InterMARGINS

Newsletter No.4

June 2004

Contents

Marginal Notes .... from the Chair

This issue of the Newsletter continues to demonstrate the ever increasing interest in our activities with a broad range of articles and information about Margins-related activities around the world.

It was gratifying to note, as a Stop Press, in the last Newsletter that the Norwegian national margins programme NORMAR had indicated that it would join InterMARGINS as a Principal Member. Shortly afterwards we heard from the Second Institute of Oceanography in the People's Republic of China that it wished to join as an Associate Member. Although membership now stands at five, InterMARGINS continues to seek new members all the time. We know of institutions in two other countries that are likely to join before the beginning of 2005 but of course we need a much larger membership to truly claim to be an international organisation representing the interests of margins researchers world-wide. Further, more members will mean a greater income to InterMARGINS, from subscriptions, with which to achieve our aims and to benefit the whole margins community. If you would like to discuss membership at any time please contact me.

The InterMARGINS Steering Committee continues to meet twice a year, usually with invited observers. Some very interesting exchanges of information have taken place at these meetings. In the past six months the Committee met in San Francisco, USA and Nice, France. Besides the Committee members from the five member countries, eight observers also participated.

Finally, I would like to draw your attention to the InterMARGINS web site (www.intermargins.org). The site continues to expand almost weekly and we are now soliciting active participation by the margins community in playing their part in developing the web site. See the article in this Newsletter about the web site.

Bob Whitmarsh

Members of the InterMARGINS Steering Committee and Observers at the meeting in San Francisco on 10 December 2003. Present were (left to right) Jan-Inge Faleide, Keith Louden, Julie Morris, Asbjørn Breivik, Garry Karner, Bilal Haq, Stuart Henrys and Wonn Soh. Not photographed were Brian O'Reilly and Bob Whitmarsh.

Activities around the world

Japan

There was a big change in the operation of research vessels in Japan in the last 6 months. Two research vessels, including *Hakuho-maru* and *Tansei-maru*, previously operated by the Ocean Research Institute, University of Tokyo, have been operated by the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) since 1 April, 2004. The first port call of the *Tansei-maru* occurred on 20 April at the JAMSTEC pier in Yokosuka. Regrettably,

Members of the InterMARGINS Steering Committee and Observers at the meeting in Nice on 28 April 2004. Present were (left to right; back row) Peter Readman, Jan-Inge Faleide, Weiren Lin, Yulong Zheng, Mingbi Li and (front row) Montse Torne, César Ranero and Ingo Pecher. Not photographed were Svenje Mehlert and Bob Whitmarsh.

JAMSTEC has stopped operating the submersible *Shinkai 2000*. The only submersible now available to scientific users is *Shinkai 6500*.

The ship programme for research vessels in the Japanese Fiscal Year 2004 has now been determined. The submersible *Shinkai 6500* is going to visit to 1) Nankai Trough, 2) Izu-Bonin Arc and 3) Lau Basin in 2004. During these cruises, 1) data on fluid behavior in the Nankai ODP CORK site, at a depth of over 4000 m, will be obtained and 2) the chemical component and structure of the pristine Izu Bonin Arc is going to be examined along the topographic escarpment on the trench side of the arc. In the Lau Basin, microorganism samples will be taken by submersible. Related to ocean-bottom crustal movement, a deep-tow side-scan sonar survey is planned in and around the epicenter of the 2003 Tokachi-oki Earthquake of magnitude 8.0. In this survey, the probability of mass movement and slope instability will be evaluated because the underwater cable station above the epicenter recorded the presence of concurrent, earthquake-induced, turbidity currents. In addition, two interesting cruises are scheduled in the area of the Nankai prism. One is for long-term heat flow monitoring and the other is for three-dimensional structural analysis of mud volcanoes in the forearc basin. A seismic survey across the Ontong Java plateau is also scheduled in this FY. Mike Coffin (ORI) will be chief scientist on the cruise.

PR of China

The principal research activities on continental margins in China are funded by the government. One major project is 'Critical Issues for the evolution of the Chinese Marginal Sea and the Formation of Major Natural Resources (2000-2005)' which is funded by the Ministry of Science and Technology. The other projects were, and are, mainly funded by National Natural Science Foundation of China. Most projects emphasize the margins of the East China Sea and the South China Sea, especially the history of the rifted margins and the subsequent seafloor spreading in the South China Sea.

In 2003, several cruises were carried out in the South China Sea and the East China Sea; the surveys acquired multi-channel seismic profiles, multi-beam bathymetry, gravity and magnetic profiles and sediment samples. Recent researches have mainly included using satellite altimetry to generate gravity measurements, which are being used to study the deep structure of the rifted margins offshore China, to use multi-beam bathymetry, in combination with other geophysical observations, to study the rifting history of the margins and to use the tomography of China's marginal seas and adjacent areas to study the geodynamic regime of these seas. Additionally, gas hydrates studies are ongoing in the South China Sea and the East China Sea, where bottom simulating reflectors have been found.

USA

The NSF-MARGINS panel met 1-2 March, 2004 to consider the 26 submitted proposals. With a total budget of $6.15M, 10 proposals were recommended for funding. Discussions are still underway between the National Science Foundation (NSF) and proponents, and so specifics are not yet available. Generally speaking, the funding will go to proposals for work on all four MARGINS initiatives (Source to Sink (including Waipaoa), Seismogenic Zone, Rifting of Continental Lithosphere (Gulf of California) and Subduction Factory). Also included is funding for two post-doctoral fellowships and continued support of the US MARGINS Office.

NSF (Panels for the Integrated Ocean Drilling Program (IODP) and MARGINS) is working to launch a rapid response to submarine gas, fluid and magma venting from NW Rota submarine volcano in the Mariana arc, part of the MARGINS SubFac initiative. The submarine activity was discovered on a NOAA cruise (http://www.oceanexplorer.noaa.gov/explorations/04fire/), on which MARGINS funded scientists were participants. If all went as planned, five Lamont-Doherty OBS instruments, scheduled for pick-up 30 April-17 May, 2004 will have been immediately re-deployed around the submarine volcano. This will have been the second MARGINS event response, with the first being the response to the Anatahan eruption in the Marianas in May 2003 (http://www.margins.wustl.edu/SF/Anatahn/Anatahan2003.html). New web pages will be launched if the Rota response is carried through.

The NSF carried out a routine Five-year review of the MARGINS Program 29-30 April, 2004. NSF-MARGINS Program Officer Bilal Haq prepared a charge to the review

committee that was both broad and deep. The US MARGINS Office prepared a series of background documents for the NSF Review Committee which showcased the science done to date, highlighted the international cooperation that helped achieve the science, identified gaps in the implementation of the science plans and discussed priorities for the next years of the MARGINS Program. Once the review is complete, these background documents will be made available on the US MARGINS website.

At the Spring US MARGINS Steering Committee (MSC) meeting at NSF Headquarters, Ocean Sciences Division Director, Jim Yoder, spoke to the MSC. Dr Yoder noted that a search is on to replace NSF Director Rita Caldwell, and himself. Dr. Margaret Leinen, Deputy Director for the GEOSCIENCE Directorate was re-appointed for another three-year term. Jim also noted that approximately flat funding for NSF and MARGINS should be expected for FY 2004 and 2005. Jim finally spoke to environmental and marine mammal issues and permitting of seismic cruises. He noted that several cruises have been cancelled at short notice by the countries in the EEZs of which the *RV Maurice Ewing* was scheduled to work. NSF and NOAA are working now to get permitting done for the remainder of the current *Ewing* schedule, then will review the entire NSF process of environmental impact statements, NOAA permits, and broad international cooperation necessary for ship's clearance to work in the EEZs of other countries.

U.S. MARGINS Chair, Julie Morris, and potential proponents Garry Karner (former US MARGINS Chair, Andrew Goodliffe and Jim Cochran travelled to Cairo, Egypt to meet Prof. Ali Tealeb, President of the National Research Institute for Astronomy and Geophysics. The discussion centered on possible avenues whereby US scientists working on MARGINS projects could develop successful collaborations with NRIAG. The discussions were extensive and cordial, and developed guidelines for US proponents. A critical issue still to be resolved in detail is data-sharing policies that will allow US scientists (and those from other countries as well) access to the full dataset, while still recognizing Egyptian priorities and sensitivities. Discussions are continuing.

A MARGINS database has now been launched (http://data.nsf-margins.org/). A MARGINS database proposal was funded at the MARGINS-NSF Panel in Spring 2003. Bill Ryan and Suzanne Carbotte (Lamont-Doherty Earth Observatory) and Tom Shipley (University of Texas Institute for Geophysics) are the lead investigators, working together with ODP. Bill Ryan and Tom Shipley gave a recent demonstration of the database capability to the MARGINS Steering Committee. In the short time since funding was released, the scientists have focused on developing user-friendly front ends for the database and on maximum inter-operability with existing and developing databases that are relevant to MARGINS. They have built in many tools that make the database very useful for visualizing and evaluating a wide variety of data types. They are now working to populate the database, with an initial emphasis on metadata for MARGINS cruises and expeditions. Other data types include underway navigation, bathymetry, gravity, magnetics, multibeam data from *RV Maurice Ewing* and *RV Conrad*, single- and multichannel seismic profiles (through UTIG), seismicity, and seafloor/sediment isochron data. The MARGINS database shows complete inter-operability with UTIG's Seismic Reflection database, PetDB, GeoRoc, Navdat and ODP's Janus databases. The Steering Committee was deeply impressed by the broad scientific utility of the database and its rapid development, and expressed their excitement and enthusiasm over the developments to date, with special thanks to Bill, Suzanne, Tom, and their collaborators. A town meeting at the December 2004 AGU is anticipated to acquaint the wider community with these powerful database developments.

The first two publications emerging from US MARGINS-NSF sponsored workshops have been published. The citations are: Inside the Subduction Factory, John Eiler, ed., Geophysical Monograph Series, Volume 138, 2004, 324 pages, hardbound, ISBN # 0-87590-997-3, AGU Code GM-1389973; Rheology and Deformation of the Lithosphere at Continental Margins, Edited by Garry D. Karner, Brian Taylor, Neal W. Driscoll and David L. Kohlsted. MARGINS Theoretical and Experimental Earth Science Series v. 1, Karner, Morris, Driscoll and Silver (series editors), Columbia University Press, February, 2004, 384 pages, 75 illus., ISBN: 0-231-12738-3. A third volume is in progress: Interplate Subduction Zone Seismogenesis (working title, in progress), T. Dixon and J.C. Moore, eds., 2005, MARGINS Theoretical and Experimental Earth Science Series v. 2, Karner, Morris, Driscoll and Silver (series editors), Columbia University Press.

The MARGINS Steering Committee discussed the MARGINS

post-doctoral fellowship program. Three fellowships were awarded at the Spring 2003 NSF panel meeting, and two more in March of this year. The Steering Committee has recommended that post-doctoral salary levels be raised (for the first time since 2001).

The U.S. MARGINS steering committee and Office awarded the first annual prize for an outstanding student presentation at the December AGU (http://www.margins.wustl.edu/MARGINS_Prize/MPWinners.html). The program will continue next year, with broader and earlier advertising. The steering committee reaffirmed their support for the program as open to all participants regardless of country. The primary requirement is that students submit an application via the US MARGINS website that draws the link between their research and some aspect of the US MARGINS science plan.

The Steering Committee approved a plan for the US MARGINS Office to submit a proposal for a workshop to develop a US MARGINS Education and Public Outreach Implementation workshop. The US Office will focus its EPO activities on undergraduate education and informal education. The workshop, anticipated for early winter, 2005 will bring together NSF-MARGINS funded scientists interested in education with professional educators and NSF Program Officers for educational programs. In the meantime, the MARGINS Office personnel will be attending workshops for the US effort on the Digital Library for Earth System Education, to explore avenues for cooperation there.

Dr. Paul Wyer, from the University of Oxford, UK has recently joined the US MARGINS Office, in a position analogous to that held previously by Olaf Svenningsen. Paul did his Ph.D. work with Prof. Tony Watts, and bring to the Office a quantitative geophysical approach to rifting processes, a very nice complement to US MARGINS Chair, Julie Morris, who is a geochemist working on convergent margin processes.

Drilling the seismogenic zone of an erosional convergent margin: The proposed IODP project 'CRISP'

Great subduction zone earthquakes, in the seismogenic zone of unstable slip, commonly begin 10-20 km deep at a transition from the shallower proto-seismogenic zone of stable slip. The stable to unstable slip transition is involved with material input into the subduction zone. Material structure, and physical properties change progressively during subduction, and according to current hypotheses, certain mineral transformations trigger the stable-to-unstable slip transition. Where accretion dominates a convergent margin, the input is trench sediment and that has been sampled by drilling. However, where erosion dominates a margin, the material input is unknown because it originates along the base of the upper plate beyond the sampling capabilities of past scientific ocean drilling. Mineral alterations at erosional margins are likely to be very different from accretionary margins.. Erosional margin proto-seismogenic zones have never been sampled by drilling; nor does geophysics resolve its structure, lithology, and physical properties. The Japanese, riser-equipped, drillship *Chikyu* in the Integrated Ocean Drilling Program (IODP) is expected to overcome this difficulty and drilling an erosional margin is the objective of CRISP (**C**osta **R**ica **S**eismogenesis **P**roject).

CRISP is proposing to the IODP to drill into the seismogenic zone of an **erosional** convergent margin. The evidence for erosion in the proposed drill area is based on 35 years of background studies. A key feature is the regional unconformity imaged in seismic records and commonly referred to as the 'rough surface'. It was first interpreted as the top of accreted trench sediment because, during the 1970s, a common assumption was that all convergent margins support an accretionary prism. However, drilling on DSDP Legs 67 (1979) and 84 (1981) revealed that the Guatemala "accretionary prism" is instead an extension of the upper plate igneous basement covered unconformably by Eocene and Miocene shallow water sediment. Drilled core samples from the lower slope contain microfossils that are now more than 3 km deeper than the water depth in which they lived. Microfossil depth indicators in the overlying sediment record the progressive margin subsidence since Miocene time. Subsidence from the surf zone to trench depths requires crustal thinning by erosion of material along the underside of the upper plate because seafloor sedimentation accompanied subsidence.

Although the seismic images were similar and tectonic erosion was proposed offshore Costa Rica, improved geophysical data acquired off the Nicoya Peninsula were interpreted as showing accreted sediment from the trench to the shore. Drilling on ODP Leg 170 (1996) off Nicoya showed otherwise. Core samples confirmed that, as offshore Guatemala, the Costa Rican rough surface is also a subsided erosional unconformity overlain by shallow water sediment. Additionally, the igneous basement subsequently dredged from the lower continental slope of Nicaragua indicated extension of the continental framework to the trench. In seismic records the regional erosional unconformity can be followed continuously from the drill transect off Nicoya to the proposed Osa Peninsula drill transect. Present-day erosion is indicated by the morphology of the slope. Osa lies in the southern part of an embayment where erosion and slope retreat are accelerated by subduction of Cocos Ridge and a rough seafloor. Thus, mapping of a continuous erosion surface, proved in a Leg 170 drill site, and the present-day erosional retreat of the continental slope, provide evidence of vigorous tectonic erosion where CRISP drilling is proposed.

The shallow dip of the subduction zone off southern Costa Rica, and the relatively high temperature of the subducting ocean

crust, bring the materials and processes involved in seismogenesis to shallower than usual depths, depths that can be reached by a riser-equipped drillship. CRISP is structured in 3 stages that systematically lead from shallow non-riser to deep riser drilling. Stage 1 drilling allows quantification of the subducted volume of eroded debris and trench sediment, and the characterisation of lower plate oceanic igneous rock and hydrology. It also provides the samples to characterise upper-plate basement rock with standard ODP drilling technology. Stage 2 drilling reaches 3 km deep and samples for the first time the subducting **eroded debris** along the plate interface. It provides the benchmark for material at the beginning of the transition to seismogenesis. This defines conditions in the zone of **stable slip** before the transition to **unstable slip** and provides the observations to later isolate material transformations and dynamic changes causing unstable slip. The 3-km-deep cased hole may be completed with extended ODP non-riser technology or with *Chikyu* drilling in non-riser mode. It will be engineered based on the results from Stage 1 cores and downhole geophysics. For Stage 3 riser drilling, the riser site location will be constrained with the results from downhole instruments and conventional geophysical experiments involving prior drill-holes, rock mechanics laboratory experiments and forward modelling. The riser drill site is in 500 m deep water and in optimum environmental operating conditions. Riser hole results, that are input to laboratory experiments and modelling, can indicate conditions deeper in the seismogenic zone. If found attractive for further work, the results from modelling can be verified in the future with ~7 km drilling under the auspices of The International Continental Drilling Project at sites on the Osa Peninsula. In the CRISP proposal a model has been proposed for testing (Figure 1). Oceanic crust and its cover of sediment bend downward into the trench axis and bending stress is relieved by normal faulting. Continued plate bending in the subduction zone prolongs faulting and the increased graben volume accommodates upper-plate material that is dragged into the subduction channel. The upper plate is a continuation of the continent or arc and its upper surface is commonly, but not necessarily, an erosional unconformity covered by shelf and slope sediment. Upper-slope sediment strata are coherent reflections and indicate relative stability that allows gullies to develop. The gullies are destroyed in the middle slope by active mass wasting and normal faulting. Here the upper plate progressively looses reflective and physical coherence from diffuse extensional faults at scales below seismic resolution. Basement increasingly fragments until it breaks up and merges into the frontal prism. The frontal prism is a contractile structure, like a small accretionary prism with a décollement, but is composed mainly of slope sediment, as in Costa Rica, and disaggregated upper-plate basement, as off Guatemala. Like accretionary prisms, it does not add significantly to the width of the continent. Characteristic of the frontal prism is a seafloor that emulates the subducting horsts and grabens beneath the thin prism (~1-2 km). Behind the frontal prism, erosion of fragmented upper-plate basement begins. Erosional debris dragged from the upper plate enters the subduction channel. The model framework, subsidence, normal faulting and growth of the graben is observed, but the dislodgement of fragments and dragging into the subduction channel are not seismically imaged or sampled.

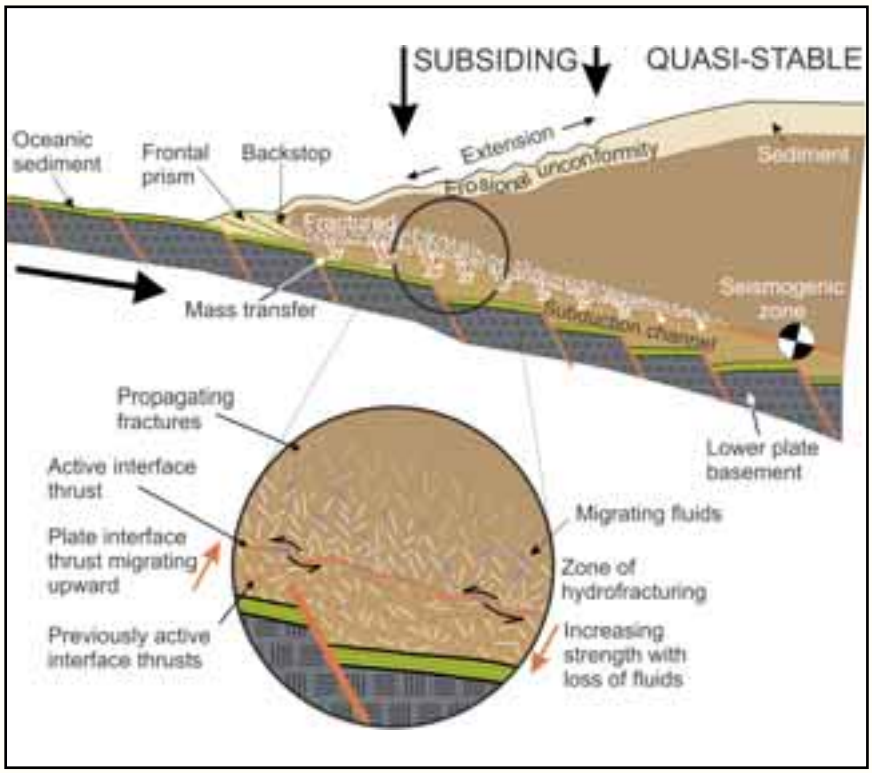


Figure 1. Diagram of a generic subduction-erosion model. Marine geophysical and geological observations indicate the structural framework, the massive subsidence and the continued growth of grabens after subduction. The dislodgement of fragments by hydrofracture (white random dashes along the plate interface), which are dragged into the subduction channel, are hypothetical. This transfer of mass from the upper to the lower plates is a proposed explanation for much of the observed margin subsidence.

With a low sediment supply, fast convergence rate, abundant seismicity, subduction erosion and a change in subducting plate relief along strike, the Middle America Trench offers excellent opportunities to learn about the causes of earthquake nucleation along **erosional** margins. CRISP can contribute to an analysis of the causes of great earthquakes in comparison with other deep drilling of fault zones (San Andreas Fault Observatory at Depth (SAFOD) and NANkai

TROugh SEIsmogenic Zone Experiment (NantroSeize)). These opportunities were discussed during the second CRISP Workshop held in the Fall of 2003 at Geomar in Kiel, Germany. Here, the proposal for the second stage was discussed and objectives were formulated that became the basis for the Stage 2 proposal submitted to IODP. The Stage 1 proposal has been reviewed and is awaiting ranking for a future drilling campaign. The overview and Stage 1 proposals are posted at www.sfb574.geomar.de/crisp/ and an article discussing the generic model of an erosional margin is planned for the September 2004 issue of *Geology*.

R. von Huene, UC Davis, USA; C.R. Ranero, IFM-GEOMAR, Kiel, Germany; P. Vannucchi, Universita di Firenze, Firenze, Italy; S. Saito, JAMSTEC, Yokosuka, Japan.

Accessing seismic information for UNCLOS Article 76 purposes: a European (and global?) solution

Compiling information to determine the offshore extent of a country's legal Continental Shelf can be a protracted and expensive business. Some of the most important factors that determine the extent of a claim are sediment thickness, the structure of the underlying basement and the definition of the base of the continental slope. Assessment of these factors relies heavily on seismic reflection profiles and may involve commissioning expensive surveys. However, it is not always appreciated that extensive, but relatively old, seismic profiles already exist for many offshore regions. Such profiles may not be held on modern information systems and, because of their age, are not readily available, assuming their location is still known.

In 1997 the European Commission (EC) funded an initiative at the Southampton Oceanography Centre, UK and five collaborating institutions to scan many of these old paper seismic profiles that reside in research institutions throughout Europe (Figure 1). To date the *SEISCAN*^{X} project has scanned - without charge - over 1.4 million line.km of records from the EEZs of European Union (EU) countries. The surveys in the North Atlantic Ocean, Mediterranean Sea and Black Sea were mostly of no interest to hydrocarbon exploration companies but are now relevant to mapping the legal Continental Shelf. It is estimated that they would cost more than US$25 million to re-acquire today. To add value to this achievement the EC has recently provided new funding until 2005 so that extended scanning operations can now address records acquired by the European Union's Associated and Partnership states world-wide. Obviously, this introduces the potential value of these profiles to maritime states preparing UNCLOS submissions under Article 76.

The old seismic profiles (acquired from 1960 onwards) are still relevant to current research and resource assessment even though their resolution is not to modern standards. The profiles can still be used to address issues of gas hydrate occurrence, methane flux to the atmosphere, sediment slope stability and determination of the sediment thickness for UNCLOS studies. In fact the old records were often collected for measuring sediment thickness alone. But, because they exist only on paper and modern compilations require digital files, the project developed software, for academic users who could not afford commercial solutions, to convert the scanned files to standard SEG-Y format. The resulting files can be loaded into ProMAX, GeovecteurPlus etc. for further processing and display (Figure 2). The project encourages long-term archive and data re-use strategies within European marine research centres and government agencies.

In addition, there are also many commercial surveys where no original magnetically recorded data remain and only plotted sections are found and here modern re-processing can extract additional information from the scanned files. The problem has proven large enough to be too expensive to rectify, and the data old enough to be considered beyond the priorities of current funding pressures, particularly for individual research institutions. The *SEISCAN*^{X} initiative has shown that there is broad enthusiasm for some of these

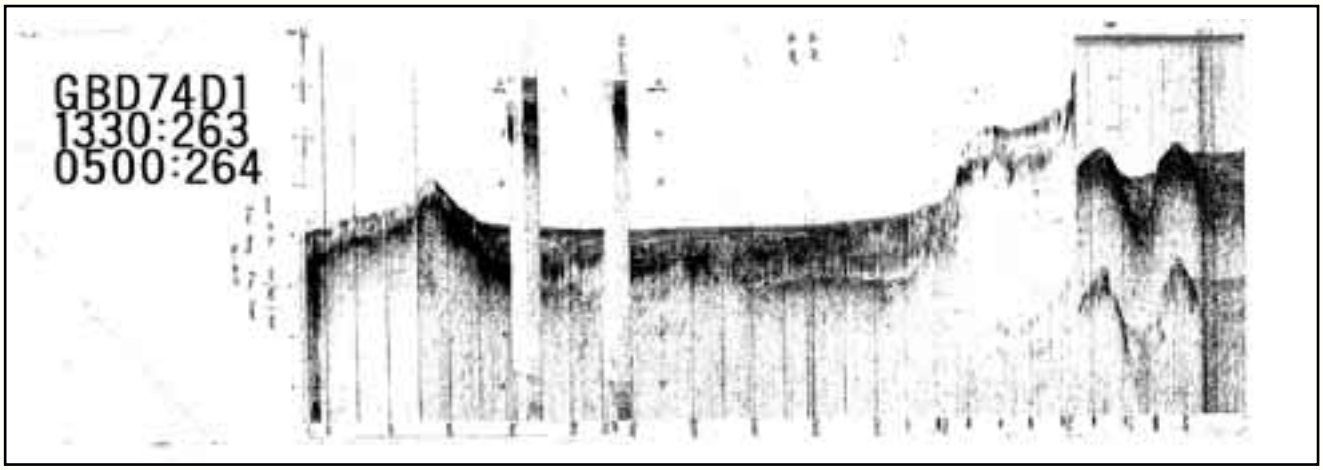


Figure 1. Typical original EPC line-scan (thermal trace) monitor record. The original record annotations are often the only surviving documentation. Each scanned A0 length paper record is annotated with a unique identity number e.g GBD74D1.

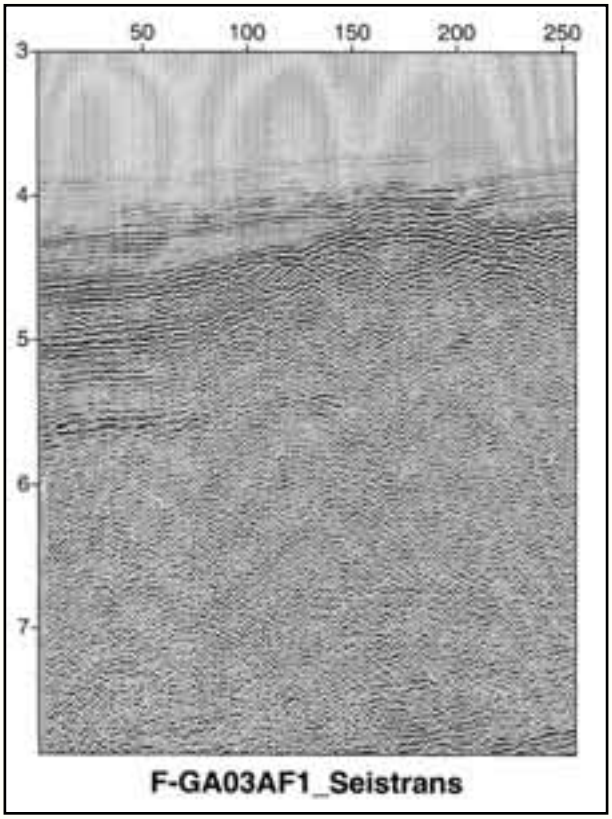


Figure 2. Plot of a file in SEG-Y format after SeisTrans conversion of a wiggly trace, variable-area, record section (y-axis seconds, twt).

seismic records to be transferred to another durable medium - in this case CDs - so they can be publicised and re-used, sometimes creating new value.

The project has been managed using a common hardware and software strategy across collaborating institutions which enables standard quality assurance processes. The *SEISCAN*[X] project holds four A0-size scanning systems at the Université Louis Pasteur, Strasbourg, the University of Barcelona, Spain, the Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS) Trieste, Italy and the National Observatory of Athens (NOA) Athens, Greece. The Athens system is mobile so it can be used by institutions unable to submit their records to a scanning centre. In addition to the EU, *SEISCAN*[X] collaborators are now located in all of eastern Europe as well as in the USA, Canada, Seychelles and Australia with added-value projects in Bosnia and Greece.

Users have the option to publicise the existence of their holdings by permitting their records to be available on a WebViewer browser at www.soc.soton.ac.uk/SEISCANEX in thumbnail and mid-resolution image form. This secures the Intellectual Property Rights of data owners because, although they are not suitable for practical use, the web images are sufficient to confirm quality and content and do provide basic metadata, navigation and contact information. This gives potential new value to the holdings of *SEISCAN*[X] facility users by informing the wider scientific and commercial communities that the information exists and is available!

Acknowledgements: *SEISCAN*[X] is a research project supported by the European Commission under the Fifth Framework Program and contributing to the implementation of the Thematic Priority "Support for Research Infrastructure" within the Energy Environment and Sustainable Development Programme: EVR1-CT2001-40016. CALDERA GRAPHICS, Strasbourg for collaboration in developing the project software.

Published in original form by Peter R. Miles, *SEISCAN*[X] co-ordinator, SOC, Southampton SO14 3ZH, UK; email: P.Miles@soc.soton.ac.uk and Robert Pettit, SeiScan GeoData (Fugro Robertson Ltd), Llandudno, North Wales in EEZ International, Summer 2003, Henly Media Group Ltd.

New wide-angle seismic interpretation of the Sea of Okhotsk

We have completed studies of the crustal structure of the Sea of Okhotsk in the Transitional Zone from the Eurasian continent to the Pacific Ocean by means of a new interpretation of all the deep seismic sounding profiles (Figure 1) conducted since the beginning of the International Geophysical Year (1958). The profiles varied from 250 to 750 km in length. The first-arrival travel-times were interpreted using the method of uniform functions (essentially a form of 2D travel-time inversion). Detailed seismic sections were obtained to depths of 30-60 km.

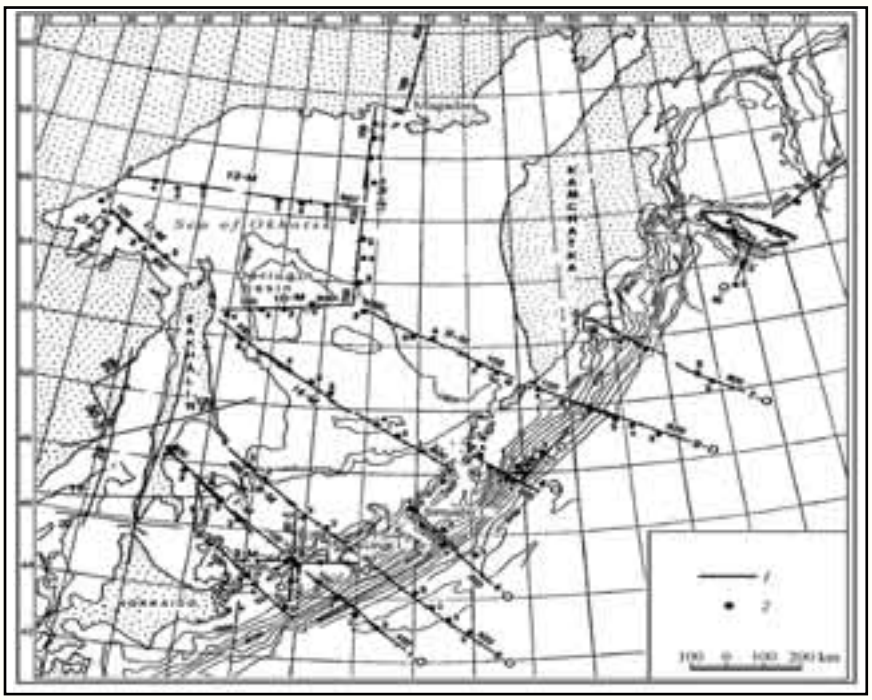


Figure 1. Map showing the compilation of the deep seismic sounding (wide-angle seismic) profiles in the Sea of Okhotsk. In the key, 1 denotes the profiles, 2 denotes the seismic stations.

New results were obtained that could be correlated with geological data and geodynamic features. It was established that the lithosphere under the Sea of Okhotsk is broken into blocks, as proved by the horizontal variation of the geological and geophysical parameters of the crust. Blocks of different ranks (sizes?) are separated by crustal faults, rifts, fold-and-nappe systems and subduction zones. The new interpretation of the seismic data confirmed earlier ideas of a reduced crustal thickness under the deep-sea basins of the Sea of Okhotsk, such as the Kuril Basin, the Deryugin and Tinro basins and the sedimentary trough of the Tatar Strait, where the uppermost mantle showed low velocities (not higher than 7.6-7.8 km/sec). It appears that the sedimentary basins of the Sea of Okhotsk lie above asthenospheric diapirs that include magma chambers. A system of rifts and spreading centers was mapped in the northern and central parts of the Sea of Okhotsk, in the Tatar Strait and in the Kuril Basin. Subduction zones that had been active during the late Cretaceous and the Early Paleogene, and are marked by ophiolite belts at the present time, have been traced in the crust near the eastern shores of the Sakhalin Region. Remnants of paleosubduction zones were mapped, using seismic data along the Okhotsk-Chukotka volcanic belt in the Sea of Okhotsk, and seem to include fragments of a lithospheric plate that was being subducted under the continental margin in Mesozoic time.

A.G. Rodnikov, Geophysical Center, Russian Academy of Sciences, Moscow, Russia

The InterMARGINS web site: latest developments and future plans

I have now been employed by InterMARGINS, for two days a week, for about a year. This time has been taken up in designing the web site and collating information for the larger sections of the site. This effort began by drawing together information from a diverse provenance. Looking forwards the challenge will now be to update and add new information.

The major web site sections, which can be accessed from the home page (Figure 1), cover 'Research Cruises', 'Projects by Country', and 'Global Charts'. The 'Research Cruises' section contains a map linked to summaries of scheduled cruises on continental margins and is organised on a yearly basis. For example, the summary for 2003 is complete (Figure 2) and we are presently compiling information for 2004. Don't hesitate to send me your 2004 cruise information.

The 'Projects by Country' section contains summary descriptions of research programmes from many countries around the world (see table) and is organised on a per country basis. It lists the national research programmes, activity reports, contact details of laboratories working on margins, funded projects and international research programmes which are led by workers in that country.

We are presently completing a section containing the following Global, i.e. worldscale, Chart information which we hope will be of use for cruise planning and other purposes: political boundaries, plate boundaries, bathymetry, satellite gravity, magnetic anomalies, natural seismicity, world stress map, volcanoes and large igneous provinces (LIPs), EEZ limits, sediment thickness, telephone cables, DSDP/ODP sites, time zones and crustal age.

Although it is an international network, in terms of normal web usage the Margins community is relatively small. Nevertheless, I am pleased to say that statistics indicate that the web site is being regularly visited. However, while submissions for the InterMARGINS Newsletters have generally been forthcoming I have not received anywhere near as much information specifically for the web site. Clearly then my next task is to

Figure 1. The home page of the InterMARGINS web site.

try and encourage a feeling of ownership for the site and to try and change the perception of the site from something that is simply a repository of information into a place in which information can also be exchanged.

Because a web site is more informal than other forms of publishing I would like to encourage people with any sort of information which they feel would be of interest to the wider Margins community to start regarding the InterMARGINS website as the natural forum in which to present this information. We hope that you will regard the web site as an opportunity to promote your Institution, your Group, your Project and you personally to the international Margins community. In the first instance, please check that we have included your details on the 'Projects by Country' pages and that these details are accurate and up to date.

We are fortunate in that the locations, the research vessels, and the science all make margins research an exciting subject. I would like to start to make this more evident on the website by including some photographic commentaries which document the work that people have been, and are, doing. You might regard this as a form of 'online poster'. If you've taken photographs of your trips which are informative about the science which you've been doing please contact us and we can consider how best to put your information on to the site. Email us the URL if you've already put this information online.

As always any margins related information which you forward to us will be treated as a priority.

David Geddes, InterMARGINS Office, SOC, UK. email: dxg@soc.soton.ac.uk

Figure 2. The world-wide chart of Margins cruises (red dots) that took place in 2003.

Countries with Project pages	
Australia	Japan
Canada	Netherlands
Denmark	New Zealand
France	Norway
Germany	Portugal
Greece	Spain
India	UK
Ireland	USA
Italy	
In preparation: Brazil, S Africa	
Awaiting information: PR China	

A table of the countries that are currently listed on the 'Projects by Country' pages.

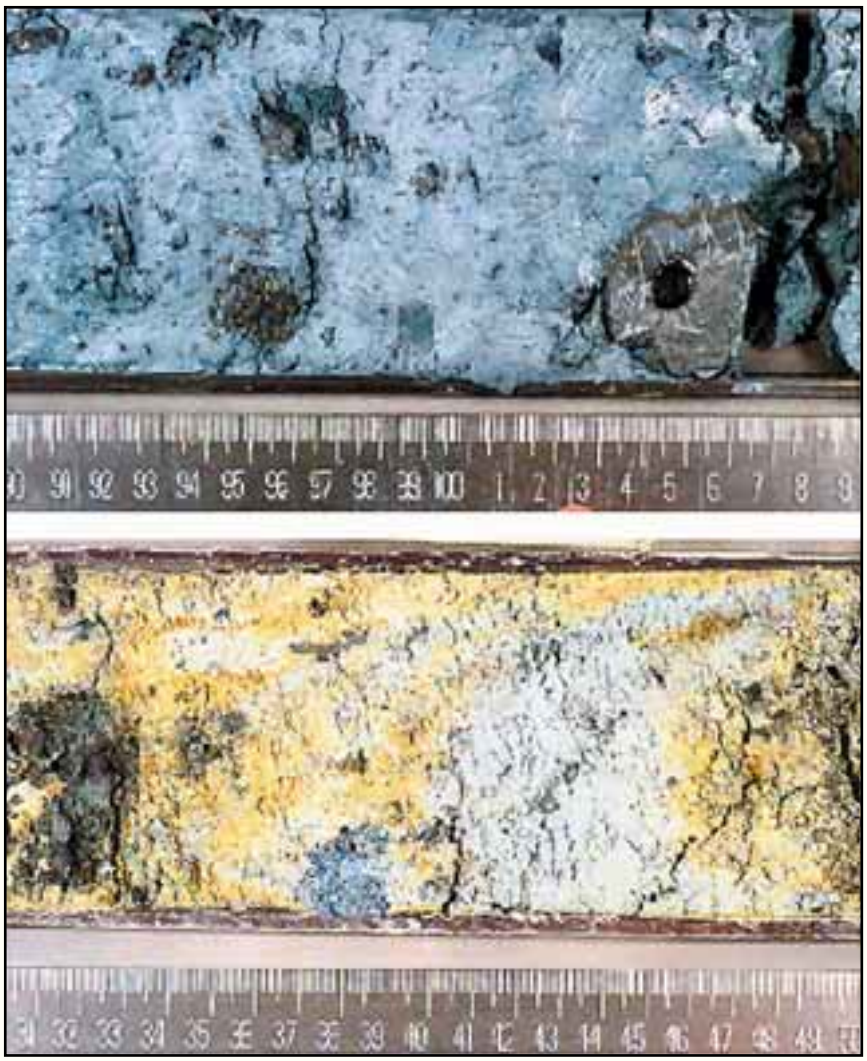
Countries sign up to IODP

In the past several months many countries have signed agreements sealing their membership of the Integrated Ocean Drilling Program (IODP).

In Europe, on 15 December, 2003, the European Consortium for Ocean Research Drilling (ECORD) signed a Memorandum of Understanding which celebrated the official start of ECORD. The ECORD Memorandum established ECORD as the consortium of 12 European countries, Denmark, Finland, France, Germany, Iceland, Italy, Netherlands, Norway, Portugal, Sweden, Switzerland and United Kingdom involved in participating in IODP. At present, Spain has joined the consortium and negotiations are in progress with Austria, Belgium, Canada, Ireland and Greece. Subsequently, on 16 March, 2004, ECORD became officially part of IODP, joining the U.S.A. and Japan. The ceremony of signing the Memorandum of Understanding with IODP was hosted by the RCOM (Research Centre Ocean Margins) at Bremen University, Germany before the joint International Continental Drilling Program (ICDP)-IODP Euroforum. Representatives from MEXT (Japan), NSF (USA) and ECORD took part.

In the USA, on 30 March, 2004, the National Science Foundation signed a cooperative agreement with the Joint Oceanographic Institutions (JOI) in Washington, D.C., to lead U.S. participation in the IODP. U.S. participation will be accomplished through the U.S. Science Support Program (USSSP), an entity created by NSF specifically to support U.S. scientists' activities in the IODP; the USSSP will be managed directly by JOI. NSF is funding USSSP for its first 3 years with US$15 million. These funds will, among other things, support U.S. scientists' travel and salaries for participation in drilling expeditions and post-expedition research, encourage activities that further the planning and development of drilling proposals and expeditions and develop educational and community engagement programs.

Photographs of cores from a Pacific Ocean serpentinite mud volcano



Scales in cms

These photographs show split cores that were recovered from the South Chamorro Seamount in the western Pacific Ocean on Leg 195 of the Ocean Drilling Program. The scales are in centimetres. A curvilinear belt of serpentinite mud volcanoes extends for hundreds of kilometres along the strike of the Izu-Bonin subduction complex. The volcanoes are located at the toes of forearc complexes, and their locations with respect to the trench depends on the vertical distance to the main subduction thrust zone. More than a decade of geochemical, geophysical, and submersible exploration of these features has shown them to be composed primarily of extensively serpentinized harzburgite with entrained blocks and cobbles of comparatively fresh harzburgite. Also found in the mud are clinopyroxene, calcite, and sodic amphiboles such as crossite. The seamounts form when water from the décollement hydrates harzburgite to form serpentine mud that flows up through fractures in the forearc. The water comes from breakdown and dewatering of hydrous minerals at the interface of the subducting and over-riding plates. Decarbonization of carbonates may also occur. Analyses of pore water from the serpentinite diapirs offer a unique opportunity to access samples and evaluate geological processes in this non-accretionary subduction complex. Features discovered and lessons learned here will be applicable to subduction in similar settings.

The top picture is of a part of core 195-1200E-1H3 from 1.35 meters below the sea floor (mbsf) in borehole 1200E. The core gave off a strong odour of hydrogen sulphide. Geochemical and isotopic evidence show that this interval is a site of intense sulphate reduction, probably by Archaea microbes. Chrysotile fibres are clearly visible under light microscopy; the samples also contain brucite, magnetite, and bastite replacing orthopyroxene. The grey to black colour may be due to precipitation of iron sulphides, but this has yet to be proven. However, iron concentrations are 0.01 mmol/L, which is consistent with the iron precipitating with sulphide. Sulphate concentrations are 1.6 mmol/L and sulphide concentrations are 12.6 mmol/L.

The lower picture is from part of core 195-1200E-3H1 from 19.96 mbsf in borehole 1200E. No odour of hydrogen sulphide was detected in this sample. The yellowish-brown coloured material is calcite. The green area is serpentine mixed with montmorillonite clays. Some black patches of incipient alteration of orthopyroxene to bastite are evident.

Steve Komor, Leg 195 Shipboard Scientist, Syracuse University, USA

Recent Newsletters and other publications received

Date	Item	Available from http://
February 2004	GDRMarges Bulletin d'Information no. 6 (Newsletter of the French national margins programme)	gdrmarges.lgs.jussieu.fr
December 2003	OD21 Newsletter Vol. 15	www.jamstec.go.jp/jamstece/odinfo/
September 2003	MARGINS Science Plans 2004 170pp.	www.margins.wustl.edu
Fall 2003	MARGINS Newsletter No. 11	www.margins.wustl.edu

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