ltd. on the Middle Fly and by Porgera Joint Venture on the Strickland. Previous research on the Fly River enables the research focus to be on the Strickland River.

NSF Award number 0125919

Convection of the mantle wedge above subduction zones

Greg Hirth

*Department of Geology & Geophysics
Woods Hole Oceanographic Institution
Woods Hole, MA02543-1050*

This study will model the convection of the mantle wedge above the downgoing slab in subduction zones. Most of the budget is to provide salary support for post doc candidate Magali Billen to carry

out fluid dynamics based models of wedge convection. The purpose of the modeling is to try to resolve the disagreement between petrologic evidence for high temperatures (1200-1300°C) in the wedge vs. thermal models that predict much lower temperatures on the order of 700-800°C. This discrepancy might be explained by a low viscosity region that allows convection in the wedge melting region at rates faster than subduction rates. The modeling will explore this possibility, as well as the effects of several factors on the style and velocity of convection: asthenosphere viscosity, localized low-viscosity zones, age of the overriding plate, slab dip, slab viscosity, slab age, slab velocity, and possible non-linear rheology.

NSF Award number 0203636

Indirect study of subducted ocean lithosphere at the Central American Margin

Peter F. Lonsdale

*Scripps Institute of Oceanography
University of California, San Diego
9500 Gilman Drive
La Jolla, CA 92093-0205*

The PIs plan mapping and sampling features on the Cocos and Nazca plates to provide a basis for inferring the properties of the subducted Cocos plate under Central America. The basic premise is that the Nazca plate south of Grijalva was formerly contiguous with Cocos plate under Nicaragua and parts of Costa Rica and that this fossil plate boundary could form an important structure in the downgoing slab. Because a small fragment remains unsubducted, the investigators propose to not only study it, but also it's conjugate off Peru, where much more remains. At that locality, the structure can be mapped more thoroughly and the results extrapolated to the subducted slab beneath Costa Rica. Further, dredging will provide essential samples to measure the composition of the lithosphere that is beneath the Central American arc.

NSF Award number 0203348

Collaborative research: The four-dimensional pattern of Rifting in the southern Gulf of California

Peter F. Lonsdale¹ and Paul Umhoefer²

1. *Scripps Institute of Oceanography
University of California, San Diego
9500 Gilman Drive
La Jolla, CA 92093-0205*
2. *Geology Department
Northern Arizona University
Flagstaff, AZ 86011-4099*

The PIs will carry out a swath bathymetry survey of the southern Gulf of California, obtain 3.5 kHz, magnetic and gravity profiles and collect dredge samples of the volcanic basement. The objectives are to test hypotheses concerned with the generic problems of how continental rifts are segmented tectonically and whether this relates to asymmetries of faulting, how rift propagation occurs tectonically and what type(s) of magmatism accompanies continental break-up and earliest seafloor spreading. The Gulf of California is a MARGINS' focus site and this study will complement other research being carried out and planned for this region.

NSF Award number 0203664

What locks subduction thrusts?

Casey Moore

- Earth Sciences Board of Studies
University of California, Santa Cruz
1156 High Street
Santa Cruz, CA 95064*

Under this award, the PI will examine a well-documented Eocene-Paleocene rock complex from a paleo subduction thrust, now exposed in Alaska, in order to quantify and understand the differences, at a variety of length scales, between the upper aseismic parts of a subduction thrust and the lower seismogenic parts. This study will test the hypothesis that deposition of minerals in cracks strengthens and locks subduction thrusts in the periods between major earthquakes. During field work, the PI and a Ph.D. student will

document changes in structural fabric and mineral veins of various generations. Later lab studies will look at changes in physical properties, and mineralogy under similar PT conditions as presently exist in the SW Japan subduction zone. Quantification of shear zone parameters, changes in mineralogy, intensity of pressure solution, density and porosity, and size/shape of blocks and matrix, will allow interpretations of the importance of simple sliding (aseismic) vs. stick-slip (seismic) behavior. Further, the results of the lab experiments can be used to interpret textures and structural features indicative of sliding, stick-slip, and healing. These observations and measurements, including fluid inclusion studies with Vrolijk, will be useful for testing ideas about velocity weakening in actual subduction zones, providing guidance for experimentalists on what types of materials are best for deformation studies, a preview of what will be seen in riser drilling at Nankai, and 10-100m scale constraints on interpreting 3D seismic studies in subduction complexes.

NSF Award number 0203351

Processes controlling depositional signals of environmental change in the Fly River Sediment Dispersal system: mechanisms and rates of shelf clinoform development.

Charles A. Nittrouer

- School of Oceanography
University of Washington
Seattle, WA 98195-7940*

This project will investigate the processes of sediment transport and accumulation that lead to development of the shelf clinoform in the Gulf of Papua off the Fly River. The study will include a variety of sampling and monitoring stations from near the river mouth to the base of the clinoform that will provide time-series observations on the spatial and temporal variation in present day sediment transport and accumulation. The study

will specifically investigate the role of fluid muds as primary mechanism for across-shelf transport of sediment that leads to clinoform morphology. Core studies including radioisotope measurements will provide information of sediment transport and accumulation on seasonal to millennial time scales.



MARGINS Steering Committee highlights

Olaf M. Sverningsen

Lamont-Doherty Earth Observatory, 61 Route 9W, Palisades, New York 10964, USA

This is a new column in the newsletter in which highlights and important decisions made during the meetings of the MARGINS Steering Committee are made available to the community.

The Steering Committee convened at Lamont-Doherty Earth Observatory of Columbia University in Palisades, New York, on March 13-14, 2002, and the agenda included the following items (items covered in other places in this newsletter are indicated in brackets):

1. Welcome by the MARGINS Chair and the Director of Lamont,
2. NSF Program managers' report on MARGINS and MARGINS funding (see From the Chairman's desk, page 6, and Funded Programs, page 14),
3. Meeting reports (pages 8, 10, and 12)
4. EarthScope — status and interaction
5. Data management issues
6. MARGINS Research Fellowships (see announcement on page 13)
7. Publication of science plans
8. MARGINS Publications
9. Watch dogs for the focus initiatives/ the Steering Committee's responsibilities
10. Nominations for Steering Committee vacancies (see From the Chairman's desk, page 6)

Below are summaries of some of the decisions and discussion points that are not covered elsewhere in this issue.

MARGINS

Under Item 2, Bilal Haq of the NSF requested that the scientific achievements of the MARGINS Program should be summarized in the form of scientific milestones or breakthroughs. Projects are now funded within all of the four MARGINS Focus Initiatives, and NSF expressed interest in a review of the pro-

gress for each initiative. Such a review would contain:

- the status of each component
- what was envisaged, and
- what has been achieved up until now?

The MARGINS Office will coordinate these efforts and publish the results in the MARGINS newsletter.

EarthScope

The MARGINS Steering Committee, together with EarthScope and the Borderland Initiative, need to write a white paper about deploying ocean bottom seismometers (OBS's) as a forerunner to a proposal to MRI.

Data management issues

The NSF representatives pointed out that the Margins Data Policy now is a part of Ocean Sciences Division's data management policy.

Tom Shipley demonstrated The University of Texas at Austin, Institute for Geophysics' Seismic Reflection Data Search Site (http://wedge.ig.utexas.edu/Web/main_html/intro.htm), and Garry Karner demonstrated the Lamont-Doherty-MARGINS metadata web site (<http://data.ldeo.columbia.edu/margins>)

Publications

The Steering Committee decided that the science plans for each initiative, which are presently available as downloadable PDF files on the MARGINS web site, should be printed published.

A MARGINS publications series is taking shape. The two first publications will be books resulting from the two MARGINS Theoretical and Experimental Institutes (TEIs), and each TEI is expected to result in a book. Both the volume from the "Inside the Subduction Factory", and from the "Rheology and Deformation of the Lithosphere at Con-

tinental Margins" TEIs are in the final stages of the pre-printing process.

Watch dogs for the focus sites and initiatives

Each Steering Committee member is expected to work actively to promote MARGINS in their respective community (with the assistance of the MARGINS Office) and to represent their community in the MARGINS Steering Committee.

This means that the it is the responsibility of Steering Committee members to actively promote new workshops, town meetings, TEIs, and other MARGINS activities. The MARGINS Office will assist in organizing and coordinating such events, but it is stressed that all MARGINS projects are proposal-driven, and there is no budget for financing for example a TEI; the PIs will have to prepare and submit a proposal to the NSF in order to finance any such endeavour.



MARGINS Office News

Olaf M. Svenningsen

Lamont-Doherty Earth Observatory, 61 Route 9W, Palisades, New York 10964, USA

MARGINS Publications

One of the MARGINS Office's tasks is to keep track of the progress of the various components of the MARGINS Program, and to make the science results available on the MARGINS web site. The MARGINS Steering Committee and NSF have decided that every publication that is produced within MARGINS, needs to obtain a publication number. These will be used to organize an online database, containing literature references, abstracts and keywords of MARGINS publications. Only publications produced within projects funded by the MARGINS-NSF Program are eligible for registration.

To obtain a MARGINS Publication Number, authors of any publication funded by the NSF-MARGINS Program are requested use the web form at:

<http://www.ldeo.columbia.edu/margins/PublicationReg.html>

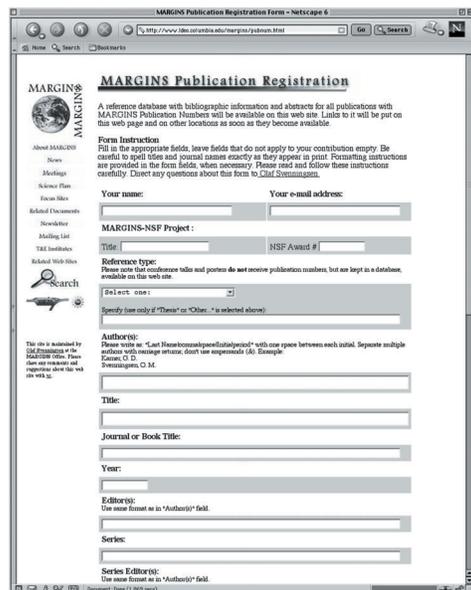


Figure 1. The Publication Registraton form at the MARGINS web site

Publication numbers should be requested whenever a manuscript is accepted for publication, for the number to be included in the Acknowledgements or at some other appropriate location in the

publication procedure. Specific bibliographic information, like page numbers, can be amended later. Full instructions on how to use the form are posted on the web.

If cut-and-paste is used to enter, for example, authors, abstract and keywords, the form takes about one to two minutes to complete.

Conference contributions (talks and posters) will not receive an official number, but authors are still strongly encouraged to submit the bibliographic information via the form for inclusion in the reference database. As a means to prolong the life of conference contributions, the submittal of summaries of posters and talks, including graphics, to the MARGINS Office for posting on the web site is encouraged.

Web site update

In the previous issue (#7) of this newsletter, some statistics for the use of the MARGINS web site were summarized. The development since then has been very positive, and the user statistics for the last 11 months is shown in Figure 2.

At the beginning of 2002, a new web

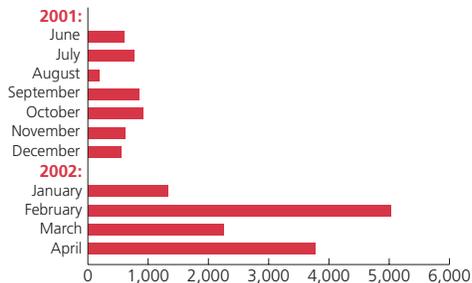


Figure 2. Visits to the MARGINS web site from June 2001 to April 2002

counter was installed, which makes detailed tracking of web site use possible. Also, at the beginning of the year, the MARGINS-NSF Awards Database was published on the web site. This, together with some other enhancements, resulted

in a substantial increase in the number of visits to the web site. The increased frequency of hits has remained high throughout the winter and spring.

IMPORTANT: MARGINS-NSF logo use

We would like to revisit the need to advertise the results, work and successes of the MARGINS Program at national and international conferences and meetings. In a room full of posters, being able to easily recognize what projects are funded by which program is particularly important to the NSF program managers. An excellent way to do this is by acknowledging MARGINS in: 1) Research papers funded by NSF-MARGINS, and 2) Including the MARGINS logo in poster presentations by using the MARGINS logo:



Accompanied by the text: "Research supported by NSF-MARGINS [award # ...]"

The MARGINS-NSF logo can be downloaded in a number of different formats and sizes from the following site:

<http://www.ldeo.columbia.edu/margins/Logos.html>



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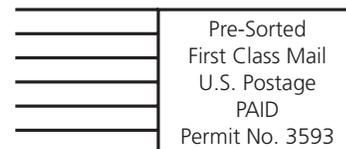
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MARGINS

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Upcoming Meetings:

- **The Geological Society of America 2002 Annual Meeting & Exposition**
October 27-30, 2002 in Denver, Colorado
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- **Chapman Conference on Continent-Ocean Interactions within the East Asian Marginal Seas**
November 27-30, 2002 in San Diego, California
—
- **AGU 2002 Fall Meeting**
6-10 December 2002, San Francisco, California
—

For more information on meetings, see the MARGINS web site:
<http://www.ldeo.columbia.edu/margins>



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