JOI/USSAC NEWSLETTER

NEWS FROM THE JOINT OCEANOGRAPHIC INSTITUTIONS/U.S. SCIENCE SUPPORT PROGRAM ASSOCIATED WITH THE OCEAN DRILLING PROGRAM • Nov 1997, Vol 10, No 3

A detailed window on climate change in Northern California

contributed by Mitchell Lyle, Per Bodén, Linda Heusser, Jennifer Pike, and Alan Mix

The end of Leg 167 marked only the first milestone in the completion of the high-resolution paleoceanographic objectives for drilling along the California margin. Now, a little more than a year since the *JOIDES Resolution* sailed into San Francisco, the first significant scientific results are coming forth. Shorebased research has, as expected, greatly improved our chronostratigraphy and higher sample density has improved our ability to detect events and cycles.

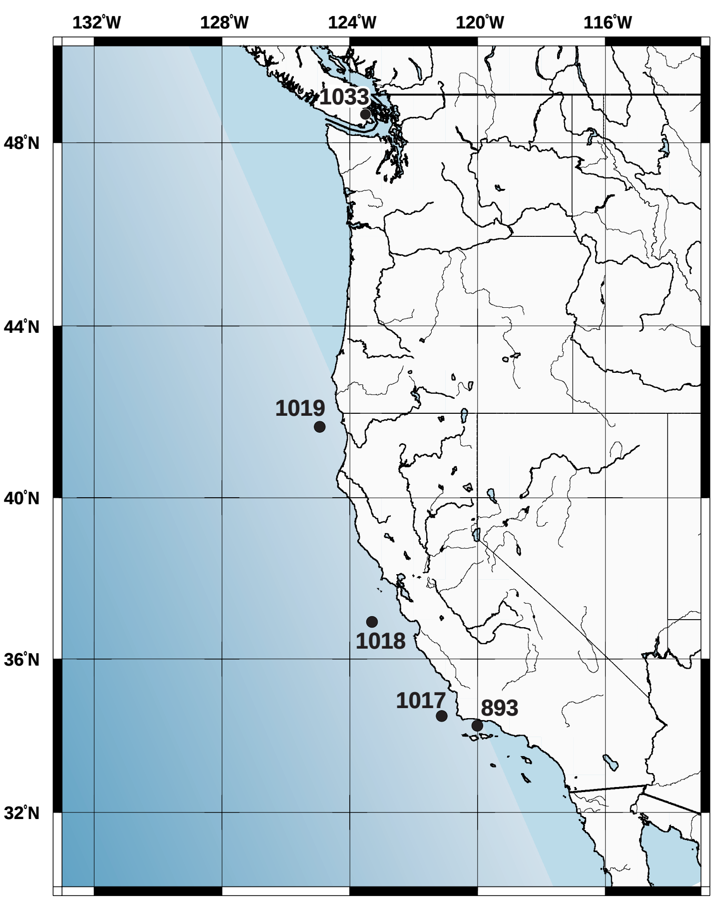

Fig. 1: Location of northeastern Pacific ODP drill sites with Late Pleistocene sedimentation rates greater than 200 m/Myr. These provide sediment records that can be used to monitor centennial-scale paleoceanographic changes. Sites 1017, 1018, and 1019 were drilled on ODP Leg 167.

Three drill sites, Sites 1017, 1018, and 1019 from Leg 167, provide very high resolution climatic records (sedimentation rates greater than 200 m/Myr) for the Late Pleistocene interval (Figure 1). These, and ultra-high resolution records (sedimentation rates greater than 1000 m/Myr) of the Holocene/Late Pleistocene interval in the Santa Barbara Basin (Site 893, Leg 146) and in Saanich Inlet (Sites 1033 and 1034, Leg 169S), for the first time provide the means to study how climate and oceanographic conditions have evolved along the Pacific coast of North America. Prior to 1992 none of these records existed.

Groups of scientists are studying each of the Leg 167 sites. We have been most directly involved with Site 1019, and will present some of the exciting new information here. Site 1019 was drilled in the Eel River Basin near the slope break at a water depth of 977 m. The sediments are silts and silty clays with generally small amounts of calcareous and opaline microfossils, and some small turbidites.

Studies of the deglaciation

One of the pleasant surprises resulting from our post-cruise research is the discovery that we had recovered an expanded sedimentary section extending to 20 ka (thousand years before present) at Site 1019. The average sedimentation rate is 610 m/Myr (Figure 2). While the majority of the section is bioturbated, we found three laminated intervals with ages between 15 and 9.5 ka. Two of these

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are in the relatively warm periods which bracket the cold Younger Dryas chronozone, when the Atlantic cooled to almost glacial conditions. A third laminated interval occurs early in the deglaciation, at about 15 ka, just after warming began in earnest.

These intervals are probably caused by high biological productivity in surface waters with only a minor contribution by the expansion of the oxygen minimum zone to the seafloor — all the laminated intervals are marked by a highly abundant and diverse assemblage of benthic foraminifera, indicating that the seafloor was at least partly oxygenated. The zone of high organic carbon (C-org) burial, based on color reflectometry (see below), is larger than the laminated interval. The laminated sediments occur at the beginning of a high C-org interval. The conditions that caused the laminations thus appear to occur abruptly and then taper off with time. If the terrigenous and diatomaceous laminae couples represent an annual cycle, the shortest event is only 6 years long and the longest lasted for about 100 years. One of the puzzles which we are continuing to study is why no laminations appear during the prior deglaciation, the OIS (Oxygen Isotope Stage) 5/6 boundary.

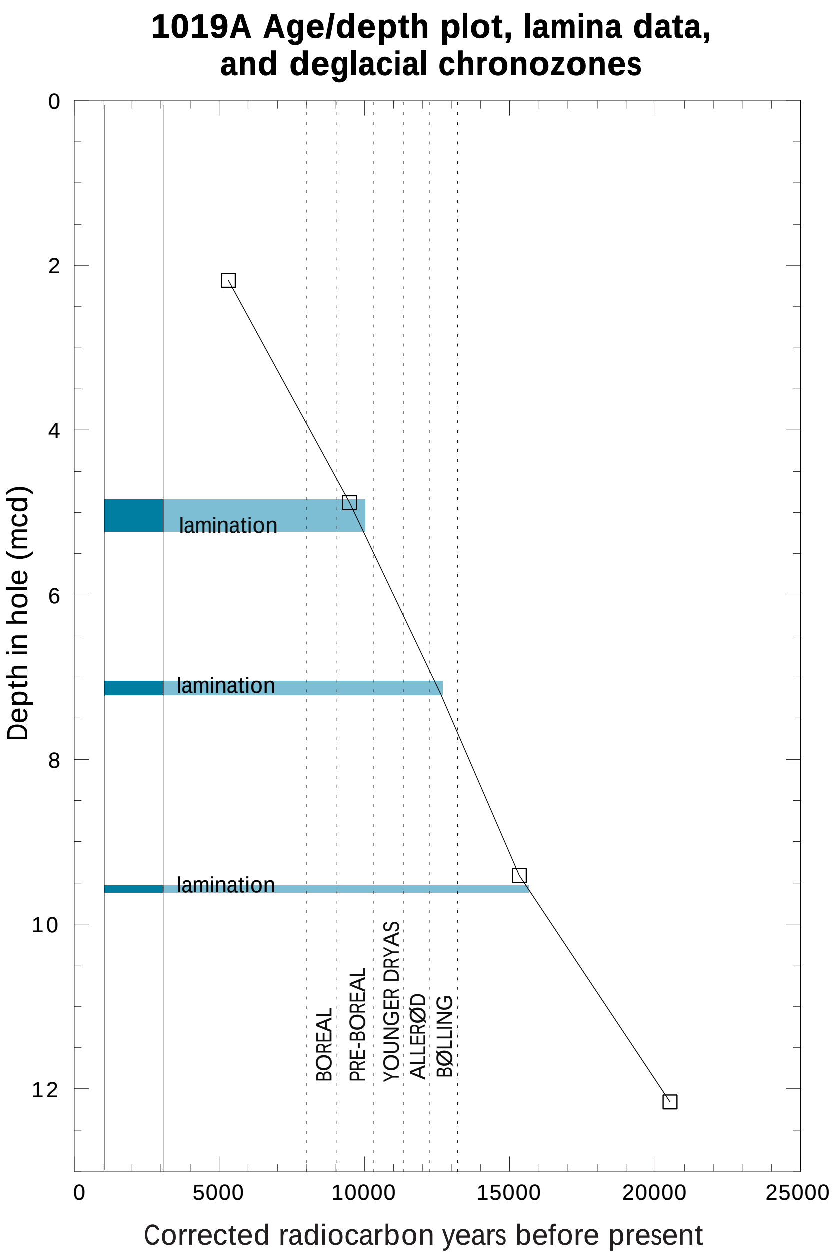

Fig. 2: Age (reservoir-corrected radiocarbon years before present) versus depth (in meters composite depth scale) in Hole 1019A. Open squares mark radiocarbon sample depths. Intervals of laminated sediments are marked on this age/depth plot.

The last 150,000 years

We are also assembling time series of pollen abundance, calcium carbonate and organic carbon burial, stable carbon and oxygen isotopes, and clay mineralogy for longer time scales in order to study orbital forcing of the northeastern Pacific Ocean and of terrestrial climate in northernmost California. These studies were impossible before drilling because high sedimentation rates precluded sufficient penetration by piston coring from a conventional research vessel. For example, the depth to the OIS 5/6 boundary is about 34 meters below the seafloor at Site 1019, while at Site 1020 the OIS 5/6 boundary is at approximately 16 meters depth. The records that we have assembled to date show that the region is sensitive to both orbitally forced climate change and also to higher frequency events (Figure 3). On the orbitally forced time scale, glacial intervals tend to be more carbonate-rich than interglacials. This generality is punctuated, however, by many large carbonate burial events. The carbonate events that we have labeled (a)-(j) can be correlated offshore to Site 1020 in 3040 meters of water and to a high-resolution carbonate record from the site survey piston core EW9504-17PC from 2670 m water depth. We believe that at least some of the carbonate events can be correlated as far south as the tip of Baja California. Because we can find these events in shallow and deep water, we believe that they result from carbonate production, not higher preservation. The carbonate events straddle the glacial-interglacial boundary between OIS 5 and 4, with the largest events occurring within stage 5.

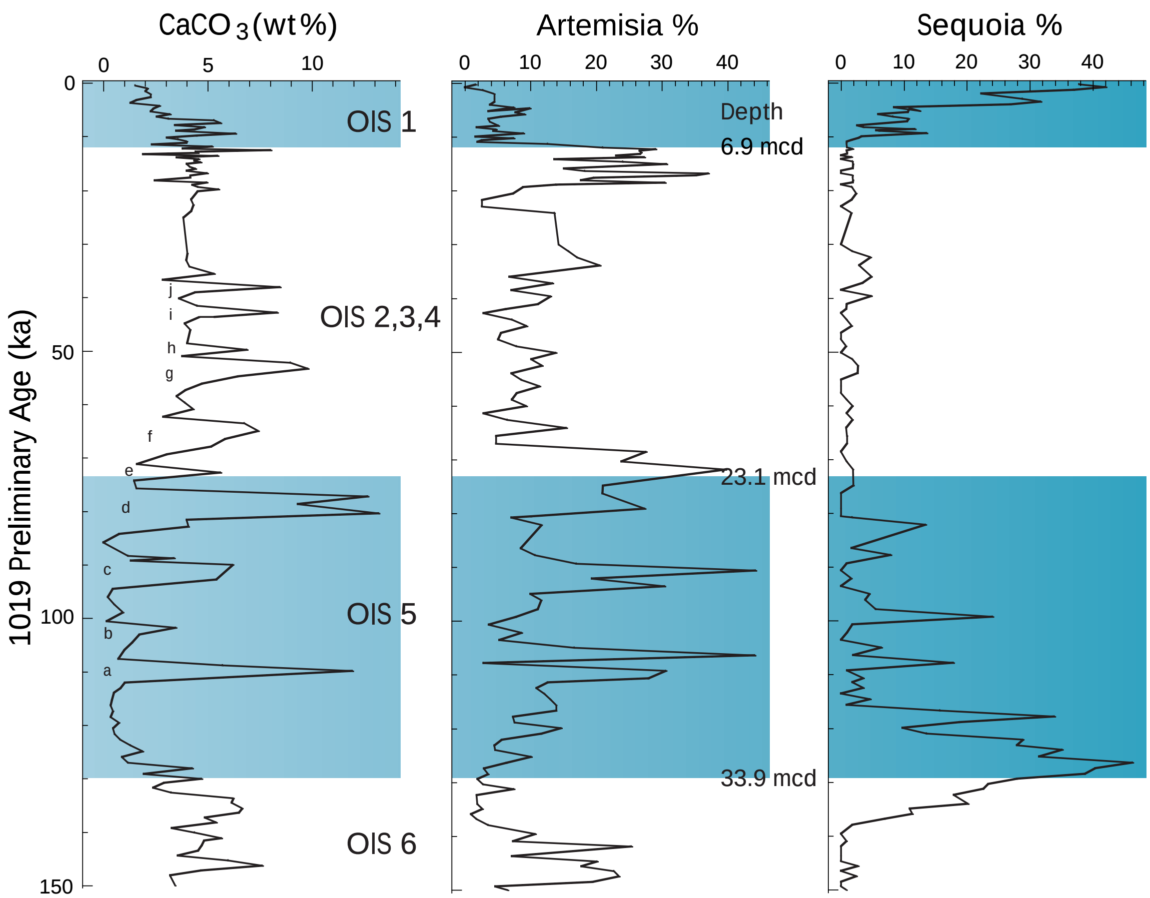

Fig. 3: 150 kyr time series of biogenic carbonate content and pollen deposited at Site 1019 based upon a preliminary timescale which correlates carbonate events regionally. Pollen % is the percentage of total pollen represented by that type. Interesting correlations exist between pollen percentages and carbonate events, especially those marked (a) - (e). Sequoia (redwood) pollen is only high during the strongest interglacials and appears during carbonate lows in the core. Artemisia (sagebrush) pollen is high primarily during high carbonate events.

Carbonate events labelled (a) through (e) coincide with periods of elevated deposition of sagebrush (artemisia) pollen, which probably represents drier, less-forested conditions onshore. The correlation highlights an apparent link between marine and terrestrial conditions which will be explored more fully in the months to come. One of the interesting puzzles of the pollen record is the lack of sage-brush pollen during the last glacial period, except for oxygen isotope stage 2, despite the large responses to events in OIS 5 through the 5/4 boundary. This type of response is evidence that more than one typical “glacial” or “interglacial” climate exists. These should ultimately be defined by significant anomalies in temperature, precipita-tion, seasonality of temperature or precipitation, and insolation. We believe that they will be linked to ocean circulation changes that we will detect offshore.

Pollen studies also reveal that the redwood (sequoia) forest, the hallmark of northernmost coastal California, only exists during the strongest of interglacial periods. In Figure 3, one period of high sequoia correlates with the latest Holocene, while the next peak of equivalent value occurs only at OIS 5e. Other warm intervals in OIS 5 are marked by only moderate to low amounts of redwood. Longer records from Site 1020 reveal the same trends for the last half million years.

Improving resolution of time series by sediment core remote sensing

Paleoceanographic studies require that large numbers of samples be analyzed to produce the time series. Any method which increases the rapidity and reduces the cost of analyses ultimately improves our ability to understand complex pale-oceanographic changes. One new approach is to analyze cores for important chemical or mineral-ogical variations based upon some remotely sensed physical parameter of the sediments. In the tropical Pacific Ocean for example, carbonate content can be estimated from GRAPE bulk density measured non-destructively on the shipboard Multisensor Track [e.g. *Hagelberg et al.*, 1995].

On Leg 167, we also experimented with the use of color reflectometry for sedimentological applica-tions using the Oregon State University SCAT color reflectometer track. In the northern California Leg

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167 drill sites, regressions between the 1024 channels of color information and organic carbon content developed an equation which could be used to estimate organic carbon with an RMS error of ± 0.15% (Figure 4). The low carbonate contents of the northern Leg 167 sites (< 15% for the last 500 kyr) precluded development of an accurate estimate for carbonates. Further south, where sites had high carbonate contents, carbonate content was estimated with an error of about ± 5%.

The top two laminated sediment intervals in the deglaciation are easily resolved by their organic carbon content in Hole 1019C, but the lowermost lamination fell within the core break and was not sampled. The C-org time series shows the existence of another high C-org interval at about 4.2 mcd, or about 8 ka, and a series of small C-org events during the glacial interval between 12 and 20 mcd. These events were not resolved by discrete sampling because of the coarse spacing of the discrete samples, and show up only because of the 4 cm spacing of color reflectance measurements. The significance of these events in a paleoceanographic context is not clear but will be one focus of future studies.

Conclusions

ODP drilling has for the first time provided high-resolution paleoceanographic records along the western margin of North America. All of these sites have been drilled since 1992, and most were drilled in 1996. Potentially, these records will provide means to observe the evolution of the northeastern Pacific and its interaction with the major glacial events. Linking these data to terrestrial records, either through pollen or through well-dated terrestrial sediment sections will help us to understand and predict the affects of climate change on precipitation, runoff, and temperature which control the habitability of the western U. S. These data will also help us better understand teleconnections in the climate system, for example between Heinrich events in the North Atlantic Ocean and climate change in the Pacific.

Acknowledgments

Mitchell Lyle, Linda Heusser, and Alan Mix were all funded by JOI/USSSP post-cruise grants, without which this research would have been impossible. The SCAT color reflectometer development and deployment on Leg 167 was also funded by JOI/USSSP.

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Ortiz, J., A. Mix, S. Hostetler, and M. Kashgarian, The California Current of the last glacial maximum: reconstruction at 42°N based on multiple proxies, *Paleoceanography, 12,* 191-205, 1997.

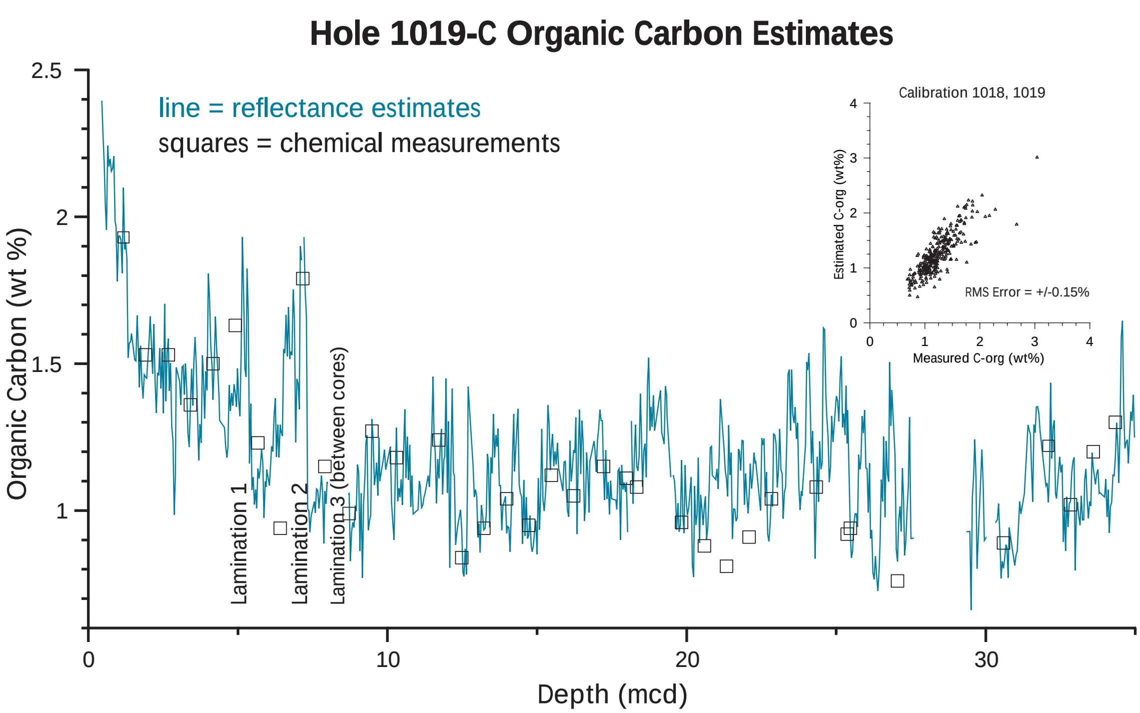


Fig. 4: Organic carbon contents from Hole 1019C estimated from color reflectance using the Oregon State University SCAT track. Open squares mark discrete organic carbon measurements The inset shows the calibration data set. Two of the laminated intervals are found in this core, while the third was missed at the core break between Cores 1 and 2. The laminated intervals are reflected by high organic carbon events. These events are larger than the laminated intervals, however. The SCAT track also detects other organic carbon events that are not marked by laminations, and which could not be detected by the coarse-scale discrete analyses.

Hierarchies of sea-level fluctuations recorded in cores, logs, and seismic data along the Great Bahama Bank Transect

Fellowship Profile

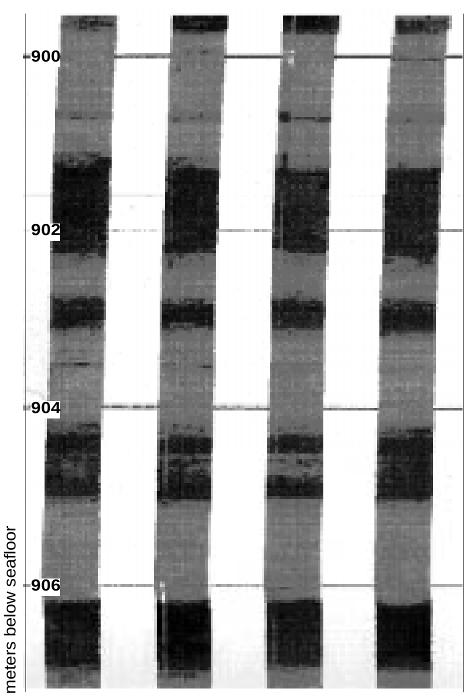
Karin Bernet

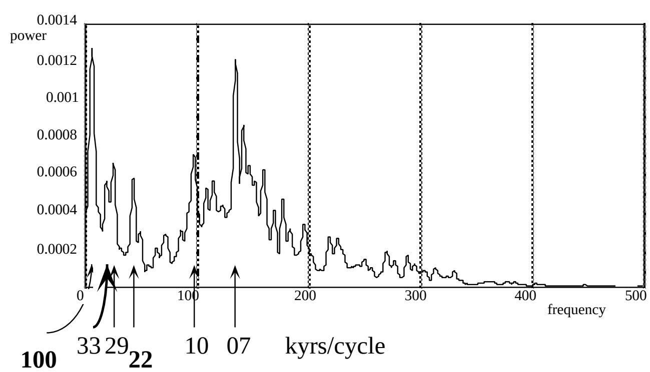
Ph.D. Student:
RSMAS, U of Miami

Faculty Advisors:
Gregor Eberli

ODP Leg 166 drilled the prograding margin of western Great Bahama Bank to extract sedimentary and oxygen-isotope records of Neogene sea-level fluctuations. The oxygen isotopes provide a proxy record for orbitally-induced, high-frequency climate and sea-level changes along the Bahamas Transect, and the sediments record these changes in centimeter- to meter-scale cyclic depositional patterns. In addition, these sediments contain information about the longer-term evolution of sea-level changes. For example, sedimentary successions that are seen on seismic data as unconformity-bounded sequences document 17 major, large-scale sea-level fluctuations in the Neogene along the Bahamas Transect. Because of the excellent sedimentary record available along this transect, it offers a unique opportunity to investigate if the high-frequency sea-level changes bundle into a predictable or hierarchical manner to form long-term sea-level changes, or if these few major events are random occurrences controlled by other processes.

By examining the Leg 166 cores for sedimentary characteristics and facies variations, using Formation MicroScanner data (FMS) and spectral analyses, I have documented that small-scale (centimeters to meters) cyclic alternations of platform-derived and pelagic sediments record orbitally-forced, high-frequency sea-level changes. Spectral analysis of Miocene cycles, indicate that these changes occurred with a frequency of 20 k.y. and are probably related to the orbital precessional cycles. In several sections of the cores, 10-15 high-frequency cycles are grouped into sedimentary successions of 5-10 m thickness, in which the neritic platform-derived sediment increases upsection, indicating prolonged periods of high sea level within each fluctuation. These 5-10 m thick successions are interpreted to be the sedimentary expression of sea-level fluctuations with a 200-400 k.y. frequency that is related to orbital eccentricity. Up to ten of these intermediate successions compose sedimentary sequences that coincide with one seismic sequence. These seismic sequences record longer-term, low-frequency sea-level changes of 0.5-2.5 m.y. duration. Although the ages of these low-frequency changes agree well with known eustatic changes, the sedimentary record does not display a predictable stacking frequency of the smaller-scale cycles into the seismic sequences. Currently I am constructing synthetic seismic profiles with different frequencies to assess how the stacking of the different sedimentary packages produces the resulting seismic sequences.





Left: Formation-Micro-Scanner image of Site 1003 recording high-frequency alternations of more platform-derived material with high resistivity (light in color) and more pelagic sediment with low resistivity (dark in color).
Top: Spectral analysis indicates that these changes occurred with a frequency of 20,000 yrs and might be related to orbital precession cycles.

Initial Reports update

Beginning with Leg 176, the full "Initial Reports" volume will be available in electronic format only, both on CD-ROM and on the www. Accompanying the CD-ROM will be a 50 to 100 page booklet. The goal of the IR booklet is to provide users with an overview of the leg before viewing the CD-ROM. It contains enough information so that readers who cannot access the CD, or readers who want to know whether the leg might be of any interest for their research, can get an overview of the principal cruise results. There won't be sufficient information in the booklet to prepare a sample request, for example. The content of the booklet was also designed so that the shipboard scientific party would not have to increase their workload to prepare this additional publication.

The booklet will contain site: (a) a brief CD-ROM user guide, (b) an introductory chapter that summarizes the leg objectives, and (c) a site abstract chapter. The site abstract chapter for each site will include the hole information and principal results (traditionally printed at the beginning of each site chapter), the site coring summary table, and a lithostratigraphy figure. The booklet will not contain core photos or barrel sheets.

ODP may amend the content of the booklet at any time, based on community input after wide distribution, however, there remains a page limit for this printed document.

"Blast from the Past" posters

JOI, in a partnership with the Smithsonian Institution, has designed and printed a limited number of posters highlighting the "Blast from the Past" exhibit, currently on display at the Natural History Museum through February 16, 1998. The showcase of the museum's "Blast from the Past" exhibit is a spectacular ODP K/T boundary core recovered during Leg 171B earlier this year, at a site 300 miles off the coast of northern Florida. A replica of the core will replace the original which will enable the exhibit to become a permanent installation in the Paleo Hall. Posters are now available (until we run out) by writing to joi@brook.edu.

Separately, USSSP funds supported a science teacher to develop some high school classroom activities that will accompany a "Blast from the Past" poster, to be distributed in the May 1998 issue of *The Science Teacher,* published by the National Science Teachers Association. The magazine's circulation is 27,000. Additional copies of the poster with activities will be available in May.

JanusWeb debuts

ODP will release its new relational database, Janus, on the Internet in early 1998. JanusWeb will become accessible to the global community of users in February, one year after the successful launch of Janus on the *JOIDES Resolution* during Leg 171B. Users will be able to search for, assemble, and download data via easy-to-use and predefined data requests (queries), a graphical map interface, and through a "power query" for those familiar with the database structure and Standard Query Language. Links will also be provided to publications, logging data and older paleontology data, not yet in the relational database. When launched in February, users will have access to data from Leg 171B. Data from successive legs will become available on JanusWeb as the 12-month post-cruise moratoria expire. Scientists who have sailed on any leg since 171B have access to data from their leg immediately after the cruise and do not have to wait until the end of their moratorium period to access JanusWeb. Contact JanusWeb@odp.tamu.edu for user name information and JanusWeb access. Plans are also being made to "migrate" data from previous legs (pre 171B) into Janus. You can access the new ODP Janus database at http://www-odp.tamu.edu/database/index.html. ODP welcomes any comments and suggestions you have for improving JanusWeb.

ODP's Greatest Hits

The JOI/USSSP funded "ODP's Greatest Hits" brochure seems to have made a hit and, because of this, JOI is already reprinting it. For copies of the brochure send a message to joi@brook.edu. A "Greatest Hits" slide set is now available as well.

During its October 1997 meeting, USSAC suggested that JOI place the many abstracts received from the U.S. community on the JOI web site, instead of publishing a large printed volume. However, USSAC encouraged JOI to produce a series of the shorter "Greatest Hits" booklets — the next installment is planned (somewhat tentatively) for the spring.

Drilling to 25,000 mbsf: With a little help from Mother Nature

contributed by Patricia Fryer and Gregory Moore

Site Augmentation Results

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SOEST, University of Hawaii

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New side-scan sonar and geophysical surveys of the southeastern Mariana convergent margin, obtained in part with USSSP funding, show a complex history of deformation in the Mariana forearc region and reveal eight serpentine mud volcanoes in different stages of evolution. The data were collected aboard the R/V *Moana Wave* in August-September of 1997. HMR-1 surveys, gravity, magnetics, and 6-channel seismic lines were run over the south-eastern portion of the Mariana Trough and along the outer half of the southeastern Mariana forearc (Figure 1).

Most of the serpentine mud volcanoes imaged during our survey erupted near fault-bounded forearc grabens. The muds probably formed as fault gouge during fault movement at depth in the forearc. The density contrast with the surrounding, less highly hydrated mantle peridotite and the admixture with rising slab-derived fluids permits the fault gouge to rise along fault-controlled conduits and eventually to erupt at the surface. As the mud volcanoes form, overlying sediments, through which the rising serpentine muds pro-trude, are shed from the seamounts during uplift. This process leaves the more highly compacted, deeper sediment layers exposed at the summits of young seamounts. Subsequently, the serpentine muds extrude, producing flows of variable morphology, depending on the amount of slab-derived fluid entrained with the muds (Figure 2).

A rapid rise of serpentine muds and slab-derived fluids from depths equivalent to the décollement makes the Mariana forearc mud volcanoes likely sites for the study of the pressure, temperature, and geochemical conditions at the zone of contact between the subducting and overriding plates. A more precise determination of these conditions is possible in forearc regions like the Marianas where the lack of a thick accretionary wedge of sediment means fluids suffer only minimal contamination. The fact that the deep forearc is nearly monolithologic (harzburgite) also contributes to minimizing the potential variability of the slab-derived fluids.

We now know that the serpentine seamounts are distributed from distances of 10 to 100 km from the trench axis, essentially along a transect of the outer half of the forearc. We also know now that they are distributed along the entire length of the Mariana forearc. Most importantly, we can now determine, by surveying with side-scan sonar, the stage of development of the seamounts. We can identify those which are active. Deep ocean drilling at sites on these seamounts, combined

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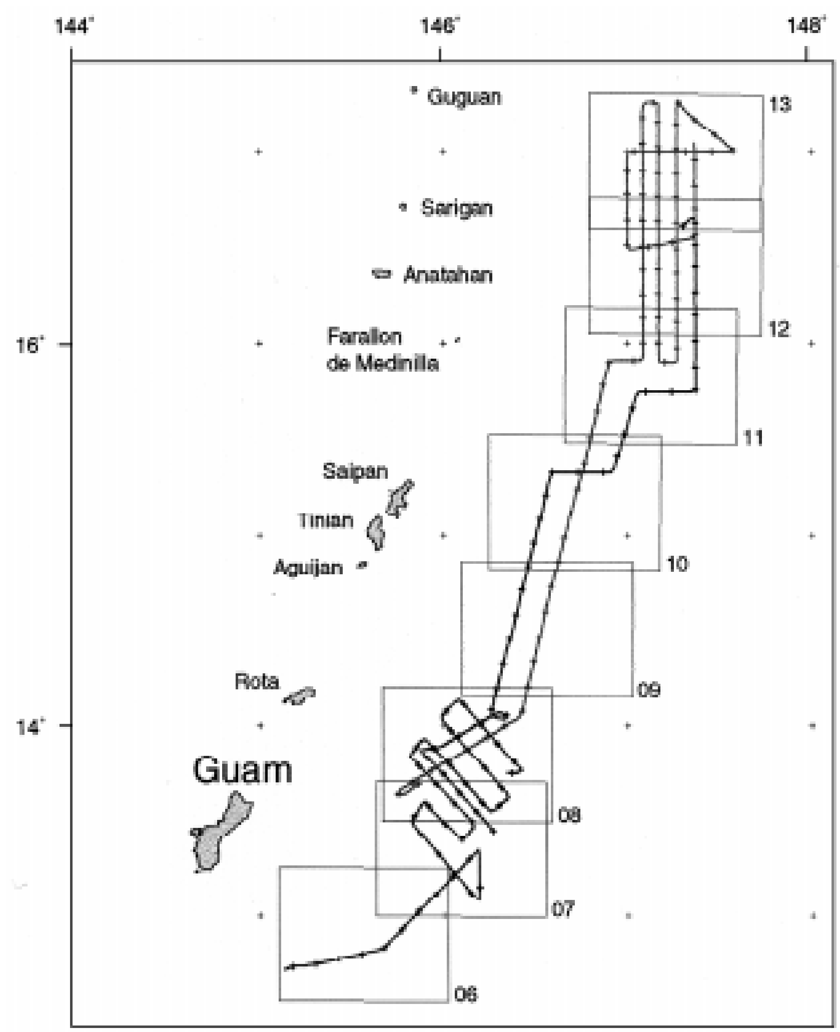
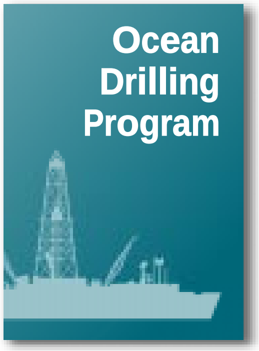


Fig. 1: R/V *Moana Wave* Hawaii-MR1 trackline for the August-September 1997 survey cruise. Note that survey boxes 01-04, west of Guam, are missing from this figure.



If you would like to participate on an ODP leg please contact:
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The ODP/TAMU web site has shipboard scientist applications available at: www-odp.tamu.edu/sciops/cruise_application_info.html

Summaries of upcoming ODP Legs 182-187

In August 1997, the JOIDES Scientific Committee finalized the drillship operations schedule for 1999. Brief descriptions of Legs 182-187 follow. We encourage you to contact the leg co-chief scientists and/or Tom Davies at ODP/TAMU if you are interested in obtaining more information about a particular leg.

Leg 182: Great Australian Bight
Co-Chiefs: D. Feary (Aus), A. Hine (US)

Leg 182 will drill an array of 10 holes across the Cenozoic carbonate shelf in the Great Australian Bight to (1) document the way in which this large, high-to-mid latitude shelf carbonate platform evolved throughout the past 65 Ma. in response to oceanographic and biotic change; and to (2) extract information contained in the carbonate sediments about global sea level fluctuations, physical and chemical paleocean dynamics, biotic evolution, hydrology and diagenesis.

Leg 183: Kerguelen Plateau
Co-Chiefs: M. Coffin (US), F. Frey (US)

Leg 183 represents the first leg in a proposed two-leg program to investigate the origin, growth, compositional variation, and subsidence history of the Large Igneous Province (LIP) formed by the Kerguelen Plateau and Broken Ridge in the south-eastern Indian Ocean. This will be achieved by drilling an array of holes, of approximately 200 m basement penetration, through the northern, central and southern portions of the LIP and by an offset drilling program in the vicinity of major fault scarps (~200 m) where tectonic processes have exposed deeper crustal levels.

Leg 184: East Asia Monsoon
Co-Chiefs: TBN

Drilling at seven sites in the South China Sea is proposed to study the evolutionary development and variability of the East Asian monsoon. There are four major objectives for the proposed leg: (1) to obtain a continuous marine record of climate history in East Asia and to compare the evolution of the East Asian with South Asian or Indian monsoon system; (2) to examine possible relationships between plateau uplift, monsoon evolution and global cooling; (3) to improve our understanding of the stability of the West Pacific Warm Pool and of the role of seasonality changes in tropical marginal seas; and (4) to establish a detailed history of sea level changes for the South China Sea.

Leg 185: Izu-Mariana
Co-Chiefs: TBN

This leg's goal is to determine the net crustal fluxes being recycled into the deep mantle by mass balance of the inputs (sediment and basaltic portions of the incoming plate) and outputs (sediment and fluid fluxes to the forearc crust and mantle, and crustal components recycled to the volcanic arc and back-arc) at the Mariana-Izu subduction zone. This mass balance has not been possible at any convergent margin previously because it requires a focused effort to constrain fluxes at all levels in the subduction zone, preferably in the form of a drilling transect. Deepening ODP Hole 801C, the oldest *in situ* oceanic crust, will provide estimates for the oceanic crust input to the Mariana trench. The crustal section being subducted at the Izu-Bonin trench is virtually unsampled. Drilling through sediments and altered oceanic crust at Site BON-8 will constrain this crustal input, and test whether the along-strike variations in the volcanics has some source in along-strike variations in crustal inputs. Drilling significantly into basement will provide the first available reference sites for the for the structure and composition of old (Pacific) fast spreading oceanic crust that has experienced the net effect of aging and alteration.

Leg 186: W Pacific Seismic Net/Japan
Co-Chiefs: TBN

The objective of this leg is to establish long-term borehole geophysical observatories at three key areas in the western Pacific to understand the effect of plate subduction from the trench to deep mantle in surface manifestations of active plate boundary processes in various time scales from creation and evolution of island arcs and marginal seas to earthquake phenomena.

Leg 187: Australia-Antarctic Discordance
Co-Chiefs: TBN

The Australian-Antarctic Discordance (AAD) is an anomalously deep region centered on the Southeast Indian Ridge between Australia and Antarctica. Among its unique features is an unusually sharp boundary between Pacific and Indian mantle isotopic provinces. The configuration of the isotopic boundary, and therefore its dynamic history, can be determined by a planned program of off-axis sampling in the region of the eastern AAD boundary. A suite of approximately eight single-bit holes will sample 50 - 100 meters into igneous basement, primarily along two isochrons (15 and 30 Ma). A complex drilling strategy will involve selection of later sites (from a predefined suite of possible sites) on the basis of trace element data from the preceding sites.

JOIDES Resolution schedule for Legs 176-187

LEG	REGION	CO-CHIEFS	DEP. PORT	DATE	SCIENTIFIC OBJECTIVES
176	Return to Hole 735B	Dick Natland	Cape Town	10/97	To deepen hole 735B and investigate the nature of magmatic, hydrothermal, and tectonic processes in the lower ocean crust at a slow-spreading ocean ridge.
177	S Ocean Paleocean	Gersonde Hodell	Cape Town	12/97	To investigate the Cenozoic and Neogene paleoceanographic and climatic history of the southern high latitudes.
178	Antarctic Peninsula	Barker Camerlenghi	Punta Arenas	2/98	To explore Antarctic glacial history and sea-level change and to investigate the paleoproductivity in the Antarctic coastal ocean.
179	NERO/Hammer Drilling	Casey	Cape Town	4/98	To install a broadband ocean seismometer and instrument package which will fill a gap in the Global Seismic Network and permit study of Indian Plate dynamics.
180	Woodlark Basin	Taylor Huchon	Darwin	6/98	To investigate lithosphere extension, specifically the nature of low-angle faulting, continental breakup, and the evolution of conjugate rifted margins.
181	SW Pacific Gateway	Carter McCave	Townsville	8/98	To reconstruct the stratigraphy, paleohydrology, and dynamics of the Pacific's Deep Western Boundary Current and related water masses since the early Miocene.
182	Great Australian Bight	Feary Hine	Wellington	10/98	To document this carbonate platform's evolution since 65 Ma in response to oceanographic and biotic change and to study global sea-level fluctuations, physical and chemical paleocean dynamics, biotic evolution, hydrology and diagenesis.
183	Kerguelen Plateau	Coffin Frey	Fremantle	12/98	To investigate the origin, growth, compositional variation, and subsidence history of the Large Igneous Province (LIP) formed by the Kerguelen Plateau and Broken Ridge.
184	E Asia Monsoon	TBN	Fremantle	2/99	To study the evolutionary development and variability of the East Asian monsoon.
185	Izu-Mariana	TBN	Hong Kong	4/99	To determine the net crustal fluxes being recycled into the deep mantle by mass balance of the inputs and outputs at the Mariana-Izu subduction zone.
186	W Pac Seismic Net/Japan Trench	TBN	Tokyo	6/99	To establish long-term borehole geophysical observatories at three key areas in the western Pacific to understand the effect of plate subduction on active plate boundary processes.
---	Dry dock	--		8/99	--
187	Aus-Ant Discordance	TBN	TBN	10/99	To unravel the dynamic history of the Australian-Antarctic Discordance by a planned program of off-axis sampling.

ANNOUN

A WORKSHOP ON

ADVANCED CORKS

FOR THE 21ST CENTURY

CO-CONVENORS: K. Becker and E. Davis
LOCATION: Scripps Institution of Oceanography
DATES: December 15-16, 1997

JOI/USSSP will support a medium-sized workshop to set out the scientific objectives and requirements for the next generation of ODP instrumented borehole seals or CORKs (Circulation Obviation Retrofit Kits). Between 1991 and 1997, 13 CORKs have been deployed by ODP for long-term monitoring of subseafloor hydrologic processes, in a variety of hydrological environments including mid-ocean ridges, young oceanic crust, and subduction margins. The success of this program has contributed significantly to the increasing emphasis in the ODP Long Range Plan on use of ODP holes as observatories. There is likely to be a hiatus until 1999 or 2000 before the next ODP CORK deployments, and it is an appropriate time to consider whether a wholly new CORK design is justified to accommodate a wider range of ODP observatory objectives.

This workshop is intended to explore the full range of feasible CORK science objectives, with input from a wider range of the community interested in sealed and instrumented boreholes than the group now directly involved with CORKs. Thus, we welcome participation by all interested scientists of all disciplines. The workshop report will focus on the science that could be achieved with future CORKs, as well as the technological implications and requirements. Once the workshop report is drafted, a small follow-up meeting will be held in winter of 1998 between workshop convenors and ODP engineers to formulate specific design and engineering recommendations for future CORKs.

JOI/USSSP funds will be available to offset travel costs for approximately 20-30 U.S. scientists, and the workshop is also open to international participation. Scientists interested in participating should apply with a brief statement (one-page maximum) of their particular interest and intended contribution to the workshop, as well as their estimated need for travel support. Applications should be sent by November 30 to the lead convenor by e-mail, fax, or mail at the following addresses:

E-MAIL: kbecker@rsmas.miami.edu
FAX: (305) 361-4661
MAIL: Dr. Keir Becker, Div. of Marine Geology and Geophysics
University of Miami, RSMAS, 4600 Rickenbacker Causeway
Miami, FL 33149

JOI/USSAC OCEAN DRILLING FELLOWSHIP PROGRAM

JOI/USSAC is seeking graduate students of unusual promise and ability who are enrolled in U.S. institutions to conduct research compatible with that of the Ocean Drilling Program. Both one- and two-year fellowships are available. The award is up to $22,000 per year to be used for stipend, tuition, benefits, research costs, and incidental travel, if any. Masters and doctoral degree candidates are encouraged to propose innovative and imaginative projects. Research may be directed toward the objectives of a specific leg or to broader themes.

PROPOSAL DEADLINES

Shipboard work (Legs 182-186): 4/15/98
Shorebased Work (regardless of leg): 4/15/98 and 11/15/98

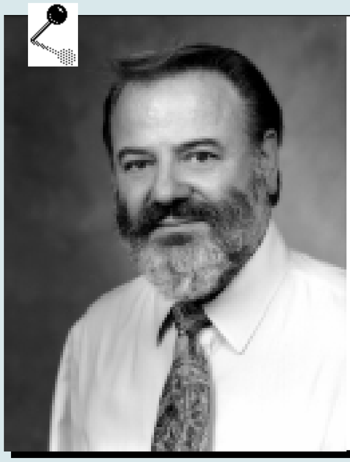
For more information and/or to receive an application packet please contact Andrea Johnson at:
JOI/USSAC Ocean Drilling Fellowship Program
Joint Oceanographic Institutions
1755 Massachusetts Ave., NW, Suite 800
Washington, DC 20036-2102
Tel: (202) 232-3900 x213
Fax: (202) 232-8203
E-mail: ajohnson@brook.edu

Now available on the ODP Logging Services website

Proponents Helper

The Helper is designed to assist proponents with the logging-related forms that must be submitted with each ODP drilling proposal.

http://www.ldeo.columbia.edu/BRG/LOG/helper.html



ODP Director goes walk about

Dave Falvey, Ocean Drilling Program Director, has decided to move on. We would like to thank Dave for his outstanding service and commitment to the scientific ocean drilling community and wish him great success in his new position as Director of the British Geological Survey.

The ODP Interim Director at JOI will be Nicklas Pisias. Good luck Nick!

Now accepting

JOIDES SCICOM AND JOI/USSAC APPLICATIONS

Joint Oceanographic Institutions is seeking applications for U.S. positions on the JOIDES Scientific Committee (SciCom) and JOI/U.S. Science Advisory Committee (JOI/USSAC) for the Ocean Drilling Program.

The JOI Board of Governors anticipates appointing two new members to SciCom, replacing members who rotate off in August 1998. Membership term is three years.

Five new members of USSAC will be appointed by the JOI Board of Governors in the spring, with their three-year term beginning October 1, 1998.

If you are interested in serving on one of these important committees, please send a CV (no more than two pages), and a letter of interest to Ocean Drilling Programs, Joint Oceanographic Institutions, 1755 Massachusetts Ave., NW, Suite 800, Washington, DC 20036-2102. Scientific leadership and a keen interest in Ocean Drilling Program science and related activities must be demonstrated.

For more information on SciCom duties and responsibilities, please contact Dr. Susan Humphris (joides@whoi.edu). For more information on USSAC duties and responsibilities, please contact Dr. Michael Arthur, USSAC Chair (see page 19).

A workshop on the

Costa Rica - Nicaragua SEISMOGENIC ZONE

CO-CONVENORS: E. Silver and M. Protti
LOCATION: San Francisco, CA
DATES: December 7, 1997

A one-day workshop is planned in San Francisco on December 7, the day before AGU. This workshop follows on the heels of 3 international workshops that have affirmed the value of intensive study of the seismogenic zone, leading ultimately to deep drilling. Because the SEIZE workshop in June rated Costa Rica - Nicaragua as one of the two prime locations for such studies, we hope to focus attention on what should be done as a next step to understand the workings of the seismogenic zone.

This workshop builds on three international workshops that have occurred over the last two years. These workshops have stressed the importance of understanding the mechanics of the seismogenic zone in subduction environments, and one meeting (SEIZE) recommended Costa Rica-Nicaragua as one of two highest priority regions for focused study. Following these recommendations, we plan to gather a group of approximately 40 experts in different fields to briefly review what is known, followed by discussion of what needs to be done to understand this process. Our goals are to better define the nature of the seismogenic zone, to prioritize potential scientific studies, and to organize international teams to focus on different aspects of the structure and behavior of the seismogenic zone. It is expected that from these teams, proposals for research will be generated. In part, this work is a first step in the preparation for deep riser drilling into an active seismogenic zone.

Funding for this workshop has been provided by JOI/USSSP.

For more information, please contact:
Eli Silver, Earth Sciences Dept., University of California, Santa Cruz, CA 95064
O: (408) 459-2266, F: (408) 459-3074, email: esilver@earthsci.ucsc.edu

MUSICAL CHAIRS

JOI/USSSP bids Roger Larson farewell, with gratitude for his hard work and dedication as USSAC Chair.

We extend a warm welcome to Michael Arthur, the new USSAC Chair.

JOI/USSSP SUPPORTED SHIPBOARD PARTICIPANTS

LEG 176: Return to Hole 735B
U.S. Co-Chief: Henry Dick, WHOI
U.S. Co-Chief: James Natland, U of Miami
ODP Staff Scientist: Jay Miller
LDEO Logging Scientist: Gerardo Itturino
Jeffrey Alt, U of Michigan
Wolfgang Bach, WHOI
Jeffrey Gee, SIO
Greg Hirth, WHOI
Barbara John, U of Wyoming
Deborah Kelley, U of Washington
Peter Meyer, WHOI
H. Richard Naslund, SUNY Binghamton
Ralph Stephen, WHOI

LEG 177: S Ocean Paleoceanography
U.S. Co-Chief: David Hodell, U of Florida
ODP Staff Scientist: Peter Blum
LDEO Logging Scientist: Ulysses Ninnemann, SIO
Katarina Billups, UC Santa Cruz
Jim Channell, U of Florida
Christopher Charles, SIO
Gabriel Filippelli, Indiana U/Purdue U
Sharon Kanfoush, U Florida
Stagg King, Georgia Inst of Technology
Thomas Janacek, Florida State U
Suzanne O'Connell, Wesleyan U
Joseph Ortiz, LDEO
Joseph Stoner, U of Florida
Neil Summer, U of Florida
Detlef Warnke, CSU Hayward

Visit the ODP Booth at AGU
December 9-11 – San Francisco
Booths 223-227

ODP-related Science

Deciphering Cenozoic cool-water carbonates of the Great Australian Bight

contributed by Albert C. Hine and David A. Feary, ODP Leg 182 Co-Chief Scientists

Albert C. Hine
Dept. of Marine Science
University of South Florida

David A. Feary
Australian Geological
Survey Organization

On October 4, 1998, scientists on board *JOIDES Resolution* will sail from Wellington, New Zealand for the Great Australian Bight off southern Australia to drill 10 sites along the continental margin (Eucla Basin; Figure 1), from the shelf edge (200 m) to the middle of the continental rise (4,465 m). Drilling will primarily target Cenozoic cool-water carbonate sequences. The overall objectives are: (1) to reconstruct the Cenozoic paleoceanographic history of this carbonate-dominated, mid-latitude continental margin and its adjacent basin during the evolution of the Southern Ocean; (2) to develop depositional response and sea-level models for predominantly cool-water carbonate sequences; and (3) to determine fluid circulation pathways and the diagenetic alteration history of this cool-water carbonate platform. Upon completion of drilling operations, *JOIDES Resolution* will return to Fremantle, West Australia on November 29, 1998.

Geologic setting

The southern margin of Australia is a divergent, passive continental margin that formed during a protracted period of extension and rifting leading to the separation of Australia and Antarctica during the Cretaceous. This margin evolved during the subsequent northward drift of the continent. The initial extension phase (96 Ma) was followed by a period of slow spreading until the middle Eocene (49 Ma), resulting in a continental basin containing as much as 12 km of terrigenous, clastic sediments. The onset of faster spreading in the Eocene corresponded with the initiation of carbonate sedimentation as fully marine conditions became established. Carbonate sedimentation continued throughout the remainder of the Cenozoic as the small gulf between Australia and Antarctica widened into a broad, open seaway, and then into the modern Southern Ocean. The resulting carbonate sequences are laterally very extensive, but relatively thin, only approximately 800 m in total thickness (Figures 2, 3).

Throughout the Cenozoic, the western Great Australian Bight has been very stable with geohistory analysis of a well (Jerboa-1; see Figure 1) in the study area indicating minimal Tertiary subsidence. Slight regional tilting (<1°) in the middle Miocene resulted in uplift and exposure of the adjacent Nullarbor Plain along the southern coast of Australia, and the restriction of Neogene sedimentation to the modern outer shelf and upper slope [*Feary and James,* 1995, in press].

Southern Ocean paleoceanography

Because the Southern Ocean has such a major controlling influence on global circulation and climate, the Ocean Drilling Program has recognized the importance of increased understanding of the ocean history of this region, particularly since it is so poorly understood as compared to the high latitude North Atlantic [*Kennett and Barron,* 1992]. We have identified three paleoceanographic problems that can be addressed by Leg 182 drilling.

(1) The stratigraphic record in the Southern Ocean is punctuated by numerous hiatuses that are attributed to increased circulation during the initiation of the Circum-Antarctic Current in the Cenozoic [*Miller et al.,* 1987; *Kennett and Barker,* 1990]. Such hiatuses are thought to form on deep margins during times of lower sea level, and correlate with unconformities on the continental shelf. However, discontinuous onshore sequences of Oligocene shelf carbonates were deposited while erosion or non-deposition of the entire Oligocene occurred on the adjacent ocean floor during highstand. Therefore, we want to determine the relationship between circulation patterns in the deep ocean and on the shelf during times of warm versus cool ocean conditions.

(2) Subsidence of the Tasman Rise, which permitted initiation of cold Circum-Antarctic circulation and thermal isolation of Antarctica, is one of the most important developments in Cenozoic paleoceanography [*Kennett,* 1982]. The history of this event is poorly constrained because so much of the oceanic record is missing due to seafloor erosion. The proximity of the Leg 182 shelf-to-

basin transect to the Tasman Rise indicates that it should contain an excellent record of the pale-oceanographic development of this gateway.

(3) Starting in the middle Eocene, there is circumstantial evidence that easterly, warm-water currents from the Indian Ocean were deflected into the proto-Great Australian Bight to form an embryonic Leeuwin Current. Furthermore, Quaternary cores indicate that a complex interplay between the warm, oligotrophic Leeuwin Current and the cooler, eutrophic upwelling of the West Wind drift had a dramatic effect on primary productivity on the Eucla margin. In addition, the shelf-to-basin drilling transect should contain an important record of paleoproductivity linked to upwelling events. Such periods should be revealed by low species diversity, high numbers of individuals, increased sedimentation rate, and distinctive changes in stable isotope and trace element compositions. Determining the history and evolution of the Leeuwin Current and its effect on the regional paleoceanography is a major goal of Leg 182.

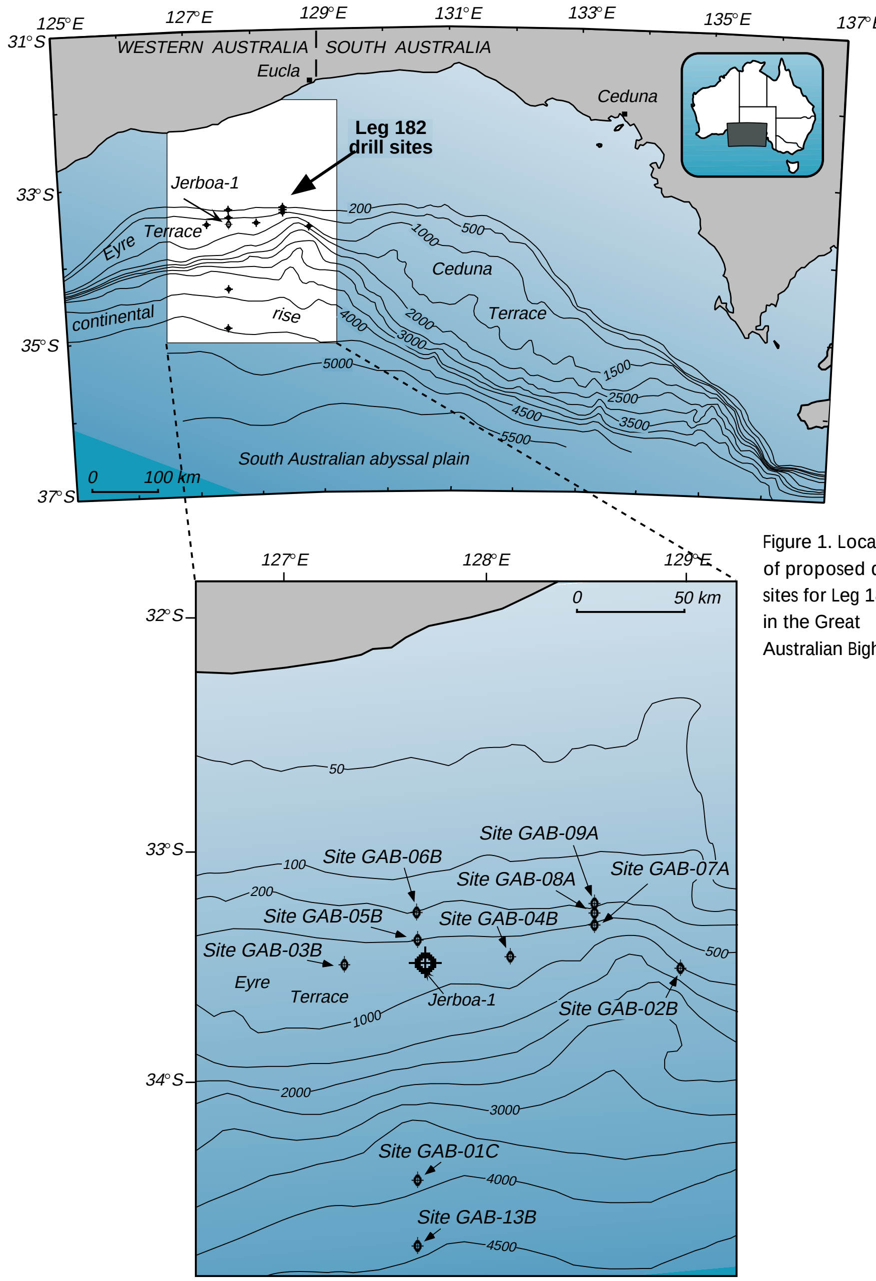


Figure 1. Location of proposed drill sites for Leg 182 in the Great Australian Bight.

Cool-water carbonate deposition models

The deposition and accumulation dynamics of neritic carbonate sediments under cool-water conditions (ca. <20° C) are poorly understood as compared to the much more intensively studied warm-water carbonates [*Nelson,* 1988]. Because of their dominantly calcitic skeletal composition, nutrient-dependent biology, and low diagenetic potential, cool-water carbonates record ocean history changes in a fundamentally different manner than their tropical counterparts. Additionally, cool-water carbonate shelves are sedimentological hybrids—the sediment production factory is autochthonous as are all carbonate provinces, yet the absence of reefal rims found in warm-water carbonate regimes allowed the full sweep of oceanic storm waves and swells to control deposition. Cenozoic exposures of inner shelf facies in Australia suggest that storm- and wave-dominated processes controlled deposition. Are these high-energy models applicable to cool-water carbonate deposition throughout the Cenozoic in the Great Australian Bight? Are the abundant prograding clinoforms seen in seismic data produced by *in situ* enhanced biological production on the distal shelf, or are they produced by finer-grained sediments swept off the shelf to accumulate below wavebase? The drilling strategy will allow us to develop sedimentological and stratigraphic models for carbonate sedimentation along continental margins bathed by predominantly cool oceanic waters [*James and von der Borch,* 1991; *Boreen and James,* 1993].

Response of cool-water carbonates to sea-level fluctuations

The Eucla margin is rich in biogenic carbonate sediments which respond sensitively to sea-level fluctuations and which also contain geochemical information needed to link these sea-level changes to paleoceanography. Using this information, two fundamental issues can be addressed.

First, we can determine the detailed sea-level history of the Southern Ocean basin and how this history is linked to paleoceanographic variations. The existing southern Australian sea-level record, derived from onshore sequences in which the marine record is preserved only in highstand system tracts, seems to be at odds with the global model during several critical time periods [*Haq et al,* 1987]. By using proxy paleoenvironmental indicators in a much more expanded and better preserved Eocene to early Miocene section offshore, we can provide a test of this part of the global curve as well as to determine the amplitude of specific events. Additionally, the late Miocene to Pliocene sequence is mostly unknown onshore, so cores obtained on this leg should provide the first clear record of this interval of sea-level fluctuations in this part of the world. We view the sea level objectives of Leg 182 as directly complementing Legs 150, 174A on the New Jersey margin and Leg 166 in the Bahamas, as components of the global-latitudinal, sea-level transect.

Second, we want to determine how cool-water carbonate platforms respond to sea-level changes. Carbonate platforms, with their chemically metastable sediments born largely in place, are particularly responsive to changes in environmental parameters (temperature, water chemistry, etc.). To date, most information on carbonate platforms comes from rimmed, warm-water platforms. There is almost no information on how cool-water platforms respond to changes in these parameters. We aim to determine how different segments of the paleo Eucla Platforms reacted to different parts of the sea-level cycle, and to determine whether cold and warm-water carbonate platforms have fundamentally different depositional geometries resulting from the different ways the sediment-producing factory responds to sea-level changes.

Fluid circulation and sediment diagenesis

The Eucla margin has one of the few modern shelves where the onshore recharge zone is a vast, flat-lying karst plain (the Nullarbor Plain). The high primary depositional permeability of winnowed grainstones on the shelf and the lack of early cementation suggest that significant groundwater circulation may occur, at least at shallow depths. This circulation may be driven by the temperature contrast between the cool overlying waters of the Southern Ocean and geothermal heat flux from below. Alternatively, aridity recharge occurring over the vast inland hinterland may drive brackish to saline waters southward to discharge through the now-flooded shelf. These two possible mechanisms may be further influenced to an unknown extent by sea-level changes, storm surges, and changes in the paleoceanographic regime.

Cool-water carbonates exhibit a radically different pattern of diagenesis to that of tropical, aragonitic carbonates. Slow sedimentation permits seafloor lithification by intermediate Mg-calcite cements , but these appear to be volumetrically limited and localized to omission surfaces and

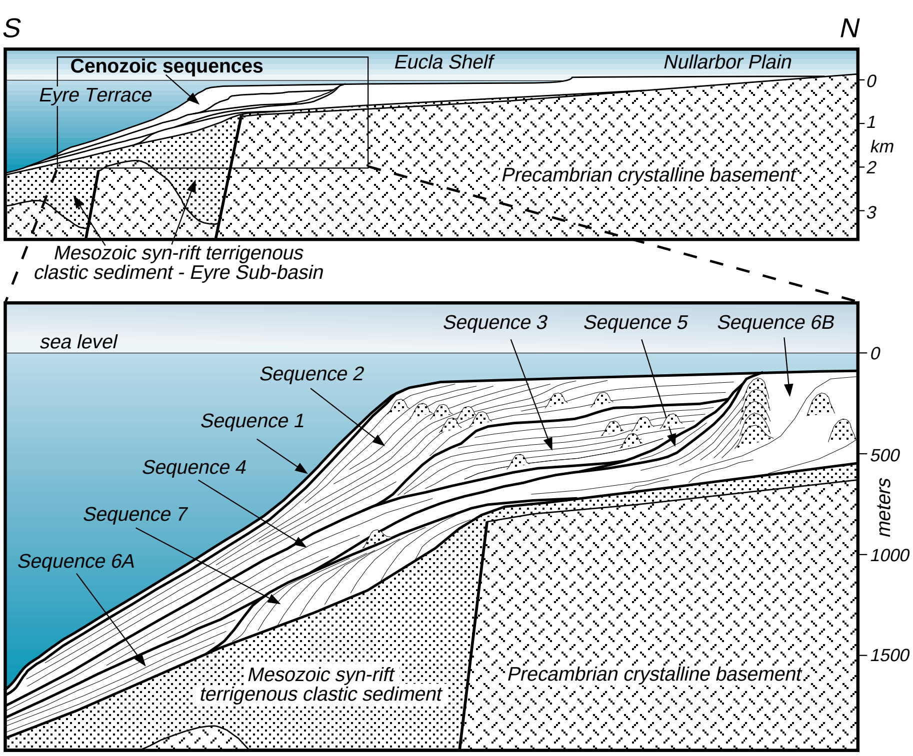


Fig. 2: Schematic N-S diagram extending from the Nullarbor Plain to the upper continental slope across the Eyre Terrace (along longitude 128^{0}E) showing the distribution and internal relationships of seven Cenozoic sequences defined from seismic data. These sequences overlie Mesozoic syn-rift siliciclastic sequences and Precambrian crystalline basement. Vertical scales are approximate.

hardgrounds which are ubiquitous in the modern inner shelf. Indeed, both shallow marine and meteoric cements appear to be very sparse, as magnesium is lost from high Mg-calcite during grain recrystallization to low Mg-calcite. Sparse Ca-rich dolomites may be present [*Reeckman,* 1988; *Bone et al.,* 1992] and at some locations, replacement may be pervasive [*James et al.,* 1993] even though fine-grained subtidal, evaporation-related dolomites typical of tropical platforms are absent. It is not known whether dolomitization is episodic or has occurred over extended periods of time. We plan to determine the present-day associations between groundwater circulation, fluid geochemistry and diagenetic products. Then, by inference, we can use the spatial and temporal distribution of ancient diagenetic components to determine whether the same associations have occurred in the past. We hope to provide fundamental insights into the diagenesis of cool-water, open-shelf carbonates.

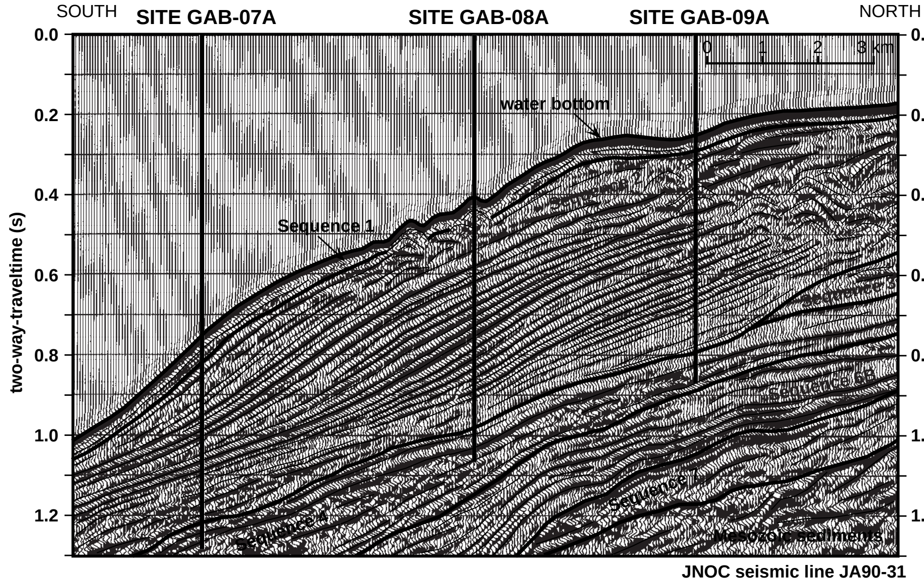


Fig. 3: Proposed depth transect consisting of three drill holes situated on JNOC seismic line JA90-31. Note pronounced mounds, sigmoidal clinoforms, and sequence boundaries.

Biostratigraphic framework of Eucla Basin Cenozoic sequences

The Leg 182 drilling transect offers the opportunity for pioneering analysis of the Cenozoic evolution of cool-water calcareous biota, with direct application to studies of ancient carbonate platforms presently lacking in modern analogues. Linked information from the neritic and oceanic high-to-mid latitude carbonate realm should produce an excellent record of paleobiological information. Patterns and modes of speciation and diversification of coeval shallow and deep-water benthic organisms as well as contemporaneous planktonic biota should be revealed. By comparing these results with those from Antarctica and the northeast Australian shelf, the geography of such processes and their relationship to physico-chemical factors should be discernible.

Summary

The results of Leg 182 should for the first time provide fundamental information on the geologic development, biologic evolution, and diagenesis of cool-water carbonate platforms. This information will, in turn, form the basis for comparisons with and contrasts to their warm-water counterparts. We expect to develop new geologic models of cool-water carbonate deposition and platform stratigraphy. Finally, the Eucla margin should provide important data on global sea level fluctuations that can be added to the extensive data base from past drilling legs.

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A letter from the Chair

Dr. Michael Arthur is Professor, Department of Geosciences, Pennsylvania State University.

Silent string? (apologies to Rachel Carson)

As I take over the Chair of USSAC from the ever-effective Roger Larson (thanks Roger for your excellent service in this capacity), I am forced to consider how I might effectively use this space to communicate some important information to you, the proponents and beneficiaries of the Ocean Drilling Program. After all the Chair is expected to have something important to say occasionally (don't expect miracles, however). Indeed, I perceive a need to begin to poke and jab at the complacent U.S. earth science community regarding a possible future for scientific ocean drilling. Yes folks, the millennium is almost upon us, and we must consider whether or not there will be a scientific ocean drilling program of some kind in the future. Or, will the drill string fall silent as the result of indifference and/or ignorance. In this and future columns, I hope to take on some of the myths and misconceptions regarding ODP and to urge you to become involved in the effort to ensure a future for a strong U.S. component in ODP and its possible successor programs.

A distant but major objective requiring our attention almost immediately is the justification for a program of scientific ocean drilling beyond 2003. Many of us ODP intimates know of the multitude of scientific advances that have effectively been made because of ODP. We are also quite aware that there remain a host of important scientific problems that can and should be attacked through future ocean drilling. However, many of our non-ODP-associated colleagues are, for some reason, not getting this message. In my opinion, the impact of ODP on earth science in general has been greatly under appreciated. The main problem here may be our own complacency. Perhaps we have had this awesome tool at our command for so long that we now take it for granted that it will always be there for us. In our efforts to get the science done, we have failed to communicate our enthusiasm and excitement to "outsiders" to ODP. In addition, some of our colleagues may be persuaded by some of the myths that this successful (but costly) program has spawned, perhaps because they want to believe the worst about "big science." Regardless of the reasons, we, as individuals and as a community, must put some energy into promoting the panoply of achievements reached as a result of ODP-related science.

Considerable effort is already being put toward raising awareness of the great contributions that ODP has made to our understanding of the earth system. For example, kudos go to Ellen Kappel, John Farrell and Johanna Adams for the production of the outstanding first edition of *ODP's Greatest Hits*. This attractive first volume was a hit itself and the 3000-copy press run almost immediately went out of print; as a result of popular demand this volume has been reprinted. We thank all of you out there who contributed material for this effort – stay tuned, there is more to come.

Likewise, each year USSAC sponsors a slate of ODP Distinguished Lecturers that is designed to spread the word about why, how and what science is being done onboard the *JOIDES Resolution*. The Distinguished Lecturers are selected both for the interest that their talks will generate and for their ability to communicate the excitement and intensity of the program. We look upon them as our ambassadors and expect them to reach audiences that might be largely unaware of ODP. Through this lecture series we hope to interest more people in becoming active participants in the Program.

As regards the future of scientific ocean drilling beyond 2003, you should be aware that a group of scientists were convened by JOI/USSAC for the purpose of providing justification for U.S. participation in a possible future international program. This committee, under the moniker of "COMPOST II" and chaired by Jamie Austin and Nick Pisias, produced a document that outlines a strategy for an international two-ship program to begin as early as 2003. The document can be found on the JOI web page (www.joi-odp.org); we also plan to publish the general recommendations in *Eos* in the near future.

Finally, in the remaining space, I would like to address several commonly held misconceptions or myths about ODP. The first myth is that ODP has served only a small and select "club," largely from JOI institutions. According to an ODP database (many thanks to Tom Davies and his staff for providing the numbers outlined below), 564 individual U.S. scientists have sailed as shipboard scientists over the 12 years of ODP (Legs 101-175). Over 54% of those sailing were not from a JOI institution. Another myth is that a large proportion of participants sail multiple times, and that this has become a significant source of salary for soft-money scientists. In fact, over 67% of the participants have sailed only once. To be sure, there are also some scientists that have sailed multiple times, but only about 15% of the individuals from the U.S. have sailed three or more times.

I would like to end with what I consider an amazing and encouraging statistic. Out of the 564 U.S. scientists that have sailed on the *JOIDES Resolution*, 203 sailed as students! It is clear that ODP has provided a unique experience and excellent training for a large number of students, many of whom have gone on to become productive earth science professionals. Let us hope that we will be able to continue in this enterprise, and not have to face a "SILENT STRING."

Michael A. Arthur
Chair, USSAC

POSITION AVAILABLE

U.S. REPRESENTATIVE to the JOIDES OFFICE

The JOI/U.S. Science Support Program is seeking applications for a 2-year position as the U.S. representative in the JOIDES Scientific Planning Office, beginning January 1, 1999. While the final decision has not yet been approved by NSF, JOI is recommending award of the JOIDES Office to GEOMAR, located in Kiel, Germany, for the period of 1999 through 2000. The successful applicant will provide high level executive support to the Chair of the JOIDES Scientific Community. Duties may include managing drilling proposals submitted to JOIDES, liaison to the Site Survey Panel, and assisting the SciCom Chair in preparation of meeting agendas and agenda books.

A Ph.D. in earth sciences or related fields and previous involvement with the Ocean Drilling Program are desirable. Salary and benefits will be negotiated. Application letters must include vita and three references and should be sent to Ms. Denise Lloyd, JEX, JOI/U.S. Science Support Program, Joint Oceanographic Institutions, 1755 Massachusetts Avenue, NW, Suite 800, Washington, DC 20036-2102. JOI will begin reviewing applications on March 1, 1998, and will continue to do so until the position is filled.

1998-99 JOI/USSAC

DISTINGUISHED LECTURER SERIES

The JOI/USSAC Distinguished Lecturer Series began in 1991 with the goal of bringing the results of ODP research to students at both the undergraduate and graduate levels and to the earth science community in general. A flyer/application for the 1998/99 Series will be available in January 1998. Applications will be accepted from U.S. institutions (colleges, universities, and nonprofit organizations) interested in hosting a talk by one of the lecturers listed below. To receive an application contact the JOI/USSAC Distinguished Lecturer Series, 1755 Massachusetts Avenue, NW, Suite 800, Washington, DC 20036-2102; tele: (202) 232-3900; fax: (202) 232-8203; e-mail: joi@brook.edu; or visit the JOI web site at www.joi-odp.org.

Jim Channell, University of Florida
Paleomagnetic intensity records from the North Atlantic: Applications to stratigraphy and geochronology

Peter deMenocal, Lamont-Doherty Earth Observatory
Pliocene-Pleistocene African climate and paleoenvironments of early hominid evolution

Julie Morris, Washington University
Getting sedimental about subduction

Rick Murray, Boston University
Assessing marine-terrestrial linkages: The ODP record of Panamanian uplift, Caribbean tectonics, and Andean orogeny

Richard Norris, Woods Hole Oceanographic Institution
Aftermath of the apocalypse: The K/T extinction and recovery of marine ecosystems

Hilary Olson, University of Texas Institute for Geophysics
Application of sequence biostratigraphy to understanding sea-level change on the New Jersey Margin

NSF Report

The future and the Integrated Ocean Drilling Program

Contributed by J. Paul Dauphin, Associate Program Director, NSF/ODP

On October 27, the President signed into law Congress' 5% increase for NSF's Fiscal Year 1998 budget. The total, newly approved, NSF budget is for $3.429 billion. This is an increase of $159 million over the FY1997 level and $62 million more than the request for FY 1998. This is the first time since 1984 that Congress has appropriated more money than NSF has requested. Good news which we hope signals the beginning of a trend. Included in these funds is a substantial portion of the $3 million for shipyard (refit) cost of the JOIDES Resolution in FY 1998.

Another piece of good news is that, in mid-November, following national and international reviews of the Ocean Drilling Program, NSF's National Science Board gave funding authorization for Phase III, the final phase of the program.

In April of this year a group of governmental funding officials from Japan, the U.S., and Europe met in Leiden, the Netherlands to discuss the future of scientific ocean drilling beyond 2003. This group recognized the substantial planning effort which has taken place over the past decade by the scientific community to document the "cutting-edge" scientific questions which can only be addressed through scientific ocean drilling. The participants agreed that detailed analysis and planning should begin immediately by an international working group of government officials with the assistance of scientists and drilling technology experts to explore fully the concept of a comprehensive drilling program for the year 2003 and beyond. As part of this agreement the planning effort would be based on a two-drilling-vessel program, a "JOIDES like" riserless drill ship and a riser-based drill ship as proposed by the Japanese. This planning should also address ancillary capabilities for obtaining cores and subsea data in shallow water or in waters otherwise unreachable by the two drill ships. This new program, the group felt, should be referred to as the Integrated Ocean Drilling Program(IODP), and the working group would be called "The International Working Group for an Integrated Ocean Drilling Program"(IWG/IODP). The IODP integrates the OD-21 (Japanese riser vessel) concept, European drilling discussions, and the ODP Long Range Plan for Phase IV.

The IWG/IODP is initially being co-chaired by Mike Purdy, Director of the Ocean Sciences Division at NSF and Tsuyoshi Maruyama, Director of the Ocean and Earth Division, Science and Technology Agency, Japan. The IWG/IODP recently met at NSF on September 22 for the second time. At this meeting the group adopted the Terms of Reference that describe its goals and objectives. At this meeting the IWG/IODP decided to ask JOIDES, the existing advisory structure to the present ODP, for helping three important areas.

1) To stimulate and build on the science planning for Phase IV of scientific ocean drilling as outlined in the ODP Long Range Plan.
2) Engage in the definition and development of required technical capabilities of riser (well-controlled) ships/drilling and non-riser drilling capabilities.
3) Assist in the definition of technical and staffing requirements to support these operations and the required infrastructure. The IWG/IODP drafted a letter with these requests and it was then forwarded to the Chair of the JOIDES Executive Committee, Bob Detrick.

The IWG/IODP felt that there would probably be a need for a major international, integrative activity/conference, (COSOD III ?) no later than the year 2000. At the last meeting of the U.S. Science Advisory Committee participants felt that a meeting of the U.S. scientific community interested in scientific ocean drilling was needed in order to refine their scientific expectations and aspirations so that these might be communicated to the international conference for an IODP.

At the end of the day, funding for a program of this magnitude can only be achieved through a unified scientific community's request based on compelling scientific arguments arrived at through the most thoughtful of processes. If you are concerned. I would urge you to heed Mike Arthur's message in this issue of the *JOI/USSAC Newsletter.*

On a final note, I would like to take this opportunity to recognize the numerous contributions to the Ocean Drilling Program by David Falvey, as he leaves the Program to take up a new post at the British Geological Survey. His efforts will not soon be forgotten.

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Membership term is three years

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JOI/USSAC NEWSLETTER

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The *JOI/USSAC Newsletter* is issued three times a year by Joint Oceanographic Institutions (JOI) and is available free of charge. JOI manages the international Ocean Drilling Program (ODP) and the U.S. Science Support Program (USSSP) which supports U.S. participation in ODP. Funding for JOI/USSSP is provided through a cooperative agreement with the National Science Foundation (NSF).

Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of NSF or JOI. Please contact the editors for more information or to subscribe: JOI/USSAC Newsletter, Joint Oceanographic Institutions, Inc., 1755 Massachusetts Avenue, NW, Suite 800, Washington, DC 20036-2102; tele: (202) 232-3900; fax: (202) 232-8203; Internet: joi@brook.edu

JOI/USSAC
NEWSLETTER

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Mariana survey, continued from page 7

with installation of borehole observatories, would permit the marine geologic community to monitor the dehydration reactions in the subducting slab from 0 to 25 km depths along the entire length of a modern-day, active convergent margin system. The studies of the muds obtained by drilling and the paragenesis of metamorphic rocks entrained in the muds would permit the sort of accurate determination of physical properties of the décollement that would only be exceeded by data from direct drilling into the contact zone between the plates at depths of 25 km. Such direct sampling is technologically unfeasible, but the natural rise of material from the décollement in the forearc mud volcanoes makes access to those depths achievable by the Ocean Drilling Program.

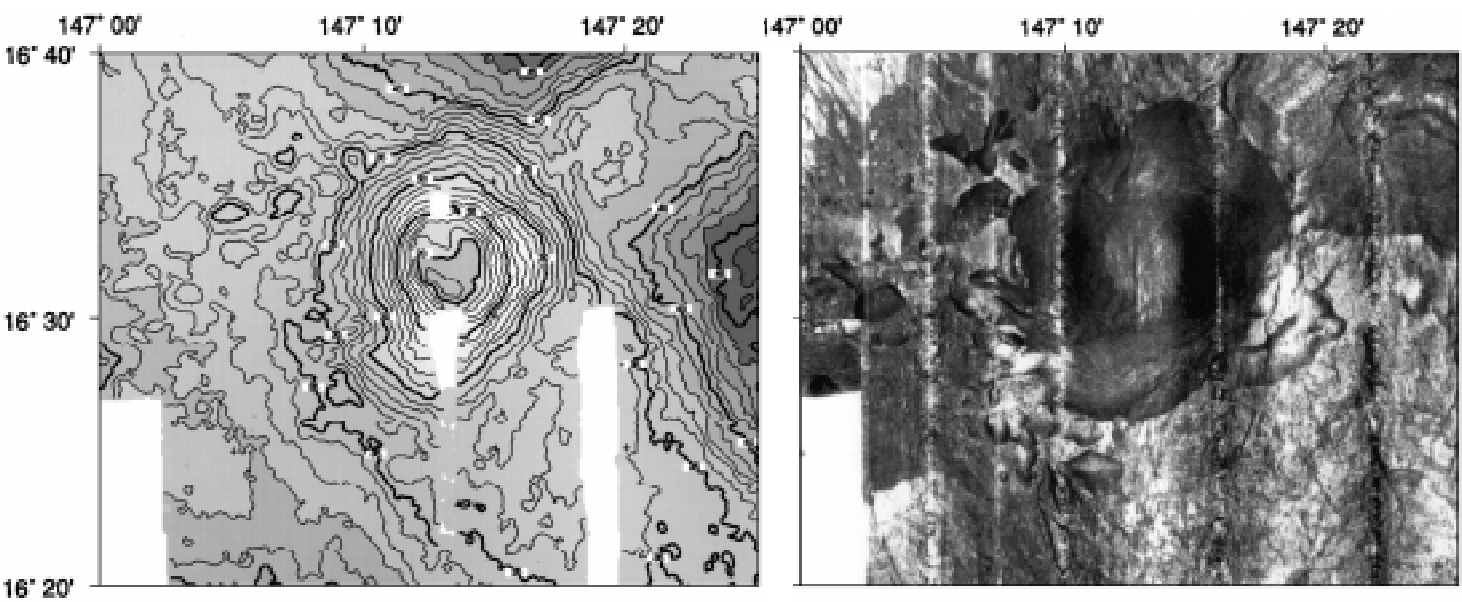

Fig. 2: Hawaii-MRI acoustic imagery and bathymetry from the survey of Celestial Seamount. Contour interval is 100 m (500 m bold). The dark circular area in the acoustic image is interpreted to be serpentine mud flows.