DRAFT

IODP-Industry Science Program Planning Group Meeting

Minutes

28-29 January 2008

Pau, France

IIS-PPG Attendees:

Didier-Hubert Drapeau, Didier-Hubert.DRAPEAU_at_total.com, IIS-PPG (Host)
Rod Graham, Rod.Graham_at_Hess.com, alternate for Andrew Pepper
Erdem Idiz, Erdem.Idiz_at_shell.com, alternate for Andrew Bell
David Roberts, d.g.roberts_at_dsl.pipex.com, IIS-PPG
Kurt Rudolph, kurt.w.rudolph_at_exxonmobil.com, IIS-PPG
Ralph Stephen, rstephen_at_whoi.edu, IIS-PPG (Chair)
Yasuhiro Yamada, yama_at_electra.kumst.kyoto-u.ac.jp, IIS-PPG

Ex-Officio Attendees:

Jean-Luc Auxietre, Jean-Luc.AUXIETRE_at_total.com, Total
Jan Behrmann, jbehrmann_at_ifm-geomar.de, Science Planning Committee Liaison
Dan Evans, devans_at_bgs.ac.uk, ECORD-ESO
Yoshi Kawamura, kawamuray_at_jamstec.go.jp, CDEX
Manik Talwani, IODP-MI, by conference call

IIS-PPG Regrets:

Andrew Bell, Andy.Bell_at_Shell.com, IIS-PPG
Richard Davies, Richard.Davies_at_durham.ac.uk, IIS-PPG
Harry Doust, harrydoust_at_hotmail.com, IIS-PPG
Andrew Pepper, apepper_at_hess.com, IIS-PPG
Martin Perlmutter, mperlmutter_at_chevron.com, IIS-PPG, failed conference call
Yoshihiro Tsuji, tsuji-yoshihiro_at_jogmec.go.jp, IIS-PPG

Executive Summary

This was the fourth meeting of the IODP/Industry Science Program Planning Group. To promote development of industry related drilling proposals, to facilitate communication, and to develop effective links between academic and industry scientists, we generated eight consensus statements at the meeting:

IISPPG Consensus Statement 0108-01: IISPPG commends IODP-MI on their efforts to establish an industry supported ocean drilling program. The IISPPG is pleased to have played a role in this endeavour.

IISPPG Consensus Statement 0108-02: IISPPG encourages Arctic drilling. We recommend that oil and gas industry representatives attend the Arctic drilling workshop being proposed by Bernard Coakley in Bremerhaven.

IISPPG Consensus Statement 0108-03: IISPPG thanks CDEX and ECORD for attending the meeting. Closer interaction between the industry members of the IISPPG and the IO's is necessary to develop drilling proposals since some aspects require new or modified platforms. Invite IO's to at least one IISPPG meeting per year.

IISPPG Consensus Statement 0108-04: IISPPG would like to continue to play a role in nurturing IODP drilling proposals but in an extension of the UK-ILP model we encourage development of joint industry-academic consortia: a) to facilitate access to industry seismic data, b) to carry out and fund any necessary reprocessing, analysis and interpretation of the data, and c) to fund any necessary pre-drilling surveys. (Use BESACM as a pilot project)

IISPPG Consensus Statement 0108-05: Industry-IODP cooperation is still evolving and to respect the long tradition of industry involvement in the academic ocean drilling programs we recommend that the next IISPPG meeting focus on establishing the ground rules for an IODP industry liaison panel as a standing committee of IODP

IISPPG Consensus Statement 0108-06: IISPPG encourages the oil and gas companies to join IODP-MI as Associate Members.

IISPPG Consensus Statement 0108-07: IISPPG will pursue a workshop on the theme of High Value Single Wells. The focus here is on sites that can be drilled on a single leg of the riserless ship and would be competitive in the existing round of proposals (prior to 2013).

IISPPG Consensus Statement 0108-08: IISPPG requests that Jean-Luc Auxietre (Total) replaces Didier Drapeau and that Rod Graham (Hess) replaces Andy Pepper as members.

We thank Didier-Hubert Drapeau and Total for graciously hosting the meeting.

1) Introduction

In addition to furthering the white paper process that had been initiated in The Hague, two primary concerns of this meeting were a) reviewing the IIS-PPG mandate and mode of operations and b) reviewing the progress with the Industry Supported Ocean Drilling Program (called the Industry Task Force at the Sapporo meeting).

2) Minutes of the Previous Meeting

The minutes of the previous meeting, in Sapporo, 23-24 July 2007 were accepted.

3) Review the Progress on Consensus Items from the Sapporo Meeting.

IISPPG Consensus Statement 0707-01: SASEC Consensus Statements 0706-07 and 0706-08 represent radical changes in the manner with which academic scientists collaborate with industry in ocean drilling. The "Deal" between academic scientists and the funding agencies and the drill ship operators is changing dramatically. We recommend that options for pursuing substantial industry support for the IODP drilling platforms be pursued by an Industry Task Force (ITF) independent of the IODP SAS. The ITF would consist of representatives from the petroleum industry, the Implementing Organizations, IODP-MI and SAS (ex-officio) facilitated by IODP-MI. **IODP-MI has prepared a proposal for an Industry Sponsored Ocean Drilling Program (ISODP) using the JOIDES Resolution. (During the meeting we had a conference call with Manik Talwani. This topic is covered in more detail below - 8b.)**

IISPPG Consensus Statement 0707-02: Given the already strong proposal pressure and the much reduced availability of the IODP drilling platforms for the remainder of the program, there is little point in further "promoting development of IODP drilling proposals to address industrial priority research within SAS or within the context of the ISP". We recommend an IISPPG meeting in Paris in January-February 2008 to complete the white papers and to consider other avenues for pursuing academic-industry liaisons within SAS (for example, more mini-workshops similar to the Tokyo workshop). **With the advent of the ISODP the role of the IISPPG might change. A summary of background information on this topic and of our discussion on this topic is given below - 8d.**

IISPPG Consensus Statement 0707-03: The industry members of IISPPG would like to investigate the potential of using platforms currently utilized by IODP for industry developed drilling consortiums. A possible project envisioned could be, for example, an Arctic basin analysis program. In order to proceed in a timely manner, we request that IODP-MI ascertain the level of interest of the IO's in pursuing and facilitating this approach to solving IODP funding issues. If there is interest, prior to the IISPPG or ITF engaging the entire industrial community to inquire about creating this consortium, we need the following information that will drive corporate decisions: (1) the approximate cost of the ships for drilling in both ice free and ice covered locations in the Arctic, (2) the drilling capabilities of each ship, (3) the scheduling and availability, and (4) the fiscal

responsibilities (liability, etc). While this potential program would be driven by industry interests we believe that there could be significant opportunities for scientific collaboration with academia and government. **Material on the specifications of the various platforms is included as Appendices 19 and 23. The IO's were invited to the Pau meeting to address these issues and representatives attended from ECORD-ESO and CDEX - 8c.**

IISPPG Consensus 0707-04: We recommend that the SPC appoint Andrew Bell (Shell) as a new member of the Industry-IODP Science Program Planning Group (IIS PPG), replacing resigned member Neil Frewin, effective immediately. **This membership change was approved at the August SPC meeting.**

IISPPG Consensus 0707-05: We request that SPC and the National Funding Agencies sort out all funding issues with respect to IISPPG member travel reimbursement. To be effective, the IISPPG needs members from multi-national oil companies and negotiating "who pays the travel" is not an effective use of IISPPG time. **This seems to be working.**

IISPPG Consensus 0707-06: We recommend industry participation at the IODP rapid climate change workshop if approved (Kurt Rudolph). **No progress.**

IISPPG Consensus 0707-07: We recommend that technical sessions and/or panel discussions be held at AAPG, GSA and/or EAGE (Kurt Rudolph, Andy Pepper, and Marty Perlmutter to evaluate). **No progress.**

4) Update on IODP activities, the August 2007 SPC meeting, and the Draft IODP Implementation Plan

Although Harry Doust did not attend this meeting he did prepare an updated figure on "Active proposals of possible industry interest" that was presented (see Appendix 1). Three new themes were Deep Biosphere, Gas Hydrates and Instrumentation. The PPG was also reminded of the September 2001 summary on "Critical Industry Interests for IODP" (Appendix 28 of the July minutes).

Feedback from the August SPC meeting was presented (Appendix 2) as well as the Draft IODP Implementation Plan (Appendix 3).

Jan Behrmann gave an update on the ship schedules from the latest OTF meeting (Appendix 4).

5) First science leg of the Chikyu

Yamada-san gave a short presentation on his experiences on the first science leg of the Chikyu.

6) Progress reports on IIS-PPG white papers.
6a) Rifted margins mission proposal

Ralph Stephen presented a progress report on the BESACM (Birth and Evolution of the South Atlantic Conjugate Margins) white paper (see Appendices 6, 7 and 8 of the Sapporo minutes for an overview and background documentation). The BESACM project was a sub-section in the Rifted Margins Mission Proposal (COBBOOM - #720) that was submitted for the April 1, 2007 deadline by John Hopper. None of the mission proposals were approved by the SAS (Appendix 5). In addition the rifted margins work was not designated as an objective in the Draft Implementation Plan (Appendix 3). Some aspects of rifted margins work may be appropriate for the ISODP. Although the PPG views this as high priority work of interest to industry it is not clear how to proceed.

6b) Mesozoic paleo-oceanography and source rocks

Harry Doust had prepared a draft white paper and other materials for the Sapporo meeting (see Appendices 9, 10, 11 and 12 of the Sapporo minutes). This is primarily an activity of the UK-IODP Industrial Liaison Panel. Erdem Idiz lead the discussion on this.

Appendix 6 is an outline for a UK-ILP meeting, in Durham, September 21 and 22, 2007, that never happened. The title was "A WORKSHOP DEDICATED TO PLATE TECTONICS, PALAEOCEANOGRAPHY/ PALAEOCLIMATE, SOURCE ROCKS, AND THE DEEP BIOSPHERE". The UK-ILP meeting, in Durham, January 30 and 31, 2008 (immediately following the PPG meeting), that did happen was titled "Understanding ocean redox and formation of Corg-rich sediments during extreme and transitional climate modes". These were the same meetings, at different stages of the planning process.

6c) Silica diagenesis, shallow compaction and fluid flow

There were no presentations or discussion on this topic.

6d) Arctic drilling

At the Sapporo meeting arctic drilling had been identified as a top priority for industry, even though it was recognized that neither the JOIDES Resolution nor the Chikyu were capable of working in the ice (see Appendices 29 and 30 of the Sapporo minutes). Rod Graham and Kurt Rudolph lead the discussion. Bernard Coakley has been leading an effort for a workshop on "Scientific drilling in the Arctic" which is targeted for Bremerhaven in November 2008 (Appendix 7).

6e) Source-to-sink sediment transport processes

There were no presentations or discussion on this topic.

6f) High-scientific-value single wells

Dave Roberts gave an excellent presentation on wells that could be drilled by the JOIDES Resolution on a single leg but would still be of high scientific value to industry (Appendix 8). Sites included the Northwest Indian Ocean, the Eastern Mediterranean, the Gulf of Mexico, the Namibe Basin, the Orphan Basin, the Hatton-Rockall Basin, and the South Falkland Plateau. Dave has requested feedback from other members of the PPG in preparation for a workshop that will be held in conjunction with a July 08 IISPPG meeting in Houston.

7) Updates on national IODP-industry liaison efforts.
7a) UK ILP

There were no presentations or discussion on this topic other than the workshop presented above in 6b).

7b) Japan

Tsuji-san sent this short statement regarding PPG activities in Japan: "Regarding my presentation on the Japanese industrial relation to the IODP, what I can say at present is that we had a meeting of the geology and exploration committee members of Japanese Association for Petroleum Technologies. In the meeting we had a special presentation focused on the operation of Chikyu, by Mr. Saga of CDEX. Some companies expressed small possibility to use Chikyu in her non-IODP shiptime, but it was not an official comment. I transferred the message of Talawani-san to the committee members and some key persons in our industry in Japan regarding the usage of Joides Resolution. But, no positive comment has been obtained."

7c) US liaison efforts - RPSEA and DeepStar

At the Houston IISPPG meeting in January 2007 we had a presentation from Mike Grecco who represented RPSEA and DeepStar (see Appendix 2 of the Houston minutes). This initiated a collaboration between IODP-MI and RPSEA/DeepStar and IODP-MI became a member of both groups. In Sapporo Ralph Stephen gave an update on the membership of IODP-MI in both RPSEA and DeepStar (Appendix 14 of the Sapporo minutes). More details on the collaboration are given in Tom Janecek's presentation at the June SASEC meeting (Appendix 27 of the Sapporo minutes). In Pau Ralph Stephen gave a progress report on this effort using materials from IODP-MI (Appendix 9) and RPSEA (Appendix 10).

8) Review of the IIS-PPG mandate and mode of operations
8a) Introduction and Background

Ralph Stephen presented a brief overview on the IISPPG mandate, the issue of industry financial support for scientific ocean drilling, and the IISPPG recommendation for an Industry Supported Ocean Drilling Program (previously called the Industry Task Force) (Appendices 11 & 12).

8b) The Industry Supported Ocean Drilling Program (ISODP)

The IISPPG has been discussing various approaches to obtaining large amounts of industry funding (>$10M) for the IODP platforms, essentially the Chikyu and JOIDES Resolution. At our Sapporo meeting we recommended the formation of an Industry Task Force (ITF) that "would consist of representatives from the petroleum industry, the Implementing Organizations, IODP-MI and SAS (ex-officio) facilitated by IODP-MI". IODP-MI has prepared a proposal for an Industry Sponsored Ocean Drilling Program (ISODP) using the JOIDES Resolution. Manik Talwani lead this discussion by conference call (Appendices 13[Talwani presentation], 14[SAS Consensus Statements], 15[ISODP Proposal]. 16[ISODP Addendum], 17[Guidelines from NSF], 18[IODP-MI membership] and 19[JOIDES Resolution specs]).

The IISPPG is supportive of the ISODP concept. We encourage oil and gas companies to join IODP-MI as Associate Members and to participate in developing the ISODP. We are concerned that the existing SAS proposals, which were prepared by the academic community at essentially no charge to the drilling program, may get transitioned to the ISODP without adequate compensation to the proponents. Since the ISODP is totally independent from the SAS there is not much else we can do. The IISPPG remains, however, the only SAS committee specifically charged with industrial liaison.

8c) Feedback from IO's

We thought it would be worthwhile to get feedback from the IO's on the ISODP model. All of the IO's were invited to attend the Pau meeting and we had representatives from CDEX (Yoshi Kawamura) and ECORD-ESO (Dan Evans).

We initiated the process by addressing the points listed in this Consensus Statement from the Sapporo IISPPG meeting: "IIS-PPG Consensus 0707-03: The industry members of IISPPG would like to investigate the potential of using platforms currently utilized by IODP for industry developed drilling consortiums. A possible project envisioned could be, for example, an Arctic basin analysis program. In order to proceed in a timely manner, we request that IODP-MI ascertain the level of interest of the IO's in pursuing and facilitating this approach to solving IODP funding issues. If there is interest, prior to the IISPPG or ITF engaging the entire industrial community to inquire about creating this consortium, we need the following information that will drive corporate decisions: (1) the approximate cost of the ships for drilling in both ice free and ice covered locations in the Arctic, (2) the drilling capabilities of each ship, (3) the scheduling and availability, and (4) the fiscal responsibilities (liability, etc). While this potential program would be driven by industry interests we believe that there could be significant opportunities for scientific collaboration with academia and government."

In his presentation on the ESO, Dan Evans reviewed the financial predicament facing IODP and gave a summary of the ISODP process (Appendix 20). Since there is strong industry interest in the Arctic and since the Chikyu and JOIDES Resolution cannot

work in the Arctic, there is an opportunity for ECORD/ESO to meet the industry demand. Dan outlined a scenario based on the EUREKA/EUROGIA model and building on the ACEX experience that would not necessarily involve IODP at all.

Jan Behrmann gave a follow-up presentation on the Aurora Borealis, an ice-breaker with a deep sea drilling capability similar to the JOIDES Resolution (riserless) which is being proposed in Europe (Appendix 21). This is in the preliminary design phase and it could meet many scientific and industrial requirements for Arctic Drilling.

Kawamura-san gave a short presentation on the Chikyu operations, outlining the funding realities (Appendix 22). They also need industry support. The specifications of the Chikyu are given in Appendix 23.

8d) The future of the IISPPG

SPC "views the membership of the IIS-PPG as a valuable connection with industry scientists, which in the current climate of reduced program funding could be of major help to the program" (quotes in this section are from Jim Mori in an email dated 11/26/07) (Appendices 24 and 25). How can the PPG (or new SAS group based on the PPG) help to foster new ties between IODP facilities and industry?

"What is the future direction for the PPG (finish, continue, evolve to a new type of group)? The PPG has a 3 year mandate (starting from about January '06). Based on the past PPG activities and the potential new opportunities for the industry to directly charter IODP facilities, SPC would like a recommendation for its March 2008 meeting on future activities within the PPG or a new entity evolving from this group."
What is the status of the industry-IODP proposals and pre-proposals that the PPG has encouraged. Is this process working? Does the SAS need more proposals for academic/government money? Is this process useful for attracting industry money?

Furthermore industry-IODP interaction has a different style in different countries. For example, the ILP in the UK is a very active group whose goal, to encourage industry-IODP science proposals, overlaps the IISPPG mandate. A practical model in the UK has industry providing the data and the government providing the funding to re-analyze it for scientific objectives. The Virtual Seismic Atlas (VSA) being developed at Leeds has proven to be an important vehicle for cooperation. Another example is the industry-IODP workshop that was held after the Sapporo meeting in Tokyo. How can the diversity of styles be used to the benefit of IODP?

The PPG was asked to discuss these topics over dinner Monday evening. On Tuesday morning each meeting participant was asked specifically to present an opinion. All participants were in favor of continuing the PPG, at least for the near term. The justification falls in three general areas:

1) The IISPPG remains the only SAS committee specifically charged with industrial liaison duties. Given all of the activity at the moment (eg, the ISODP, the Aurora

Borealis, the UK-ILP) it makes sense to have a dedicated committee a) to keep an eye on everything, b) to disseminate information among IODP academic and industry scientists, IO's, and funding agencies, and c) to look out for the interests of basic science.

2) The IISPPG would like to continue to play a role in nurturing IODP drilling proposals but in an extension of the UK-ILP model we encourage development of joint industry-academic consortia: a) to facilitate access to industry seismic data, b) to carry out and fund any necessary reprocessing, analysis and interpretation of the data, and c) to fund any necessary pre-drilling surveys. (For example, we could use BESACM as a pilot project.)

3) To respect the long tradition of industry involvement in the academic ocean drilling programs we recommend an IODP industry liaison panel as a standing committee of IODP. Industry-IODP cooperation is still evolving but the next IISPPG meeting should focus on establishing a mandate for the standing committee.

Other comments were:

a) The ISODP timing (a commitment of industry money by May-June 2008) is unrealistic. Legal issues such as liability and the treatment of proprietary data will take much longer to sort out.

b) In the Arctic it will be vital to have IODP-industry liaison, spanning US, Japan and ECORD interests.

c) It is desirable to continue. Drilling the mesozoic source beds section will require the PPG.

d) IODP scientists need to exploit the available industry seismic data.

e) We need to continue the tradition of getting top level industry scientists on IODP panels.

f) The IISPPG is useful for the IO's.

g) The PPG is necessary as a focus of industry interest within the SAS and IODP.

h) Keep mandate 1: "Most important, define industrial priority research within the IODP context, and promote development of IODP drilling proposals to address such objectives within the context of the ISP."

i) The PPG is necessary to coordinate existing collaborations.

j) In addition to developing proposals with new themes, it is important to develop new types of proposals (eg, ISODP).

k) The PPG should continue to support the evolution of the ISODP and to work towards an Arctic drilling program.

l) I am impressed with the industry commitment to IODP.

m) I like the white paper process.

n) The IISPPG is a good mechanism to raise the awareness of IODP in Japanese industry.

o) The IISPPG should encourage more riser proposals.

p) The IISPPG has a lot to offer but it is conflicted with funding issues. The IISPPG needs to spend more time on science. It will be interesting to see how well the IISPPG works, now that the funding issues have been transitioned to the ISODP.

q) Mandate 2 (..." develop effective links between academic and industry scientists, facilitate communication and cooperative scientific and technical development activities between the IODP and industry, ...") will continue to be important as a bridge to the ISODP.

9) Outreach Actvities

Very little was done on outreach activities (Consensus Items 6 and 7 from the Sapporo meeting) at this meeting.

10) Membership

We would like to replace Didier Drapeau with Jean-Luc Auxietre (Total) and Andy Pepper with Rod Graham (Hess). Neither Drapeau nor Graham were either Lead Agency or IODP Member Representatives.

11) Next Meeting

The next meeting was tentatively scheduled for Houston in June or July 2008. Kurt Rudolph. Exxon, volunteered to host the meeting. In conjunction with the Houston meeting, Dave Roberts will lead a workshop on "High-Value Single-Wells" (see Appendix 8).

Acknowledgements

We thank Didier-Hubert Drapeau and Total for graciously hosting the meeting.

Active IODP proposals of potential interest in context of IIS-PPG themes

Selection as of January 2008
(H. Doust)
Missions in *italics*

For list and abstracts see
www.iodp.org/500/600/700

Mesozoic Source rocks & Palaeoceanography

- 549 Arabian Sea OMZ
- 626 Pacific equatorial seds
- 658 N Atlantic Pg volc/SR
- 691 Weddel shelf restricted MZ
- 711 Tanzania Pg climate

Source2sink

- 552 Bengal Fan
- 618 Red/Mekong river drainage
- 658 N Atlantic Pg volc/SR
- 691 Weddel shelf restricted MZ
- 711 Tanzania Pg climate

Instrumentation

- 631 (?) ION Observatories
- 666 SCIMPI Tool development
- 703 Costa Rica SeisCORK
- 712 Sediment CORK trial installation

Continental breakup & ocean birth

- 556 Brazil-Malvinas Late Tert
- 645 E Greenland Margin
- 659 Newfoundland non-volc
- 686/7 S Alaska tectonic/seds
- 692 conjugate non-volc margins
- 710 Gulf of Corinth rift
- *720 COBBOOM mission*
- 725 N Atlantic volc margins

Arctic

- 708 Central Arctic Cenozoic (Lomonosov Ridge revisit)
- ? Mz-Cz Alpha Ridge

Deep Biosphere

- 601 Okinawa deep biosphere
- 689 Morocco deep biosphere
- 701 GAB deep biosphere

Proposal status:

With SSEPs
With SPC
With OTF

Gas Hydrates

- 553 Cascadia Margin
- 635 Hydrate Ridge observatory
- 663 Perturbation experiment

Others

- 569 CO2 sequester
- 589 GOM Overpressures
- *713 MissionMonsoon Asia climate/tectonics*

Excerpt from the draft minutes
IODP Science Planning Committee

10th Meeting, 27–30 August 2007

Coast Hotel, Santa Cruz, USA

8.6 Industry-IODP Science Program Planning Group (IIS PPG)

Tim Byrne, SPC liaison to the July 2007 IIS PPG meeting, reviewed the highlights of that meeting and presented several consensus statements. He provided an update on the progress of projects from the January 2007 IIS PPG meeting, noting that: the South Atlantic rifted margins project was included in the Continental Breakup and Birth of Oceans mission proposal (720-MP); Mesozoic source rocks and paleo-oceanography white paper and pre-proposal are moving forward; there is still strong interest in the Arctic and a white paper is in progress; an IIS PPG Workshop was successful in attracting Japanese industry; there still seems to be a need for formal alternates, but no consensus on who might/should pay. Other items addressed at the July 2007 meeting included: the future of IODP-industry collaborations (e.g., via an industry task force or PPG); a possible change in role of the IIS PPG from nurturing proposals to nurturing collaborations, for which the IIS PPG requested confirmation from the SPC that this is appropriate; and nomination of Andrew Bell as a new member. The next meeting is planned for January or February 2008 in Europe.

Referring to the suggested possible change in role of the IIS PPG, Becker noted that while there was no specific request for a change in mandate, it did appear that the IIS PPG wanted to de-emphasize the most important aspects of its mandate. He suggested that the SPC could encourage the PPG as long as they do not de-emphasize these important aspects. Larsen commented that the IIS PPG was set up under a very different scenario, and that now with ships not operating year-round, the role of the PPG needs to be reconsidered. Talwani stated that during the July IIS PPG meeting there was discussion about whether the PPG should be disbanded, which was followed by a suggestion for one more meeting. After a successful workshop it seems they now do not want to disband or have just one more meeting. Byrne confirmed that this was the case. He suggested that the PPG is confused about the Industry Task Force. Byrne indicated that he thought the task force would be outside the SAS. Becker confirmed that this is correct, because task forces are IODP-MI groups and industry work done outside the IODP cannot include planning by the SAS.

Byrne presented several IIS PPG consensus statements. Referring to IIS PPG Consensus 0707-01 on an Industry Task Force, Becker commented that the SPC could endorse the recommendation, but could do nothing more because task forces are the responsibility of IODP-MI. He asked whether the IOs and IODP-MI think the formation of such an Industry Task Force would be helpful. Divins stated that he was not certain that a formal group such as a task force would be beneficial. He suggested that what is needed are specific people who have industry contacts, and that it was more of a business issue and not a science issue.

Talwani stated that the IODP-MI cannot form an Industry Task Force as suggested by the IIS PPG. He suggested ignoring this issue. Becker commented that the SPC could just receive the recommendation, note that it is not within the purview of the SAS to deal with it, and forward it to IODP-MI and the IOs. MacLeod commented that to deal with this issue required knowing if there would be more than one meeting. Katz stated that for anything related to industry-IODP interaction, industry scientists have no control of funds, and therefore the management people with control of the money need to be addressed in a different manner. Byrne suggested that there was a need to educate industry scientists, since the people with money will ask the scientists if the science is good. MacLeod agreed. Katz stated that what industry needs to know is what has to be done, and how much it will cost for something to happen. With no further discussion, Becker's recommendation to receive IIS PPG Consensus 0707-01 was accepted by consensus. Becker also recommended that the SPC receive IIS PPG Consensus 0707-03 on an industry drilling consortium; this was accepted by consensus without further discussion.

IIS PPG Consensus 0707-01: SASEC Consensus Statements 0706-07 and 0706-08 represent radical changes in the manner with which academic scientists collaborate with industry in ocean drilling. The "Deal" between academic scientists and the funding agencies and the drill ship operators is changing dramatically. We recommend that options for pursuing substantial industry support for the IODP drilling platforms be pursued by an Industry Task Force (ITF) independent of the IODP SAS. The ITF would consist of representatives from the petroleum industry, the Implementing Organizations, IODP-MI and SAS (ex-officio) facilitated by IODP-MI.

IIS PPG Consensus 0707-03: The industry members of IIS PPG would like to investigate the potential of using platforms currently utilized by IODP for industry developed drilling consortiums. A possible project envisioned could be, for example, an Arctic basin analysis program. In order to proceed in a timely manner, we request that IODP-MI ascertain the level of interest of the IO's in pursuing and facilitating this approach to solving IODP funding issues. If there is interest, prior to the IIS PPG or ITF engaging the entire industrial community to inquire about creating this consortium, we need the following information that will drive corporate decisions: (1) the approximate cost of the ships for drilling in both ice free and ice covered locations in the Arctic, (2) the drilling capabilities of each ship, (3) the scheduling and availability, and (4) the fiscal responsibilities (liability, etc). While this potential program would be driven by industry interests we believe that there could be significant opportunities for scientific collaboration with academia and government.

SPC Consensus 0708-14: The SPC commends the Industry-IODP Science Program Planning Group (IIS PPG) for its efforts in developing IODP-industry collaborations, both within and outside of the program. The SPC receives IIS PPG Consensus 0707-01 and Consensus 0707-03 and forwards them to IODP-MI and the Implementing Organizations with SPC encouragement to further develop industry collaborations as described in those consensus statements.

Referring to IIS PPG Consensus 0707-02 on a change to its mandate, Becker asked if the white papers written by the PPG would be made public. Larsen commented that he would not approve the next IIS PPG meeting without seeing the white papers. Becker stated that the SPC did not need to formally respond to the meeting plan embedded in IIS PPG Consensus 0707-02, as the eventual meeting request would be subject to normal approval by the SPC chair and IODP-MI Vice President for Science Planning.

IIS PPG Consensus 0707-02: Given the already strong proposal pressure and the much reduced availability of the IODP drilling platforms for the remainder of the program, there is little point in further "promoting development of IODP drilling proposals to address industrial priority research within SAS or within the context of the ISP". We recommend an IIS PPG meeting in France (Paris?) in January-February 2008 to complete the white papers and to consider other avenues for pursuing academic-industry liaisons within SAS (for example, more mini-workshops similar to the Tokyo workshop).

Referring to IIS PPG Consensus 0707-05 on funding for travel, Becker suggested that the SPC could receive this request and forward it to the Program Member Offices (PMOs). With no further discussion, this was accepted as a consensus.

IIS PPG Consensus 0707-05: We request that SPC and the National Funding Agencies sort out all funding issues with respect to IIS PPG member travel reimbursement. To be effective, the IIS PPG needs members from multi-national oil companies and negotiating "who pays the travel" is not an effective use of IIS PPG time.

SPC Consensus 0708-15: The SPC receives IIS PPG Consensus 0707-05 regarding travel support for Industry-IODP Science Program Planning Group (IIS PPG) members and forwards their concern to the Program Member Offices (PMOs), which are responsible for providing travel support.

Referring to the recommendation to appoint Andrew Bell as a new member of the IIS PPG in IIS PPG Consensus 0707-04, Becker asked who would pay for his travel support. He noted that this vacancy is not for an ECORD-entitled member, but that it represented an extra slot, and ESSAC or Shell would have to agree to cover travel costs. MacLeod responded that normally costs would be met by the national office of the country of the member, which in this case would be IODP-Netherlands. In this case, however, he noted that Bell is British, but posted in the Netherlands and IODP-Netherlands has an issue with paying his costs. MacLeod asked for guidance. Becker replied that this was outside the SAS and that it was a PMO issue since they paid the travel costs. Ruppel asked what specific expertise Bell would bring to the IIS PPG. Byrne did not know. Becker suggested that the panel look at Bell's CV, then return to this issue on Thursday. On Thursday, Bekins reported that Bell was a basin modeler with a quantitative approach and international experience; she supported his membership. Becker suggested that the SPC could appoint Bell, but travel funding would be a European issue. MacLeod agreed to this suggestion. A straw vote showed unanimous support for the appointment of Bell to the IIS PPG.

IIS PPG Consensus 0707-04: We recommend that the SPC appoint Andrew Bell (Shell) as a new member of the Industry-IODP Science Program Planning Group (IIS PPG), replacing resigned member Neil Frewin, effective immediately.

SPC Consensus 0708-16: The SPC appoints Andrew Bell as a new member of the Industry-IODP Science Program Planning Group (IIS PPG), replacing resigned member Neil Frewin, effective immediately.

Byrne presented two other IIS PPG recommendations. Addressing IIS PPG Consensus 0707-06 on IIS PPG participation at the proposed 2008 IODP rapid climate workshop, Becker stated that a regular application process existed, and Rudolf should apply to attend the workshop. Referring to IIS PPG Consensus 0707-07 on technical sessions at various meetings external to the IODP, Becker commented that this shows that the IIS PPG is fulfilling its mandate, however the same comment applied regarding a regular application process. The SPC took no further action on these two items.

IIS PPG Consensus 0707-06: We recommend industry participation at the IODP rapid climate change workshop if approved (Kurt Rudolf).

IIS PPG Consensus 0707-07: We recommend that technical sessions and/or panel discussions be held at AAPG, GSA and/or EAGE (Kurt Rudolf, Andy Pepper, and Marty Perlmutter to evaluate).

IODP IMPLEMENTATION PLAN: 2008-2013

REQUEST FOR COMMENT

DEADLINE: 30 NOVEMBER 2007

The Science Advisory Structure Executive Committee (SASEC) is soliciting comments on the draft document IODP Implementation Plan: 2008-2013.

During the early part of 2007, it became clear that the IODP budgets for FY'08 and beyond in both the US and Japan would fall considerably short of those anticipated. This will result in a decrease in operational days for IODP to between 6-8 months per year for each of the large vessels, and significant reductions in other parts of the program.

SASEC has considered the shortfall and its consequences. Significant progress in all thematic areas and initiatives of the Initial Science Plan cannot be made in the available time. A major impact could be weakening of the case for renewal, for which preparations must begin at the end of 2010.

In response to this situation, SASEC recognized the need to focus IODP's priorities over the next few years on those themes/initiatives that have the highest potential for major scientific impact in the time available prior to renewal. In the document "IODP Implementation Plan: 2008-2013", SASEC has developed a set of guiding principles to assist in the proposal submission and review processes, as well as in the scheduling of expeditions for 2008-2013, and has recommended four scientific foci for IODP for the next few years: the deep biosphere, climate change, formation of ocean crust, and the seismogenic zone.

It is important to note that the entire ISP remains the fundamental IODP scientific planning document. All high quality proposals addressing its themes and initiatives, whether falling within or outside the four priority foci, will be given serious attention and will be considered for scheduling according to the stated guiding principles.

The recommended Implementation Plan has been reviewed by the Science Planning Committee (SPC) and is now available for public comment. All comments received by the deadline will be considered by SASEC as it revises the document for approval in January 2008.

Please send comments to the draft Implementation Plan posted below no later than ***30 November 2007*** . Submit comments to IODP-MI Science Planning Office at: implementation_plan@iodp-mi-sapporo.org. If requested, the identity of those submitting comments will be kept confidential by IODP-MI.

IODP Implementation Plan: 2008-2013

Draft for comments – November 2007

EXECUTIVE SUMMARY

The IODP Initial Science Plan (ISP) identified three major themes – The Deep Biosphere and the Subseafloor Ocean; Environmental Change, Processes and Effects; and Solid Earth Cycles and Geodynamics – as well as eight new initiatives requiring major advances in drilling platforms and technologies, and expansion of the drilling community into new areas of specialization. These themes and initiatives continue to be the overarching drivers of the program. However, it has now become clear that the IODP budget through 2013 will fall considerably short of that anticipated. This will result in a decrease in operational days for IODP to between 6-8 months per year for each of the large vessels, and significant reductions in other parts of the program. It will also require a focusing of IODP's priorities over the next few years on those themes/initiatives that have the highest potential for major scientific impact prior to renewal of the program.

In order to achieve this, the following guiding principles will be implemented to assist in the proposal submission and review processes, as well as in the scheduling of expeditions for 2008-2013.

Guiding Principles for Selecting Expeditions for 2008-2013

1. Likely to have very high scientific impact within the next 5 years
2. Will reach major milestones
3. Of high societal relevance
4. Achieves a balance between risk, cost, and scientific impact
5. Demonstrates an integrated and interdisciplinary approach
6. A necessary precursor for future investigations – building for the future

In accordance with this guidance, IODP will focus on four major areas over the next six years:

- The deep biosphere and the limits of life
- Rapid climate change, extreme climates, and sea level change
- Processes of ocean crust formation and a deep crustal section
- The seismogenic zone and initiation of borehole observatories.

It is important to note that the entire ISP remains the fundamental IODP scientific planning document, and high quality proposals addressing its themes and initiatives will be given serious attention. However, demonstrable progress before 2013 in the four major areas identified will have highest programmatic priority. All proposals, whether falling within or outside these four areas will be considered for scheduling according to the stated guiding principles. Hence, there will be drilling expeditions over the next few years in thematic areas other than those listed above.

Financial constraints will require a trade-off between operational days and the implementation of high priority, expensive science. While priorities, costs (both financial and operational), risks, and potential scientific impacts must all be considered and balanced, the program requires a minimum level of continuity in drilling activities in order to sustain community interest and involvement. Based on these considerations, expeditions should be scheduled to conform with the following ***minimum operational requirements***:

- *Chikyu* – average of 7 months per year over a 5-year period with the goals of:
  - (i) achieving major milestones in NantroSEIZE
  - (ii) maximizing the use of the vessel for riser drilling
  - (iii) start a new IODP project that requires riser drilling.
- *JOIDES Resolution* – average of 7 months per year over a 5-year period with the goal of:
  - (i) optimizing operating days within the restrictions imposed by the prioritized science.
- *Mission Specific Platforms* – one every two years with the goal of:
  - (i) pioneering drilling in new, challenging environments.

IODP must make every effort to develop projects with potential partners (e.g. through collaborative proposals with industry, foreign governments, etc.) that might increase science operational days and/or provide resources to IODP that increase its flexibility in the expeditions that can be accomplished for the remainder of the program.

IODP Implementation Plan: 2008-2013

INTRODUCTION

Since 1968, scientific ocean drilling has recovered unique global historical records preserved in marine sedimentary deposits and underlying basement rocks. These records have been key to making major advances in our understanding of Earth's dynamic nature and its changing tectonics, climate, ocean circulation, and biota.

Building on more than thirty years of experience, an international community of Earth scientists developed a bold new vision for an Integrated Ocean Drilling Program (IODP) to begin in 2003. The centerpiece of IODP's efforts was envisaged to be a completely new, riser-equipped drillship to be operated by Japan, partnered with a modern, non-riser drillship to be operated by the United States. These drillships would be supplemented by "mission specific platforms" as needed (e.g. drilling barges, jack-up rigs, etc.) to be leased and operated by the European Consortium. This multi-platform approach, and new, state-of-the-art tools and technologies for downhole measurements and long-term seafloor observatories, is the most ambitious program of ocean drilling and exploration ever conceived.

The vision for IODP was articulated in an Initial Science Plan that identified three major themes: The Deep Biosphere and the Subseafloor Ocean; Environmental Change, Processes and Effects; and Solid Earth Cycles and Geodynamics. In addition, eight new initiatives were proposed that require major advances in drilling platforms and technologies, and expansion of the drilling community into new areas of specialization. This Initial Science Plan continues to guide the proposal submission process and the selection of expeditions to schedule to the present day, and will continue to represent the goals of IODP until 2013.

IODP began in 2003 while the Japanese drillship, *Chikyu*, was still under construction. During its first three years, IODP conducted a series of expeditions using the non-riser drillship *JOIDES Resolution* (from the previous Ocean Drilling Program) and mission-specific platforms. These expeditions included, among others, the first scientific drilling expedition in the Arctic Ocean, the most extensive study of sea level changes ever undertaken in a coral reef area (Tahiti), and recovery of the first continuous section through volcanic basement into the uppermost plutonic rocks at the superfast-spreading section of the East Pacific Rise.

In early 2006, the *JOIDES Resolution* was taken out of service to undergo major modifications and upgrades, and is expected to be ready for IODP operations in April 2008. The riser ship, *Chikyu*, is already operational, and begun IODP drilling in September 2007 with the first expedition of the NanTroSEIZE project. The first year of multi-platform operations as articulated in the Initial Science Plan will be 2008. Expeditions for FY2008 and early 2009 are already scheduled and are well into the planning process.

During the first half of 2007, however, it became clear that the IODP budgets for FY'08 and beyond in both the US and Japan will fall considerably short of those anticipated. This will result in a decrease in operational days for IODP to between 6-8 months per year for each of the large vessels, and significant reductions in other parts of the program.

FOCUSING SCIENCE PRIORITIES FOR 2008-2013

The Science Advisory Structure Executive Committee (SASEC) has discussed the shortfall and its consequences for the science that IODP can reasonably expect to accomplish. There is very limited drilling time before the case has to be made for renewal of the program (the process for which has to begin early in FY'11), so significant progress in all thematic areas and initiatives of the ISP cannot be made in the available time.

In response to this situation, SASEC recognized the need to focus IODP's priorities over the next few years on those themes/initiatives that have the highest potential for major scientific impact in the time available prior to renewal. SASEC developed a set of guiding principles to assist in the proposal submission and review processes, as well as in the scheduling of expeditions for 2008-2013.

Guiding Principles for Selecting Expeditions for 2008-2013

1. Likely to have very high scientific impact within the next 5 years
2. Will reach major milestones
3. Of high societal relevance
4. Achieves a balance between risk, cost, and scientific impact
5. Demonstrates an integrated and interdisciplinary approach

6. A necessary precursor for future investigations – building for the future

SASEC recommends that the Science Advisory Structure examine each proposal that is of high scientific priority and likely to be ready for drilling in the next six years, and determine which of these principles it upholds. The aim should be to develop a portfolio of expeditions that have the potential to build the strongest case possible for renewal of the program in 2013.

Furthermore, SASEC recommends that IODP focus on four major areas over the next six years:

- The deep biosphere and the limits of life
- Rapid climate change, extreme climates, and sea level change
- Processes of ocean crust formation and a deep crustal section
- The seismogenic zone and initiation of borehole observatories.

It is important to note that the entire ISP remains the fundamental IODP scientific planning document, and high quality proposals addressing its themes and initiatives will be given serious attention. However, demonstrable progress before 2013 in the four major areas identified will have highest programmatic priority. All proposals, whether falling within or outside these four areas will be considered for scheduling according to the stated guiding principles. Hence, there *will* be drilling expeditions over the next few years in thematic areas other than those listed above.

IODP SCIENTIFIC FOCI: 2008-2013

1. The Deep Biosphere and the Limits of Life

Over a surprisingly broad range of subsurface depths, temperatures, and pressures, the subseafloor (sediments and rocks) hosts an extensive microbial population comprising the deep biosphere. As much as two-thirds of Earth's microbial population may be deeply buried in oceanic sediment and crust. Recognition that the subseafloor teems with microbial life poses fundamental questions about the evolution, distribution and limits of life and the operation of Earth's major biogeochemical cycles.

During the last decade, ODP and IODP have begun to explore and sample this largely undocumented biota. Initial results indicate that microbial ecosystems thrive in both oceanic igneous crust and in deep (more than 750 m) subseafloor sediments –

regions previously thought to be barren. This finding opens up new questions that can be addressed through drilling:

- How do subseafloor microorganisms obtain energy to sustain life?
- What are the types and distributions of subseafloor habitats and communities with respect to geography, temperature, depth, and the compositions of sediments, basement rocks, and formation waters?
- What are the roles of subseafloor microorganisms in the global cycles of the chemical elements?
- What do the characteristics and interactions of these organisms tell us about microbial evolution, ecology, physiology, and biochemistry?

Within this theme and during the next six years (until the year 2013), investigating the distribution of microorganisms will be the top priority. Until the limits on subseafloor microbial life are known, plans for investigations of the other questions cannot be completed. The "limits" to be examined are diverse. They relate not only to depth, temperature and geography, but also to the chemical composition and structure (e.g. porosity, permeability) of sediments and rocks, the abundance and composition of organic matter, the availability of electron donors and acceptors, and the transport of reactants via fluid flow. Special expeditions and dedicated microbial holes or sites on other expeditions should be designed to examine these limits systematically. Where possible, microbially catalyzed chemodynamics should be studied directly. Additionally, advanced molecular probes capable of providing phylogenetic and functional information should be used.

Within this theme, second priority over the next six years will be investigating the ecology, physiology, and biochemistry of subseafloor microbes. Key studies will examine microbial diversity (which can be approached using metagenomic techniques), the provenance of subseafloor microorganisms (are they from the water column or is there a unique population being propagated within the sediments and rocks), the compositions of subseafloor microbial communities (culture-independent techniques at present giving conflicting results), and viruses in pore waters and crustal fluids. An ultimate goal is to establish subseafloor microbial observatories for *in situ* studies.

Where possible, parallel studies using the most modern tools should be conducted on appropriately stored materials from cores already on hand. Legacy samples

suitable for microbiological study should be preserved from nearly all cores. Microbiologists should be included as team members on any expedition that will obtain samples of potential interest. Coring technology should be improved to increase the quantity and quality of samples for microbiological study. Methods for tracing and quantifying contaminants must be further developed and applied.

2. Rapid Climate Change, Extreme Climates, and Sea-Level Change

A second major theme of the IODP ISP is the causes of environmental and climate change on all time scales. Most observations of environmental and climate change can be grouped into times scales ranging from tectonic (generally longer than 1 myr), to orbital (20-400 kyr, with longer period modulations), to oceanic (hundreds to a few thousand years), and to seasonal-to-centennial. Through expeditions already completed or scheduled for the *JOIDES Resolution* and for mission-specific platforms, IODP is greatly adding to the global array of cores needed to understand fundamental aspects of climate and oceanographic changes. For example, major inroads will be made into deciphering sea-level change (Tahiti, New Jersey, and Canterbury Basin), the response to astronomical forcing (North Atlantic climate, Wilkes Land, and Bering Sea), and transient climate and extreme episodes (ACEX, PEAT I, and PEAT II).

For the remaining drilling time through 2013, studies of Environmental Change, Processes and Effects will focus on the two ISP Initiatives: Extreme Climates and Rapid Climate Change.

Earth is now at an environmental extreme – the geologically unusual situation of bipolar glaciation – and debate continues as to how the climate reached this state. Understanding the mechanisms by which climatic extremes develop, are maintained, and end, is also fundamental to a quantitative description of global change. Changing gateway configurations, elevation of mountains and plateaus, and CO_2 drawdown by chemical weathering are all factors that may contribute to long-term climate change. Anthropogenic global warming is now a serious problem, and atmospheric greenhouse gases will soon be at levels geologically inconsistent with the presence of ice at both poles. Current best estimates of Pliocene atmospheric CO_2 levels are similar to today and, by the end of this century, atmospheric CO_2 may approach those of the Early

Cenozoic "greenhouse" world. Through drilling and analyses of the Cenozoic sequence in cores, IODP can investigate the past response of oceans, atmosphere, cryosphere, biota, and biogeochemical cycles to warmer, indeed extreme, climates of the past. For instance, thick sequences recovered from the Arctic Ocean by ACEX document the transition of the Arctic Ocean from a warm "greenhouse world" in the Late Paleocene and Eocene to the cold "icehouse world" from the Miocene to present, with a long hiatus in sedimentation in between. To further investigate the conditions on Earth during times of past extreme climates, IODP will drill at locations that will yield critical information about the nature of past oceanic and atmospheric circulation, such as equatorial and subpolar regions, and the Arctic Ocean. In addition, sites with higher sedimentation rates in the Cretaceous and early Eocene times, and which have reduced overburden, such as some oceanic rises and plateaus, are particularly desirable targets because the lack of significant diagenesis may allow preservation of primary geochemical and isotopic signals.

Recent research has also demonstrated that climate can change abruptly across the globe – within decades in some instances. Records of "natural" rapid climate change provide an indispensable context for evaluating the climatic consequences of contemporary anthropogenic inputs to the environment. The timing and distribution of the present warming trends may match those of previous times or they may differ in some way explainable only by anthropogenic forcing. The instabilities and abrupt climate change evident in the paleoclimate record are to be expected in a system subject to complex feedbacks. Such instabilities and feedbacks are poorly represented in current models of future climate. A full understanding of the causes and consequences of past rapid climate change and robust prediction of future climate requires recovery of a global array of high-resolution cores spanning different time intervals. Records of, or proxies for, such events may be preserved in laminated marine sediments, massive corals, and deep-sea sediment drift deposits. In addition, collaboration with the International Continental Drilling Program (ICDP) could result in the recovery of a global array of high-resolution records from marine and lacustrine settings that will provide detailed proxy records of both marine and continental climate change.

A consequence of climate change, modern sea level is rising globally and the rate of rise appears to be accelerating. IODP drilling will place constraints on the

maximum rates and the nature of variability of rise during the last deglaciation. In addition, many regions threatened by sea-level rise are impacted more by processes of subsidence and sediment supply than by global changes (e.g., southern Louisiana and Bangladesh). IODP drilling on passive margins of the U.S. and New Zealand (Canterbury Basin) will provide insights into the interplay of global sea level, subsidence, and sediment supply on the movement of the shoreline that directly related to the position of the shoreline on margins throughout the world.

3. Processes of Ocean Crust Formation

The formation and evolution of the oceanic lithosphere (which covers more than 50% of Earth's surface) is the dominant process in the chemical differentiation and physical evolution of our planet. This evolution encompasses the transfer and transformation of material and energy from Earth's mantle to the crust, and from the crust to the ocean and atmosphere. Independent of sunlight, the evolving ocean crust supports life in unique subsurface and seafloor habitats that may resemble the earliest of Earth's ecosystems. From its formation until it returns by subduction to the mantle, the oceanic lithosphere interacts with seawater, sequesters surface materials (including water) and recycles them back into the mantle. The potential for IODP to contribute to an improved understanding of the processes of formation and evolution of the ocean lithosphere is enormous; in fact, recovery of a complete crustal section has been a goal of Earth scientists since the 1950s.

Scientific drilling in oceanic basement has already led to major improvements in our understanding of the ocean crust architecture and of mid-ocean ridge processes. Although the number of deep basement holes is limited, IODP has extended the successes of ODP Holes at 504B and 735B to include two deep holes at complementary sites. Hole U1309D, in slow-spreading Atlantic Ocean crust, reached 1415 m below seafloor and recovered a complex series of gabbroic rocks. Hole 1256D, in superfast-spread crust of the eastern Pacific Ocean, reached 1507 m below seafloor and, for the first time, passed through a complete Layer 2 (pillow basalt and sheeted dike) sequence, into the transition between sheeted dikes and underlying gabbros.

It is now time for IODP to build on these successes and on its unique abilities to collect physical and chemical data, and to sample fluids, substrates, and micro-

organisms below the seafloor. Over the next six years, a priority for IODP will be making significant scientific and technological progress towards the ultimate future goal of the ISP Initiative of a 21st Century Mohole – a complete *in situ* section through oceanic crust. In this timeframe, high priority and realizable objectives will be to recover a substantially longer, intact, and tectonically undisrupted section of oceanic crust, as well as tectonically exposed sections of the lower crust. These will be essential first steps towards understanding the processes of formation and evolution of oceanic crust, and how planet Earth is repaved.

4. The Seismogenic Zone and Initiation of Borehole Observatories

More than 90% of all seismic energy worldwide is released in subduction zone earthquakes. Loss of lives and vast amounts of property and infrastructure have resulted from these earthquakes and associated tsunamis, as tragically demonstrated in the recent 2004 Sumatra earthquake.

Despite the current quantitative knowledge of plate motions monitored by arrays of seismometers, geodetic measurements, and the global positioning system, the sudden release of strain that has accumulated in the seismogenic zone is not predictable. Rapid advances in far-field observations are revealing more details about how a large earthquake rupture nucleates and propagates over a fault with asperities. Physical models of earthquakes are being developed and tested by laboratory experiments and modeling, but the interpretation of the behavior of these areas remains highly speculative. On land, the San Andreas Fault Observatory at Depth (SAFOD) has recovered cores into the fault zone. However, in trying to understand how, when, and where devastating earthquakes occur, we lack fundamental knowledge of the physical and chemical conditions within the seismogenic zone and how they change over time and eventually cause sudden rupture.

Studies of the seismogenic zone were identified as an Initiative in the ISP, and IODP has committed to undertaking an unprecedented, comprehensive, multidisciplinary project to investigate the behavior of rocks, sediments and fluids in the seismogenic zone. This will be a priority until 2013. IODP will drill directly through a seismogenic fault at Nankai Trough (starting with Expeditions 314, 315, and 316 that are scheduled for 2007-2008, and including expeditions planned as part of Stage 2 drilling) to characterize the composition, deformation microstructures and

physical properties of the rocks at *in situ* conditions. Downhole logging will augment the characterization of physical conditions across the fault. Borehole observatories able to record under high-temperature conditions will be placed across the fault and will provide time-series records of fault conditions including pore pressure, temperature, stress changes, and changes in tilt and strain, as well as near-field seismic observations. This project will lead to rapid new progress in understanding the nature of this zone and the earthquake generation mechanism.

PRINCIPLES OF IMPLEMENTATION

The IODP Initial Science Plan identified six principles of implementation for its scientific expeditions:

- Coordinated use of multiple platforms within a single program
- Engineering developments and use of special measurement and sampling tools
- New logging program
- Coordination with observatory science
- Establishing a site survey program
- Cooperation with other initiatives and with industry.

While all of these continue to be desirable, the budgetary constraints may not allow implementation at the level initially envisioned. Significant reductions in components of IODP, such as engineering development or establishing a site survey program, are likely for the foreseeable future.

Operational days for IODP will decrease to between 6-8 months per year for each of the large vessels. Financial constraints will require a trade-off between operational days and the implementation of high priority, expensive science. While priorities, costs (both financial and operational), risks, and potential science impacts must all be considered and balanced, the program requires a minimum level of continuity in drilling activities in order to sustain community interest and involvement. Based on these considerations, expeditions must be scheduled to conform with the following ***minimum operational requirements***:

- *Chikyu* – average of 7 months per year over a 5-year period with the goals of:
  - (i) achieving major milestones in NantroSEIZE
  - (ii) maximizing the use of the vessel for riser drilling
  - (iii) start a new IODP project that requires riser drilling.

- *JOIDES Resolution* – average of 7 months per year over a 5-year period with the goal of:
    (i) optimizing operating days within the restrictions imposed by the prioritized science.
- *Mission Specific Platforms* – one every two years with the goal of:
    (i) expanding the environments in which IODP can drill, and pioneering drilling in new, challenging areas.

Finally, IODP must make every effort to develop projects with potential partners (e.g. through collaborative proposals with industry, foreign governments, etc.) that might increase science operational days and/or provide resources to IODP that increase its flexibility in the expeditions that can be accomplished for the remainder of this phase of the program.

3.4 Proposed FY08 / Early FY09 Operations

Figure OTF-07-17 (below) provides a composite look at the FY08 / early FY09 operations recommended by the Operations Task Force. Long-lead items for the early FY09 operations would be included, as appropriate in the FY08 Annual Program Plan.

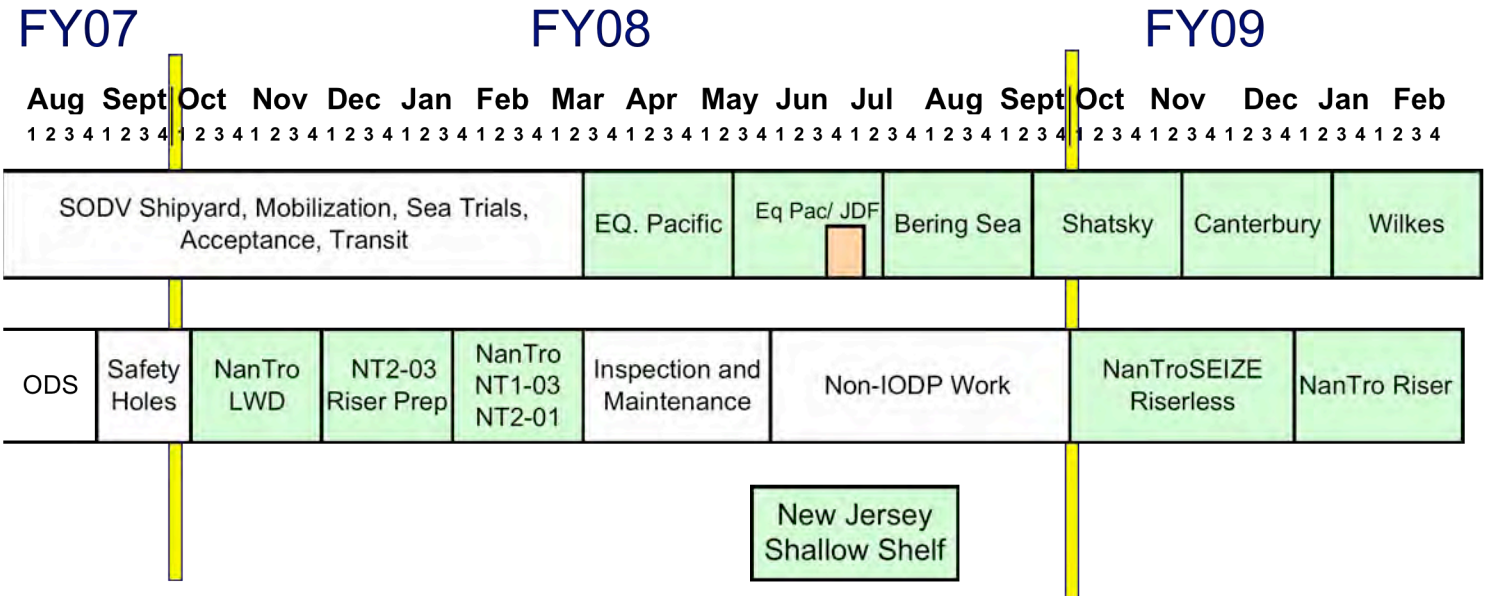

Figure OTF-07-17: *Summary of OTF recommended FY08/Early FY09 Operations*

4 FY09 and Beyond

Figure OTF-07-18 shows the OTF recommended operations for FY09. The schedule still requires further definition with respect to the specific riserless expeditions on *Chikyu* in the early part of FY09, and the SODV operations after Wilkes Land. Options regarding these operations are discussed below.

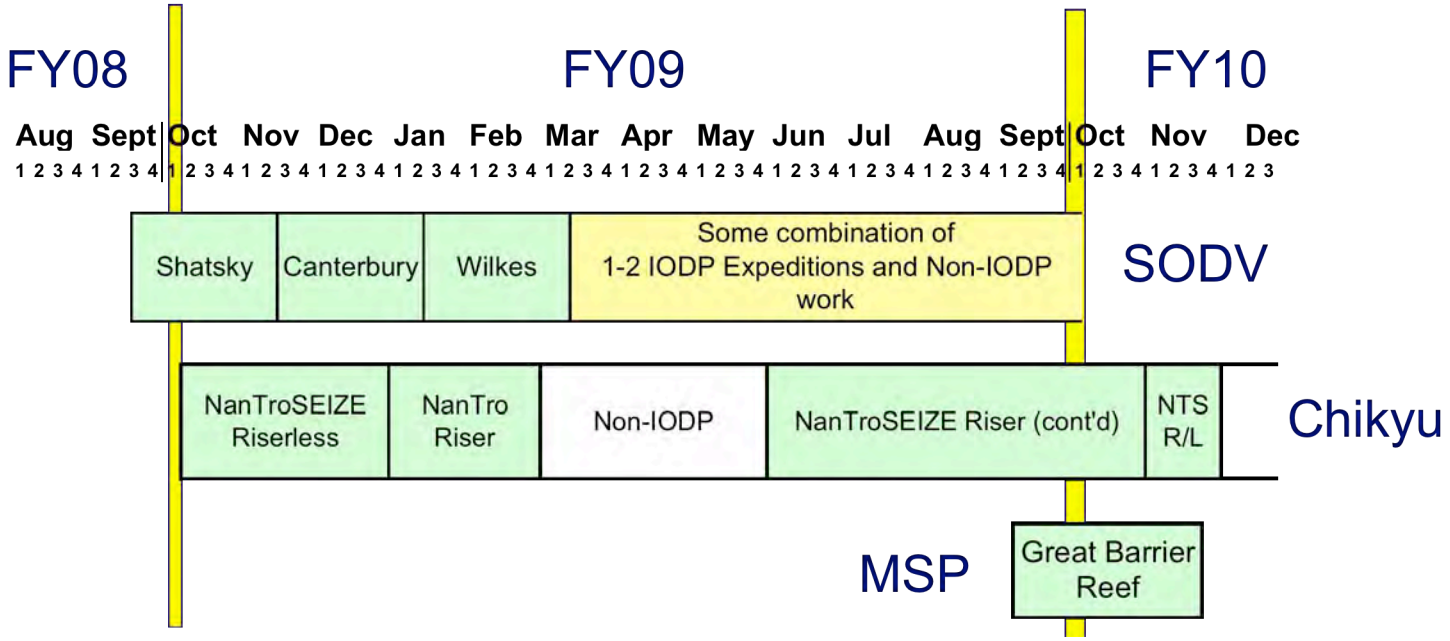

Figure OTF-07-18: *Proposed operations for FY09 for all three IODP operators. Further refinement of the latter part of the SODV schedule and the riserless operations for Chikyu will be attempted by OTF in late August.*

4.1 SODV FY09 and beyond

The proposed SODV FY09 schedule is shown above in **Figure OTF-07-18**. The post-Wilkes Land operations still need to be defined. Given that the FY09 program has ~2.5 expeditions already allocated (Shatsky, Canterbury and Wilkes Land), budgetary considerations suggest that we may be able to conduct at least one more expedition (perhaps two) with the remainder of the time potentially allocated to "non-IODP" work.

Whether the USIO can conduct more than one IODP expedition after Wilkes Land in FY09 will be determined by a number of factors, including the FY09 budget guidance from the Lead Agencies (which will not be known for another 6 months), the type of expeditions that are run post-Wilkes, the location/length of non-IODP work in FY09, and the priorities of SPC regarding where the SODV should be operating beyond FY09.

OTF will attempt to address the latter part of the FY09 SODV schedule at its August meeting. A definitive option beyond one Post-Wilkes expedition may be difficult to develop in August primarily because of the unknowns with respect to FY09 budgets and

Science Program

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INFORMATION FOR THE IODP SCIENTIFIC COMMUNITY

October 30th, 2007

Status of Mission Proposals and Long Range Planning

The next bi-annual deadline for submission of drilling proposals to IODP is April 1st 2008. The IODP Science-Advisory Structure (SAS) and IODP Management International (IODP-MI) have jointly decided that mission proposals, which nominally would be due once a year by the April 1st deadline, will not be solicited this year.

Three mission proposals were submitted by the April 1st 2007 deadline. The SAS Executive Committee (SASEC) and IODP-MI want to take this opportunity to thank the proponents behind these mission proposals for their efforts. The mission proposals received were, for a large part, built around existing proposals, some of which already obtained high ranking from SAS as normal individual expeditions. However, none of the three proposals were designated missions by SAS, in part because SAS was not convinced of the overwhelming and urgent need to carry out these as missions, instead of as individual expeditions.

The Science-Advisory Structure is seeking to focus and to simplify implementation of the IODP Initial Science Plan (ISP). The focusing is necessitated by the fact that IODP-MI does not expect that funding for drilling operations will be available for year around operations in the foreseeable future. A draft proposal by SASEC for focusing the program efforts will be published November 1st 2007 on the IODP Web site with a four weeks hearing and comment period.

Under these circumstances, SAS and IODP-MI jointly concluded that the issue of identifying and implementing strategic program priorities should be resolved before a new call for mission proposals is considered.

Proponents of future drilling, whether considering large scale experiments or more modest project plans, are therefore encouraged to submit their ideas through the conventional proposal categories at the upcoming April 1st 2008 deadline. Questions regarding proposals submission can be directed to: science@iodp-mi-sapporo.org. Submission guidelines can be found at www.iodp.org. The SASEC approved implementation plan for the ISP is expected to be published by late January 2008.

INTEGRATED OCEAN DRILLING PROGRAM MANAGEMENT INC. (IODP-MI)
Washington D.C. & Sapporo

Note on White Papers

From Ralph to IODP-MI Science. 30 Oct/07

... Regarding the white papers, the IISPPG views the white papers differently perhaps from other groups in IODP-SAS. We do not view the white papers as final, polished public documents. Rather we view the white papers as internal working documents that evolve from meeting to meeting and help the committee members promote proposals from academic PI's. The final documents in the IISPPG process are pre-proposals or proposals submitted to IODP. These are generally written by academic PI's who are not on the IISPPG. (Our request for travel funds to allow academic PIs to attend proposal specific planning meetings was denied by IODP-SAS management a year or so ago.) That said, all of the draft white papers and presentations that are discussed and made at our meetings are included in our minutes as Appendices. For example, the white paper on Birth and Evolution of South Atlantic Continental Margins (BESACM) was included as an Appendix in the minutes of the Houston meeting and the BESACM project was included in the Rifted Margins Missions proposal submitted for the April 1, 2007 deadline. The white papers and related presentations that were discussed at the Sapporo meeting are included in the draft minutes which have been submitted to IODP-MI....

John Hopper to Friends of Rifted MArgins - Nov 26/07

Hi again Rifters,

Sorry to spam twice in a day. A couple of people contacted me about a "group" letter. To make the biggest impression on IODP, it seems it might be best if individuals or small groups of individuals could send their concerns to IODP separately, rather than a single statement with a bunch of signatures.

Brian Tucholke, Keith Louden and I already sent one such letter over the weekend. In case it might inspire you, I've included it below.

To: implementation_plan@iodp-mi-sapporo.org

From: Brian Tucholke, Woods Hole Oceanographic Institution (btucholke@whoi.edu)
John Hopper, Texas A&M University (hopper@geo.tamu.edu)
Keith Louden, Dalhousie University (Keith.Louden@Dal.Ca)

Subject: Comments on Implementation Plan

We thank you for the opportunity to comment on the proposed IODP Implementation Plan: 2008-2013. We understand the potential impacts to future IODP drilling activities that are expected to result from present funding restrictions. The reduction in drilling described in the document obviously will mean that fewer projects can be accomplished before the end of the current program in 2013.

However, as participants in and supporters of IODP (and previous ODP and DSDP) activities over many years, we feel strongly that the proposed focus on selected sub-sets of the original IODP Science Plan (2003-2013) goes against the fundamental and long-standing vision of the program.

The Science Plan was conceived over many years and through widespread discussion within the scientific drilling community, including many participants at international conferences and workshops. Since the Science Plan was accepted, many scientists have made huge efforts in acquiring site survey data and in developing drilling proposals within the scientific themes that were described in the plan. To effectively eliminate parts of the Science Plan at this stage will mean that many of these efforts will have been wasted.

Moreover, we fear that this drastic and sudden change may lead to an abandonment of the program by many scientists. The support of the program by a large group of active participants throughout the world has been and will continue to be a critical, fundamental strength of the program. This ownership is more important in the long term than any one individual goal or result. There is already a perception from some quarters that disciplinary balance on the review committees has been lost, and the proposed changes to the science plan seem to formalize that loss of balance. This is to the detriment of scientific progress in many fields that have been strongly advanced as a direct result of scientific drilling.

We have no doubt that specialists in many disciplines will identify large gaps in the draft implementation plan. From our particular perspective, there are two glaring shortcomings. First, the processes and products of continental breakup, including the transition to formation of ocean crust, are not even mentioned. With this omission, crucial questions about one of the most fundamental processes of plate tectonics are ignored. The omission also obviates much of the potential for scientific interest, participation, and possible co-funding by energy industries. The result is a direct conflict with a stated goal of developing 'projects with potential partners (e.g. through collaborative proposals with industry, foreign governments, etc.) that might increase science operational days and/or provide resources.....'.

Second, we feel that the 'Processes of Ocean Crust Formation' focus is very narrowly constructed. It particularly fails to emphasize and to capitalize on major opportunities for new insights into how ocean crust is created and modified, as well as to test and advance drilling technology in 'extreme' conditions. Full crustal penetration has been a goal for more than 40 years, but it will not be achieved in most of our lifetimes, if ever. For the foreseeable future, tectonic windows provide the most viable opportunities to

sample and understand processes (e.g., melt generation, migration, emplacement) and 3D variability, in addition to tectonic effects and interactions. Furthermore, drilling in these windows will encounter a wide variety of lithologies, alteration, and temperatures at currently achievable subbottom depths. These conditions allow for engineering tests and acquisition of data that are essential to eventually achieving truly deep crustal penentration. In order to engage a broad spectrum of scientists and to maximize scientific returns and technological insights, drilling in tectonic windows should have a prominent, if not dominant, role in IODP programming for exploration of the ocean crust.

For all of the above reasons, we strongly disagree with the proposed implementation scheme, and we recommend that no changes be made to the existing Science Plan. Drilling in the deep ocean has always been a very high-risk activity that often involves a large amount of serendipity to achieve individual outcomes. We believe that it should remain the mandate of the scientific panels and planning committees to determine which proposals should be chosen based on their potential scientific impact, without the added layer of direction that has been proposed in the draft implementation plan.

NERC Science and Innovations programme, UK-IODP Industrial Liaison Panel

A WORKSHOP DEDICATED TO PLATE TECTONICS, PALAEOCEANOGRAPHY/PALAEOCLIMATE, SOURCE ROCKS, AND THE DEEP BIOSPHERE

Durham University, Department of Earth Sciences
21st and 22nd September 2007

Coordination: Howard Armstrong (Durham); Ian Head (Newcastle), Tom Wagner (Newcastle)

Aim of the workshop

The workshop will bring together scientists studying organic – rich marine sediments, ocean-climate modelers, microbiologists and industrial stakeholders interested in source rocks and boundaries of life. Our primary aim is to develop a workflow that will lead to the submission of new IODP drill proposals with strong involvement and leadership of UK scientists based around specific drilling targets.

The workshop will explore the key climatic, biological, geochemical, and physical processes involved in the formation and modification of organic-rich sediments. We aim to improve strategies to simulate and predict the spatial distribution and hydrocarbon potential of marine source rocks and to better integrate deep biosphere research with palaeoceanography, petroleum geology and computer simulation.

Objectives

Our objective is to explore the intimate relationships involved in the formation of organic-rich sediments and to develop integrated cross-disciplinary strategies to study critical examples in Earth history. We have tentatively identified three wider research themes to be discussed and developed at the workshop:

1. Paleoceanography and paleoclimate of the Eocene-Oligocene Transition
2. A mid-Cretaceous cross-latitudinal climate transect from mid latitude to pole
3. Boundaries of extreme life

Time will be made during the workshop to discuss other research ideas addressing the overarching objective of the workshop, particularly if they will lead to submission of UK IODP led research proposals.

We would appreciate if you could indicate if you are planning to attend the workshop. Note that there will be some travel support from NERC (confirmation still pending). If you have any additional drill targets which you would like to suggest and discuss, we are happy to add them to the agenda!

Regards from Newcastle and Durham. We hope to see you soon,

Howard, Ian, and Tom

1. Closure of the Central Tethys Gateway, the Oi-1 glaciation and source rocks (co-ordinator Howard Armstrong)

The Oi-1 event (~34Ma) is a critical step in the transition from the greenhouse climate of the Cretaceous and Palaeogene to the icehouse of the Neogene. It represents a 400 kyr-long glacial initiated by reorganisation of the ocean/climate system as evidenced by global shifts in the distribution of marine biogenic sediments, an overall increase in ocean fertility, a major drop in the CCD and onset of the Atlantic thermohaline circulation. Deep sea $\delta^{18}O$ values indicate permanent ice sheets, ~50% the size of the present day Antarctica ice sheet. Oi-1 also coincides with a shift in continental floral belts and a sharp positive carbon isotope excursion (~0.8 ‰) indicating a significant perturbation in the global carbon cycle, which results in the widespread deposition of organic-rich sediments, for example in the equatorial Atlantic margin basins and Paratethys. The latter now form one of the one of the world's premier source rocks, extending from the Caucasus to the Black Sea. This theme intends to explore the linkages and feedbacks between causes of Oi-1 glaciation and the temporal and spatial distribution of the super-productive oceans of the Eocene and Oligocene.

The causes of the Oi-1 glaciation remain contentious and have hitherto focused on drivers from the southern high latitudes. Evidence is now emerging for a ~35 Ma (Late Eocene-Early Oligocene) Arabia-Asia continental collision and closure of the Central Tetheyan Seaway, and is envisaged collision and basin closure had the potential to cause global cooling through a variety of mechanisms. The task is challenging and in the face of so many variables, truly multi-disciplinary. Obtaining low-latitude records of the Eocene–Oligocene transition would allow us to fully evaluate the role of a late Eocene closure of Tethys and the impact of this event on the ocean-hydrosphere-climate system, in the transition from the Cretaceous greenhouse into the Neogene "icehouse." A workflow will be devised leading to submission of a preliminary proposal deadline 1st April 2008.

2. (Palaeogene-)Cretaceous black shale transects (co-ordinator Tom Wagner)

There is growing awareness of the complex interaction between climate, the biosphere, and the ocean, and potential multi-facet hazards to society and ecosystems in the near future. Despite undisputed substantial progress in climate change research future scenarios still need to be underpinned by a deep understanding of the mechanisms and feedbacks that have occurred in the Earth's history. Of all the past warm climate periods, the Palaeogene-Cretaceous is the best constrained with respect to marine chemical records. Recent developments in molecular and isotopic geochemistry, in particular when combined with climate and biogeochemical modelling, has entered a new dimension and level of quality that is now truly synoptic, precise and comprehensive. Applying such an integrated approach to Palaeogene-Cretaceous black shale thus offers a unique opportunity to investigate the coupling between climate, ocean chemistry, and the biosphere on a generally warmer Earth, specifically during periods of rapid climate change, and convey these results into improved future scenarios.

The study object marine black shale however not only is key to unravel climate change and ocean extremes during past periods of exceptional warmth. Another, closely linked aspect of this research concerns energy from fossil fuel. As existing oil reserves decline, the increasing focus on deeper-water petroleum potentials means that the development of a fuller understanding of the origin, spatial distribution, and lateral and bathymetric variation of organic-rich sediments is vital for the development of offshore exploration strategies. Fundamental questions remain to be answered despite decades of intense research within academia and petroleum industries.

The demand for new continuous high time-resolution records across bathymetric and latitudinal thermal gradients increases, in particular from the high latitudes. The workshop will explore the outlined objectives and aims developing a pragmatic strategy leading to new IODP and mission specific research actions. Possible target areas to be discussed include but are no limited to:

- Porcupine Plain - British Chalk transect
- Newfoundland Margin (supplementary to IODP proposal 661)

- Drilling continental and coastal Arctic - how to make progress (including continental and shallow water drilling)?

3. Boundaries of extreme life (co-ordinator Ian Head)

The deep biosphere represents the largest biome on the planet and some estimates suggest that it holds as much as half of the planet's biomass carbon. However the amount of biomass per unit volume of the deep biosphere is typically very low with notable hotspots associated with geological and hydrological activity. The primary factors which affect the distribution of life in the deep biosphere remain poorly constrained. For example the highest temperature at which biological activity has been demonstrated experimentally is 121°C, but geochemical evidence suggests that in the deep biosphere this limit may be as low as 80 or 90oC. While this remains a topic of debate, it is clear that we do not fully understand the limits on the deep biosphere. Development of a specific IODP project to address questions relating to the limits on the deep biosphere is a principal aim of this workshop. One factor which undoubtedly has an influence on the distribution of the deep subsurface life is the availability of electron donors and other essential building blocks for life. Focussing on sediments with organic rich sequences and/or marked thermal gradients or brine incursions, will allow an assessment of the relative importance of physical, thermodynamic and biological constraints on the occurrence of deep biosphere hot spots. In addition biological transformations of organic matter in the deep biosphere may have a significant role to play in determining source rock quality and formation of deep biogenic methane. These issues will form a starting point for discussions with the expectation that they will be refined and augmented by suggestions from the workshop participants.

Attendees

The Eocene-Oligocene working group

Mark Allen, Durham. m.b.allen@durham.ac.uk
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Organic geochemists as per Cretaceous Working Group
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The (Paleogene-)Cretaceous working group

Tom Wagner (Newcastle, coordinator)
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The Boundary of extreme life group

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Industrial partners/ IODP IIS-PPG being arranged by Harry Doust

Andy Bell (Shell Research, Rijswijk, Netherlands) – will attend
Erdem Idiz (Shell Exploration Advice, Rijswijk, Neth) – will attend
Andy Pepper (Hess, New York, USA) – will try to come
Marty Perlmutter (ChevronTexaco, Houston, USA) – as yet no reply to invitation
Kurt Rudolph (ExxonMobil, Houston, USA) – as yet no reply to invitation
Nick Stronach - njs@fugro-robertson.com>
Kees van der Zwan (Utrecht University / Shell Research, Rijswijk) – will attend.

A Workshop to plan Scientific Drilling in the Arctic Ocean

A Proposal to

Joint Oceanographic Institutions
1201 New York Ave, NW, Suite 400
Washington, DC 20005

Submitted by e-mail to

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Assistant Director, US Science Support Program
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From

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Request $39,945 USD

Dates 1 January 2008 to 31 December 2008

Objective

This proposal would support a three day meeting at the Alfred Wegener Institute (AWI) in Bremerhaven Germany to discuss all aspects of preparing for scientific drilling in the Arctic Ocean. This workshop would bring together an international group of Arctic scientists, young scientists and ocean drilling scientists to learn and exchange ideas, experience and enthusiasm about the Arctic Ocean. As outlined in the IODP initial science plan (IODP 2001), scientific drilling in the Arctic Ocean will make incredible contributions to the understanding of this ocean basin, the continents that ring it and the global climate system. This meeting could, by providing an intellectual and logistic context for the development of individual drilling legs, lower the "activation energy" for future programs. In addition to an EOS meeting report, a report for the JOI/USAC Newsletter and, perhaps, for the IODP Journal Scientific Drilling, we will produce a detailed workshop report. Ideally, a few project planning groups would emerge from the attendees of this meeting.

Introduction

The Arctic Ocean is a repository of information about ancient climate, a laboratory for the study of ocean circulation processes and the missing piece of the tectonic puzzle needed to understand the Mesozoic history of the Northern Hemisphere. Tectonic and climate models of the earth must be global or they are incomplete. The missing pieces, the answers to questions framed by nearly sixty years of ocean exploration and forty years of scientific ocean drilling, will be obtained by sampling, analyzing and dating the sediments of the Arctic Ocean basin.

The two basins of the Arctic Ocean were created by plate tectonic processes, in two episodes, one primarily Cenozoic the other essentially Mesozoic. The formation and evolution of these basins created the circumstances for and dictated changes in high latitude ocean circulation since the Mesozoic. Our ability to study the coupled tectonic/oceanographic/climate history of this region has been limited by the difficulty of using techniques perfected at lower latitude in the arctic environment.

Plate boundaries extend across latitudes. Transfer of heat and mass in oceans and atmosphere do not respect geographic boundaries. The frontiers of curiosity are in the Arctic Ocean. Complete understanding of climate change and the geologic history of the northern continents awaits exploration and comprehensive study of the deep Arctic Ocean. While experience elsewhere provides the context for the study of features like the Gakkel Ridge, the unique environment and history of the Arctic Ocean raises other questions specific to the high latitude climate and tectonics of the Northern Hemisphere.

Scientific Questions Arctic Ocean Drilling

Scientific drilling has, to some extent, been polarized by a dichotomy between drilling for tectonic objectives and drilling for paleo-oceanographic objectives. This distinction has been based, in part, on a nearly complete understanding of regional tectonic issues made possible by the success of the plate tectonic model. In the Arctic Ocean, particularly in the Amerasian Basin, very little has been established about the tectonic history. Most of the history has been inferred from the geology of the surrounding continents and constrained by the bathymetric and potential fields data sets available for the ocean basin. The complex stratigraphy, segmented by undated multiple unconformities, seen in seismic reflection profiles collected from USCGC Healy in 2005 (Coakley 2007) hints at a complex multi-stage evolution for the basin. Drilling to sample and date these apparently heterogeneous sediments will be the only means to articulate this history.

Questions about climate change since the Mesozoic are the primary rationale for the existing Arctic drilling proposals. As detailed in the IODP science plan (IODP 2001), Arctic drilling will support studies of Extreme Climates, ultra-slow seafloor spreading (Gakkel Ridge), LIPs (Alpha-Mendeleev Ridge), continental extension (Lomonosov Ridge and the basin margins), gas hydrates and the deep biosphere in the Arctic Ocean.

Tectonic Objectives

The geological history of the Amerasian Basin is poorly understood, in part due the lack of identified plate boundaries. These boundaries must exist in this largely oceanic basin. Identification of these structures will make it possible to reconstruct the development of the basin, which will substantially improve how the history of the surrounding continents is understood. The particular problems to be solved are;

- **What was the pre-drift setting of the Chukchi Borderland?**

If the Amerasian Basin is restored to its conjectured pre-opening configuration, the extended continental block of the Chukchi Borderland prevents complete closure of the Canada Basin between the conjugate Alaska and Canadian margins. Geologic and geophysical data suggest it was initially a part of the Northern Alaska-Chukchi Microplate. One of its most preferable pre-drift positions could be found close to what is now the northeastern margin of East Siberian Sea.

Grantz et al. (1998) sampled Phanerozoic sediments from the Northwind Ridge with a piston corer. He proposed, based on the small quantities of material recovered, that these sediments could be correlated most directly with the fill of the Sverdrup Basin in the Canadian Arctic Archipelago, supporting the rotational model of opening, first proposed by Cary (1958). Continuous sampling through drilling would provide more extensive sections for correlation, making a stronger tie possible.

- **What is the composition of the Alpha-Mendeleev Ridge?**

What is known today about the Alpha-Mendeleev ridge system may be explained as a hot spot track (Lawver and Müller, 1994). The time and geodynamic framework of this process remain elusive. Some observations are inconsistent with this hypothesis. Exposed on the East Siberian margin, near the southern termination of the Mendeleev Ridge, is a huge area of the Mid Cretaceous flood basalts. Glimpses into the Late Cretaceous paleoenvironment are provided by short cores containing black marine shales suggesting oxygen-deficient or oxygen free conditions along flanks of a chain of islands and also younger laminated siliceous oozes that may relate to an upwelling system (Clark et al., 1986). Direct sampling of the sediments and exposed sub-structure by drilling could establish the origin of this feature.

- **What is the Mesozoic history of the Arctic Ocean?**

The Amerasian Basin appears to have opened in the Cretaceous. This is largely inferred from sediments exposed on the margins of the basin. The history of the basin itself during this interval is completely unknown, but could be reconstructed from sediments preserved on the Chukchi Borderland and below the cap pelagic sequence on Lomonosov Ridge, as well as elsewhere in the basin.

- **When did the gateways to the Arctic Ocean open and close?**

The formation of the Arctic Ocean changed the climate of the surrounding continents. Reconstructing the history of the Arctic Ocean and opening and closing of its' various gateways (e.g. Bering Strait, Fram Strait, Cretaceous Seaway) would define the high latitude boundary conditions for world climate and substantially improve how we understand the surrounding continents and the Arctic Ocean's impact on the global ocean.

While the form of the bathymetry is relatively well described (Jakobsson et al., 2000) many outstanding questions about the composition and origin of the large ridges, plateaux and basins remain. Understanding these individual features, which can be accomplished by drilling, will provide timing constraints on the other large scale problems in the basin, particularly how did the Amerasian Basin form and the location of Mesozoic and early Cenozoic plate boundaries.

Paleo-oceanographic Objectives

Sediment accumulation in the deep polar basin is intimately linked to environmental factors such as erosion on the surrounding continents, oceanographic circulation, atmospheric patterns and water mass productivity. Scientific drilling is needed to access this archive of paleo-environmental history.

The Arctic Ocean may tell us much about our future, if we can decipher its history. Arctic climate has changed dramatically since the end of Cretaceous as connections to the world ocean opened and closed. These gateways influenced global circulation and substantially modified equator to pole climatic gradients. Since the Mesozoic, tectonic, primarily extensional, processes created bathymetry, shaping exchange of water with the Pacific and Atlantic Oceans and circulation within the Arctic Ocean.

The current push for real-time observations (e.g., Study of Arctic Environmental Change (SEARCH) and Developing Arctic Modelling and Observing Capabilities for Long-term Environmental Studies (DAMOCLES)) will build understanding of the contemporary environment and augment the few locations with relatively long land-based records, providing context to these historical studies. While this is necessary, the only way to reconstruct the history of the Arctic Ocean, spanning a transition from the nearly unknown history of the Early Mesozoic to near tropical conditions in the late Cretaceous to Pleistocene glaciation to the present conditions of rapid change, is to recover the long records preserved in the sediments below the seafloor.

The success of the ACEX cruise (IODP Leg 302; Shipboard Scientific Party, 2005) has opened the door for further scientific drilling in the Arctic Ocean. Despite being hampered by poor core recovery and an unexpected unconformity in the section, this leg, which must be considered a great triumph, has yielded some surprising discoveries. These results will frame the next round of questions for what must be a series of drilling legs to fully explore the scientific questions listed below;

- **What is the role of the Arctic in the greenhouse to icehouse transition?**

The ACEX record of the polar environment spans the last 55 million years, but marine sequences representing upper Eocene to lower Miocene were not recovered (Moran et al. 2006). This missing interval from the ACEX record represents a critical time in the earth's climate evolution–the transition from the greenhouse world of the

Eocene to the icehouse world of today.

- **What is the history of ice rafting in the Arctic Ocean?**

The first occurrence of ice-rafted debris in the ACEX core was found at approximately 46 million years ago (Moran et al., 2006), more than 30 million years earlier than anticipated. Permanent sea ice cover also seems to have developed earlier than anticipated at 13 to 14 million years ago. The presence sea ice, particularly permanent sea ice, indicates a significant change in the Arctic Ocean, affecting atmospheric exchange, vertical stratification of salinity and albedo. Understanding how the ice pack has evolved is absolutely critical to understanding the changing wider influence of this ocean over time.

- **How has the influx of fresh water to the basin changed over time?**

Large influxes of less dense river water spread out across the basin, partly sustaining the halocline and facilitating the formation of sea ice. The history of this flux has certainly varied over time as topography of the surrounding continents changed and continental glaciers waxed and waned. Understanding this variation is critical to understanding the stratification of the Arctic Ocean and the evolution of sea ice.

- **How has continental glaciation influenced the Arctic Ocean?**

Starting with the SCICEX cruise in 1998 (Polyak et al., 2000), evidence has emerged about the impact of continental glaciation on the bottom of the Arctic Ocean (Jakobsson et al., 2007). Constraining the timing of these events is necessary to place them in context with the record of continental glaciation.

- **How has the opening and closing of the various Arctic Ocean gateways influenced circulation in the basin?**

Currently the Arctic Ocean receives water from the Northern Pacific and exchanges water with the Atlantic Ocean. In addition to the large freshwater input from the rivers draining into the basin, the relative quantities of these inputs define the chemistry and stratification of the Arctic Ocean. The alternate flooding and exposure of the Bering Strait as sea level has fallen and risen has had an intermittent effect on the basin. The gradual opening of Fram Strait, which opened the first deep connection to the world ocean, has had a steadily increasing influence since the propagation of the Gakkel Ridge across the Barents shelf in the early Cenozoic. Understanding the timing of these events and their influence on climate and exchange is necessary to develop a deeper understanding based on direct observation, rather than inference, of global circulation.

- **What is the history of deep exchange between the Arctic Ocean the world's oceans?**

Prior to the opening of the deep connection through the Fram Strait, there is every reason to believe that the Arctic Ocean was anoxic. The preserved organic sediments sampled in the ACEX core (Moran et al., 2006) as well as the laminated organic-rich Cretaceous sediments studied by Clark et al. (1986) from Alpha Ridge support this notion. This basin could have been a major carbon sink through much of the Mesozoic and early Cenozoic. Jakobsson et al. (2007) suggest that Fram Strait we sufficiently open to ventilate the Arctic Ocean in the early Miocene, but there is still much to be learned about how this event influenced ocean circulation. Direct sampling of the sediments is the only way to understand this history.

The isolation of the deep, central Arctic Ocean does not insulate it from climate change. All evidence indicates that a complex suite of interrelated atmospheric, oceanic, and terrestrial changes are now underway in the arctic, affecting every part of the polar environment. Understanding and quantifying these changes is complicated by the sparseness of paleo-oceanographic from the circum-arctic environment. Without these data, it will not be possible to understand previous climate fluctuations, which may provide a model for future changes, or predict the consequences of future climate change.

Coordination for Site Preparation

Mapping the deep basin, collecting multi-channel seismic reflection data and sampling the sedimentary record by drilling are the primary means to reveal its history. Despite improved icebreaker support, multi-channel seismic (MCS) investigations are very sparse in the Central Arctic Ocean. Our present inventory includes approximately 15,700 km of seismic reflection data acquired from drifting ice stations and roughly 8,900 km from modern ice-breakers (Kristoffersen and Mikkelson, 2004; Coakley et al. 2007).

The dense pack ice prevents easy towing of seismic gear (airguns and streamer). Standard seismic operations in the Central Arctic use short streamers (300-600 m active length) and small airgun arrays to retrieve structural information for the sediments. Improving towing methods for MCS gear in the pack ice will improve the data, which will enable follow-on scientific drilling legs.

Bringing together the cadre of geophysicists who have dedicated much of their careers to exploration of the Arctic Ocean will facilitate coordination for best use of sparse site survey resources (eg. ship time), discuss improvements to towing techniques and coordinate preparation for future drilling.

Arctic Drilling Objectives

While over 1,000 sediment cores have been raised from the deep basin, only a few cores are longer than 10 m (Kristoffersen and Mikkelsen, 2004). As a result, only a few carefully sited cores on the flanks of Northwind Ridge (Grantz et al., 1998) and Lomonosov Ridge and four short cores from the Alpha-Mendeleev Ridge, sample the pre-Quaternary (late Neogene) time interval. To solve some of the scientific problems outlined above will require continuous cored records that span the history of the Amerasian Basin and reveal the post-Mesozoic climatic evolution. The only means to achieve this is dedicated scientific drilling legs to the Arctic Ocean.

More drilling is essential to recover a complete record for the Arctic Ocean through the Cenozoic, to extend the coverage back in time to the initial birth of the deep polar basin, and to sample spatial differences imposed by evolving paleo-geography and latitudinal gradients. Retrieving continuous records of the Cenozoic and Mesozoic stratigraphy of the Arctic will require sediment cores recovered from several hundred meters below seafloor.

Two types of drilling targets can be identified;

- **Condensed sections on isolated basin highs.**

On the Lomonosov Ridge, Chukchi Plateau and Alpha-Mendeleev Ridges, the basinal highs are isolated from both turbidite sediments, which flood across the deep basin from the continental slopes, and from suspended sediments, due to their distance from major rivers discharging into the Arctic. Low sedimentation rates mean that long time records can be extracted from relatively short cores, which reduces time on site and may make it possible to drill into older sediments.

- **Expanded sections on and near continental shelves.**

Higher sedimentation rates, found near the continental shelves, may be useful for better stratigraphic time resolution. For example, questions remain about the response of northern and southern ice sheet dynamics to Milankovitch forcing (Raymo et al. 2006) and deltaic sites in the Arctic Ocean may be the only locale where paleo-climate records can reveal this dynamic relationship.

Existing Arctic Proposals

Drilling legs have, on occasion approached the entry to the Arctic Ocean (eg. Leg 151), but to date there has been only one Arctic drilling leg. On the Pacific side, the last time a hole was drilled north of the Aleutian Islands (barely) was during DSDP Leg 13 in 1973. Now there is a leg scheduled to sample the deep Bering Sea in Summer 2008 (477-Full 4). Two other proposals advocate drilling further north to study the history of connection between the Arctic, Atlantic (645-Full) and Pacific Oceans (680-Pre).

There are also two active proposals in the IODP system to sample the Arctic Ocean itself. Not surprisingly, given how little is known about this region, these legs focus on drilling isolated highs to collect continuous pelagic records rather than expanded sections for high-resolution studies.

652-Pre The Mz-Cz Arctic: Transition from a Greenhouse to a colder Earth

Proponents Wilfried Jokat, Ruediger Stein, Yngve Kristoffersen, Bernard Coakley, John Hall, Ruth Jackson, Hugh Jenkyns, Victor Poselov, Morten Smelror; Proposes drilling on Alpha Ridge.

708-Pre A Paleoceanographic Transect across the Central Arctic Ocean: Towards a Continuous Cenozoic Record from a Greenhouse to an Icehouse World (ACEX-2)

Proponents R. Stein, W. Jokat, B. Coakley, M. Jakobsson, J. Matthiessen, K. Moran, M. O ´Regan and K. St. John; Proposes a return to Lomonosov Ridge to recover a more complete section than was recovered during ACEX (leg 302).

In addition, multi-channel seismic reflection data collected on a recent cruise on the US Coast Guard icebreaker Healy during its transit across the Chukchi Borderland and the Mendeleev Ridge will make it possible to submit a pre-proposal for drilling on each of these features (Coakley et al., 2007).

Coordination of site survey data acquisition for these projects and the logistical advantages of planning a series of legs would facilitate the timely and potentially less expensive development of these critical drilling programs. This meeting would, by substantially reducing the “activation energy” necessary for Arctic Ocean drilling, also encourage other proposals that would focus on higher resolution records from the shelves and other parts of the Arctic.

Meeting Logistics

The meeting objective will be to engage the scientific community in total, particularly junior scientists, to prepare for Arctic Ocean scientific drilling. To achieve this objective, it will be necessary to get wide participation from marine geologists, geophysicists and paleo climate specialists already working in the basin. To build the future, it will also be necessary to recruit a group of young scientists who are willing to work out the difficult logistics to get access to the outstanding scientific problems in the Arctic Ocean.

Jörn Thiede, the director of the AWI in Bremerhaven, Germany, has generously offered to host this meeting at his institution. This would facilitate full participation of the German, Norwegian, Swedish and, hopefully, Russian science communities. On this basis, it will probably be less expensive to take the Americans and Canadians to Europe than vice versa. The bulk of funds requested in this proposal, augmented by Nansen Arctic Drilling funds, funds from the Arctic Ocean Sciences Boards and, perhaps, NSF funds from Arctic Natural Sciences and the Margins Program, will be spent on travel and participant support. If fully funded, I would anticipate being able to support approximately 25 participants, depending on airfares at the time of the meeting. Receiving additional NSF funds would make it possible to support additional participants.

Given the likely dates for a funding decision, lead time to plan a meeting and allowing for sufficient time to solicit and evaluate applications for participation, the meeting could be held in Spring 2008. Slipping later could be possible, but would begin to conflict with the limited arctic field season.

Independently of this effort, the IODP UK Industrial Liaison group was planning to hold a similar workshop in Durham. We have agreed to work together to develop a single meeting (see letter of support in Appendix A). Nick Kusznir, who was leading the UK effort, has been added to our list of convenors in acknowledgement of our collaboration.

A three day meeting, beginning with a few keynotes (half day) to review the history of the basin, the existing site survey data base, the logistical requirements for drilling, the ice environment across the basin and the potential for scientific drilling will serve to establish the limits and the excitement of the possibilities. After the speaking is done, alternating break-out groups and plenary sessions will serve to develop the ideas for future drilling and facilitate exchange in day 2. The final day would be dedicated to discussion of how best to proceed as a group.

Advertising Plan

While the many of the individuals listed as proposed sponsored participants are important to the future of Arctic Ocean scientific drilling, some may not to be able to participate in the drilling workshop. This is also a small community. The future productivity of Arctic drilling will be, in part, based on recruiting new and, particularly, young scientists to the effort. The meeting will be open to applicants solicited through announcements circulated through the community by various means.

Funds are requested in the budget for a one eighth page advertisement in EOS to be run for three consecutive weeks. The workshop would also be announced through the Arctic Ocean research community using the ArcticInfo listserv run by ARCUS (www.arcus.org). We would ask for assistance from USSSP to advertise the opportunity to participate in the workshop using their listserve, html newsletter, and through the advisory structure.

Summary

Exploring the Arctic by drill bit could be, in some sense, the culmination of ocean drilling, providing answers to questions developed over the years of DSDP, ODP and now IODP. A wide variety of objectives laid out in the IODP science plan could be addressed in the course of an arctic drilling program, a number of them must be addressed in the high northern latitudes.

Arctic operations are difficult and have a significant risk of failure. In addition to defining a coherent conceptual framework for Arctic Ocean drilling, this workshop will also assist in the complex process of developing, planning and executing what would be a series of mission-specific programs. Bringing the community together to plan collectively would be a means to prevent each and every Arctic drilling leg from being a “one-off” subject to the uncertainties and technical problems that held up the ACEX program for three years and inflicted serious technical problems while they were on site.

Initial List of Proposed Participants

This list intended to be indicative, not comprehensive. These are research scientist with established reputations for work in the Arctic Ocean and a demonstrated commitment to the future of scientific drilling there. Many of these individuals would likely attend this workshop, but it is not possible to predict how many. It is also not possible to predict who, among the young scientists (students, post-docs and early career faculty) or from the drilling community at large (some of whom are listed below) will apply. Engaging the enthusiasm of new recruits to the Arctic would be one of the best outcomes from this workshop.

Individuals are listed only once, despite qualifying under multiple categories (eg. Martin Jakobsson could be listed under all four).

Site Survey Specialists

Bernard Coakley*	University of Alaska (PI; NAD Chair)
Margo Edwards*	University of Hawai'i
Art Grantz*	USGS (retired)
John Hall	Geologic Survey of Israel (retired)
John Hopper*	TAMU
Ruth Jackson	Geologic Survey of Canada
Wilfried Jokat	AWI
Yngve Kristoffersen	University of Bergen
Nick Kuzsnir	University of Liverpool
Larry Mayer*	University of New Hampshire
Naja Mikkelsen	GEUS (co-convener)

Leg 302 Participants

Jan Backman	Stockholm University
Martin Jakobsson	Stockholm University
Ted Moore*	University of Michigan
Kate Moran*	URI (co-convener)
Matt O'Regan	Cardiff University
Kozo Takahashi	Kyushu University

Stratigraphers

Julie Brigham-Grette*	University of Massachusetts
Dave Clark*	University of Wisconsin (retired)
Dennis Darby*	Old Dominion University
Hugh Jenkyns	Oxford University
Lloyd Keigwin*	WHOI
Larry Phillips*	USGS (retired)
Leonid Polyak*	Ohio State
Rüdiger Stein	AWI (co-convener)
Jörn Thiede	AWI

Proponents on active IODP Proposals

Sarah Fowell*	University of Alaska (680-Pre)
Christina Ravelo*	UC Santa Cruz (477-Full 4)
David Scholl*	USGS (retired; 477-Full 4 and 680-Pre)

* candidates for USSSP Support

Budget Justification

Total funds are requested to cover participant support for 25 sponsored participants in Bremerhaven. Additional funds are requested for advertising, incidentals for the meeting and publication costs.

The PI recognizes that USSSP funding must be used, except in unusual circumstances, to support the participation of US Scientists. An asterisk indicates potential USSSP-supported participants. Among the potential participants listed above are a number of international scientists who work at AWI Bremerhaven or who would have other sources of support or who could be supported with the non-JOI funds. If this grant is funded we will also look for additional support from NSF and other sources to make sure the meeting will be as fully inclusive and representative as possible. Ensuring good Japanese and Russian participation is a particular concern.

JOI funds will be used to support participation by US scientists and to pay the items listed in the budget under "Other Direct Costs". These are advertising, publications, communication and incidentals for the meeting.

The Nansen Arctic Drilling (NAD) project funds held at JOI ($11,000) will be spent to support the participation of non-US scientists. NAD is a largely inactive organization, which received regular, annual contributions from international partners in the years leading up to Leg 302. This arctic program would replace NAD, so it is appropriate to expend the residual NAD money to support Arctic Ocean drilling. In addition, the Arctic Ocean Sciences Board (AOSB) is willing to contribute $6,000 per year to this effort for three years. Funds in the first year would be dedicated to supporting junior scientists participants. In the 2nd and 3rd year these funds would be available to support coordination of cruise planning activities.

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From: "Richard J Davies" <richard.davies@durham.ac.uk>
Date: July 13, 2007 12:59:15 PM GMT+02:00
To: <cmeth@joiscience.org>
Cc: "'Bernard Coakley'" <Bernard.Coakley@gi.alaska.edu>, <cfr@nerc.ac.uk>
Subject: **joint IODP workshop**

Dear Charna,

I am chair of the IODP UK Industrial Liaison Panel. The panel's remit is to involve industry in IODP at various different levels. The panel has 20 members who represent major and smaller international companies, many from the oil and gas sector. There has been considerable interest in scientific drilling in the Arctic and we were in the early stages of organising an Arctic workshop in the UK in order to initiate drilling proposals. On finding out of Bernard's initiative for a meeting at Bremerhaven it seemed sensible to join forces.

Therefore this email is to confirm that we fully support the Bremerhaven meeting. We expect to get some funding for travel costs from oil companies that are interested in Arctic geoscience.

I hope this joint venture can proceed, as the Arctic represents an area which we know precious little about from a geoscience perspective. A workshop on this would be very timely. Please let me know where we can contribute, or if there is additional information you require.

Best Wishes,

Richard

Professor Richard J. Davies
Director of CeREES (Centre for Research into Earth Energy Systems)
Department of Earth Sciences
Durham University Science Labs,
Durham, DH1 3LE
UK
Tel 00 44 (0) 191 334 2346
Email Richard.Davies@Durham.ac.uk

SINGLE HIGH IMPACT VALUE WELLS

IIS-PPG

PAU

January 2008

DSDP- IPOD-IODP 1968-2008

What was done and why

What was missed and why

The importance of single high value /impact wells

What was done and why

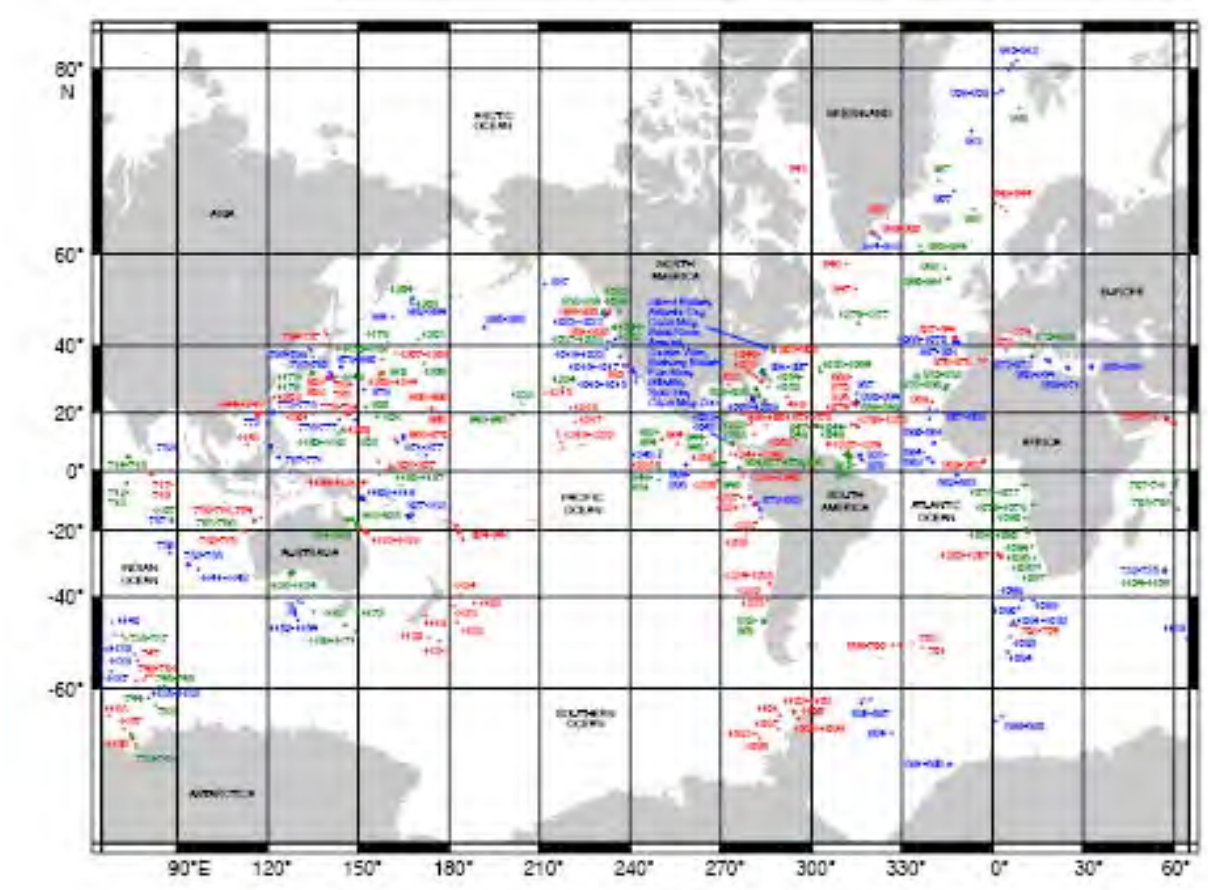
Evolution through:

- Testing- DSDP
- Thematic- IPOD
- Focus- IODP

What was missed and why?

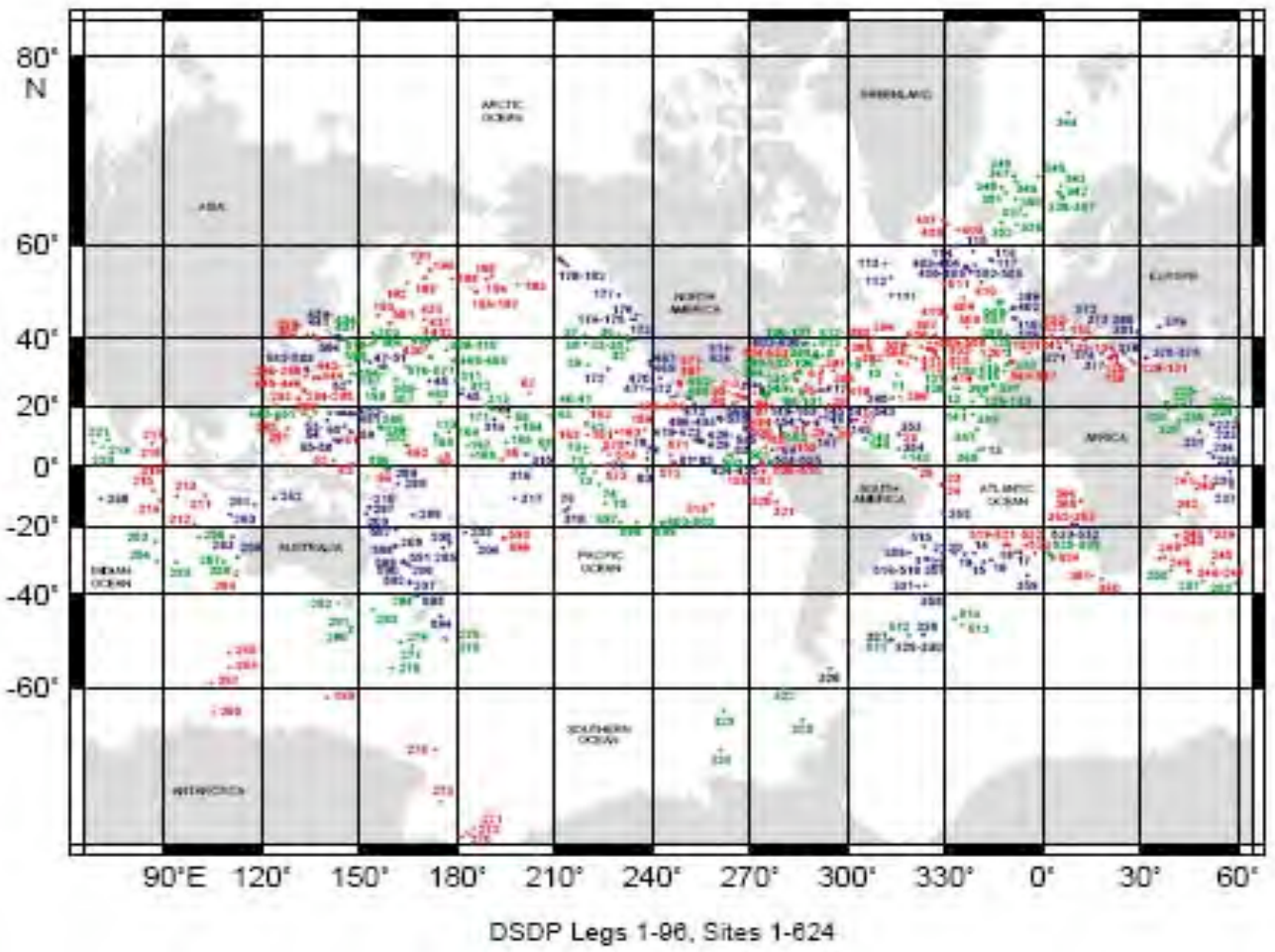
- Key ocean basins not drilled because of technical limitations of GC and JR
- Thematic and subsequent high priority focussed programmes diverted attention despite improvements in technology
- Drill site selection based on limited academic seismic coverage and capability
- Priorities mainly focussed toward paleoenvironment, fluid flow and ocean crust processes

ODP sites 1983-2003



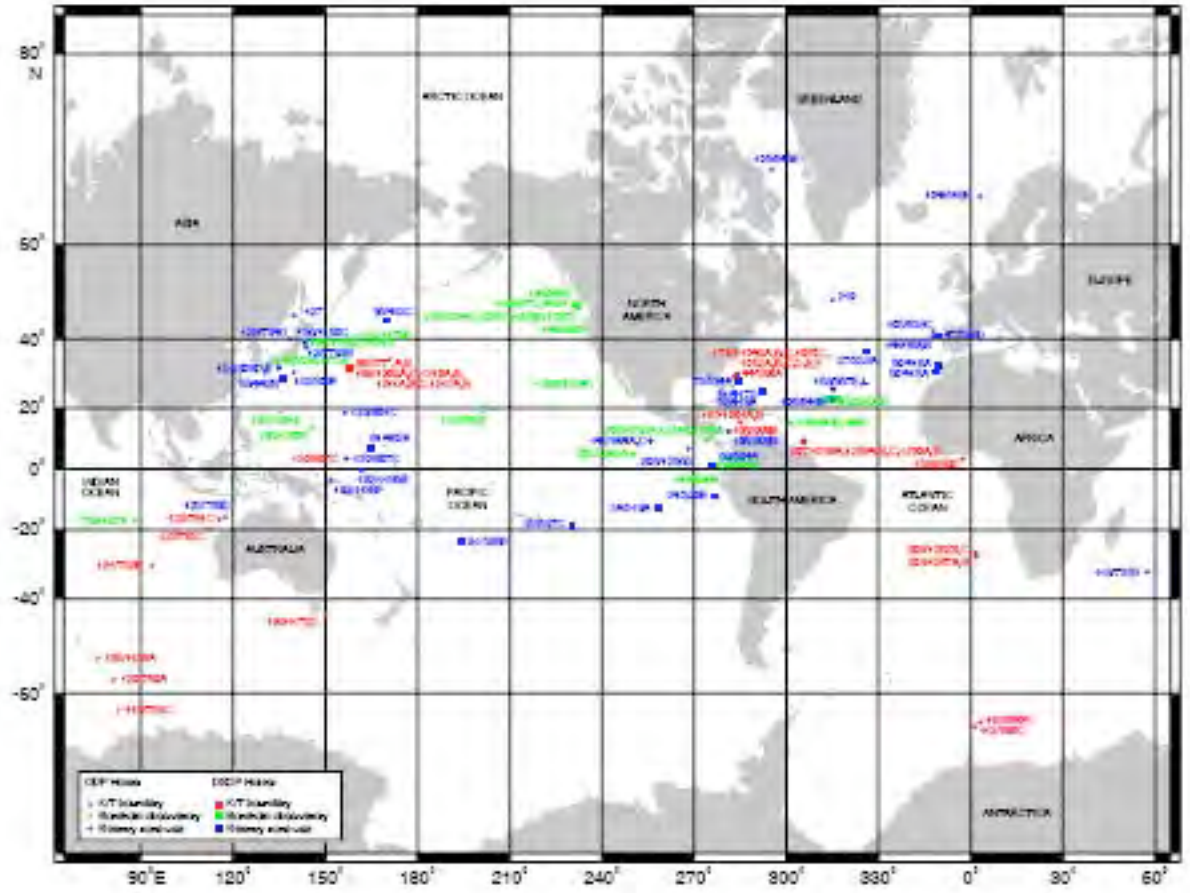
Ocean Drilling Program (1985–2003): Legs 100–210, Sites 625–1277

DSDP: Legs 1-62 Sites1-624

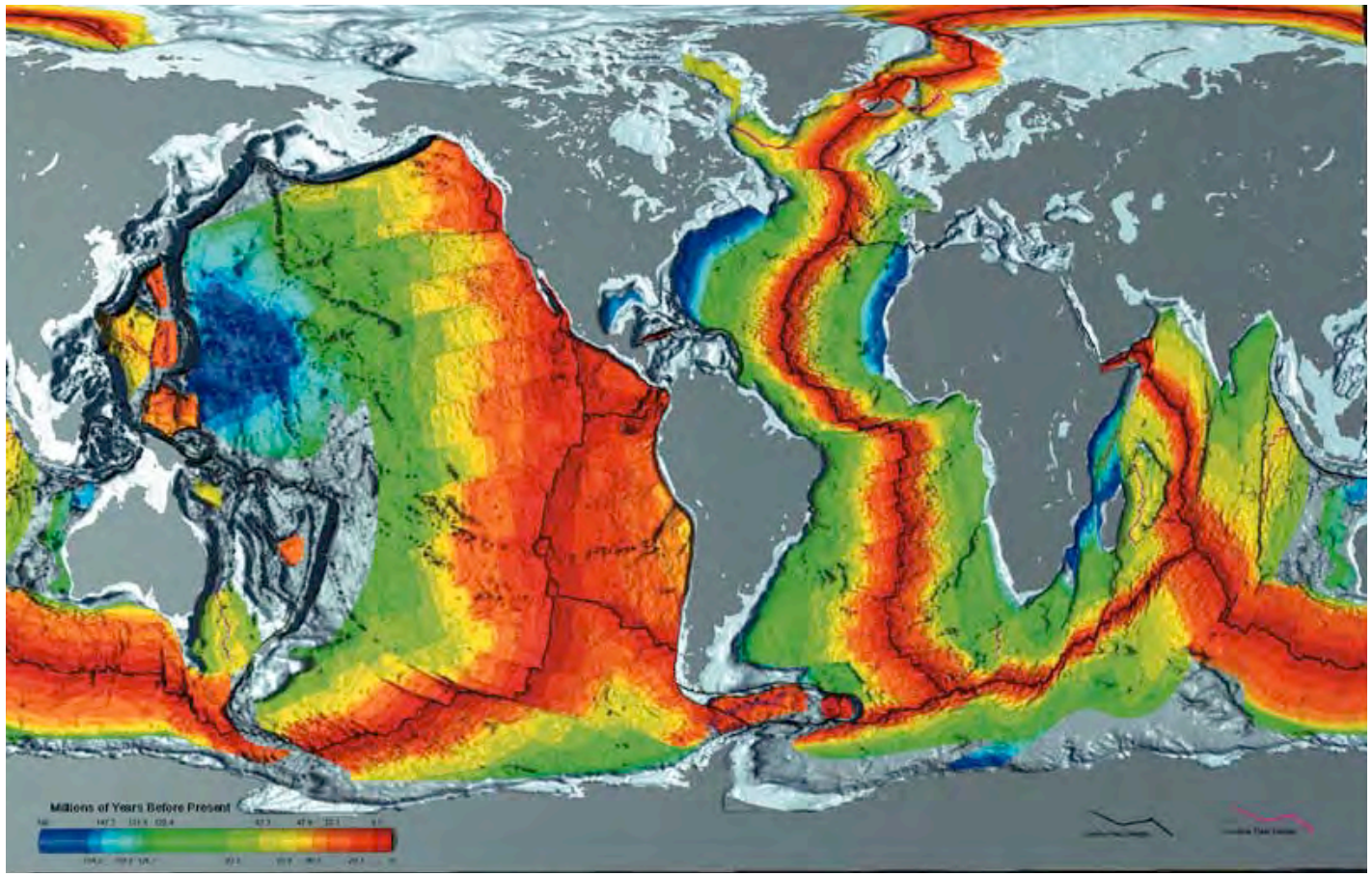


DSDP Legs 1-96, Sites 1-624

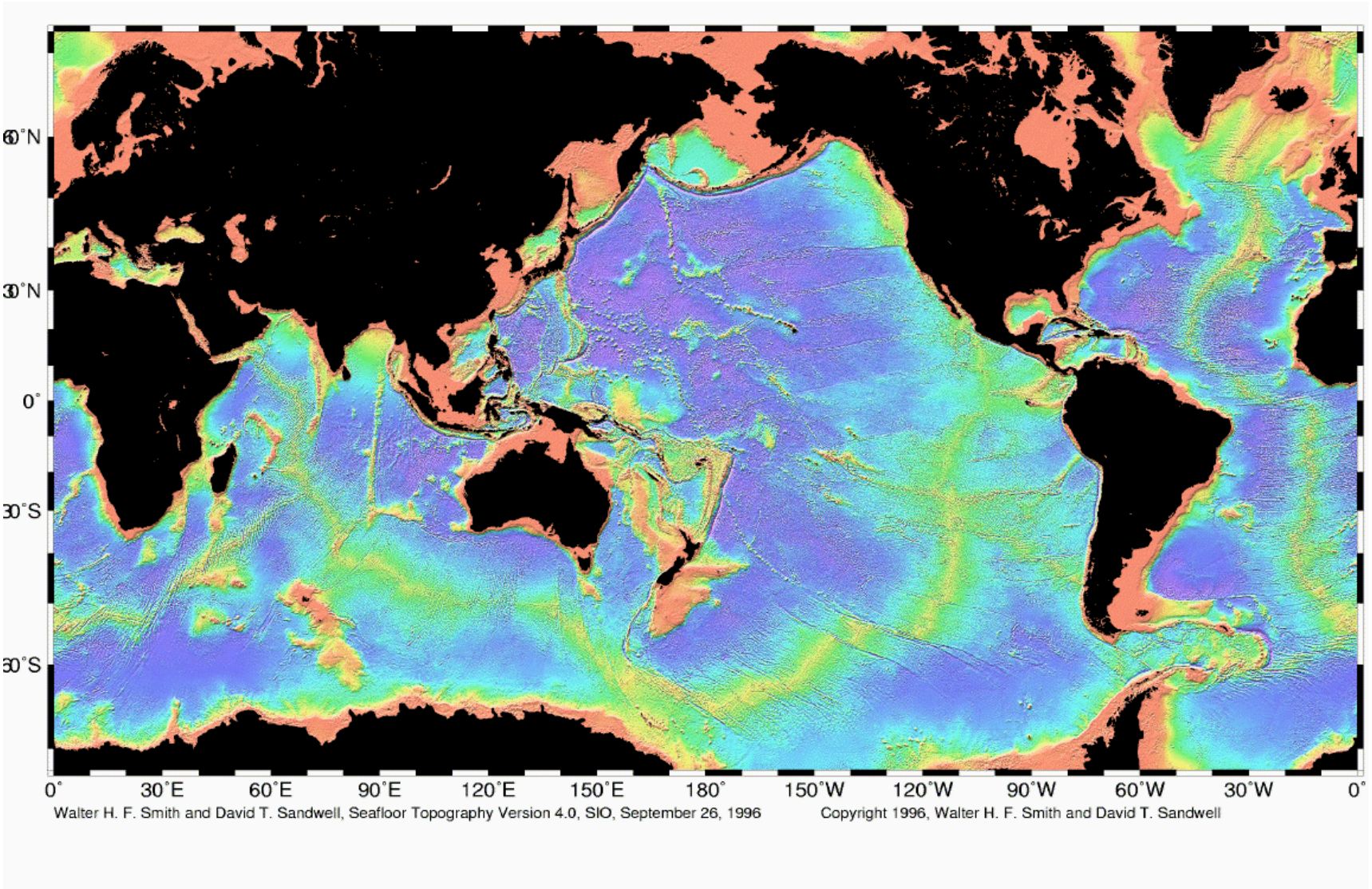
ODP sites: 2003-2007



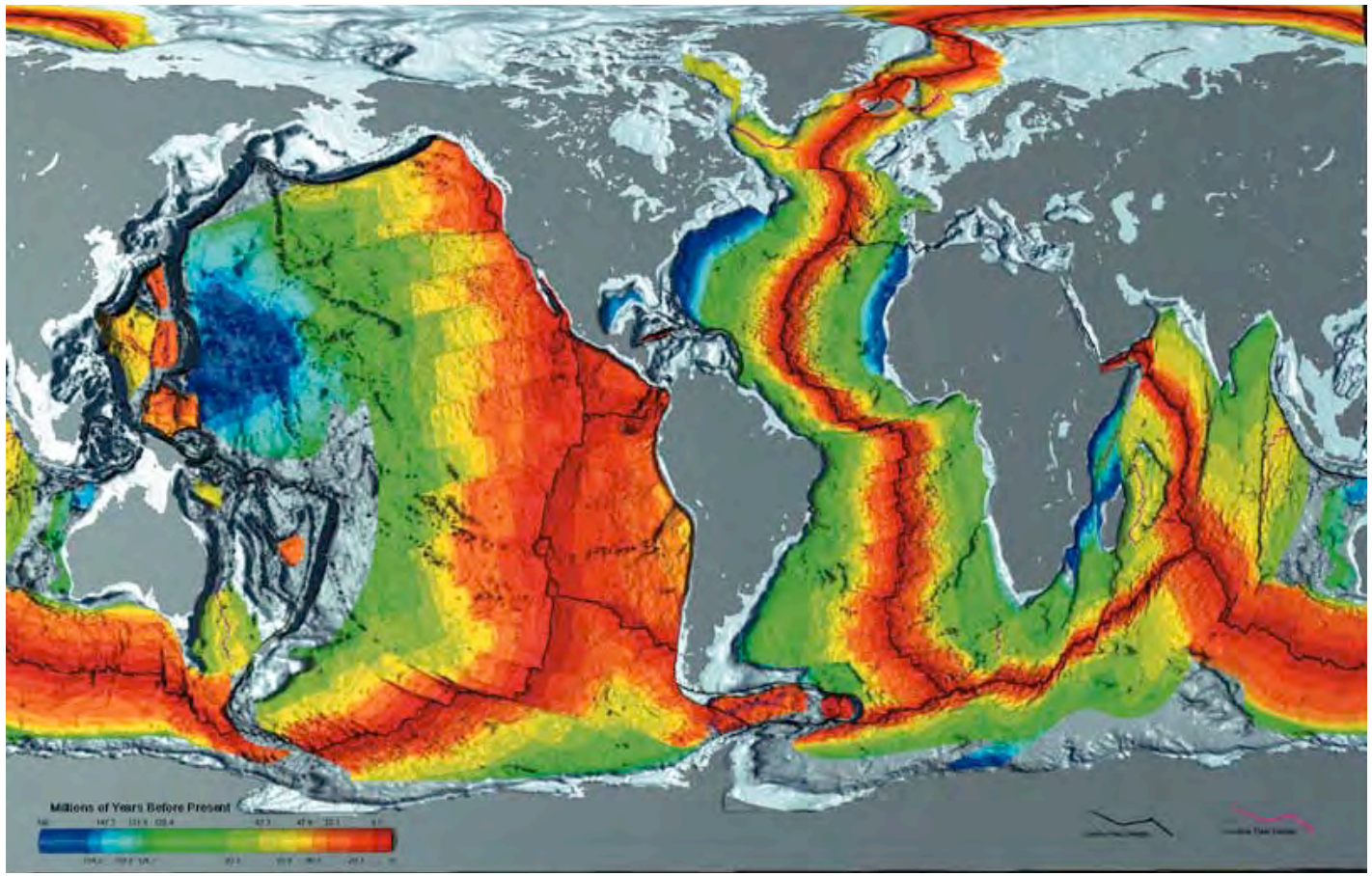
Age Ocean basins



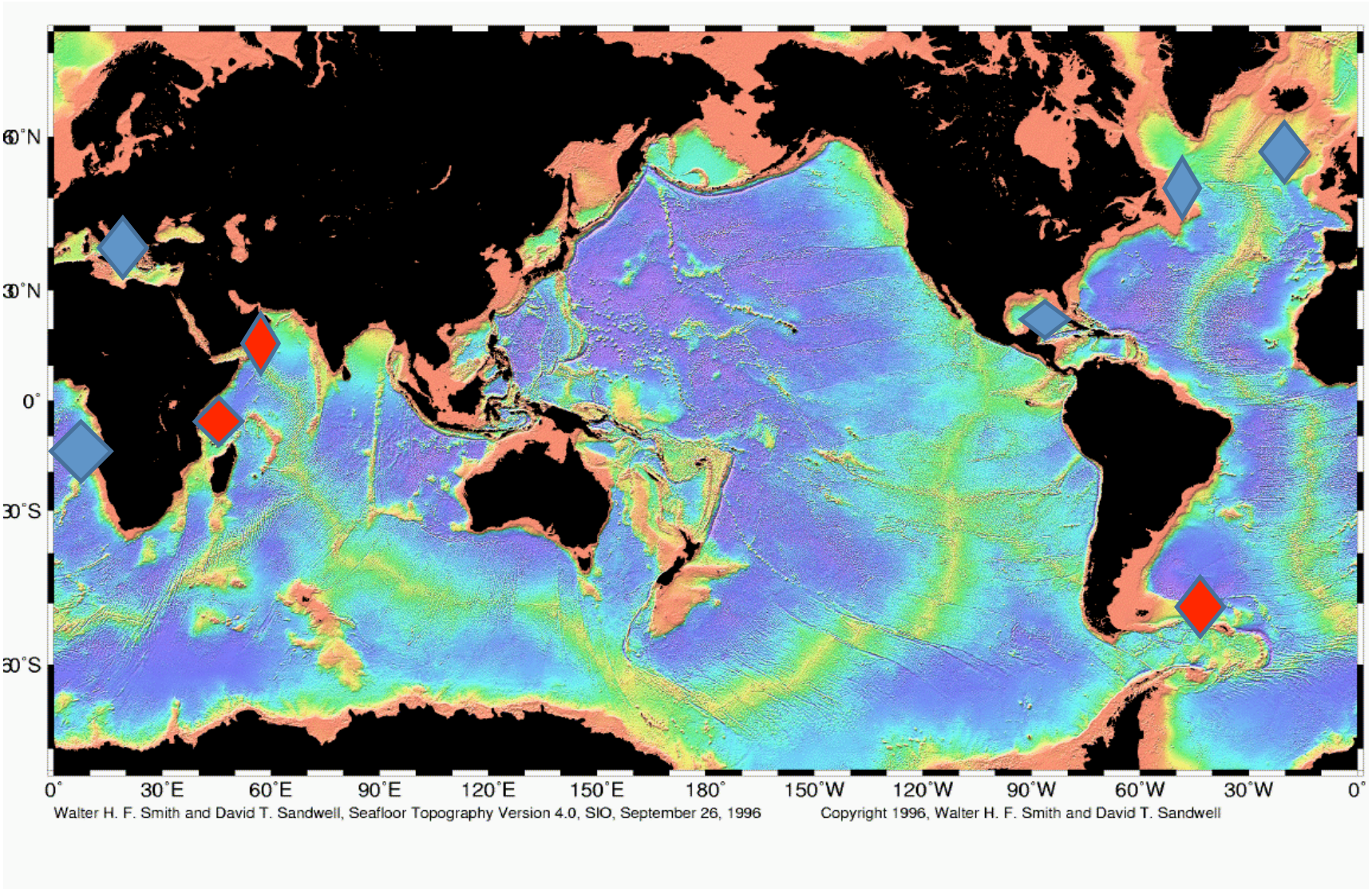
Global sea floor topography



Age Ocean basins



Global sea floor topography



NW Indian Ocean

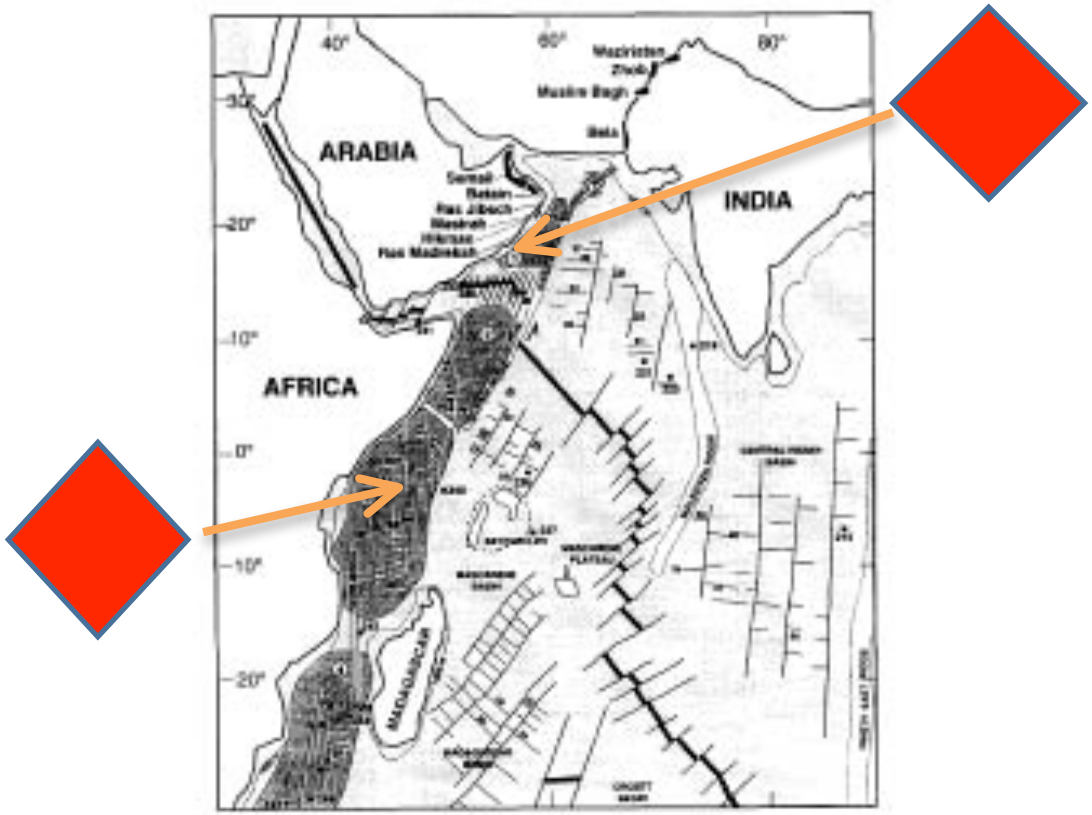


Fig. 1. Geologic setting of the Western Indian Ocean, the Eastern Ophiolite Belt of Oman and the Western Ophiolite Belt of Pakistan. The marginal basins of East Africa and Southeast Arabia are shaded dark: Owen Basin (1), North Somali Basin (2), West Somali Basin (3), Mozambique Basin (4). Numbers 117–249 indicate DSDP and ODP sites. M22–M0 are magnetic anomalies between 152 and 118 Ma; 34–21 indicate anomalies between 84 and 50 Ma.

NW Indian Ocean- 1

What is the age of the basin between Oman and the Owen fracture zone?

Problem is linked to the width of the Somali and Mascarene basins:

- Need to account for missing Somali basin and Mascarene basin ocean crust

- Masirah ophiolite is Early Cretaceous in age and younger than the classic Oman ophiolite

- No previous ODP drilling to requires depths in this area

- Relevant to Cretaceous paleoceanography

- Data status: limited amount of industry and seismic data

NW Indian Ocean - 2

What was the depositional setting of the Jurassic and Cretaceous in the Somali Basin?

Previous DSDP wells have not penetrated below the Upper Cretaceous

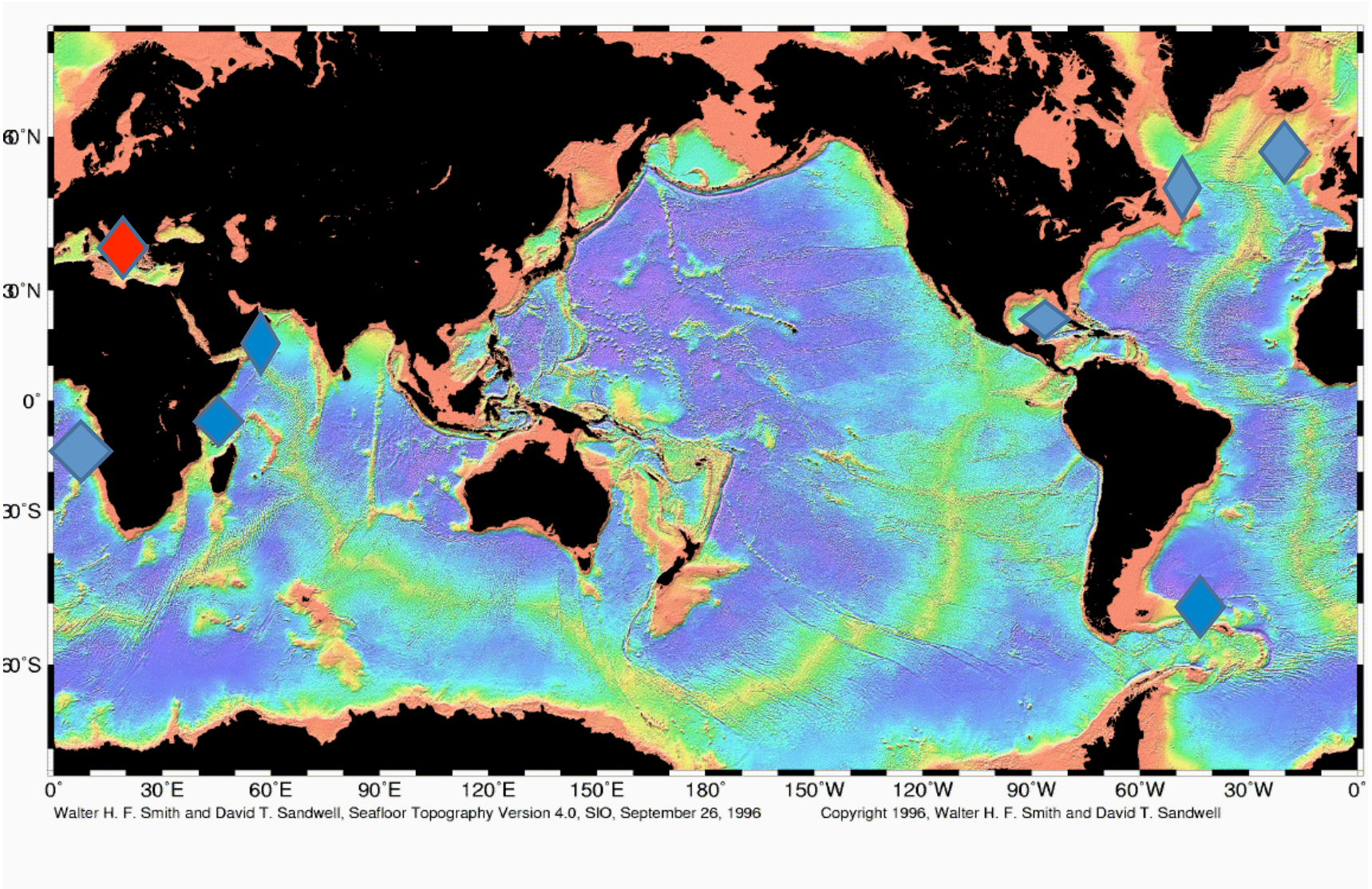
Basin is key to understanding Jurassic and Cretaceous paleoceanography

- Somali basin is the Jurassic gateway between the Tethys and the Antarctic

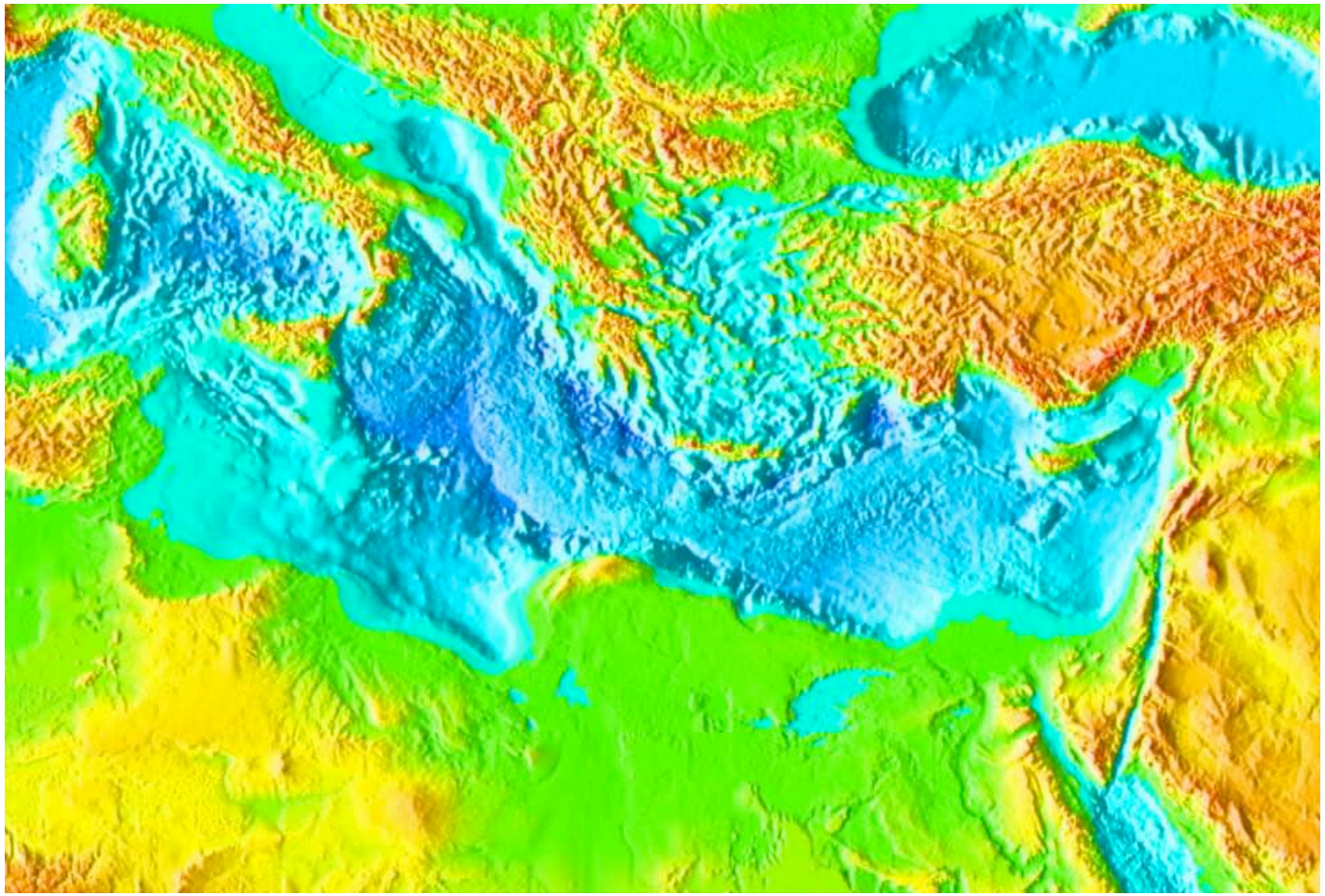
- Source bed presence in the Jurassic and Early Cretaceous is key to future East African margin exploration

- Data status: will likely require regional and site surveys

Global sea floor topography



East Mediterranean tectonics: general setting



East Mediterranean tectonics: Calabrian arc and Ionian sea

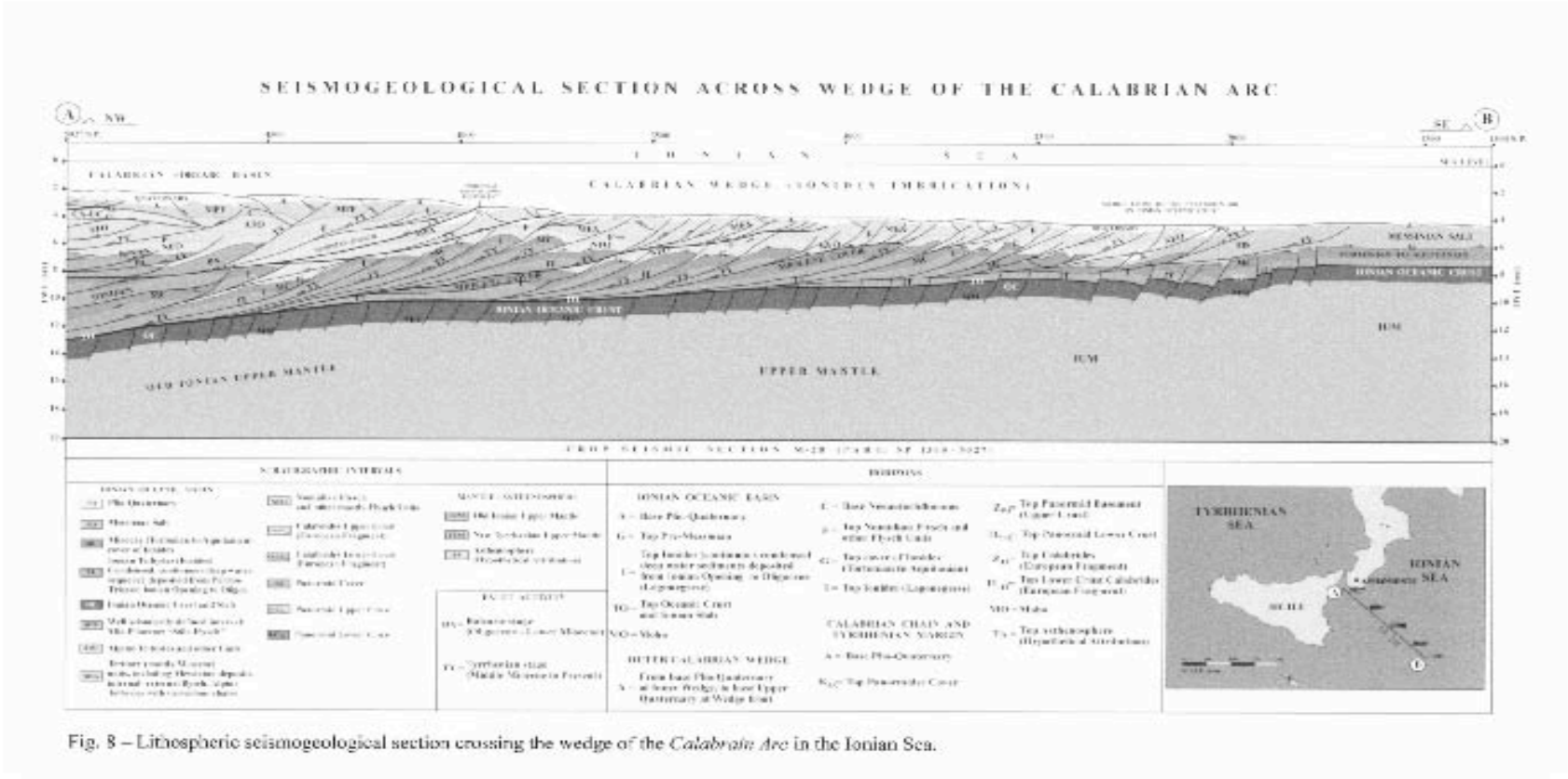


Fig. 8 – Lithospheric seismogeological section crossing the wedge of the *Calabrian Arc* in the Ionian Sea.

Finetti

2004

East Mediterranean – Ionian sea

What is the age of the oceanic crust in The East Mediterranean –Permian ,Triassic or Early Jurassic?

There are no penetrations older than Cretaceous in the east Mediterranean(Eratosthenes seamount and Mango-1 in the Nile delta

Huge scientific relevance to the opening history of the Tethys and subsequent closure.

- Critical Importance to the evolution of the Hellenides and Taurides

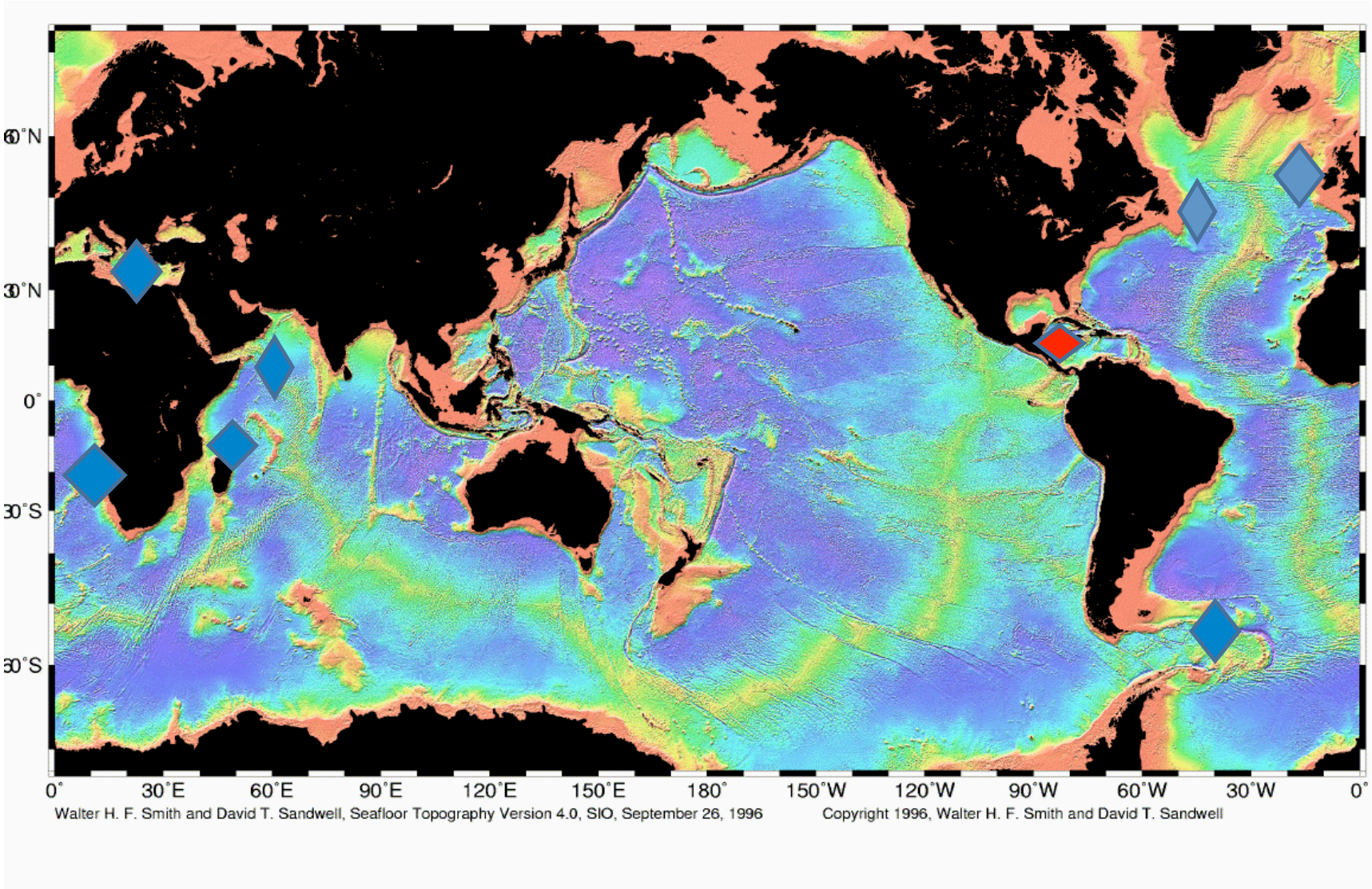
- Age of transition from a passive margin to foreland basin

- Paleoceanography and source bed presence in both passive margin and closed basin settings

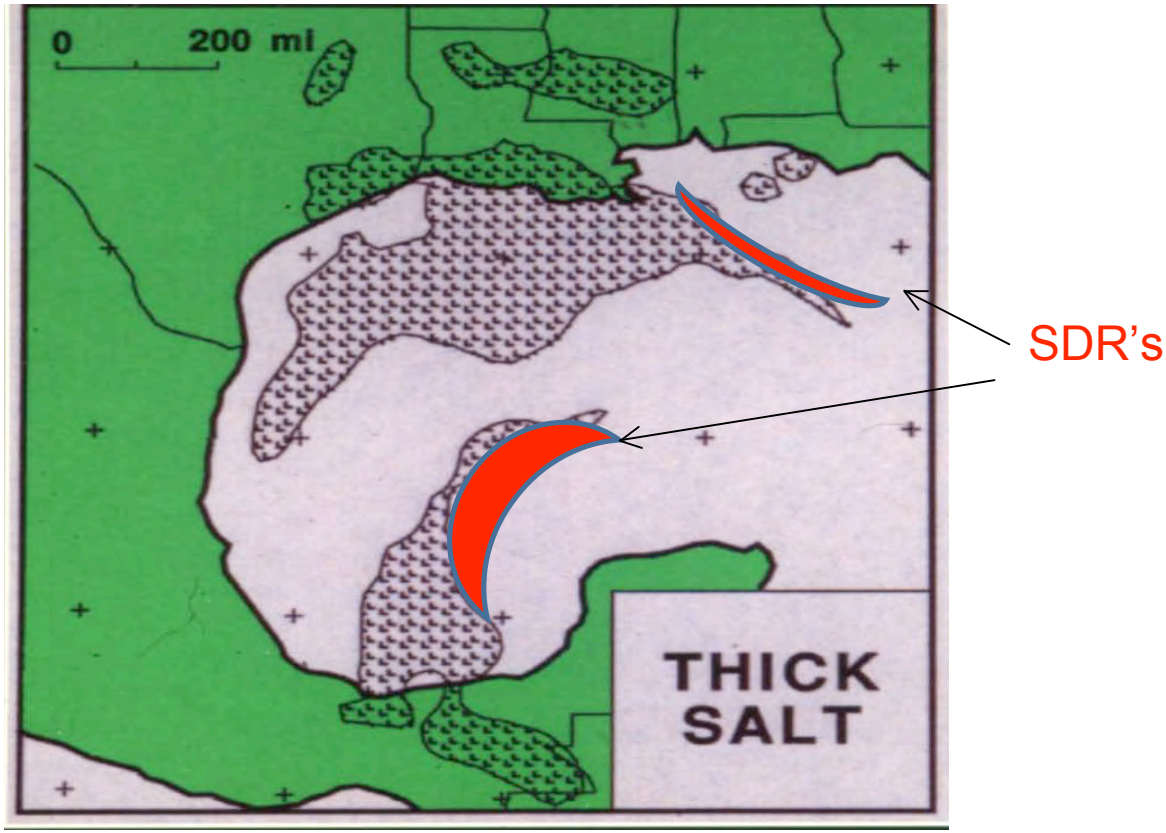
- Very relevant to exploration

- Data status: new CROP seismic lines show thin section beneath salt in the Ionian Basin but additional lines probably necessary

Global sea floor topography



VOLCANIC VS NON VOLCANIC PASSIVE MARGINS; Gulf of Mexico



Gulf of Mexico

Test of the age of onset of spreading
Critical data for Atlantic –Caribbean - Mexican tectonics

SDR's are observed adjacent to the Florida escarpment and off NW Yucatan

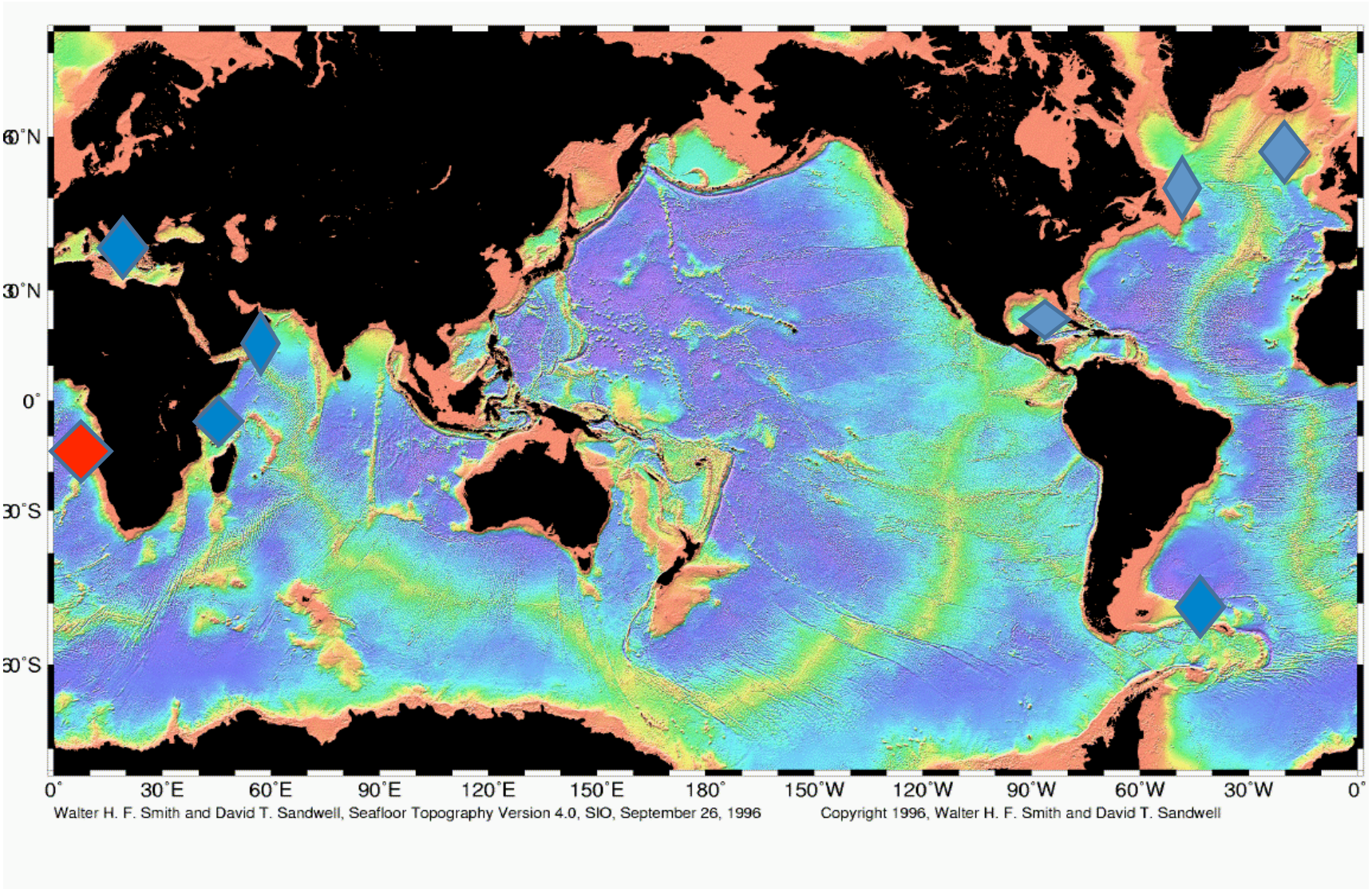
Dating the oldest sediments overlying the SDR's will determine the age of onset of spreading in the GOM

Evolution of depositional environments from subaerial associated with SDR's to pelagic by the Cretaceous has huge importance for reservoirs and source

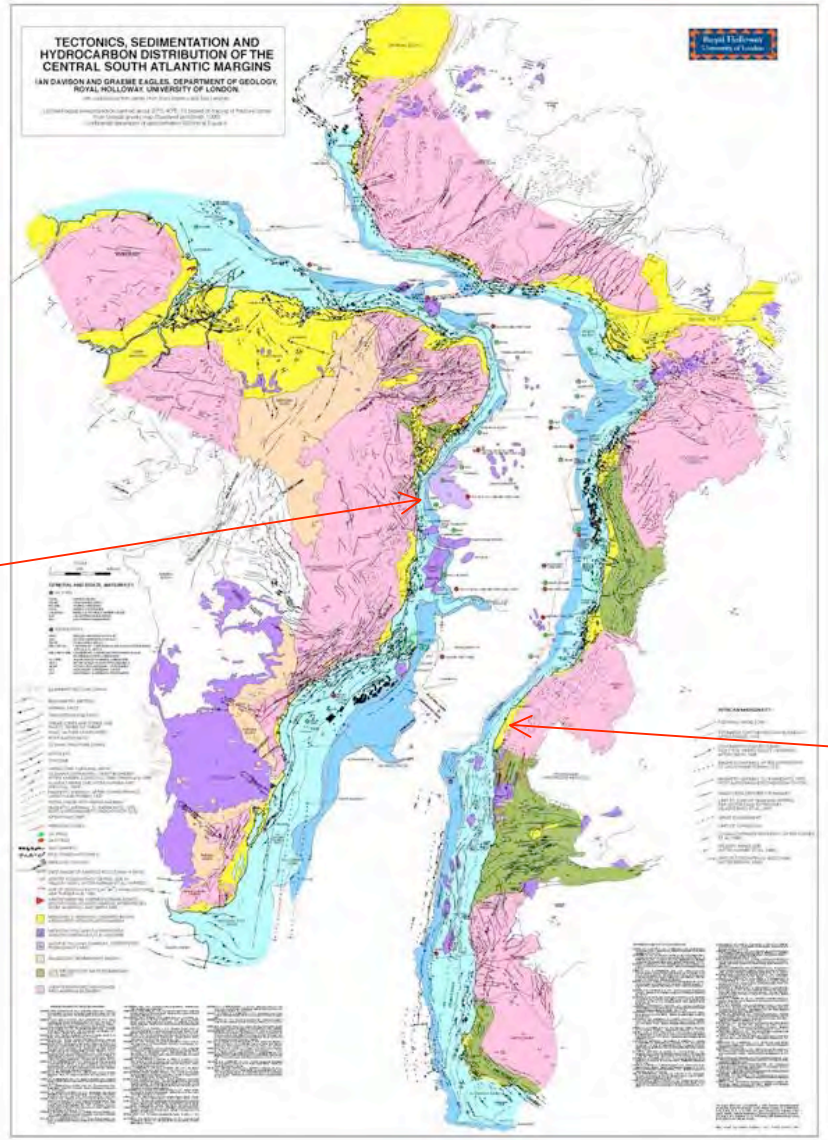
Data status: Pemex seismic lines off NW Yucatan show a thin post salt section possibly drillable by Joides Resolution

Issue: Site selection and permission to drill will need permission and collaboration from Pemex and the Mexcan authorities

Global sea floor topography



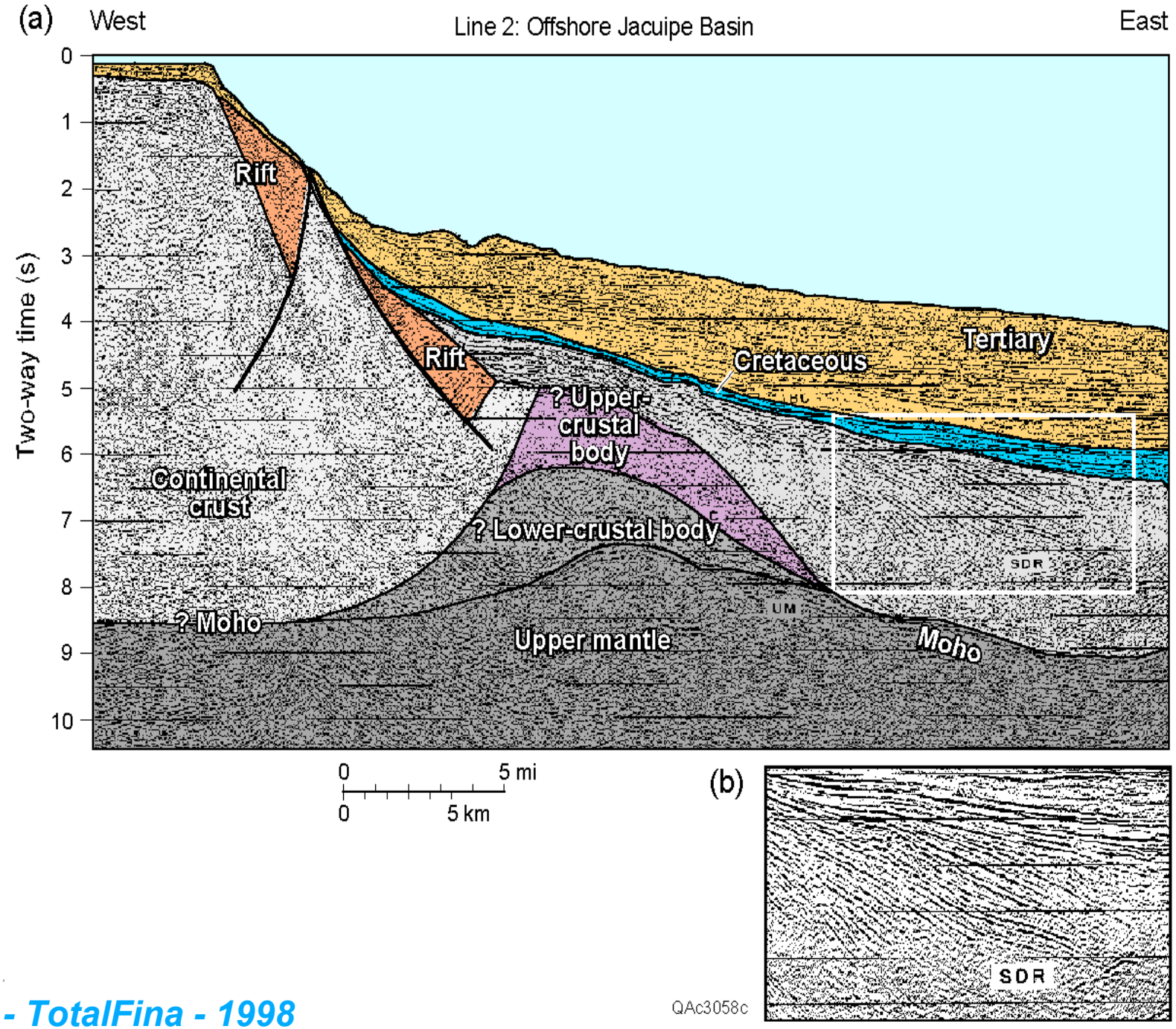
Namibe basin



Jaquipe basin

Namibe Basin

Davison & Eagles 2004


(a)
West
Line 2: Offshore Jacuipe Basin
East
Two-way time (s)
0
1
2
3
4
5
6
7
8
9
10
Rift
Rift
Continental crust
? Upper-crustal body
? Lower-crustal body
Cretaceous
Tertiary
SDR
UM
? Moho
Upper mantle
Moho
0
5 mi
0
5 km
(b)
SDR
QAc3058c

Namibe Basin

Age of spreading of the South Atlantic north of the Walvis Ridge

Transition from the Aptian salt basin to ? subaerial sea floor spreading

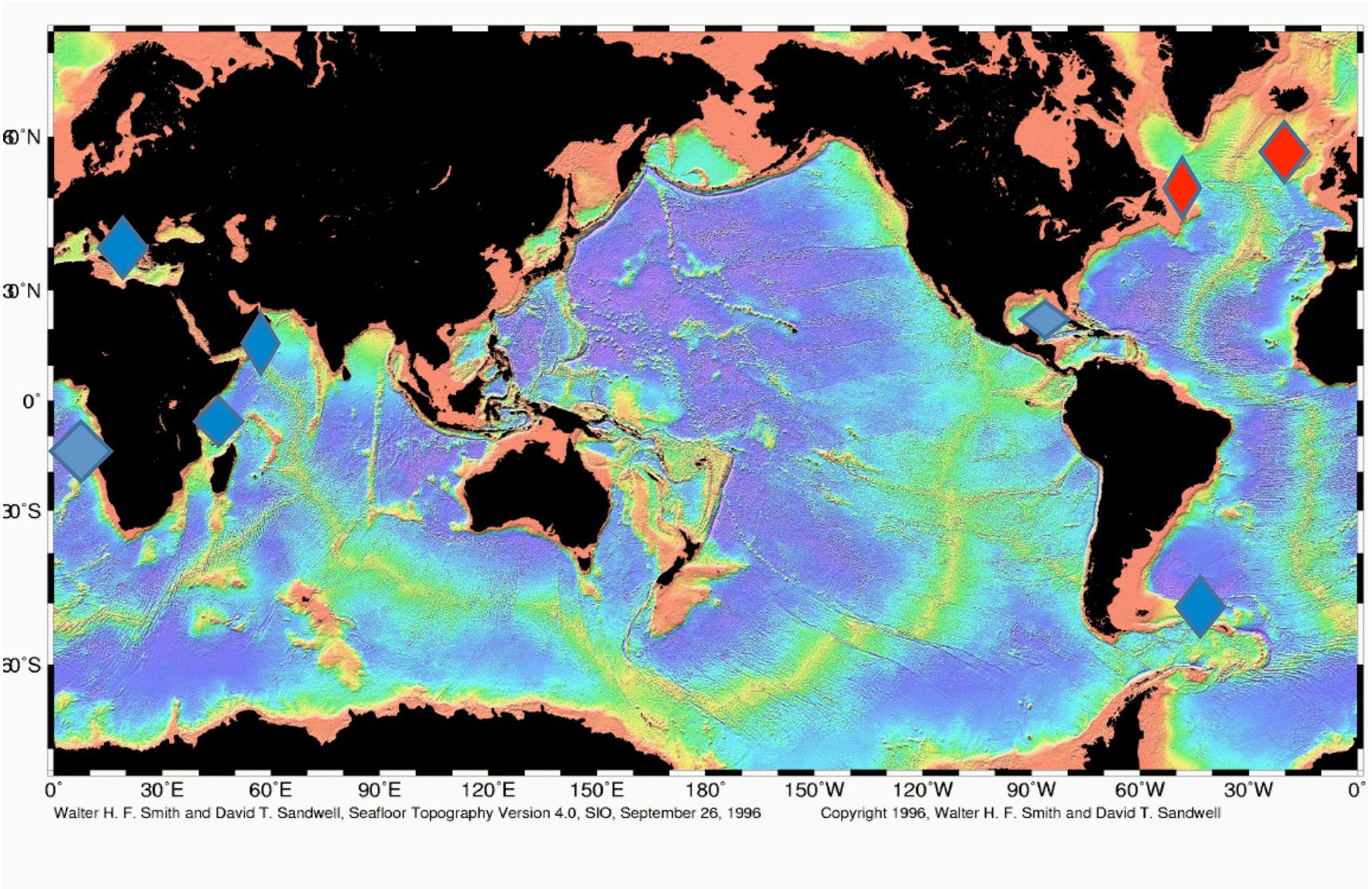
Mid Cretaceous anoxic environments

Exploit present day asymmetry of the S. Atlantic salt basin

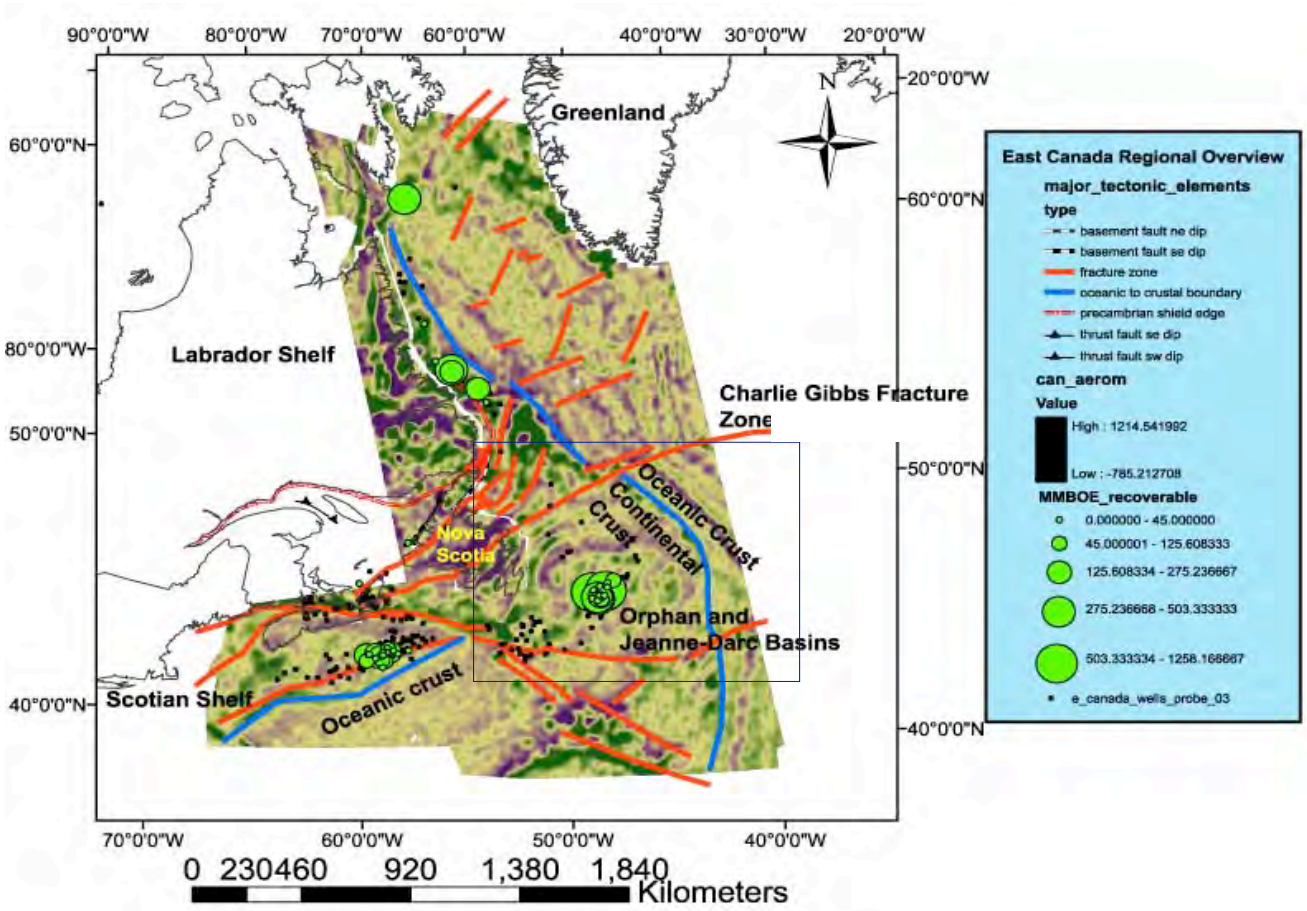
‘’Thin cover in Namibe basins

Data status: Spec and proprietary seismic data

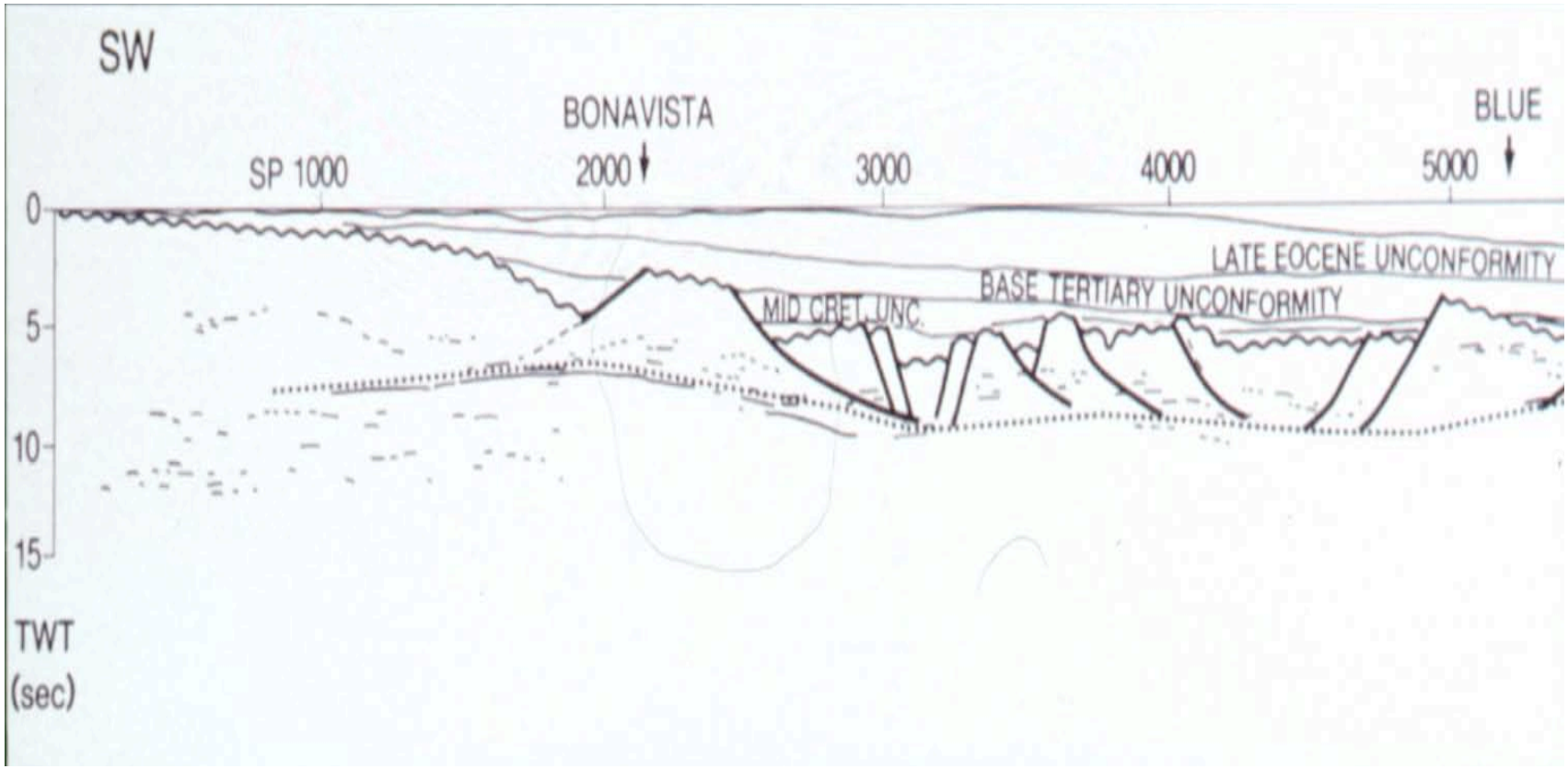
Global sea floor topography



ORPHAN BASIN – Regional tectonics/aeromag

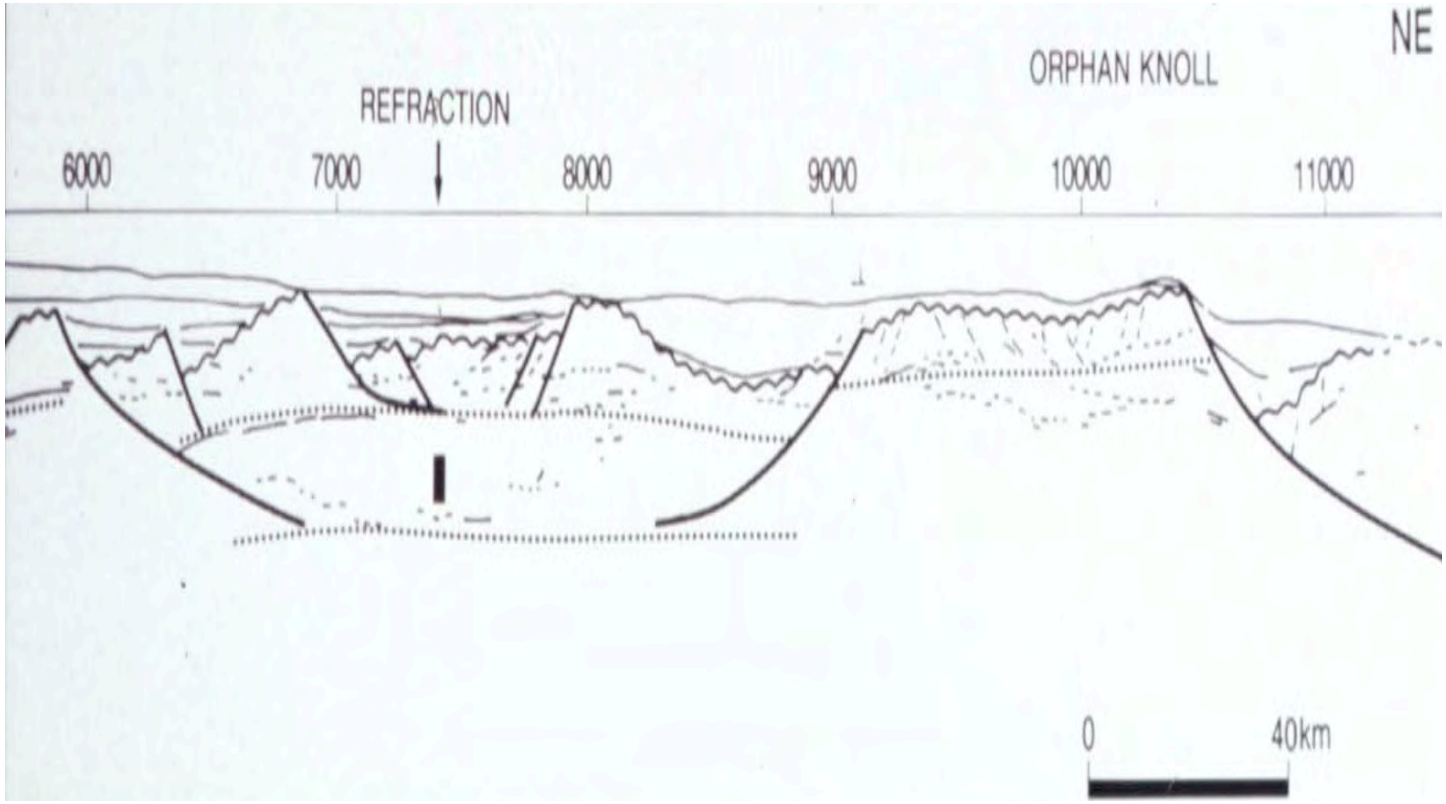


ORPHAN BASIN – deep seismic profile



Tankard et al,1989

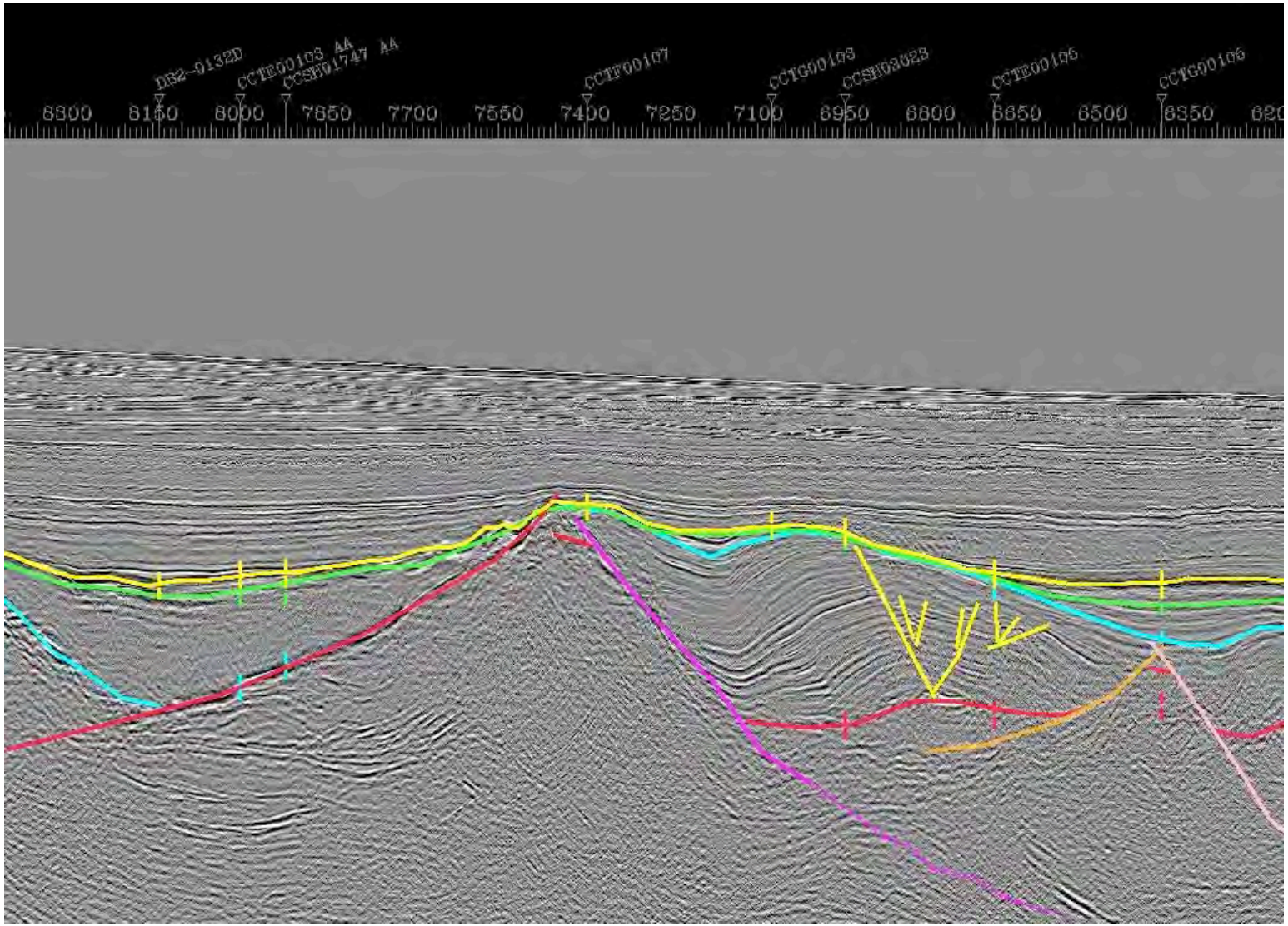
ORPHAN BASIN deep seismic profile



Tankard et al, 1989

ORPHAN BASIN

Rifts 2 and 3



Orphan basin - NE Canada

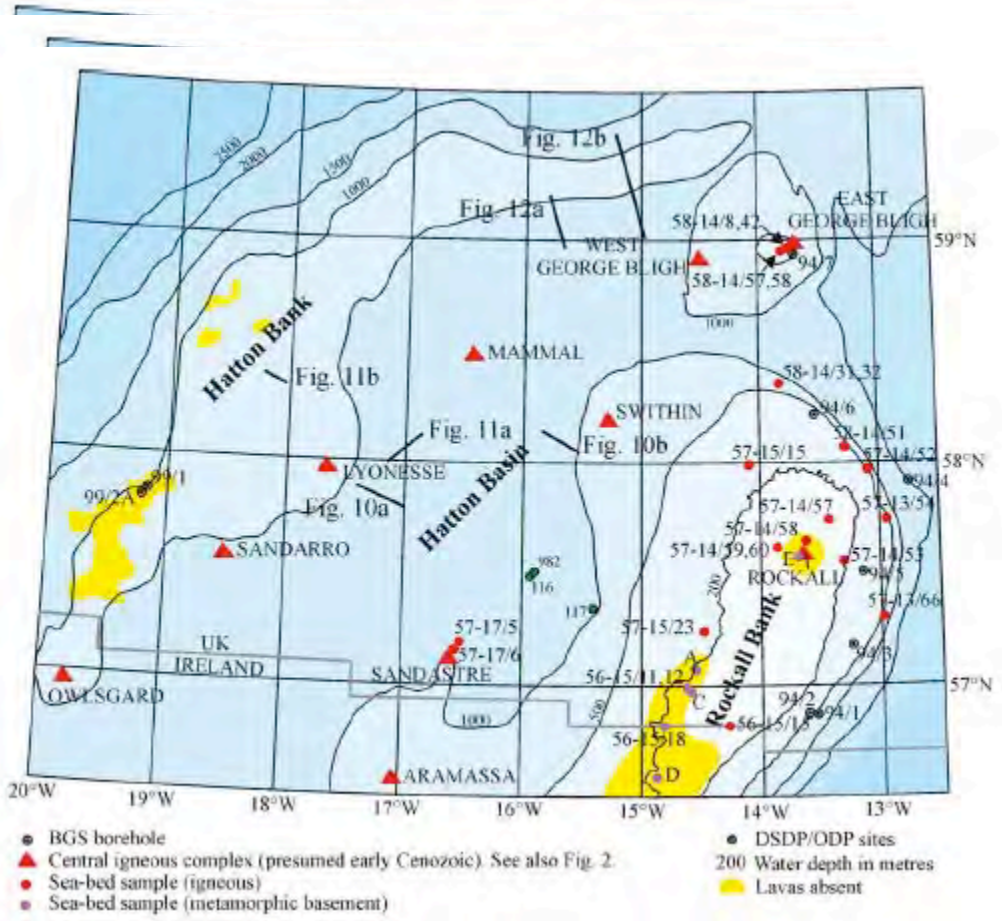
Key to understanding North Atlantic Early Cretaceous rift timing and kinematics:

-Opening of the Rockall Trough and Porcupine Basin, Labrador Sea
-Understand migration of extension directions from NW-SE to NE-SW
-*And also*
-Impact on Jurassic source bed distribution
-Mesozoic paleocirculation
-Existing industry open file wells(e.g. Blue) do not penetrate Early Cretaceous
-Old DSDP well on Orphan knoll
-Recent tight Great Barrasaway well - open file in 3 years ?

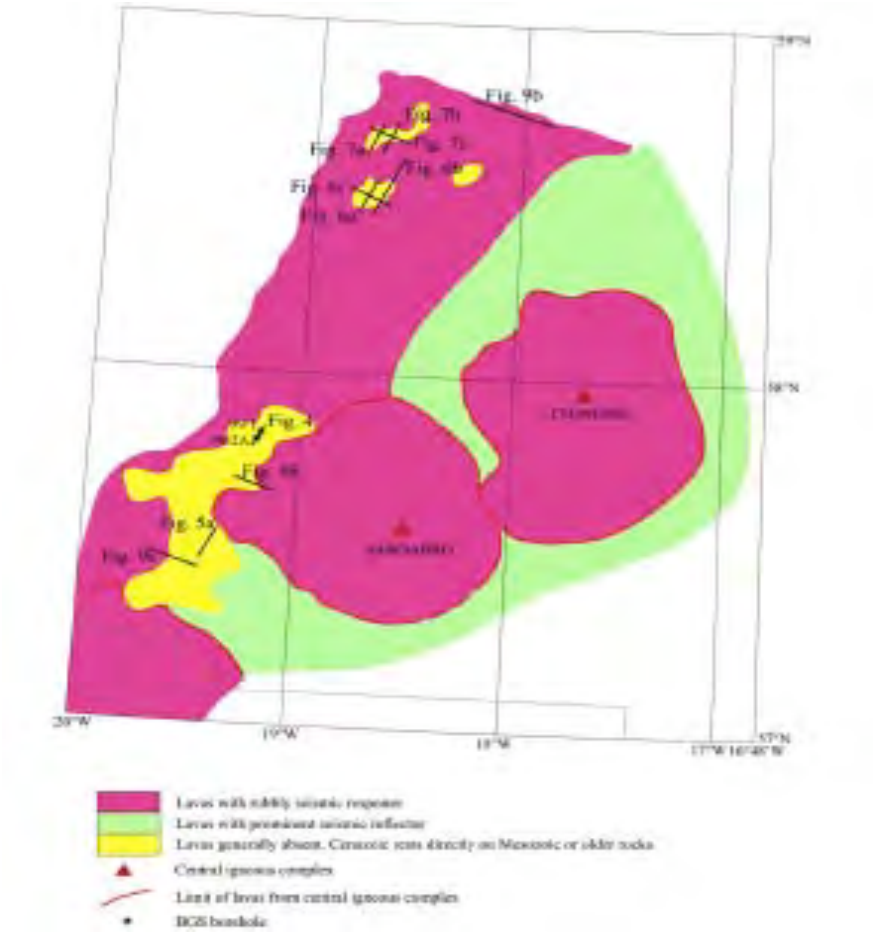
Data status: open file seismic data of old to recent vintage
open file wells

Likely to attract support from Can.Geol.Survey and Newfoundland Petroleum Board

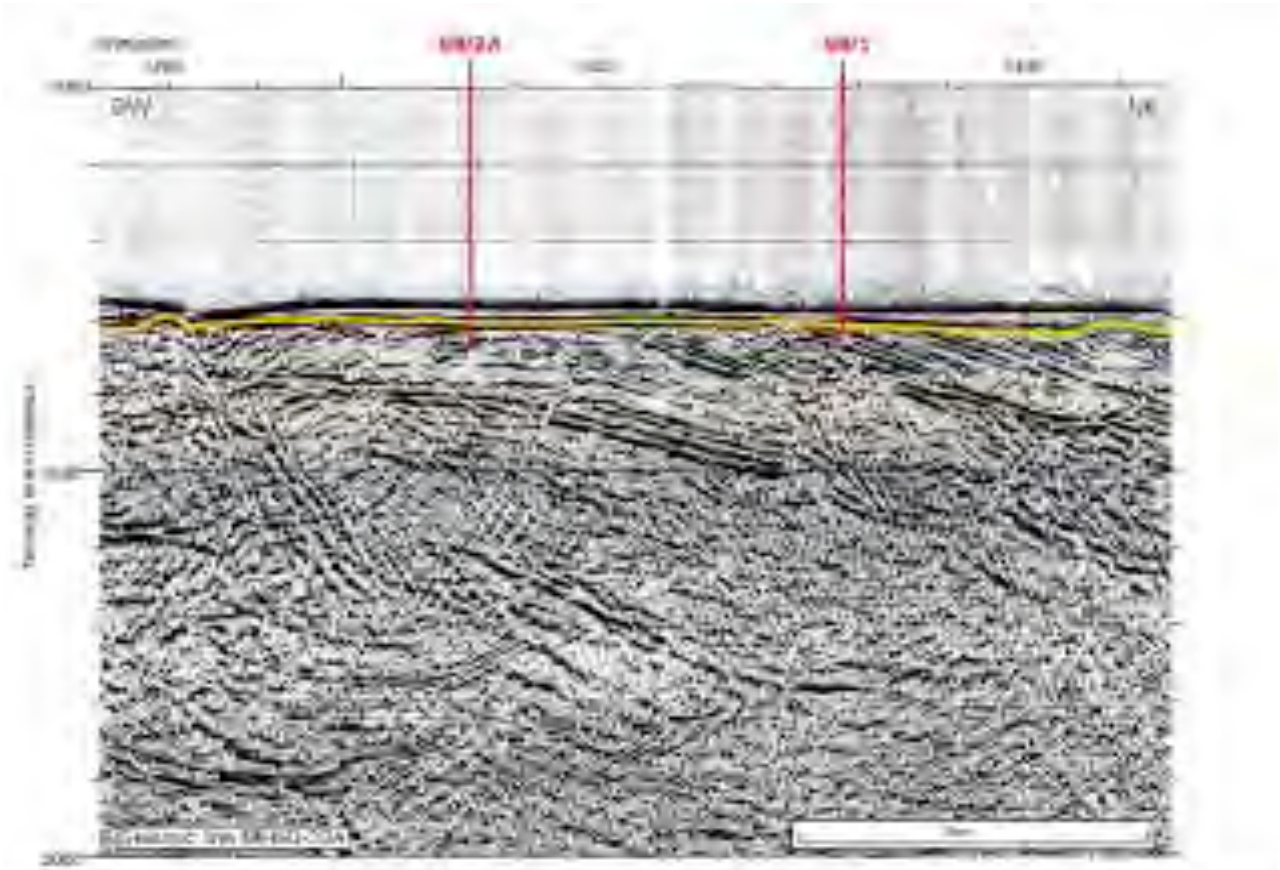
Hatton-Rockall Basin



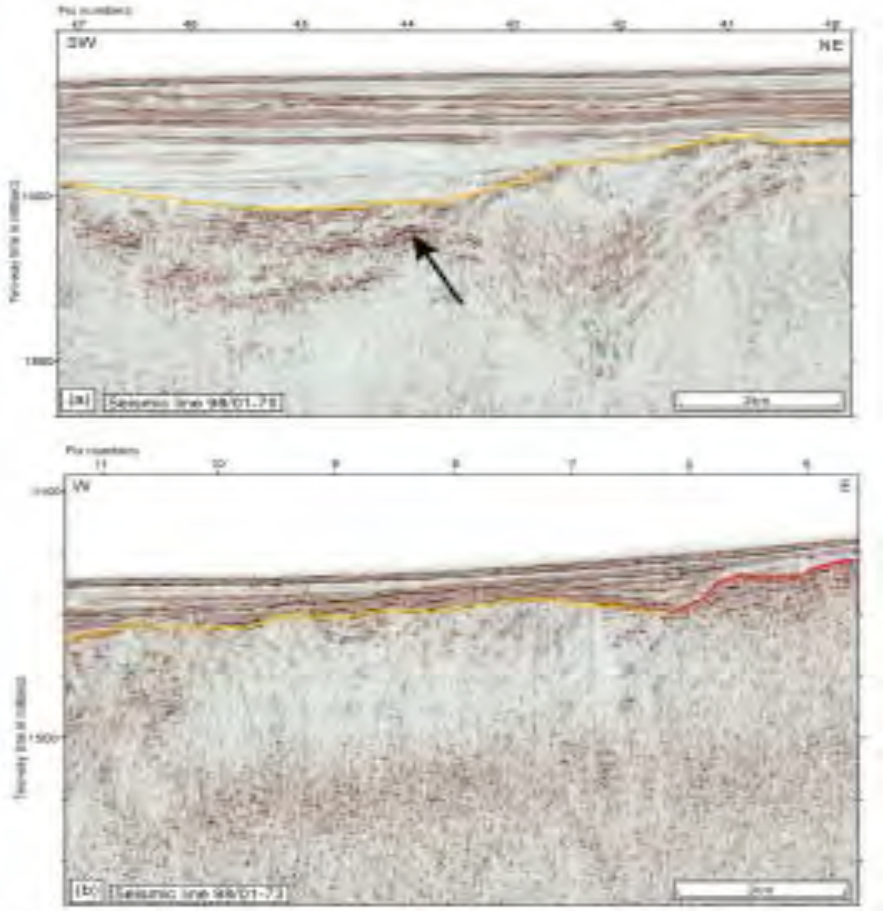
Hatton-Rockall basin



Hatton-Rockall Basin

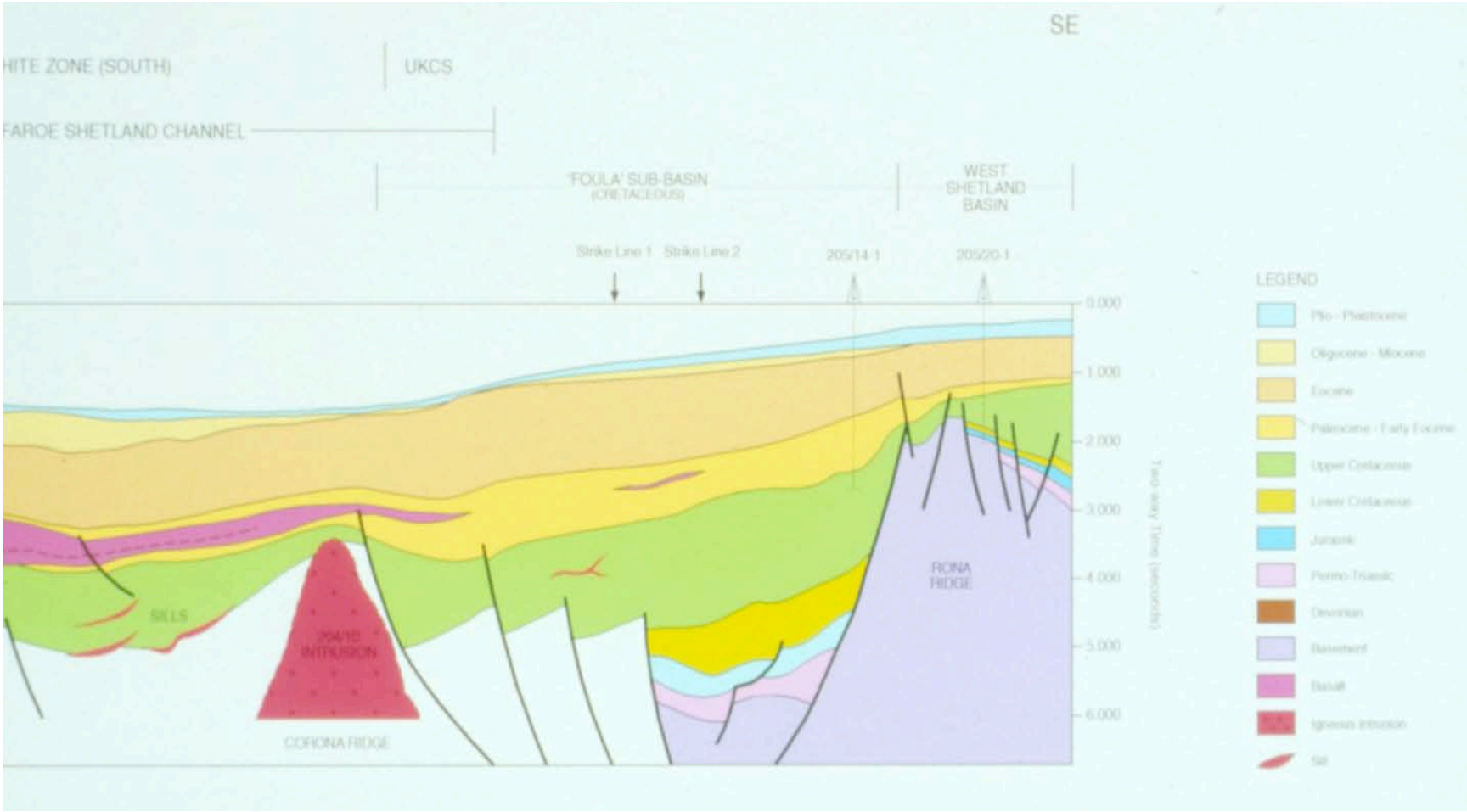


Hatton-Rockall Basin



Atlantic Margin Tectonics

West of Shetland



Hatton- Rockall basin – N. Atlantic

Mesozoic – Late Paleocene basin evolution:

Observations

Hatton-Rockall Basin is underlain by thinned continental crust and with underplating (Tertiary) to the west

Paleogene transition to spreading well known but precursor basin history a key missing link in North Atlantic

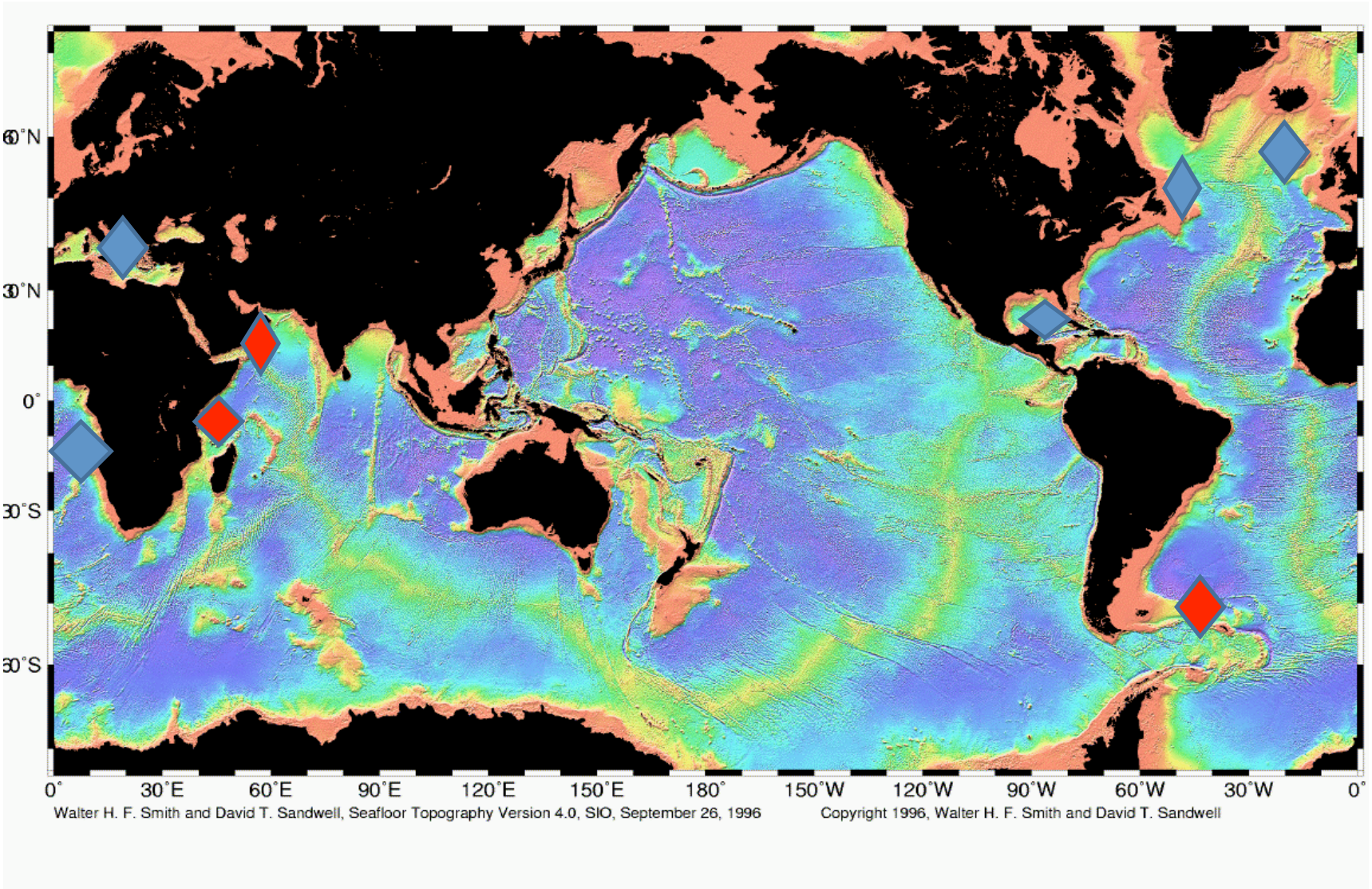
Seismic profiles and short drill cores show deep water Albian (?) shales subcrop horizontal Paleocene subaerial lava flows

Regional evidence for tectonism in the Late Cretaceous off Norway and WoS

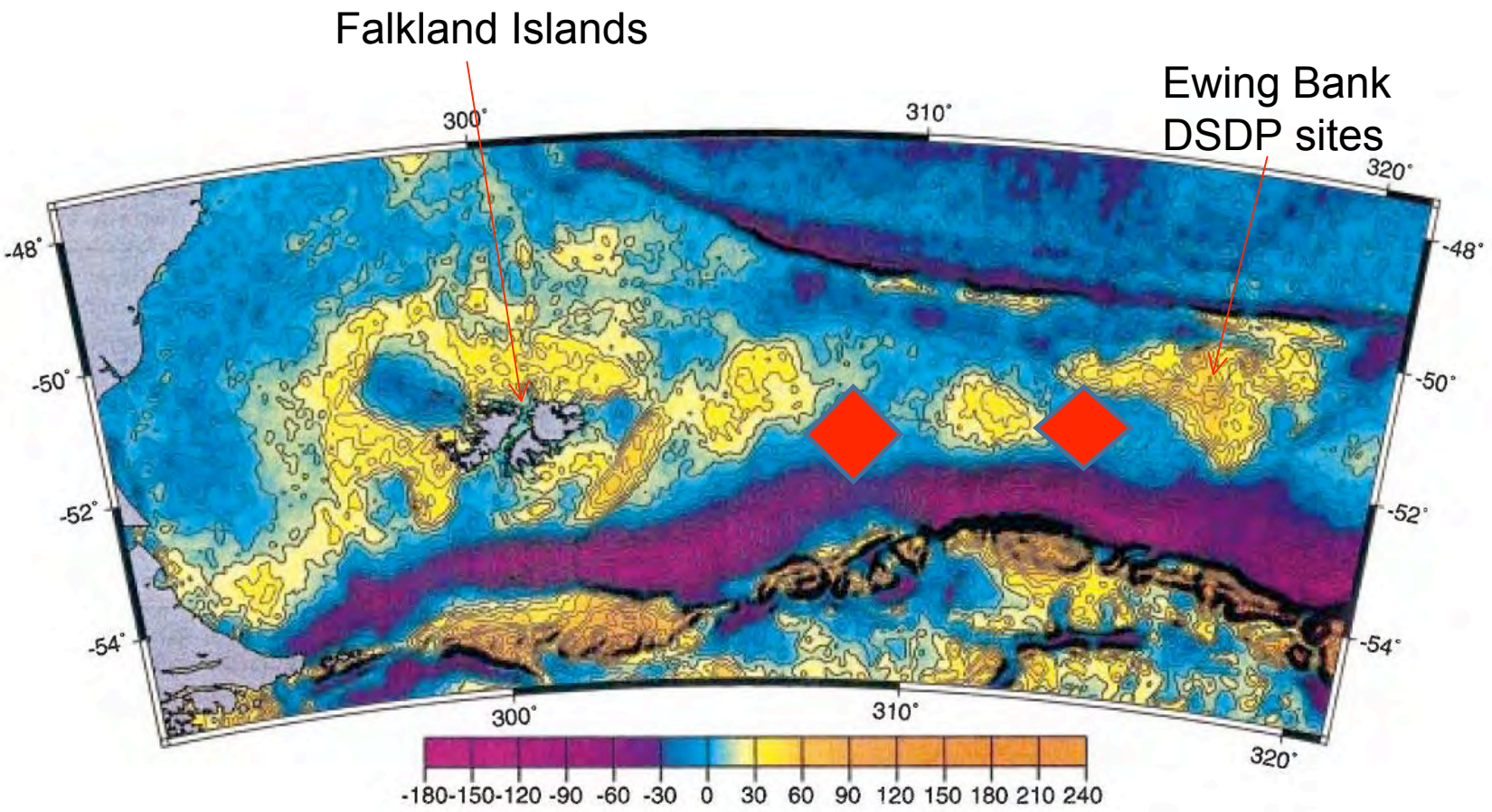
Objective:
Determine the age and nature of the extensional subsidence and uplift
Consequences in terms of sand input- relevant to sub basalt exploration

Data status:
Good regional MCS and high res seismic grid plus short drill cores obtained by BGS led Rockall consortium

Global sea floor topography



Falkland Plateau



S. Falkland Plateau

Somali Basin- SE Pacific gateway:

Mesozoic age of opening of the Weddell Sea: test of age of SDR's

Mesozoic paleocirculation and source bed deposition
•Tethys – SE Pacific faunal and water exchange

Foreland basin initiation associated with the Scotia Sea

Linkage to NW Indian Ocean sites

Data status:

Regional MCS grid between Falkland Is. and Ewing Bank
Old DSDP wells on Ewing bank show Early K and Late J source beds

Status of Efforts to Procure External Funding - DeepStar

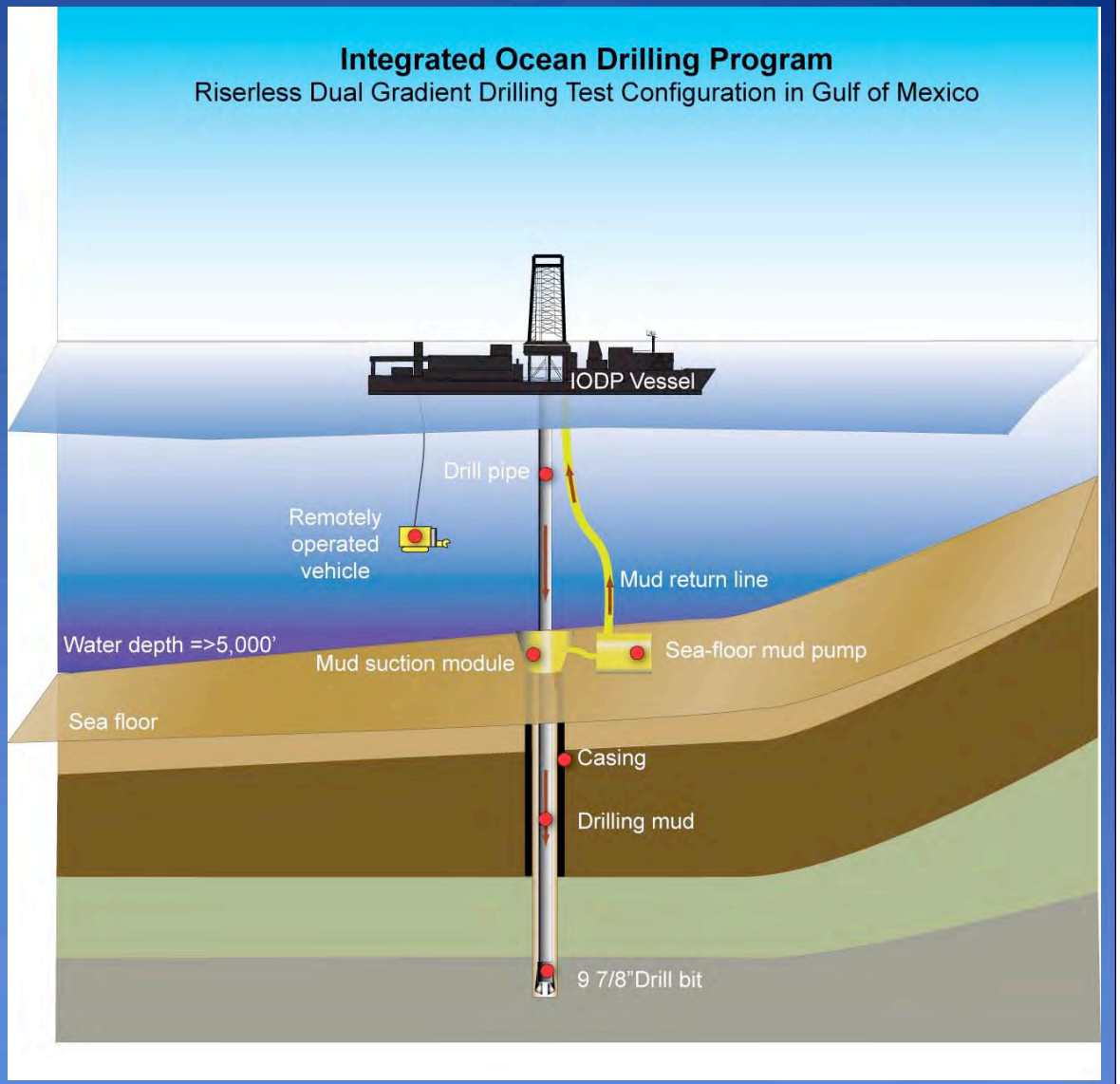
- Proposal for $645,596 includes IODP-MI as the project lead, with the USIO and AGR Services of Norway as subcontractors.

- This project will consist of a feasibility study and detailed planning effort to modify and utilize AGR's Riserless Mud Recovery system at ultra-deep (>5,000ft) sites in the Gulf of Mexico, on a riserless vessel such as the SODV.

- Implementation and subsequent funding will depend on the outcome of the feasibility study and detailed planning efforts.

- The proposal has been ranked #1 by the DeepStar Drilling and Completions committee. The probably of receiving funding is stated to be "high".

- Should the funding be awarded to IODP-MI, the project would occur in 2008.



Overview of RPSEA RFPs

Initial Program

First round of the RPSEA Ultra-Deepwater RFPs came out initially on four topics:

- **Multiphase Meter Technology: Improvements to Deepwater Subsea Measurement**

- **Graduate Student Design Projects**

- **Effect of Global Warming on Hurricane Activity**

- **Deep Sea Hybrid Power System (Phase 1)**

PDFs of these RFPs are available at: http://www.rpsea.org/en/cms/?43 I don't know which scientists at

Ultra-Deepwater Program, 2007

Composite Riser for Ultra-Deepwater High Pressure Wells (DW1401)
Develop 14" to 19" ID composite Reinforced metal tubulars for 15 ksi WP riser service in 10,000 fsw.

Ultra-Deepwater Dry Tree System for Drilling and Production in the Gulf of Mexico - Phase I (DW1402)
Develop the Feasibility Design of a Semisubmersible qualified to support dry tree risers in the GOM. This includes critical equipment specification and identification of any technology gaps.

Fatigue Performance of High Strength Riser Materials (DW1403)
This testing program will (in Phases) collect fatigue performance of materials sufficient that engineers may reliably use this data for critical service deepwater riser design. This project starts a rigorous materials testing program.

Grand Challenge - Extreme Reach Development (DW1501)
Conceptualize the tools and service capabilities required to safely drill, complete, produce, maintain, and abandon reservoirs located up to 20 miles away from the surface facilities and well access point.

Geophysical Modeling for Studying Acquisition and Processing Methods in the Deepwater Gulf of Mexico (DW2001)
This geophysical imaging technology project will generate realistic benchmark geological models, associated synthetic seismic and potential field data. Such information will allow industry to effectively and efficiently assess seismic (and other)

acquisition and processing techniques to generate hydrocarbon reservoir images beneath massive, complex salt bodies.

RFPs in 2008

* Synthetic Benchmark Models of Complex Salt
* New Safety Barrier Testing Methods
* Viscous Oil PVT
* Deepwater Riserless Light Well Intervention
* Early Reservoir Appraisal, Utilizing a Low Cost Well Testing System
* Modeling and Simulation of Managed Pressure Drilling for Improved Design, Risk Assessment, Training and Operations
* Resources to Reserves Development and Acceleration through Appraisal
* Gulf 3-D Operational Current Model Pilot
* Reliable Deepwater Power Distribution & Components

IIS-PPG Mandate

Mandate 2.1. Most important, define industrial priority research within the IODP context, and promote development of IODP drilling proposals to address such objectives within the context of the ISP.

Mandate 2.2. As appropriate, develop effective links between academic and industry scientists, facilitate communication and cooperative scientific and technical development activities between the IODP and industry, and identify IODP educational and outreach activities within selected industry professional organizations.

Mandate 2.3. Engage industry professionals as ambassadors in communicating and promoting IODP activities.

1. In the backs of people's minds, however, at least since I started with the IISPPG, there is the dream that maybe one of these industry-collaborative proposals will be good enough that a consortium of oil and gas companies will simply pay for a drilling leg (at least $10M) based on the SAS rules (non-propietary data, peer review, etc).

2. The advice we are getting from the industry members of the IISPPG is that a gift of $10M is unrealistic, at least from their perspective. If the IODP platforms are available then industry may be interested in hiring them on a commercial basis.

3. There was a feeling among the industry members of the IISPPG that the science goals of the Southern Atlantic rifted margins project were insufficiently compelling to be a serious candidate for industrial funding. The best candidate for an industry funded campaign is the Arctic.

4. IODP-MI (Manik) would lead an Industry Task Force (ITF), independent of the SAS and IISPPG. This is happening and is called the Industry Supported Ocean Drilling Project

Overview

from IODP-MI to IISPPG on 7 Nov/07

Dear Ralph and ISS PPG members,

We have in relation to your request for the next IIS PPG discussed how we best make use of the very valuable resources within the IIS PPG. The issue is that the boundary conditions for IODP collaboration with industry have changed so dramatically over the last 6 months. This major change was in fact starting to become apparent during your last meeting in July 2007 where it lead to some initial discussions of the most productive course for the PPG in the future. We here in the interest of time take the liberty to address the entire PPG with the following comments to clarify the situation. This in order to as quickly as possible get your next meeting settled regarding both timing, attendance and agenda.

The fundamental change in the IODP - industry collaborative opportunities is caused by the fact that IODP can't afford to use the platforms year around. Thus, while in the past, industry only could get access to scientific drilling platform(s) through the IODP per se (with all what this implies), there now is a completely new avenue to engage industry more directly: They can simply buy drilling/research time within the time that the program can't deploy the platforms for program funds. This in principle could be a great opportunity, though a host of issues need to be resolved..

Your current PPG was set up to foster new IODP proposals with industry interest. Proposals that were to be submitted through the normal program channels. At the time of the PPG formation, this was the logic (if not only) approach. However, within the new program reality, there might in fact be less opportunity for industry related proposals to compete for the significantly reduced program resources. So playing rules have basically changed 180 degrees and IODP is in urgent need for assistance to identify possible projects that could be of interest for industry to fund and conduct. Projects that will use IODP platforms and expertise, possibly including IODP scientists technicians etc. In most cases, they (likely) will be entirely industry funded, but SPC is also currently looking into ways to handle special 'cooperative' proposals from industry and scientists, which could be joint funded.

In light of this development, IODP-MI and the SPC chair will ask you to organize your next meeting around the following main tasks:

(1) Prepare for completion of all active white papers - complete white papers on BESACM, Mesozoic paleooceanography, Arctic drilling (We understand the mentioned concept of 'living documents' but for the purposes of SAS, a final summary report that can be easily read is desirable). - organize industry interest in an Arctic expedition.

(2) Discuss and conclude what the general nature, science & technology topics and structure of industry funded projects should be.

(3) Discuss and recommend to SPC and IODP-MI how the current PPG (with or without change in mandate), or a similar advisory entity replacing the PPG, could help such industry projects to be established.

It is realized that there are a lot of 'ifs' involved. However, we will do our outmost to support a meeting centered on these issues with the relevant information from IODP-MI, the platform operators and other parts of the SAS.

A meeting before the next SPC meeting March 3-6 (Barcelona) is highly preferable. This since a report to SPC would be necessary in order for SPC to determine the need for future meetings, changes in mandate and/or format of the PPG. However, perhaps the most critical factor regarding the timing of the meeting is that the PPG members necessary for completing the white papers and for discussion of future IODP-industry collaborations all can attend the meeting.

We welcome your comments and a revised agenda (and timing, if necessary) that addresses the points raised above. We will process such a revised meeting request as swiftly as possible.

We appreciate your understanding of the consequences for your PPG caused by this new development. Please, don't hesitate to contact us if you have any questions.

Best regards,

Hans Christian Larsen	Jim Mori
Vice President of Science Planning	SPC chair

To IODP-Mi Science from Ralph Nov 15/07

Hans Christian and Jim,

I am very sorry but I am confused by your response to our application for the Pau IISPPG meeting.

1) The Pau meeting on January 28 and 29 is the only practical time and location for a meeting of the IISPPG before March 3.

2) No one on the IISPPG intends to convert the "white papers" to formal, public documents. Our activities are adequately documented in the minutes and our "measure of success" is formal proposals and pre-proposals submitted to IODP.

3) The Industry Task Force (ITF) was clearly defined in this bullet from the Sapporo meeting:

IIS-PPG Consensus 0707-01: SASEC Consensus Statements 0706-07 and 0706-08 represent radical changes in the manner with which academic scientists collaborate with industry in ocean drilling. The “Deal” between academic scientists and the funding agencies and the drill ship operators is changing dramatically. We recommend that options for pursuing substantial industry support for the IODP drilling platforms be pursued by an Industry Task Force (ITF) independent of the IODP SAS. The ITF would consist of representatives from the petroleum industry, the Implementing Organizations, IODP-MI and SAS (ex-officio) facilitated by IODP-MI.

and this was supported at the August SPC meeting:

SPC Consensus 0708-14: The SPC commends the IIS PPG for its efforts in developing IODP-industry collaborations, both within and outside of the program. The SPC receives IIS PPG Consensus 0707-01 and Consensus 0707-03 and forwards them to IODP-MI and the Implementing Organizations with SPC encouragement to further develop industry collaborations as described in those consensus statements.

So Task 3 in your revised agenda has already been done by the IISPPG and been blessed by SPC. Establishing and running the ITF is the responsibility of IODP-MI, not SAS.

4) Task 2 in your revised agenda is clearly a job for the ITF.

5) The next step in making progress on IODP-industry collaborative projects was outlined in this bullet from the Sapporo meeting:

IIS-PPG Consensus 0707-03: The industry members of IISPPG would like to investigate the potential of using platforms currently utilized by IODP for industry developed drilling consortiums. A possible project envisioned could be, for example, an Arctic basin analysis program. In order to proceed in a timely manner, we request that IODP-MI ascertain the level of interest of the IO’s in pursuing and facilitating this approach to solving IODP funding issues. If there is interest, prior to the IISPPG or ITF engaging the entire industrial community to inquire about creating this consortium, we need the following information that will drive corporate decisions: (1) the approximate cost of the ships for drilling in both ice free and ice covered locations in the Arctic, (2) the drilling capabilities of each ship, (3) the scheduling and availability, and (4) the fiscal responsibilities (liability, etc). While this potential program would be driven by industry interests we believe that there could be significant opportunities for scientific collaboration with academia and government.

This was also supported by the August SPC. Until the ITF has feedback from the IO's on these questions there is little point in an ITF meeting.

6) If you approve the Pau IISPPG meeting as proposed in the 31/10/07 agenda then we will have an opportunity to discuss these issues further under bullet 8 of the proposed agenda. If you disapprove the Pau IISPPG meeting, then I suggest that the next industry liaison meeting be a meeting of the new ITF run by IODP-MI, not SAS (see bullet 3 above).

Regards, Ralph.

Ralph to Dave - Nov 19/07 and sent to the whole PPG on Nov 20

Dave,

Here are my thoughts at the moment. Nothing official, just a stream of consciousness. I reserve the right to change my mind.

Yes, the situation can be very confusing. The stated mandate for the IISPPG, of course, is to encourage high quality, industry-collaborative proposals to the SAS review process. In the backs of people's minds, however, at least since I started with the IISPPG, there is the dream that maybe one of these industry-collaborative proposals will be good enough that a consortium of oil and gas companies will simply pay for a drilling leg (at least $10M) based on the SAS rules (non-proprietary data, peer review, etc). [We hear that Exxon gave Stanford $200M for basic research, so I think IODP is thinking "why not us?"]

The advice we are getting from the industry members of the IISPPG is that a gift of $10M is unrealistic, at least from their perspective. If the IODP platforms are available then industry may be interested in hiring them on a commercial basis. But this would be just a business arrangement, separate from the SAS. This was the background behind the Sapporo consensus statements.

There was a feeling among the industry members of the IISPPG that the science goals of the Southern Atlantic rifted margins project were insufficiently compelling to be a serious candidate for industrial funding. There is a gray area here since industry seismic data could be very important for this project and industry could make in-kind contributions. But ultimately the actual drill ship time would still come from governments.

The best candidate for an industry funded campaign is the Arctic. Kurt Rudolf and Andy Pepper put together an overview presentation for the Sapporo meeting (see Appendices 29 and 30 of the minutes). The understanding in Sapporo was that IODP-MI (Manik) would lead an Industry Task Force (ITF), independent of the SAS and IISPPG, with the first meeting in Houston in September 07. The initial core membership of the ITF would be the industry members of the IISPPG - so the future of the IISPPG was uncertain. At any rate the Houston meeting of the ITF did not happen to my knowledge.

Apparently neither the Chikyu nor the JOIDES Resolution qualifies for work in the Arctic.

I think that SAS and IODP would like to see industry funded legs:

a) SAS would like proposals for industry funded legs that go through their review procedure and that would conform to their policies.

b) SAS leads an academic community whose time and intellectual property comes free to them (they make a big deal about paying for the travel, which is inconsequential). In turn for providing scientific justification for the drilling platforms, the academic community requests a fair chance at getting their scientific drilling objectives met. The "deal" made at planning meetings such as COMPLEX in Vancouver was that two ships would be available full time. The cut-back to half-time for both ships greatly reduces the anticipated return to the academic community.

c) IODP-MI would like to team with SAS in order to get the support of and access to this academic community. Getting academic scientists to participate in an IODP-MI led ITF would be inconvenient and a large expense. At one point in the Sapporo meeting, it was actually suggested that industry would pay the salaries of the academic participants on the ITF - perhaps through an IODP-MI led consortium.

The US-NSF position on the JOIDES Resolution is outlined in Jamie Allan's December 5, 2006 email which is Appendix 26 of the Sapporo minutes.

Meanwhile the opinions of the Implementing Organizations (IO's - Texas A&M and CDEX) which are important have not been expressed. I think that CDEX would like to rent out Chikyu time on their own as they did with Woodside. I don't know what TAMU thinks.

I don't think that there are "major conflict tensions" between SAS and IODP-MI or between any of the players - funding agencies, drill ship operators. Yes, there needs to be clarity about the role of IODP-MI (as a fundraiser from industry?) and SAS(science).

I am scheduled to speak with Jim Mori, who replaces Keir Becker as SPC Chair, tomorrow on the phone and I will see him in Tokyo next week. Let's see how it goes. I would like to keep the Pau meeting in place to provide at least one more opportunity for the IISPPG to go over this stuff.

Regards, Ralph. -6366

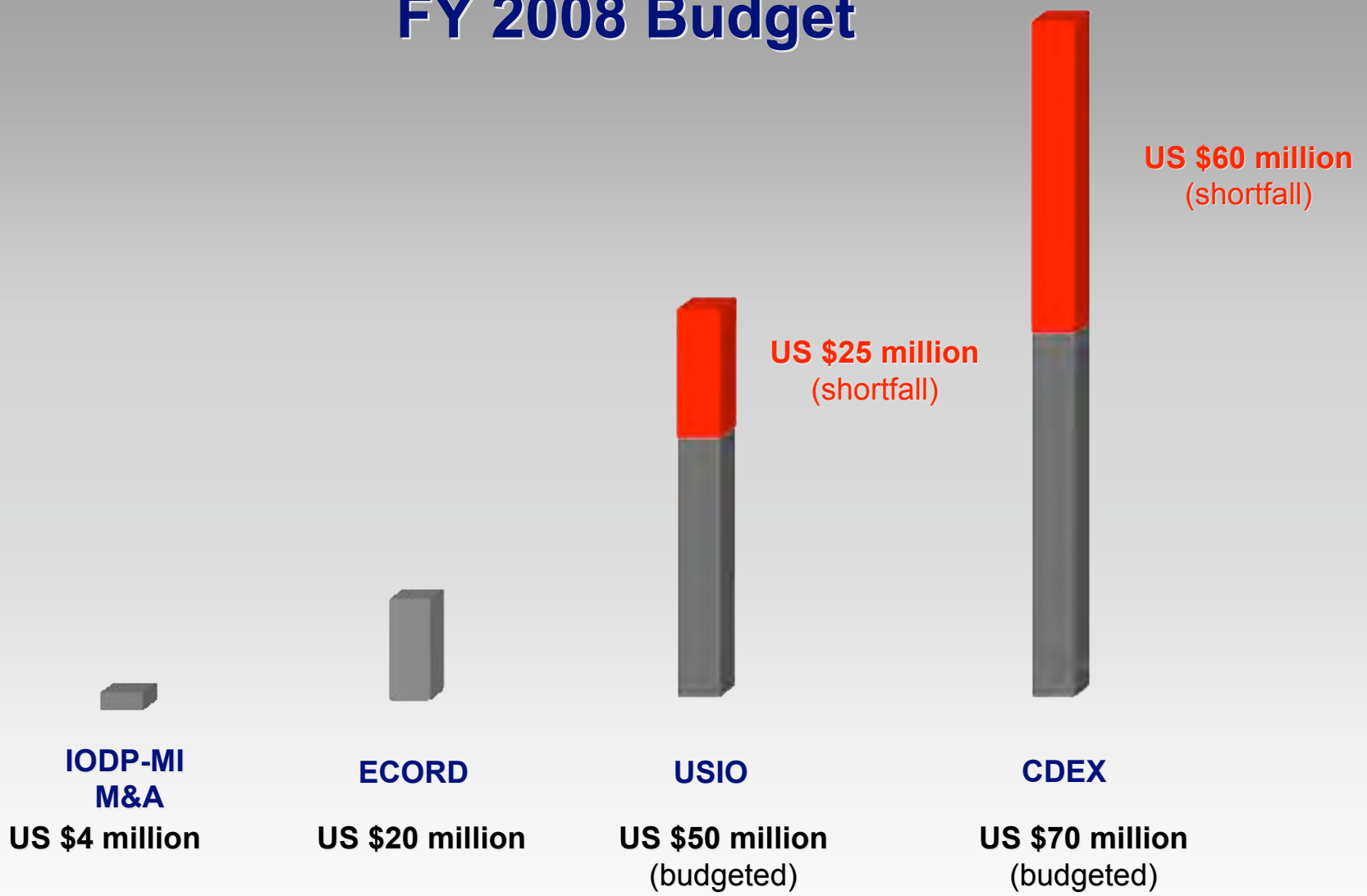
Industry and IODP

Manik Talwani

IIS PPG Meeting
PAU, France
January 28-29, 2008

INTEGRATED OCEAN DRILLING PROGRAM
MANAGEMENT INTERNATIONAL

FY 2008 Budget



Some consequences of 7 month only drilling

- Scientists' expectations for IODP not fulfilled
- Expensive operations for only 7 months each year may make renewal of IODP problematical
- Difficult to sustain infrastructure over 5 month gaps

Can we get help from industry?

3 mechanisms for cooperation with industry

- Regular IODP Expeditions (This is where IIS PPG plugs in)
- Hybrid (Complementary) Expeditions
- Industry funded Expeditions

Reality check by Operations Task Force (OTF)

- In the 2010-2013 time frame we have 12-16 SODV operations and 2 MSP operations to schedule.
- Even if only OTF's "must do" proposals are retained, there is only room for eight or nine other proposals.
- These will be drawn from existing and new proposals.

Reality check by Operations Task Force (OTF)

Thus there will be very few new proposals

•To invite new proposals of interest to industry would be unrealistic

SASEC Draft Implementation Plan

Recommended Four Scientific Foci

- The deep biosphere and the limits of life
- Rapid climate change, extreme climates, and sea level change
- Processes of ocean crust formation and a deep crustal section
- The seismogenic zone and initiation of borehole observatories.

The SASEC draft implementation plan is not favorable to industry's interests.

Implementation plan and industry

•Reaction of scientists interested in topics such as Continental margins, which are of interest to industry, is uniformly negative.

- There are two glaring shortcomings: the processes and products of continental breakup.
- The omission also obviates much of the potential for scientific interest, participation, and possible co-funding by energy industries. The result is a direct conflict with a stated goal of developing 'projects with potential partners (e.g. through collaborative proposals with industry, foreign governments, etc.) that might increase science operational days and/or provide resources."

- “It is a major disappointment that breakup and rifting related initiatives have been removed from the list of priorities. I believe this is a major mistake because both academia and industry rely on international collaboration and initiatives provided by IODP to investigate high-end non-commercial science which is to the benefit of all geoscientists.”

"Discussions I had with oil company managements show that they are unhappy by the way in which they are involved today in the IODP program. In the future, they would be interested to see some of their fundamental research objectives taken into account in IODP scientific proposals and they are ready not only to provide data and to contribute to the definition of scientific objectives but also to financially support such drilling legs within the IODP framework.

IODP Implementation Plan states that IODP must make every effort to develop projects with potential partners (e.g. through collaborative proposals with industry, foreign governments, etc.) that might increase science operational days and/or provide resources to IODP that increase its flexibility in the expeditions that can be accomplished for the remainder of this phase of the program. The Oil Industry is probably the most important potential money provider and I do not see what sections of the four themes might be of interest for them."

"Failing to include the theme of 'Continental Breakup and Sedimentary Basin Formation' in the IODP science plan seems in poor judgment and may well damage the program. Not including a rifting or passive margin theme seems to be totally incongruous with the statement that 'IODP must make every effort to develop projects with potential partners (e.g. through collaborative proposals with industry, foreign governments, etc.) that might increase science operational days and/or provide resources to IODP that increase its flexibility in the expeditions that can be accomplished for the remainder of this phase of the program.'

- All very nice, but the one theme fundamental to industry collaboration has been explicitly deleted from the draft IODP Implementation plan. The draft implementation plan will likely have a negative impact on industry's perception of the long-term objectives of the program, and I am sure that industry will rethink long-term collaborations with IODP."

3 mechanisms for cooperation with industry

- Regular IODP Expeditions
- Hybrid (Complementary) Expeditions
- Industry funded Expeditions

Existing IODP rules as well as contract terms inhibit hybrid or complementary programs in which costs are shared by IODP and industry.

3 mechanisms for cooperation with industry

- Regular IODP Expeditions
- Hybrid (Complementary) Expeditions
- Industry funded Expeditions

A PROPOSAL FOR AN INDUSTRY SPONSORED OCEAN DRILLING PROGRAM

INTEGRATED OCEAN DRILLING PROGRAM
MANAGEMENT INTERNATIONAL

Participation

- Please let us know by February 1, 2008, if your company would consider joining this program.
- We would like to know in strict confidence your favored drilling sites and areas, scientific problem, and the deliverables you would like to receive out of this program.
- We would like to receive your views about confidentiality of data, to what period confidentiality will extend and any other conditions.

- All information from interested companies will be combined into a single document without identifying the proposing companies.
- Houston meeting on February 21-22, 2008 (hosted by ExxonMobil) to arrive at framework with companies to form the basis for a five-year drilling proposal by academic scientists.

- In order to prepare for the Houston framework meeting , we would like to meet separately with representatives from individual companies to get advice and input on constructing a draft framework, which would be used for constructing the proposal.
- We would like to do this in the time frame of February 6 to 8.

- This proposal will be presented to interested companies by March 2008 (or somewhat later).
- We request a commitment to the program within 30 days after proposal submission.

Costs

- Costs will range from $5-7 million per month, depending on the shipboard services.
- The program will be offered for an average minimum of two months and maximum of 5 months per year.
- 5-8 companies may join this program.
- Companies may want to negotiate independently for further analytical services.

Cost Details (per month)

- Basic drilling and routine logging $3.6million
- Continuous coring and full laboratory support $1.7 million
- Academic scientists onboard and onshore with associated work $1.7 million
- These are ball park numbers. The framework workshop would decide how much work in each category will actually be carried out.

DELIVERABLES

- A comprehensive report will be provided to participating companies at the end of each two-month expedition.
- Companies will have full access to all the cores and logs obtained.

Arctic Program

- Strong interest expressed by companies for an Arctic drilling program.
- If interested, respond by February 1, 2008 with favored ideas and areas for Arctic drilling.
- Arctic drilling proposed if enough interest. Drilling by leasing drilling platforms.
- Planning and terms similar to proposed drilling by the *JOIDES Resolution*.

Participation of Academic Scientists

- Participation of academic scientists is essential to the program.
- Scientists exact role to be determined.
- Extent of confidentiality to be negotiated.
- Basic premise of the program will be that these scientists have access to at least part of the data collected, and the rights to eventually publish results.

Relationship to IODP

- Program is to be parallel and complementary to IODP.
- No government contract funds to be used in program.
- Permission required by NSF for use of U.S. government equipment on the *JOIDES RESOLUTION.*
- No participation from IODP Science Advisory Structure panels.

If the initiative with industry is successful, and we have two complementary programs: IODP and Industry Sponsored Ocean Drilling Program, we will have an outstanding example of a Government, Academic, and industry partnership, which will help sustain IODP.

Conclusions

- Industry is the most promising source of additional revenues.

- Existing IODP rules as well as contract terms inhibit hybrid or complementary programs in which costs are shared by IODP and industry.

Conclusions (continued)

•Leasing ships out to industry helps finances but does not help in the maintenance of infrastructure or to carry out scientific programs

• Infrastructure can be maintained and science programs can be carried out by negotiating non-IODP programs to be financed by industry.

ISOPD

IISPPG Consensus Statement 0707-01: SASEC Consensus Statements 0706-07 and 0706-08 represent radical changes in the manner with which academic scientists collaborate with industry in ocean drilling. The "Deal" between academic scientists and the funding agencies and the drill ship operators is changing dramatically. We recommend that options for pursuing substantial industry support for the IODP drilling platforms be pursued by an Industry Task Force (ITF) independent of the IODP SAS. The ITF would consist of representatives from the petroleum industry, the Implementing Organizations, IODP-MI and SAS (ex-officio) facilitated by IODP-MI.

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SPC Consensus 0708-14: The SPC commends the IIS PPG for its efforts in developing IODP-industry collaborations, both within and outside of the program. The SPC receives IIS PPG Consensus 0707-01 and Consensus 0707-03 and forwards them to IODP-MI and the Implementing Organizations with SPC encouragement to further develop industry collaborations as described in those consensus statements.

A proposal for an

INDUSTRY SPONSORED OCEAN DRILLING PROGRAM

EXECUTIVE SUMMARY

This proposal is being made by IODP's central manager, IODP Management International, Inc., (on its behalf and on behalf of the U.S. Implementing Organization) to gauge interest in forming an industry consortium for the purpose of funding a drilling program for up to five months every year, starting approximately in June 2009, and running for up to five years on the reasonably priced *JOIDES Resolution*. While we envisage some participation by academic scientists, the choice of sites, the drilling, coring and logging program, as well as the rules regarding the confidentiality and distribution of data would be largely set by the industry consortium. This program would be parallel, and complementary to, IODP, but no IODP funds would flow into this program.

If your company would consider participating in this program, please let us know by **January 18, 2008**. We would also like to know in **strict confidence**, your favored sites and areas for drilling (for example a specific continental margin), your favored scientific problem (for example stratigraphic tests in a specific area), as well as your views about confidentiality of data

We will collect the information from all the interested companies, and combine them into a single document that represents the combined views of the companies. On **February 8, 2008,** we will call a meeting in Houston for all the interested companies and present the information we will have assembled, and jointly develop a framework for a new program. This framework will form the basis for a five-year drilling proposal to be constructed by academic scientists and presented to the interested companies in the April-May 2008 time frame. The interested companies will be requested to commit to the proposed program within a period of 30 days.

Costs will be in the range $5-7 million per month, depending on the shipboard services (including logging) and the deliverables agreed upon at the Feb 18 meeting.

The program will be offered for an average minimum of two months and an average maximum of five months per year.

The participating companies will be provided a comprehensive report at the end of each 2 month expedition. They will have full access to all the cores and the logs that will be obtained.

Recognizing the strong interest expressed by a number of companies in an Arctic drilling program, we request interested companies to respond also by **January 18, 2008** and give us their favored ideas and areas for Arctic drilling. If there is enough interest, a separate Arctic drilling program will be proposed using leased drilling platforms.

BACKGROUND:

The Integrated Ocean Drilling Program (IODP), which is the successor scientific ocean drilling program to DSDP and ODP, is well known to industry. A total of 1306 sites (from all three programs) located in all the world's oceans have been drilled. The results, including analysis of core samples, logs and the cores themselves, remain freely available to all investigators, including those from industry. Assistance from industry has come in the way of participation of industry scientists on some expeditions and service on some Science Advisory Structure panels. But the funding has come entirely from government agencies in the U.S., Japan and Europe. Site selection and the procedures regarding both acceptance and approval of proposals and for sample distribution have all been governed by IODP rules.

The ten-year IODP program was predicated on full-year funding of the U.S. riserless ship *JOIDES Resolution* (JR), the Japanese riser ship *Chikyu*, and on annual expeditions on mission-specific drilling platforms to be mounted by the European Consortium of Research Drilling (ECORD). However, available government funding has not kept pace with the initial expectations; funding now appears to be available only approximately seven months each year and for the JR and the *Chikyu* and perhaps only every other year for ECORD's mission-specific platforms.

This proposal is being made by IODP's central manager, IODP Management International, Inc., (on its behalf and on behalf of the U.S. Implementing Organization), to gauge interest in forming an industry consortium for the purpose of funding a drilling program for up to five months every year, starting approximately in June 2009, and running for up to five years on the reasonably priced *JOIDES Resolution*. While we envisage some participation by academic scientists, the choice of sites, the drilling, coring and logging program, as well as the rules regarding the confidentiality and distribution of data would be largely set by the industry consortium. This program would be parallel, and hopefully complementary to, IODP, but no IODP funds would flow into this program, nor would any panels of the IODP Science Advisory Structure be involved in this program.

PARTICIPATION

If your company would consider participating in this program, we envisage the following steps:

1. Please let us know by **January 18, 2008**, if your company would consider joining this program. We would also like to know in **strict confidence**, your favored sites and areas for drilling (for example a specific continental margin), your favored scientific problem

(for example stratigraphic tests in a specific area), and most importantly, the deliverables you would like to receive out of this program. Further, we would like to receive your views about confidentiality of data, to what period the confidentiality will extend, and any other conditions you may want to specify.

2. We will collect the information from all the interested companies, and combine them into a single document. We will do it in a way that any proposed sites are not identified with the proposing company. We will also collect the views and opinions regarding data confidentiality, etc. and assemble them into a statement that represents the combined views of the companies. On **February 8, 2008,** we will call a meeting in Houston for all the interested companies and present the information we will have assembled to arrive jointly with industry participants at a framework for a new program. In addition to the company representatives, members of IODP-MI, the United States Implementing Organization, and some scientists from the academic community would attend the meeting. All of these scientists would be bound by confidentiality restrictions to be determined by initial responses.

3. The framework arrived at and agreed upon at the February 8 meeting will form the basis for a five year drilling proposal constructed by academic scientists to be presented to the interested companies in the April-May 2008 time frame. The interested companies will be requested to commit to the proposed program within a period of 30 days.

COSTS

There are several variables that will determine the cost to each company:

1. Costs will be in the range $5-7 million per month, depending on the shipboard services (including logging) that are agreed upon.

2. The program will be offered for an average minimum of two months and an average maximum of five months per year.

3. We anticipate that 5 to 8 companies may join this program.

4. Companies may want to negotiate independently or jointly for further analytical services with participating scientists or other scientists.

DELIVERABLES

The participating companies will be provided a comprehensive report at the end of each two-month expedition. They will have full access to all the cores and the logs that will be obtained, and any additional deliverables that will have been agreed upon at the February 8 meeting.

ASSOCIATE MEMBERSHIP OF IODP-MI

We would like to invite participating companies to join IODP-MI as Associate Members. There is no fixed application form. We generally ask for a letter addressed to the President of IODP-MI, in which the entity formally applies for Associate Membership. The letter is accompanied by a one-page statement in which the entity declares a "major commitment to and involvement in ocean geosciences research and/or earth system science research". I am attaching a list of current members. The members appoint a representative, (at universities and research institutions. This is usually the Dean or Director). We would expect industry representatives to be at comparable senior levels. The representative (or his nominee) attends the annual meeting of the corporate members. The next meeting is in June in China. If your company were to apply, we would expect him/her to be voted in at this meeting and expected to attend. Associate membership is non-voting. It carries a fee of $3,000 annually. Associate members will be able to review the progress of the Industry Sponsored Ocean Drilling Program.

ARCTIC PROGRAM

Recognizing the strong interest expressed by a number of companies in an Arctic drilling program, we request interested companies to respond also by **January 18, 2008** and to give us their favored ideas and areas for Arctic drilling. If there is enough interest, an Arctic drilling program will be proposed using leased drilling platforms. The planning and terms will be similar to the proposed drilling by the *JOIDES Resolution*.

PARTICIPATION OF ACADEMIC SCIENTISTS

An essential part of the program will be the participation of some academic scientists. While their exact role will have to be determined, and the extent of confidentiality to be negotiated, a basic premise of the program will be the access of these scientists to at least a part of the data that are collected, and the rights eventually to publish results.

RELATIONSHIP TO IODP

This program is envisaged as parallel and complementary to IODP**.** Since no government contract funds will be used in this program, the principal involvement of the U.S. National Science Foundation will be that its permission will be required for use of U.S. government equipment on the *JOIDES Resolution*. The IODP Science Advisory Structure panels also will not be involved in this program. At the same time, the logistics of IODP and of this program will need to be coordinated and optimized to obtain maximum science results and to reduce transit times, etc.

EXAMPLES OF DRILLING PROJECTS

Attachment 2 gives brief summaries for five types of expeditions carried out by the *JOIDES Resolution:*

Leg 155 - Amazon Fan
Leg 174 - New Jersey Sea Level
Leg 210 - Newfoundland Basin
Exp 308 - Gulf of Mexico Overpressures
Leg 204/Exp 311 - Cascadia Gas Hydrates

APPENDICES

1. *JOIDES Resolution*-capabilities.
2. Some examples of Drilling Expeditions.
3. List of IODP-MI members.

We look forward to hearing from you.

MT DD

We have received an enthusiastic response from several companies to our proposal for consideration of an industry funded ocean drilling program. We are sending this email to give you a new time line and also to clarify a couple of questions raised in our discussions with industry.

New time line

February 1, 2008 (Instead of January 18, 2007).Let us know if your company would consider joining the program. We would like you to provide us in strictest confidence, favored drilling areas and scientific drilling problems

February 21 and / or February 22. (instead of Feb 8) Workshop including interested companies, to sketch framework for program. ExxonMobil has graciously agreed to host the workshop at its Greenspoint, Houston office

March 31 (possibly somewhat later). Submission of drilling proposal.

One month after submission. Commitment by your company.

Please note that we are not asking your company to make any financial commitment until one month after you receive the proposal.

Question regarding drilling areas and scientific problems

This question has been raised by several companies. Basically our response is that you provide us with information that you are comfortable providing. We are not asking for detailed drilling locations, nor are we asking for very vague large areas like a whole ocean. Rather, you may provide an area that is small enough to provide some clues as to what scientific problems might be tackled in that area. Again the scientific problem needs to be neither excruciatingly detailed nor much too vague. Keep in mind that what you are trying to accomplish is to get other companies to share in the costs for drilling to solve your favorite scientific problem.

Questions regarding detailing costs per month

Basic drilling and routine logging	$3.6 million
Continuous coring and full laboratory support	$1.7 million
Academic scientists onboard and onshore with associated work	$1.7 million

These are ball park numbers. The framework workshop would decide how much work in each category will actually be carried out.

Integrated Ocean Drilling Program Memorandum

To: Manik Talwani, President, Integrated Ocean Drilling Program-Management International, Inc. (IODP-MI)

David Divins, Director for Ocean Drilling Programs, Consortium for Ocean Leadership (COL)

From: James F. Allan, Program Director (NSF/ODP) James F Allan

Date: November 1, 2007

Re: NSF Guidance - Allowable OCE-0352500 and OCE-0432224 Contract Activities Regarding non-IODP Operations of the Scientific Ocean Drilling Vessel (SODV)

Cc: M. Rouse, S. Wozniak, R. Batiza, J. Walter

This Memorandum provides the Consortium for Ocean Leadership, Inc. (COL) and Integrated Ocean Drilling Program Management International, Inc. (IODP-MI) with program guidance concerning what is allowable within their NSF-funded contract activities regarding use of the SODV.

The National Science Foundation (NSF) has contracted management responsibility for operation of the SODV to the COL, formerly Joint Oceanographic Institutions, Inc. COL subsequently subcontracted scientific operations to the Texas A&M Research Foundation (TAMRF), which is in direct contract relationship (i.e. privity) with Overseas Drilling Limited (ODL), the SODV owner.

For purposes of this Memorandum, four documents address the allowable use of the SODV:

(1) NSF contract OCE-0352500 to COL;
(2) NSF contract OCE-0432224 to IODP-MI;
(3) Letter dated June 1, 2004, from NSF's Acting Director, Arden L. Bement, Jr., entitled, "Approval to Provide Indemnification Against Risks in the Integrated Ocean Drilling Program (IODP) Scientific Ocean Drilling Vessel Operations under contract number OCE-0352500." [See also Modification #5, dated June 25, 2005 to OCE-0352500]; and
(4) Memorandum between the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) of Japan and The National Science Foundation of the United States of America concerning Cooperation on the Integrated Ocean Drilling Program (IODP), dated April 22, 2003.

SODV operational use falls within three categories:

1) Within IODP, under the conditions of the April 22, 2003 Memorandum between MEXT and NSF, contract OCE-0352500 to COL, and NSF contract OCE-0432224 to IODP-MI;
2) Outside IODP, but in cooperation between NSF and another U.S. Government Agency, under the conditions of and funded primarily through NSF contract OCE-0352500; and
3) Outside of IODP and outside NSF contract OCE-0352500 (i.e. the "off-NSF-contract" option), which are described more fully below:

SODV Operations within IODP (using external funds)

Within the initial phase of operations within IODP (FY2004 to FY2007), SODV operational funds were provided through two contractual routes. SODV Platform Operational Costs (POC) and non-IODP funds in support of System Integrative Contractor (SIC) activities were provided through contract OCE-0352500. SODV Science Operational Costs (SOC) were provided by NSF, after commingling with contributions from other IODP members, through contract OCE-0432224 with subsequent sub-contractual transfer to COL.

Regarding support of future SODV operations and activities within the IODP, external funding outside of NSF and other IODP members, is acceptable and welcome, but only if the operations and activities that this funding supports have been:

a. Considered and prioritized by the IODP Science Advisory Structure (SAS) following processes defined by SAS in cooperation with IODP-MI;
b. Mutually approved by COL, IODP-MI, and the SAS; and
c. Defined in a Program Plan or modification of a Program Plan approved by the Lead Agencies.

Contract funds may be expended by both COL and IODP-MI in facilitating such operations and activities, with COL taking responsibility for facilitating and implementing such operations and activities after scheduling.

Funds provided externally from IODP contract funding may augment support for IODP operations and activities and may originate from national funding organizations, U.S. Federal Agencies, not-for-profit organizations, and the commercial sector. **Use of such external funds within IODP is predicated upon following the Program Principles as defined within the April 22, 2003 Memorandum between MEXT and NSF.**

Even though these external funds may support SODV IODP operations, they do not represent IODP Program funds and, therefore, are not SOC or POC. Nevertheless, these external funds may support operations requiring expenditure of IODP Program POC or SOC funds, and so need to be identified within an approved IODP Program Plan.

These external funds may initially be provided to COL, IODP-MI, or NSF through an interagency agreement. It is NSF's preference that the funds are provided directly to COL, the ship science operator, whenever possible, although this is not a requirement.

SODV Operations outside the IODP, but in cooperation between NSF and another U.S. Federal Agency

It is envisioned that scientifically-based SODV operations may occur in the future in cooperation between NSF and other US. Federal Agencies. All funding to support such activities would be provided contractually by NSF to COL, with these funds provided at least partially to NSF though an interagency agreement. In this case, only COL may spend contract funds (excluding IODP Program funds) in support of these activities, with prior NSF approval.

Clarification may be needed from NSF as to whether indemnification provided by NSF to COL covers these potential operations.

"Off-NSF-contract" use of the SODV

It is contemplated that SODV operations, external to that supported by the COL contract with NSF, may occur that are funded by commercial or other organizations. **IODP and "off-NSF-contract" use of the SODV shall not be intermixed during these operations.** Neither COL nor IODP-MI may spend contract funds in helping ODL seek or support off-contract SODV work. ODL may choose to pursue commercial work in partnership with COL, or COL and IODP-MI, but **COL alone shall negotiate with NSF regarding use of NSF-owned equipment.**

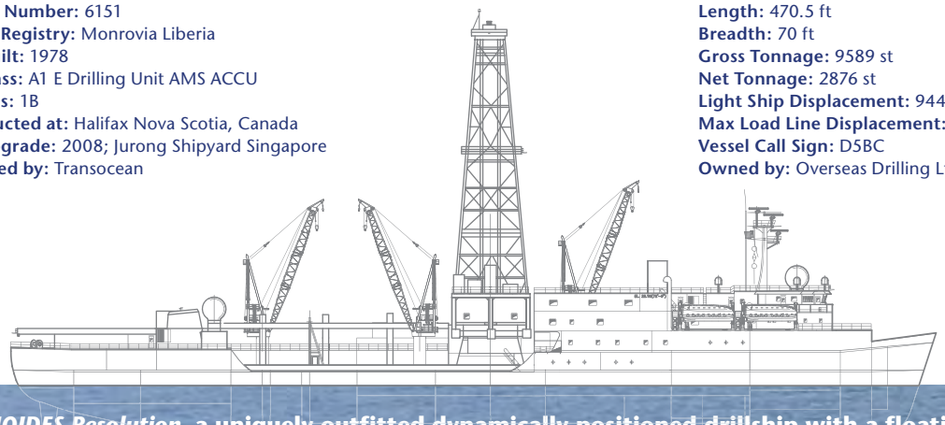
IODP-MI Members

Institution	Country
AIST	Japan
Alfred-Wegener-Institut	Germany
British Geological Survey	UK
Cardiff University	UK
ETH,Geological Institute	Switzerland
European Institute for Marine Studies (IUEM)	France
Florida State University	USA
Hokkaido University	Japan
IFM-GEOMAR	Germany
JAMSTEC/IFREE	Japan
IPG-Paris	France
Kochi University	Japan
Kyushu University	Japan
Lamont Doherty Earth Obs.	USA
Rutgers University	USA
Texas A&M University	USA
Tohoku University	Japan
Tokai University	Japan
Universitaet Bremen	Germany
University of Bergen	Norway
Univ of California, San Diego	USA
Univ of California, Santa Cruz	USA
University of Florida	USA
University of Hawaii	USA
University of Leicester	UK
University of Miami	USA
University of Southampton	UK
University of Texas at Austin	USA
University of Tokyo	Japan
University of Washington	USA
Vrije Universiteit	The Netherlands
Woods Hole Oceanographic Institution	USA

JOIDES Resolution Scientific Ocean Drilling Vessel

Official Number: 6151
Port of Registry: Monrovia Liberia
Year Built: 1978
ABS Class: A1 E Drilling Unit AMS ACCU
Ice Class: 1B
Constructed at: Halifax Nova Scotia, Canada
Last Upgrade: 2008; Jurong Shipyard Singapore
Operated by: Transocean

Length: 470.5 ft
Breadth: 70 ft
Gross Tonnage: 9589 st
Net Tonnage: 2876 st
Light Ship Displacement: 9449 st
Max Load Line Displacement: 18,636 st
Vessel Call Sign: D5BC
Owned by: Overseas Drilling Ltd.



The *JOIDES Resolution*, a uniquely outfitted dynamically positioned drillship with a floating laboratory, has been investigating the Earth's origin and evolution through scientific ocean coring worldwide since 1985. While contracted for the Ocean Drilling Program and the Integrated Ocean Drilling Program, operations have extended from north of the Arctic Circle to south of the Antarctic Circle and from the depths of the Mariana Trench to the coastal areas off New Jersey. The vessel has also conducted gas hydrate investigative programs for government agencies of Japan and India.

Capabilities
Maximum water depth: 27,000 ft
Minimum water depth: 300 ft
Total hanging drill string length: 30,000 ft
Panama Canal capable (height and width)
Time at sea without re-provisioning: 75 days

Drilling Tubular Storage Capacity
Drill pipe: 46,500 ft (5 and 5½ in.)
Drill collars: 2,300 ft (8¼ and 6½ in.)
Casing: 7350 ft (20, 16, 13⅜, 11¾, 10¾ in.)

Power
Engines/Generators: 7 EMD 16 cylinder diesel
5 @ 2100 kW (3000 hp)
2 @ 1500 kW (2200 hp)

Propulsion
12 ea. 750 hp thrusters (10 retractable, 2 fixed)
Main screws: 2 shafts; 9,000 shp

Liquid Capacities
Diesel fuel (MG): 936,000 gal (3000 mt)
Drill water: 354,386 gal
Ballast: 215,208 gal
Potable water: 175 st

Mud/Cement
Mud pumps: 2 ea. Oilwell A1700PT triplex
Liquid mud: 3740 bbl
Bulk capacity: 13,300 cu ft
Cement unit: Halliburton 400 HT

Heave Compensation System
Western Gear model 800-17-20
Lift capacity: 800,000; 1,200,000 locked
Total stroke: 20 ft
Max. operating conditions: 15 ft heave; 7½ sec

Core Retrieving Winch
National duel drum, independent drive
Motor: D 79 electric, 750 hp
Capacity: 31,000 ft of ½ in. line per drum

Derrick
Model: Dreco 147 ft
Height above water line: 205 ft
Rating: 1,200,000 lb Static; 800,000 lb dynamic

Drawworks
Model: Oilwell E3000;
Motors: 2 ea. EMD M89 – ALB x 1200 hp ea.
Line: 1¾ in.
Brakes: Dual Baylor Elmagco model 7838

Drill String Support
Type: Dual elevator handler (no slips; protects pipe)
Model: Varco DEHS/471
Reach: 60 in. horizontal; 36 in. vertical
Elevator size: 350 or 500 ton; modified side door

Drill String Bending Restraint
Moonpool guidehorn (no riser support)

Iron Roughneck
Model: Varco IR 2100
Pipe size: 4 in.– 8½ in. diameter
Make up torque: 63,000 ft•lb
Breakout torque: 75,000 ft•lb

Top Drive
Model: Varco TDS3
Motor: EMD M89 electric, 1000 hp
Continuous torque: 30,000 ft•lb @ 169 rpm
Intermittent torque: 40,000 ft•lb
Breakout torque: 60,000 ft•lb
Maximum speed: 250 rpm

Rotary Table
Model: Oilwell A-49 1/2
Motor: EMD D 79 MB
Maximum speed: 325 rpm

Cranes
Type: Bucyrus Erie Pedestal type
Model: 2 x MK60; 70 ft and 80 ft booms
1 x MK 35 with 80 ft boom

Pipe Rackers
Type: Horizontal racking (triples)
Manufacturers: Western Gear/VMW
Capacity: 24,700 ft of 5 in. drill pipe
: 9900 ft of 5 ½ in. drill pipe

ASK System
Manufacturer: Nautronix
Model: 5002 (dual redundant)
Type: intermediate baseline
Capabilities: 2% of water depth
Signal: Beacon primary; GPS secondary

Personnel Complement
Capacity: 135

Scientific Spaces
Square footage: 18,000 ft^2
Refrigerated core storage: 26,250 ft

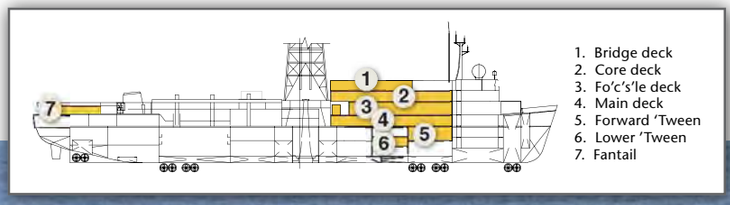
Normal Fuel Consumption
Cruising: 33–47 mt/day
DP (3 engines): 16.5–19.5 mt/day
DP (2 engines): 12–13 mt/day

Transit Speed: 10.5 kt (optimal)

Helideck: Sikorsky S-61 capable

Moonpool: 22 ft diameter

SODV Science Services



Survey Capabilities

- Navigation system
- Bathymetry system
- Seismic sound source and acquisition systems

Drilling and Coring Capabilities

Drilling and Coring

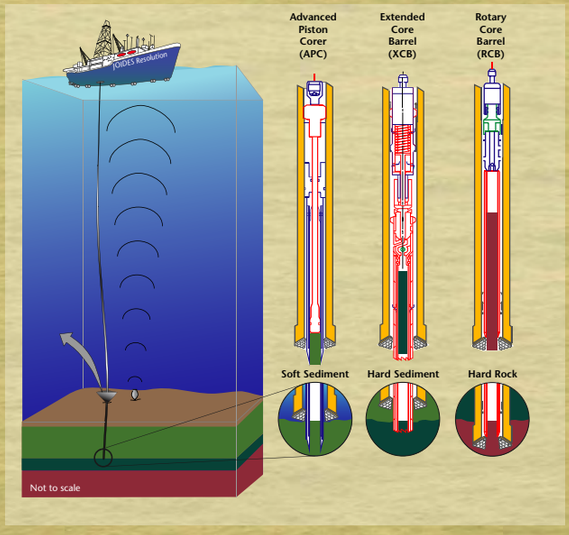
- Soft sediment: Advanced Piston Corer (APC)
- Hard sediment: Extended Core Barrel (XCB)
- Hard rock: Rotary Core Barrel (RCB)
- Borehole reentry capabilities

Downhole Sampling Tools

- Recovery of cores at in situ pressure
- Recovery of in situ formation fluid

Drilling Parameters

- Rig Instrumentation System



Network and Communications

- High-capacity data servers and ~7 TB storage system
- Wireless network available in laboratory areas
- Network connections available throughout ship
- Over 20 Mac and ~50 Windows workstations
- Over 20 Windows instrument hosts
- Laboratory Information Management System
- Printers throughout labs and large-format plotter
- Video distribution system
- 24/7 ship-to-shore communications
- Digital Asset Management System

Curation, Data, and Publication Services

- Shore-based, secure, refrigerated core storage
- Shore-based analytical equipment
- Janus relational database
- Production of state-of-the-art publications since 1986

Formation Measurement Capabilities

IODP and Third-Party Tools

- Formation temperature
- Formation pressure
- Resistivity at the bit

Formation Logging

- Resistivity
- Gamma ray attenuation density and lithology
- Natural gamma radiation
- Neutron porosity
- Acoustic velocity
- Bottom-of-hole check shot
- Vertical seismic profiling
- Borehole temperature

Long-Term Observatories

- Circulation Obviation Retrofit Kit (CORK)

Shipboard Analytical Capabilities

Geological Analyses of Core Samples

- Lithology, structures, fossils, etc.
- Microscopy
- X-ray diffraction mineralogy
- Stratigraphic correlation
- Heat flow analysis

Physical Properties of Core Samples

- Digital imaging
- Moisture and density analysis
- Magnetic susceptibility
- Gamma ray attenuation bulk density
- Natural gamma radiation
- Resistivity
- Thermal conductivity
- Spectral reflectance
- Magnetostratigraphy and rock magnetism
- Acoustic velocity
- Sediment strength

Chemistry and Microbiology

- Hydrocarbon and natural gas chromatography
- Organic constituent analysis
- Pyrolytic hydrocarbon content characterization
- CHNS analysis
- Total organic carbon analysis
- Coulometric carbonate analysis
- ICP-AES elemental analysis
- Ion analysis in aqueous samples and extracts
- Halogenated compound detection
- Microbiological microscopy
- Sample mass measurement
- Gas analysis
- Radioisotope van for sample preparation

Staff Support

- Drilling and coring technical support
- Laboratory and logging technical support
- Information Technology technical support
- Curatorial and data management support
- Publications and Web support

IODP
INTEGRATED OCEAN DRILLING PROGRAM

IIS-PPG meeting

28th-29th January 2008, Pau

ESO and the Arctic

Dan Evans
ECORD Science Operator

ECORD Science Operator

Contents

- Background of ECORD Science Operator (ESO)
- Manik's presentation (abbreviated)
- ECORD initiative: EUREKA
- ACEX and Arctic possibilities

Composition of ESO

- ESO is a consortium of European scientific institutions formed to undertake Mission Specific Platform (MSP) operations for ECORD on behalf of the Integrated Ocean Drilling Program (IODP). The ESO Implementing organisation (IO) comprises:

  - British Geological Survey
  - University of Bremen
  - European Petrophysics Consortium

Role of ESO

- Current contractual relationships based on working within IODP
  - Operate within ECORD
  - Work within the greater IODP set-up
  - Manage expeditions from start to finish

  - Almost all staff also work on other projects
  - Not dependant on IODP funds

Manage expeditions

- Scheduling at OTF and early planning
- Appointment of co-chiefs and science party
- Scientific Prospectus preparation
- Obtaining suitable platform and infrastructure
  - Coring and logging systems
  - Scientific facilities
- Manage offshore phase
- Prepare for and manage Onshore Science Party
- Co-ordinate IODP expedition publications

- **ESO contracts a suitable platform for each project in order to achieve its scientific objectives**

- **Also contract expertise, e.g. SPRS**


28th August –
6th September
Mobilisation by Seacore of
DP Hunter in Tampa,
Florida.

IODP
INTEGRATED OCEAN DRILLING PROGRAM

ECORD
Science Operator

All platforms required to carry out all IODP minimum measurements

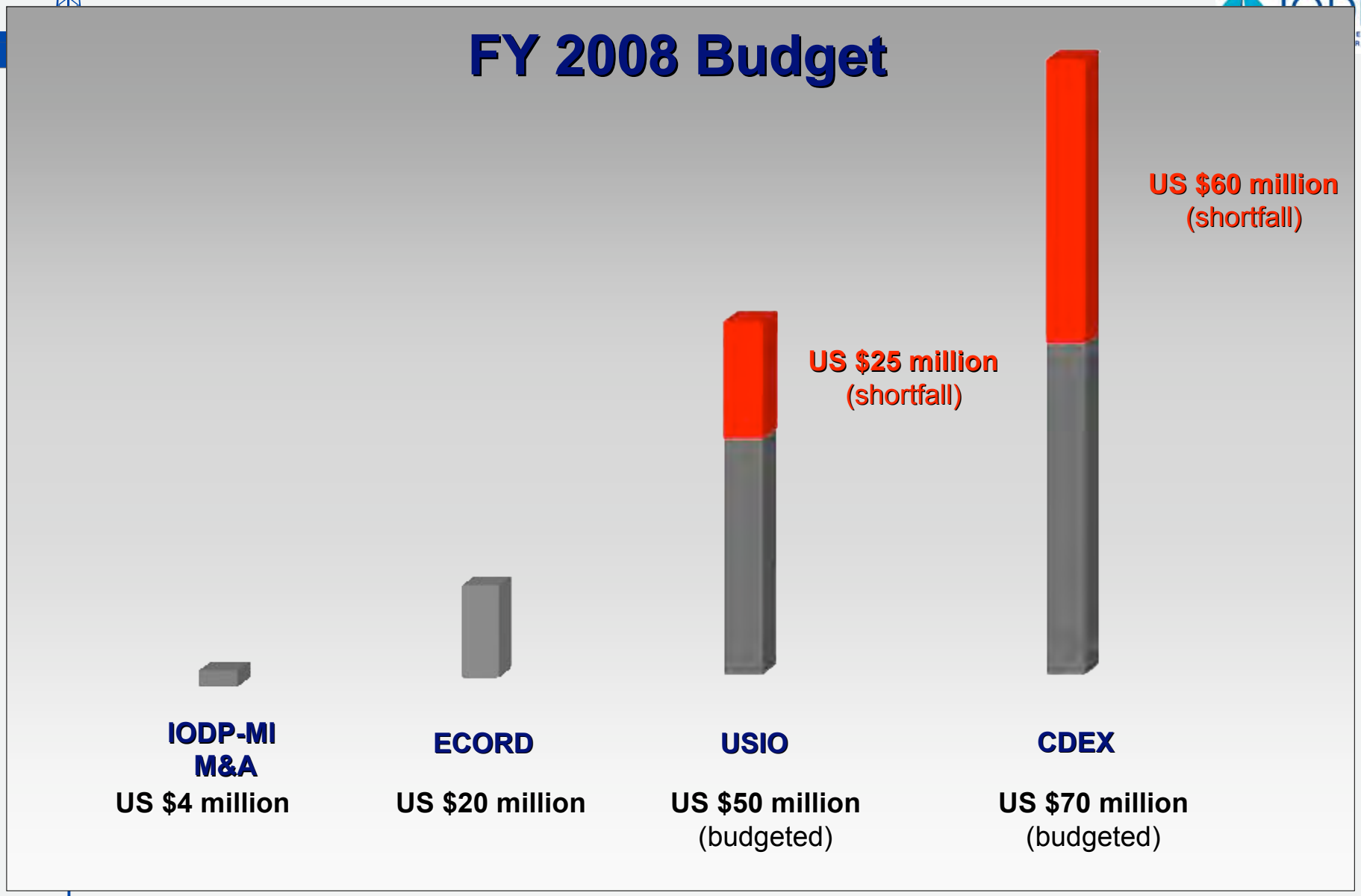
Future MSP expeditions

- 2008 – New Jersey Shallow Shelf #313
  - Probably a lift barge will be contracted
- 2009 – Great Barrier Reef
- 2010 - 2013
  - 13 MSP proposals currently with IODP, but no others at OTF
  - Would hope to implement 2/(3) expeditions
  - ESO has spare capacity

Reality check by Operations Task Force (OTF)

- In the 2010-2013 time frame we have 12-16 SODV operations and 2 MSP operations to schedule.
- Even if only OTF's tier 1 proposals are retained, there is only room for eight or nine other proposals.
- These will be drawn from existing and new proposals.

FY 2008 Budget



Participation

- Please let us know by February 1, 2008, if your company would consider joining this program.
- We would like to know in strict confidence your favored drilling sites and areas, scientific problem, and the deliverables you would like to receive out of this program.
- We would like to receive your views about confidentiality of data, to what period confidentiality will extend and any other conditions.

- All information from interested companies will be combined into a single document without identifying the proposing companies.
- Houston meeting on February 21-22, 2008 (hosted by ExxonMobil) to arrive at framework with companies to form the basis for a five-year drilling proposal by academic scientists.

DELIVERABLES

- A comprehensive report will be provided to participating companies at the end of each two-month expedition.
- Companies will have full access to all the cores and logs obtained.

Participation of Academic Scientists

- Participation of academic scientists is essential to the program.
- Scientists exact role to be determined.
- Extent of confidentiality to be negotiated.
- Basic premise of the program will be that these scientists have access to at least part of the data collected, and the rights to eventually publish results.

Relationship to IODP

- Program is to be parallel and complementary to IODP.
- No government contract funds to be used in program.
- Permission required by NSF for use of U.S. government equipment on the *JOIDES RESOLUTION.*
- No participation from IODP Science Advisory Structure panels.

Arctic Program

- Strong interest expressed by companies for an Arctic drilling program.
- If interested, respond by February 1, 2008 with favored ideas and areas for Arctic drilling.
- Arctic drilling proposed if enough interest. Drilling by leasing drilling platforms.
- Planning and terms similar to proposed drilling by the *JOIDES Resolution*. …..to be discussed

Arctic drilling

ECORD's initiative

The ECORD council is investigating the possibility of using the EUREKA/EUROGIA scheme to develop an industry-academy project in the Arctic

What is EUREKA?

- EUREKA is a pan-European network for market-oriented, industrial R&D.
- Created as an intergovernmental Initiative in 1985, EUREKA aims to enhance European competitiveness through its support to businesses, research centres and universities who carry out pan-European projects to develop innovative products, processes and services
- EUREKA currently has 38 full members : 25 europeans countries + Norway + Switzerland + Russia + Ukrain + Turkey , etc…
- EUREKA is funded at the national level, “à la carte” scheme

http://www.eureka.be/

What is a « EUREKA CLUSTER » ?

- EUREKA 'Clusters' are long-term, strategically significant industrial initiatives.
- They usually have a large number of participants, and aim to develop generic technologies of key importance for European competitiveness, primarily in ICT and, more recently, in energy and biotechnology.
- Clusters bring together large companies – very often competitors – along with SMEs, research institutes and universities, sharing both the risk and benefits of innovation. They focus on developing and commercially exploiting new technologies.

EUROGIA

Cluster of EUREKA

Chairman :
Gabriel Marquette
(Schlumberger)

EUROGIA

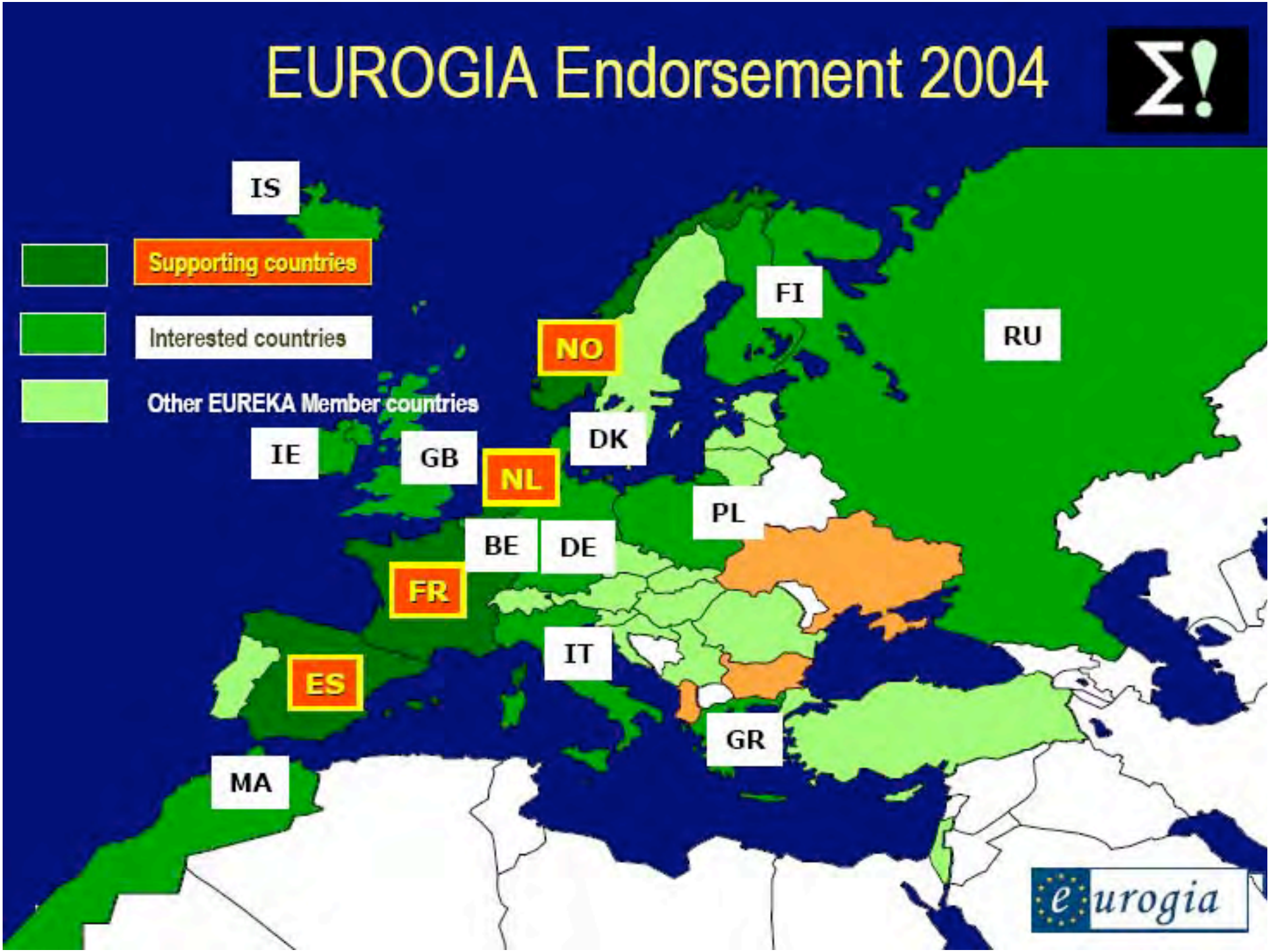
A EUREKA initiative

for sustainable development

and more secure energy supply

towards a cleaner and safer future

ECORD Science Operator


EUROGIA Endorsement 2004
Supporting countries
Interested countries
Other EUREKA Member countries
IS
NO
FI
RU
DK
IE
GB
NL
PL
BE
DE
FR
IT
ES
GR
MA
eurogia

Organisation Σ!

E-PAC
Public Authorities

Advisory Group
O&G Operators
EUROGIF President

Board
Industries

- Programme Compliance
- Projects Labelling
- Relations with Public Authorities

Technical Committee
Industries &
Research Institutes

- Projects Evaluation
- Recommendations to the Board
- Programme evaluation (yearly)

Office
Operations

- Management of Association
- Internal & External Communication
- Partners database management

Calls 01 to 05 Results

- *Five Calls were completed from 2004 to 2006:*
  2 evaluation meetings and one Board meeting per call.
- Project Outlines: **32**
- Labelled Projects: **23**
  - Total budget: **83 M €**
  - Number of participanting orgnisations: **81**
  - Of which, *Large Enterprises:* *38*
    SMEs: *19*
    Research Institutes: *12*
    Universities: *12*
  - Countries involved: **11**

eurogia

Advantages of this scheme

- it allows industry to share the risk : the cost is shared between industry and the governments.
Industry may be more interested in participating in an Arctic project if the cost is shared

- at the government level, it is tapping other funding sources
For example, in France, the 2007 EUREKA budget was 100 M€ from the Ministry of Industry and 3 M€ from the Ministry of Research

There are still a number of question to address

- **Is this scheme applicable ? What level of funding can we expect ?**

Bruno Goffé, the ECORD chair, is meeting with the chairman of EUROGIA today

- **We need to identify European companies interested**
- **We need to identify European scientists interested**
- **Can scientists from other countries be involved ?**
- **ECORD does not own a platform. What we can offer is the experience of ESO and the expertise of scientists**
- **What would be the relationship of such a project with ECORD/IODP ?**
- **What would be the benefit for ECORD/IODP ?**

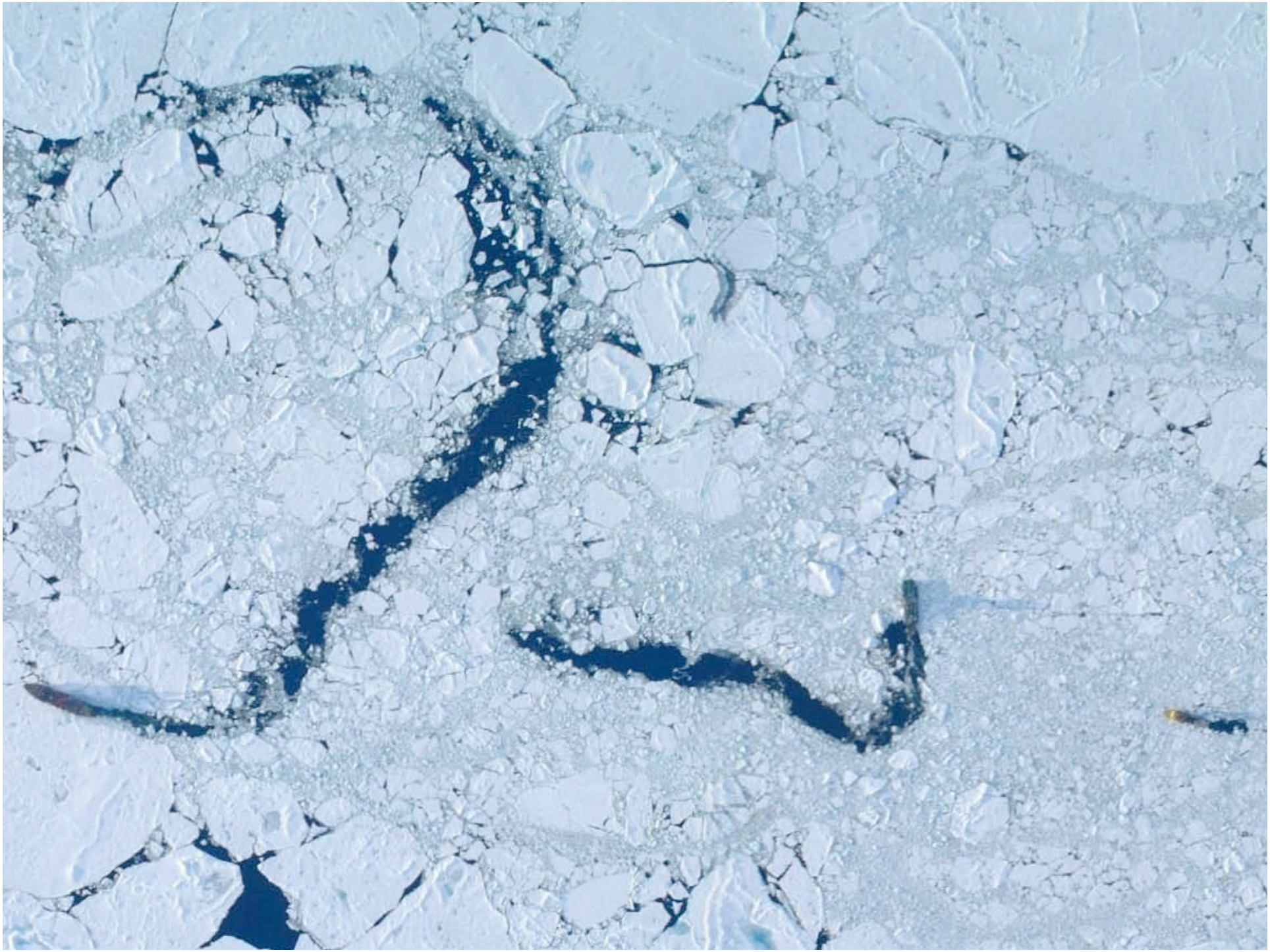
ACEX

IODP Expedition 302

August-September 2004

The ACEX fleet


Moonpool fitted
for ACEX
Vidar Viking mobilised by Seacore
as a drilling vessel in 6 days at
Aberdeen



ACEX

- Was a particularly complex expedition and a recognised high-risk operation
- Total cost $11.85M plus *Oden* in kind
- Prior to ACEX there had been no successful drilling in Arctic ice; groundbreaking
- Excellent scientific results emerging – 3 *Nature* papers
- A total of 339 metres of core were recovered in 4 holes.
  - 68% of cored section

ACEX Finances (%)

ESO	10
Seacore	12
Sovetskiy Soyuz	17
Vidar Viking	26
Oden, including $1.2M from Sweden	18
SPRS (helicopters, ice management, staff)	9
Schlumberger	3
Other costs, incl. drilling consumables, containers, lab and consumables etc	5

$13.2 million

Budgeted fuel costs	$656k
Actual fuel costs	$978k (7.5%)

IIS-PPG Questions

- Cost
  - $13.2M for 3 weeks drilling in ice in 2004
  - Site surveys
- Capability
  - In ACEX it was c.1700m drillstring
  - Drilled to over 400m in c.1100m water
- Scheduling
  - August-early September recommended
- Fiscal responsibilities
  - Liabilities – risk
  - Cost ?
  - Site surveys ?

Current Challenges – Andy Pepper

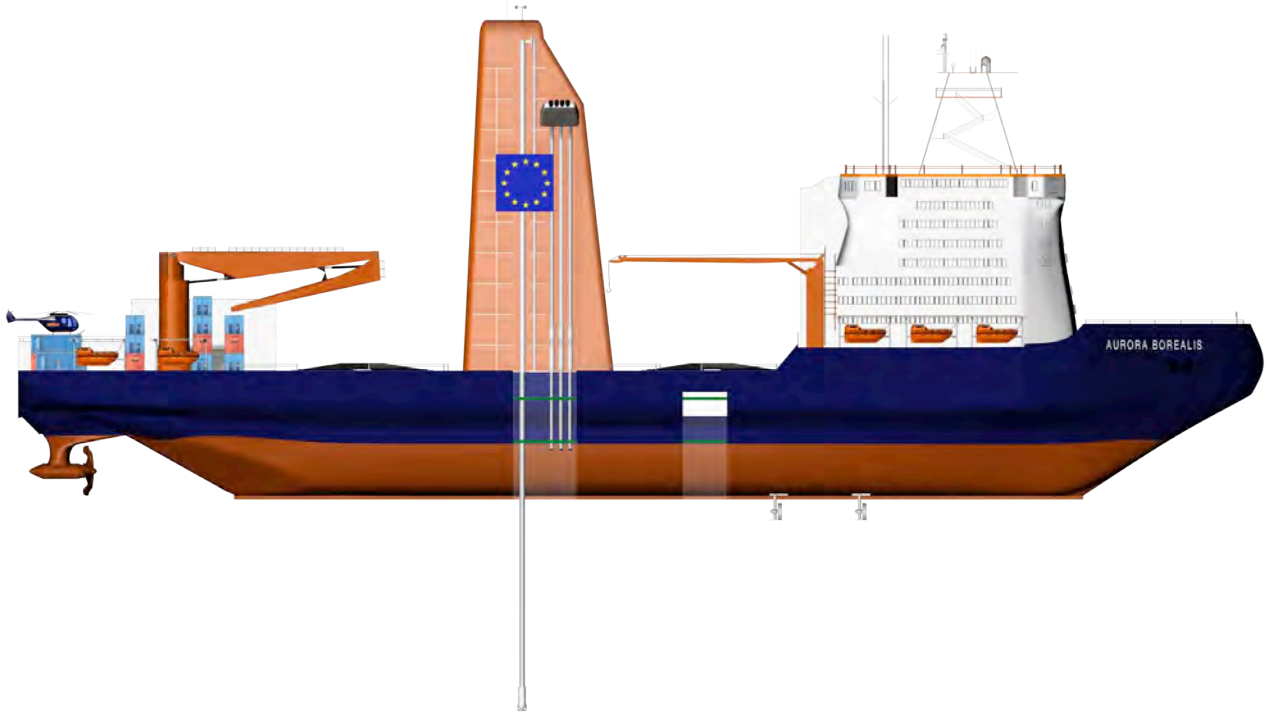
- • The "Deal"
  - Can Scientific and Industry communities find a win-win and attract more drilling
  - $$ into the IODP program to everyone's mutual benefit?
- • Pace
  - Short summer operational window – how long to execute how many wells?
  - Priority?
- • Confidentiality
  - If, as expected, a limited number of industry companies fund the drilling program, what do they get in return (e.g. term confidentiality limits)?
- • Politics
  - Will Russia participate pursuant to recent deep water claim?
  - If not, plan B? (i.e. can a meaningful program be devised, excluding Russian waters?)
- • Environmental
  - Deep water locations less sensitive? N.B. ongoing negotiations between Shell and native communities offshore North Slope (Platts, 07/07/05)
- • Operating Platform
  - Operating capability, cost, scheduling of Chukyu, JR, vs. MS
  - Ice-free areas for Chikyu and JR

Possible personal vision

- Expedition not IODP-related at all
  - Termed an ECORD consortium
  - Separate IODP and industry involvement
    - Environmentalist issues, eg GBR
- Industry consortium initiative
  - Managed by ESO, or its component(s)
  - Involving scientists selected on basis of IODP network
- EUREKA; plus other industry funding

AURORA BOREALIS

an European Research Icebreaker with Deep-Sea Drilling Capability



Graphik: Fernando V. Delgado/Christian Michaelis, AWI

– Technical and Conceptual Aspects –

Funded by:

Federal Ministry of Education and Research

SEVENTH FRAMEWORK PROGRAMME

Graphic: Fernando V. Delgado/Christian Michaelis, AWI

Background and User Needs

AURORA BOREALIS
EUROPEAN RESEARCH ICEBREAKER

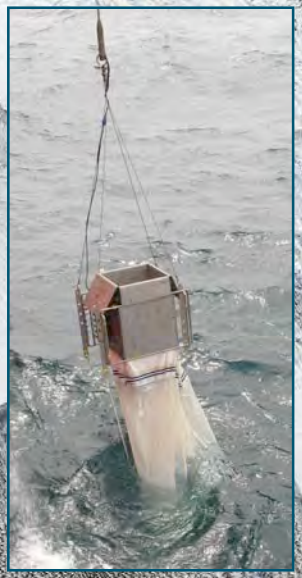
Arctic and Antarctic Operational Challenges

- Year-round marine science and observation programs.
- Independence from ice and weather conditions.
- Autonomous deep-sea drilling.
- High-quality cores in high-sedimentation realms.
- Routine Deployments of ROV/AUV.
- Advanced integrated ice management and forecasting.
- Ground-truthing high-resolution remote sensing information.
- Deploy and maintain real-time ocean observatories.
- Adaptable infrastructure for future technology developments.
- **Modern multi-purpose research platform.**

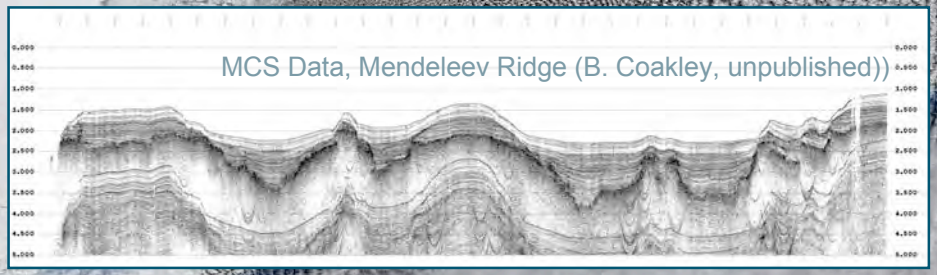
Multi-Disciplinary All-Season Research Platform

Cryosciences
Winter ice thickness / properties

Physical and Chemical Oceanography
- water sampling -



Geophysics
MCS, 3D, optimized arrays, streamer winches, etc.



Geological and Biological Oceanography

Long sediment cores (e.g. CALYPSO-system), Plankton nets, fishery biology, remotely operated drilling, surface sediment sampling, etc.

New and Future Technologies

Integrated Remote Operations in Polar Regions

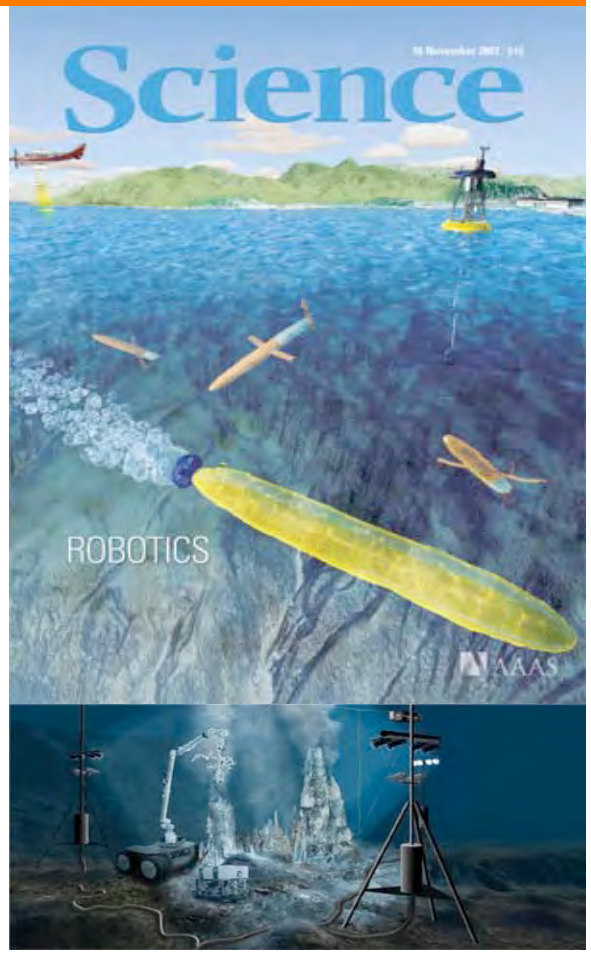
Science Topics (non-exclusive):

Life in extreme, small-scale environments, e.g. hydrothermal vents, gas seeps,…

Real-time and widespread observations of pelagic ecosystems and dynamic changes.

Regional mapping of oceanographic parameters.

Physiology, population dynamics of polar benthic and planktic communities in open ocean, coastal shelf seas, under Antarctic ice shelf.

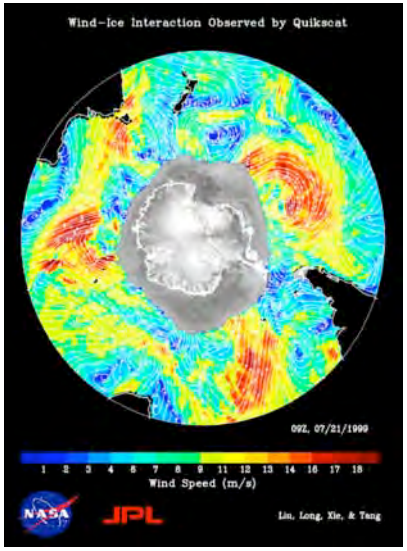


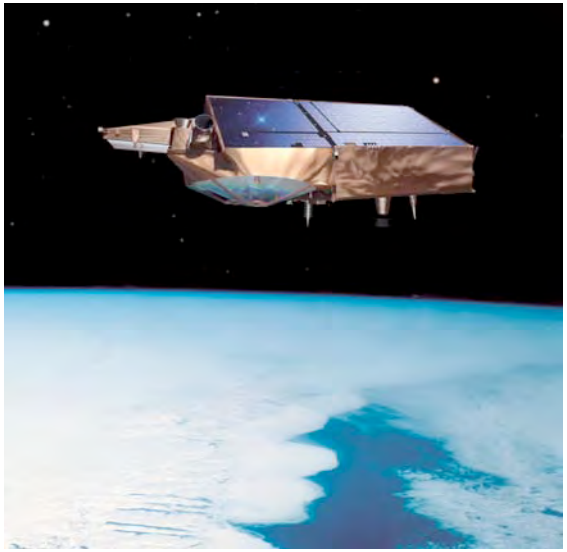
AUV and ROV deployments challenging to impossible in most polar regions from regular multi-purpose icebreakers or smaller vessels.

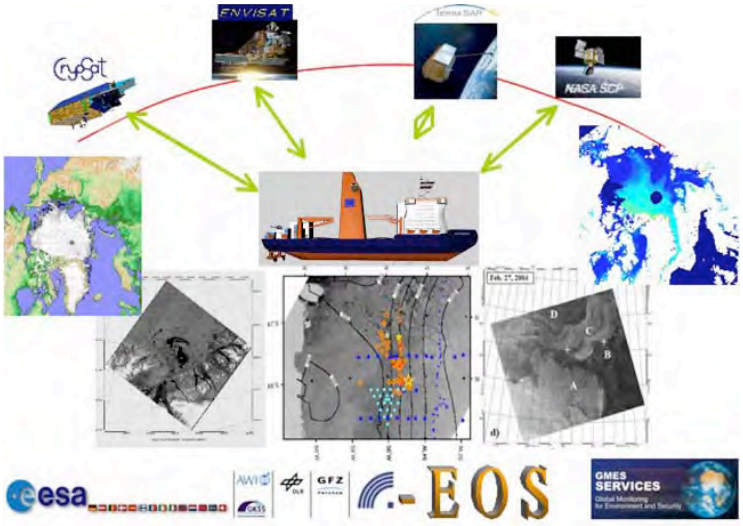
If deployed, logistical efforts and associated costs hinder recurring or wide-scale missions.

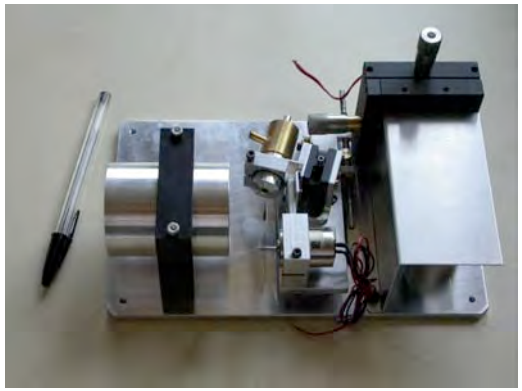
- **AURORA BOREALIS: permanently equipped with mid-sized ROV.**
- **Facilitate all-seasons' deployments, under unfavorable ice conditions.**

Monitoring Systems for Arctic sea ice, icebergs and atmospheric interactions









Aerosol LIDAR and
Optical Particle Sizer (onboard ITALICA)
Photos: Massimo del Guasta

- Ground-truth remote sensing/satellite data.
- Helicopter support for ice monitoring.
- Permanent laboratories for continuous ship-borne monitoring of marine meteorology and atmospheric physics

  (e.g. tropospheric aerosols: IFAC-CNR proposal, M. del Guasta, V. Vitale).

Characteristics — Scientific Drilling

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EUROPEAN RESEARCH ICEBREAKER

Scientific Ocean Drilling and Geological Oceanography

Financial

- All IODP IOs and agencies face substantial budget cuts, limiting resources for Scientific Drilling.
- SODV, CHIKYU operations: 6-8 months/yr.
- ECORD-MSP: every other yr.
- => Likely no further polar drilling operations within current IODP (–2013).

Technical

- IODP–MSPs do not provide full range of tools and analytical services.
- Full compatibility with drilling and coring tools of other Implementing Organisations (IOs) and platform operators needed.
- Future cost-effective joint development and ownership of tools for deployment on ALL platforms.

ERICON-AURORA BOREALIS provides a cost-effective platform to fulfill high-priority science goals of IODP-MSP and will help shape eventual IODP successor format in favour of EU/Russian interests.

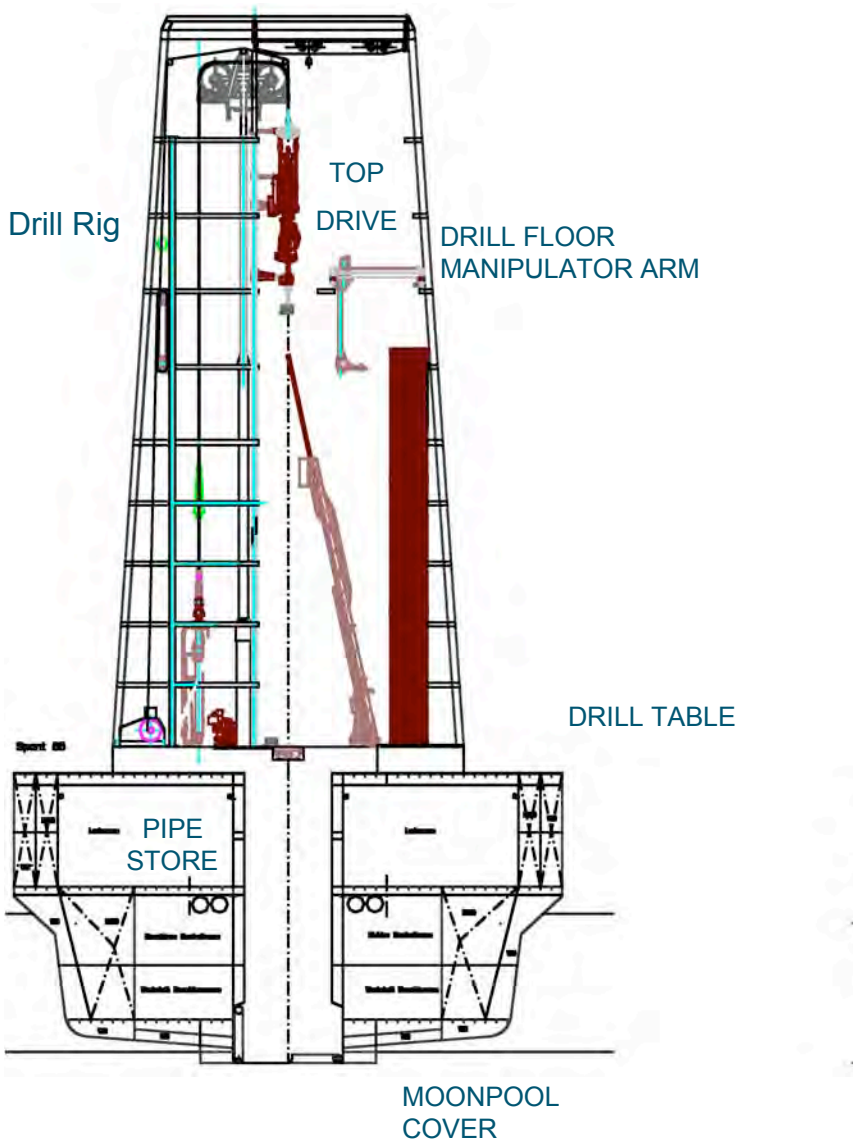
Polar Scientific Deep-Sea Drilling

Concept for Arctic Drilling Equipment and Infrastructure

- Derrick is located within enclosed structure.
- Derrick is connected to exhaust casing and funnel.
- All preparation works will be done under weather protection (e.g. pipe tripping, inner core barrel assembly).
- Workflow strategy during drilling operations.
- Deal with emergencies during drilling and coring under polar conditions.

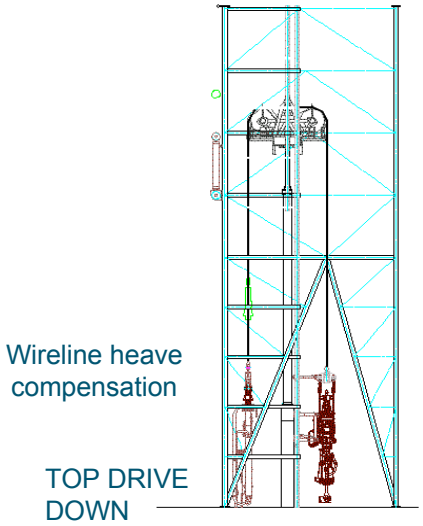
Longitudinal Section – Drilling Part

Midship Cross Section – Drilling Part



ERICON-AB steps

- Propose framework for drilling equipment, not final components.
- Specifications according to IODP.
- Full compatibility ensures operation of all IODP-certified tools and services.
- Market survey/development AHC/PHC system and drilling equipment.



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EUROPEAN RESEARCH ICEBREAKER

Scientific Ocean Drilling – Measurements

IODP Standard Measurements

Rig Floor

Weight on bit
Penetration rate
Mud pressure
Mud density
Mud logging (including gas analysis)
Driller depth
Pumping rate
Rotation rate
Heave compensation

Minimum Measurements

Biostratigraphic
Visual core description
Smear slides Thin sections
Split-core digital photography (section line-scan and/or table layout)
Core logging: • natural gamma ray • gamma ray attenuation • magnetic susceptibility
Temperature profile
Moisture and density/porosity (discrete samples)
Downhole logging: • natural gamma ray • spectral gamma • density • porosity • resistivity • sonic • borehole imaging
Borehole depth scale

Core Petrophysics:

Natural remnant magnetism (NRM) with step-wise demagnetization
Core logging: P-wave velocity
P-wave velocity (on split cores)
P-wave velocity (discrete samples)
Thermal conductivity (both whole core and pieces)
XRF scanner
X-ray CT scanning
Whole round core digital surface photography
Color reflectance
Close-up and micro-imaging
Core orientation and structural measurements

Downhole Petrophysics:

Vertical seismic profile or checkshot
Downhole pressure
Open-hole temperature Caliper
Magnetic susceptibility
Magnetic field

Microbiology and Geochemistry :

Pore Water Chemistry (nutrients, pH, alkalinity, sulfate, chloride, major and trace elements).
Whole rock major and trace elements
microbiology (Cell counts on fixed samples)
Bulk carbon-hydrogen-nitrogen-sulfur (CHNS) analyses
Contamination testing
Carbonate analyses

Standard measurements shall be carried out across all platforms and/or shore-based labs).

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Scientific Ocean Drilling – Measurements II

IODP Supplemental Measurements

Measurements that if are needed to satisfy expedition objectives should be made available to IODP. Some of these techniques will undoubtedly be 3rd party tools or require single expedition leasing of a tool.

Downhole Petrophysics:

Logging While Drilling and Measurements While Drilling
Logging While Coring
Permeability through packer tests
High-resolution gamma
Nuclear magnetic resonance
Formation testing
Pressurized core sampling
Downhole sidewall sampling
Pressurized fluid/gas sampling
Spontaneous potential (SP)

Geochemistry and Microbiology:

Laser ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS)
DNA and biomarker microbiological analysis
Phospholipid analysis

Core Petrophysics:

Anhysteretic Remanent Magnetization (ARM) and Isothermal Remanent Magnetization (IRM) with step-wise acquisition and demagnetization (step-wise acquisition and demagnetization)
Permeability on discrete samples
Vp and Vs, anisotropy and attenuation
Vs
Thermal imaging of core with infrared
Nuclear magnetic resonance
Particle size analyzer
Shear strength (i.e., miniature vane method)
Non-contact resistivity
XRF scanner
Whole round core digital surface photography

Anticipated Technical Liaison and Cooperation with External Organisations

- IODP-USIO
  - Technical specifications and expertise for riserless ocean drilling.
  - Ensure full compatibility with existing gear, tools and analytical services on SODV and CHIKYU.
  - Ease the way for future joint IO developments.
- IODP-MI / ECORD
  - Adherence to existing and future IODP protocols (EDP, ORTF, etc.).
  - Integration into IODP-MSP framework.
- ANDRILL / CRP
  - Small riser system for drilling overconsolidated facies.
  - Mobile, containerized drilling components (mud, drill water tanks, etc.).
  - Equipment operation in polar conditions.
- ICDP
  - Mobile modularized laboratory systems.
  - Potential development of jointly used containerized modules.

Graphics: Delgado/Michaelis, AWI

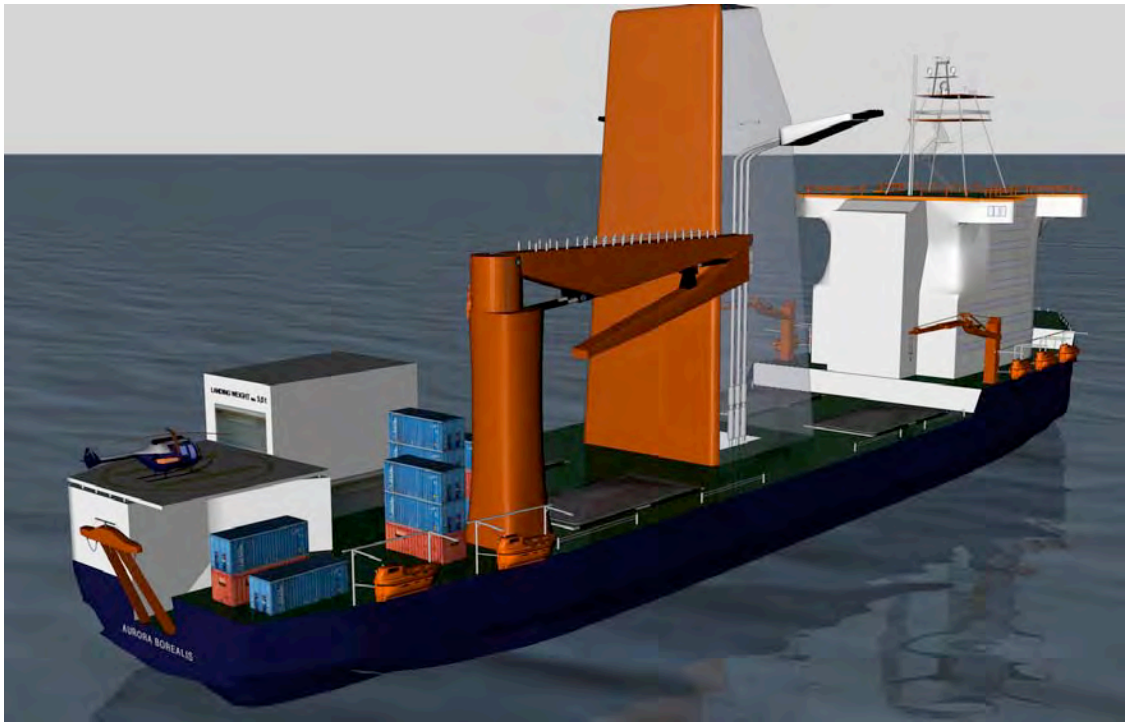
Technical Specifications of the vessel

AURORA BOREALIS
EUROPEAN RESEARCH ICEBREAKER

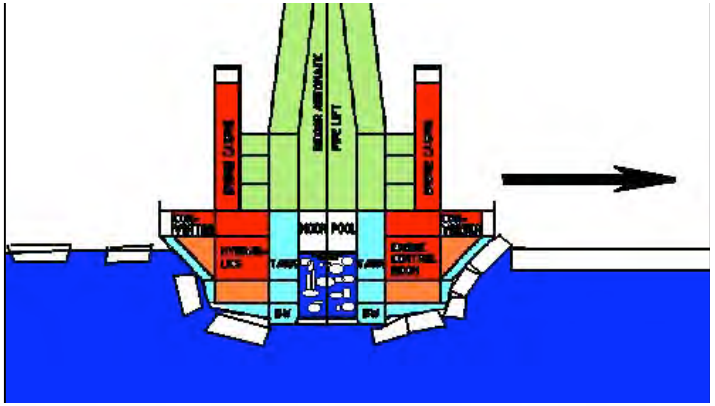
Future technology - Requirements

- Powerful icebreaker with more than 73.000 HP (about 55 MW)
- Operates autonomously (no add. icebreaker support).
- Year-round deployment: Polar Areas/open ocean.
- Location of deployment: Central Arctic, Arctic basins, Antarctic Shelf Seas.
- Drilling: about 1000 m below surface, in down to 5000 m water depth. Deep-Sea drilling within closed sea-ice cover.

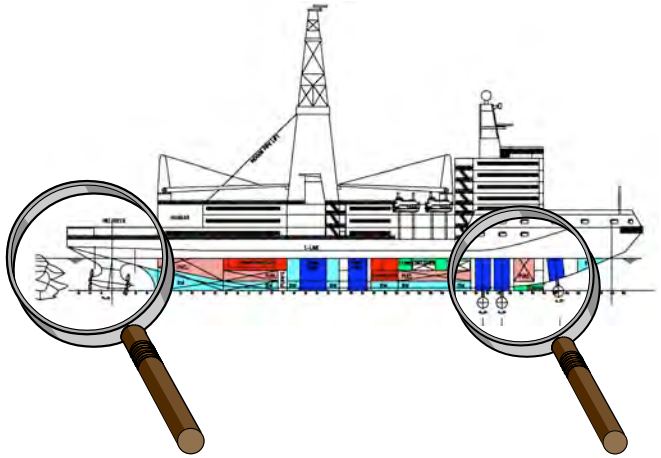
- 160-190 m length.
- Twin Hull.
- Modularized laboratory systems - mission specific laboratories.
- Two or more helicopters: scientific and logistical support.
- Two moon-pools.



Dynamic positioning in drifting ice…

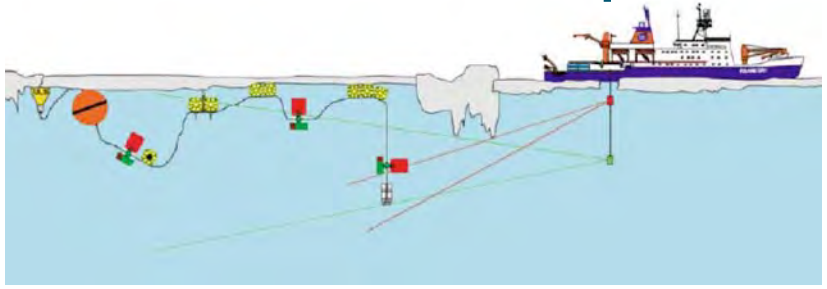


- Icebreaking with slow or no vessel speed
- Icebreaking sideways: Hull shape
- High propulsion power
- Mechanically robust azimuth propulsion pods
- Ice-resistant, powerful thruster system



Extensive testing of models in open water and ice tanks before final design.

Alternative Operation Modes - Moon Pools

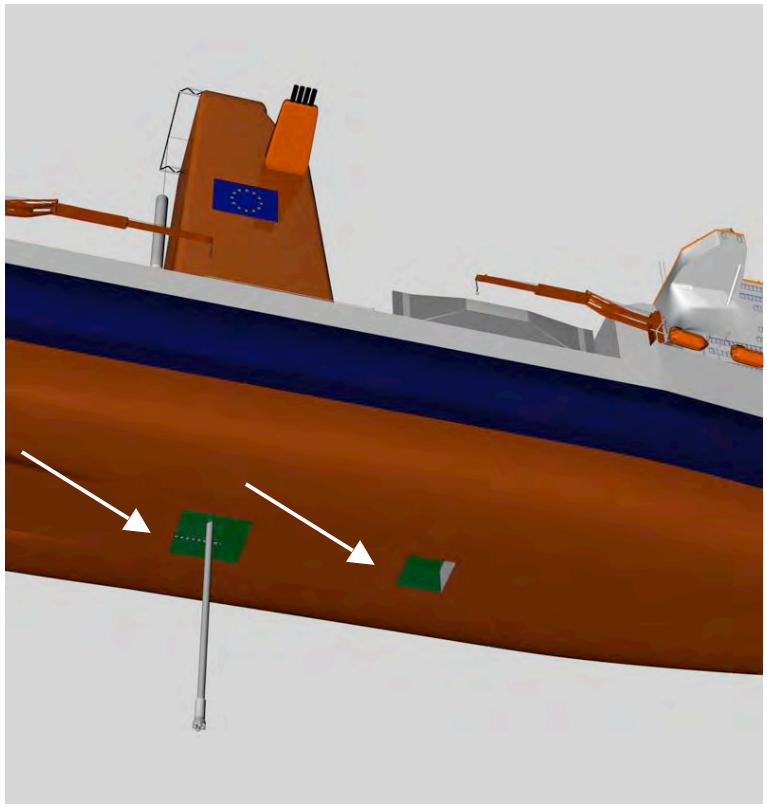


Most instrument deployments are dependant on partly open water within ice cover.

But most tool and instrument deployments within closed ice cover are technically challenging…

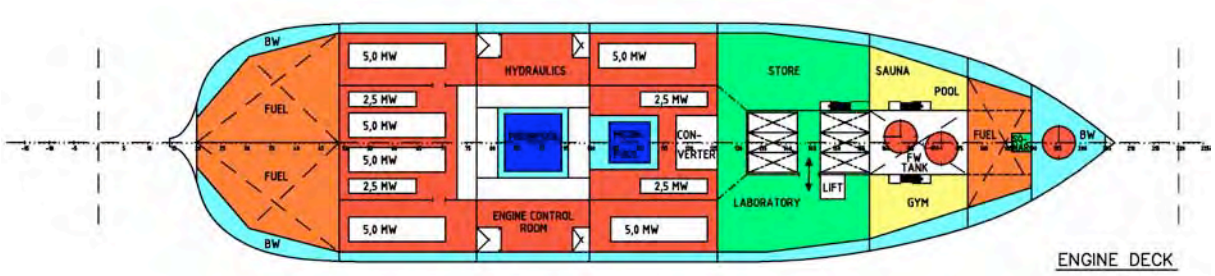
Moon Pools for deep-sea drilling, sediment (CALYPSO) coring, monitoring,…

Second Moon Pool for alternate ROV, AUV and other equipment (hydrography, biology) deployments.



Safety Management

- Propulsion systems withstanding severest ice conditions.
- Complete double-hull design.
- Fully redundant engine rooms and equipment.
- Redundant dynamic positioning system (DP2).
- Full weather protection (e.g. hangars) for science and drilling operations.
- Combine high ice-breaking capacity of vessel with stable open water performance (e.g. transits, Southern Ocean).
- Advanced concepts for de-icing superstructure and equipment to maintain ship's stability.
- Complete equipment for sustained survival of crew and scientists in Total Loss of Ship scenarios.



Future Steps

- Interactive process with european scientists/engineers to determine needs for technical equipment, ship—tool—instrument interfaces and requirements.
- Integration of all feasible science equipment and gear's requirements into AURORA BOREALIS general arrangement plans.
- Establish technical liaison contacts to partner institutes and expert organisations to exchange and communicate necessary specifications of scientific equipment.
- Maintain permanent liaison with SODV operator (IODP-USIO) to guarantee full compatibility to post-refurb. IODP riserless drilling and shipboard analysis.
- Survey and plan advanced riserless drilling gear (USIO tech. spec.).
- Central integrated concept for all science winches onboard.
- Survey and evaluation of available/to be planned modularized laboratory solutions for seemless integrated, mobile scientific workflow solutions.
- Technical work is carried out by engineering companies and shipyards selected after an European public tendering process.
- Set up protocols for technical communication and specifications for all partners.

Draft Timeline for Technical Design Work

Working Title	12/07	01/08	02/08	03/08	04/08	05/08	06/08	07/08	08/08	09/08	10/08	11/08	12/08
Analysis existing documentation													
Functional Design / Draft													
Design Calculations, Vessel lines													
Naval Construction Planning w Equipment													
Planning Engines / Propulsion System													
Vessel's techn. Systems													
Electrical Engineering/DP													
Model Construction													
Ice Tank Trests													
Open Water Tests													
Verification-Model tests													
Cost Calculation / Project Plan Construction / Documentation													

Technical Design Work carried out by general contractor.
Association with external specialized engineering companies/individual experts

- General Contractor: Schiffko GmbH, Hamburg, Naval Architects.
- Ice model basin and icebreaker design expertise: Aker Arctic, Helsinki.
- Additional ice experiments and testing: Hamburg Ship Model Basin.
- Dynamic Positioning: D. Deter, API, Houston and Kongsberg Maritime.
- Offshore, Drilling: Prof. Dr.-Ing. Clauss, Berlin and USIO-TAS / Sci Ops / ODL.

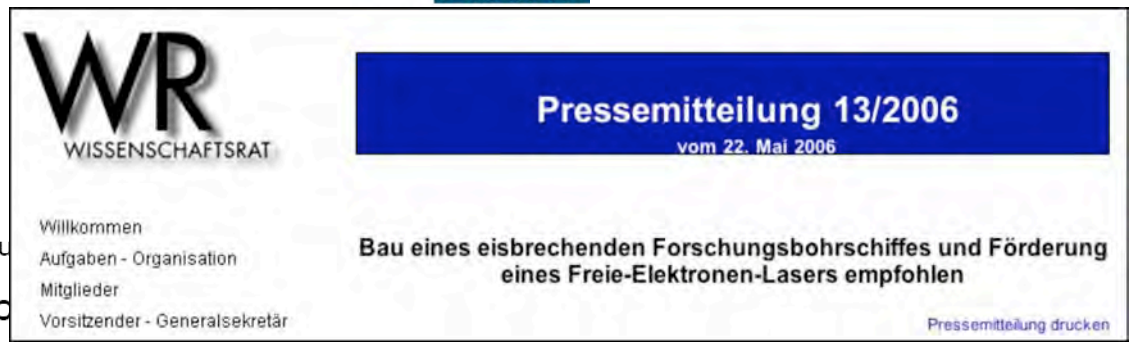
AURORA BOREALIS Technical Challenges

- Most innovative polar research ice-breaker to date.
- Exclusive use for science programs.
- Capable for year-round operations in entire Arctic Ocean and around Antarctica.
- Deep-Sea drilling in >95% of polar waters.
- First vessel with Dynamic Positioning (DP-2) capability in ice conditions.
- First vessel with routine deployment of heavy equipment through moon-pools.
- During operations, year-round helicopter support for scientific/logistical needs.
- Advanced sea-ice observation and forecasting systems.
- European leadership in innovation, technology in polar shipping and research.

Projekt: AURORA BOREALIS

Schedule

- 2001? Idea
- 2002 Evaluation of the Wissenschaftsrat; proposal was postponed in order to prepare a technical feasibility study
- 2004 Science Perspective: AURORA BOREALIS: A long-term European perspective for deep Arctic Ocean Research 2006-2016
- 2005 Technical Feasibility Study AURORA BOREALIS, University of Applied Sciences Bremen and Hamburg Ship Model Basin (HSVA)
- 2005 Anew Evaluation of the Wissenschaftsrat
- 2006 Positive Review and recommendation to construct the ship with obligations
- 2007 BMBF Funding for technical refinement and implementation in the international science community
- 2. MAI submission of a proposal to the European Commission for the ESFRI preparatory phase



WR WISSENSCHAFTSRAT

Pressemitteilung 13/2006
vom 22. Mai 2006

Willkommen
Aufgaben - Organisation
Mitglieder
Vorsitzender - Generalsekretär

Bau eines eisbrechenden Forschungsbohrschiffes und Förderung eines Freie-Elektronen-Lasers empfohlen

Pressemitteilung drucken

Table 1: Estimated R&D, constru

Remaining Development and C

	Total Staff (FTE)	Staff Costs	Other Costs	Total Cost
Costs for remaining experiments, development and optimisation	6,0			6,0
Costs for construction	103,5		245,1	348,6
Total (R&D+ Construction	109,5			354,6

Operation (Mill €)

	Total Staff (FTE)	Staff Costs	Other Costs	Total Cost
Estimated annual operation costs	6,3		11,2	17,5

Uncertainties in the operational costs are the increasing fuel prices. Unil now, we have not identified potential shipyards, which is able to build the ship. The foreseen budgetary reserves are about 5% of the total costs.

Table 2: Estimates of total costs for R&D and construction by year in (Mill €).

	2005	2006	2007	2008	2009	Total Costs
Civil construction		43.6	70	130	60	303.6
Core facility				25	25	50
Experiments etc.		0.5	0.5			1
Total (costs per year)		**44.1**	**70.5**	**155**	**85**	**354.6**

The German “Wissenschaftsrat” recommended the construction of the ship. The project has got funding for remaining experiments from the BMBF

The construction and operational costs are based on the technical feasibility study of 2004. New estimates amount to:

ca.22 Mio € operational costs

ca. 400 Mio € construction costs

BMBF project: AURORA BOREALIS

- Project running time: March 2007 - January 2009
- Two main targets: 1. Technical refinement of the vessel

  and model tests and 2. Implementation of AURORA

  BOREALIS as a European / international Research Icebreaker
- Technical Work will be carried out after a public tendering process by companies and shipyards in Germany and Europe
- **Call for tender just closed!!**
- Installation of a coordination office for AURORA BOREALIS at the AWI

European Strategy Forum on Research Infrastructures

ESFRI

EUROPEAN ROADMAP FOR RESEARCH INFRASTRUCTURES

Report 2006

	Projects (in alphabetical order per discipline)	Estimated Construction Cost (M€) *	First possible operations for users	Indicative Operational/ Deployment Cost (M€/year)
Environmental Sciences	AURORA BOREALIS	360	2010	18
	EMSO	150	2011	20
	EUFAR	50 - 100	2007	2 - 4
	EURO ARGO (GLOBAL)	76	2010	6
	IAGOS-ERI (GLOBAL)	20	2008	6
	ICOS (GLOBAL)	255	2010	13
	LIFE WATCH	370	2014	70

Proposal for the Preparatory Phase: New Infrastructures identified in the 2006 EC-ESFRI Roadmap for FP7

Proposal Acronym:

ERICON-AURORA BOREALIS

48 Months (EC Requested Budget 6.98 Million Euro)

Coordinator: Dr. Paul Egerton - European Science Foundation

Project Manager: Dr. Nicole Biebow – Alfred Wegener Institute

16 Partners (Funding Agencies, Scientific institutes, Companies) of 10 European Nations are participating

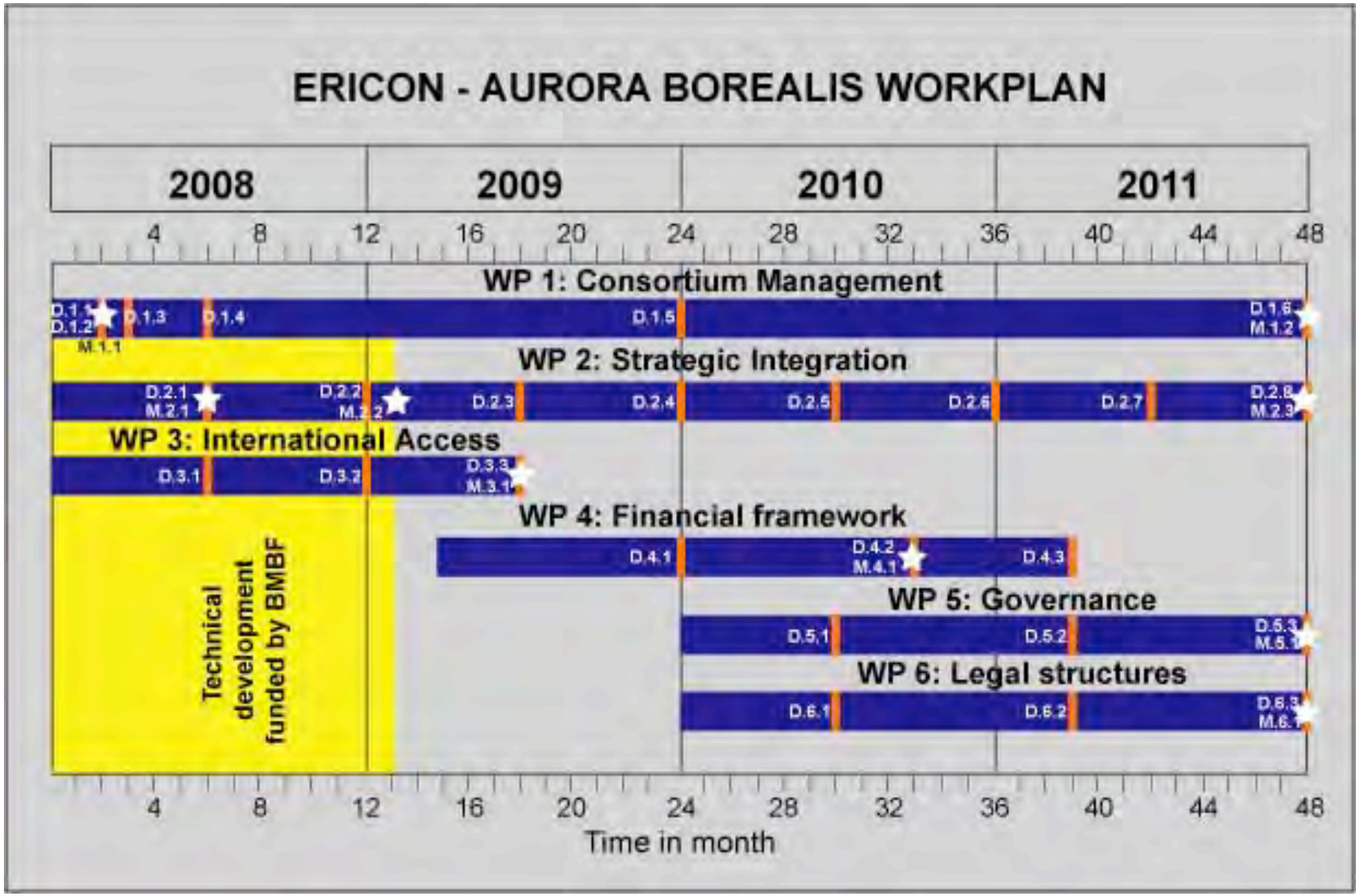
Submission to the EC on 2. May 2007

Very positive Evaluation by the Commission in August 2007

Offered budget 4.5 Millon Euro

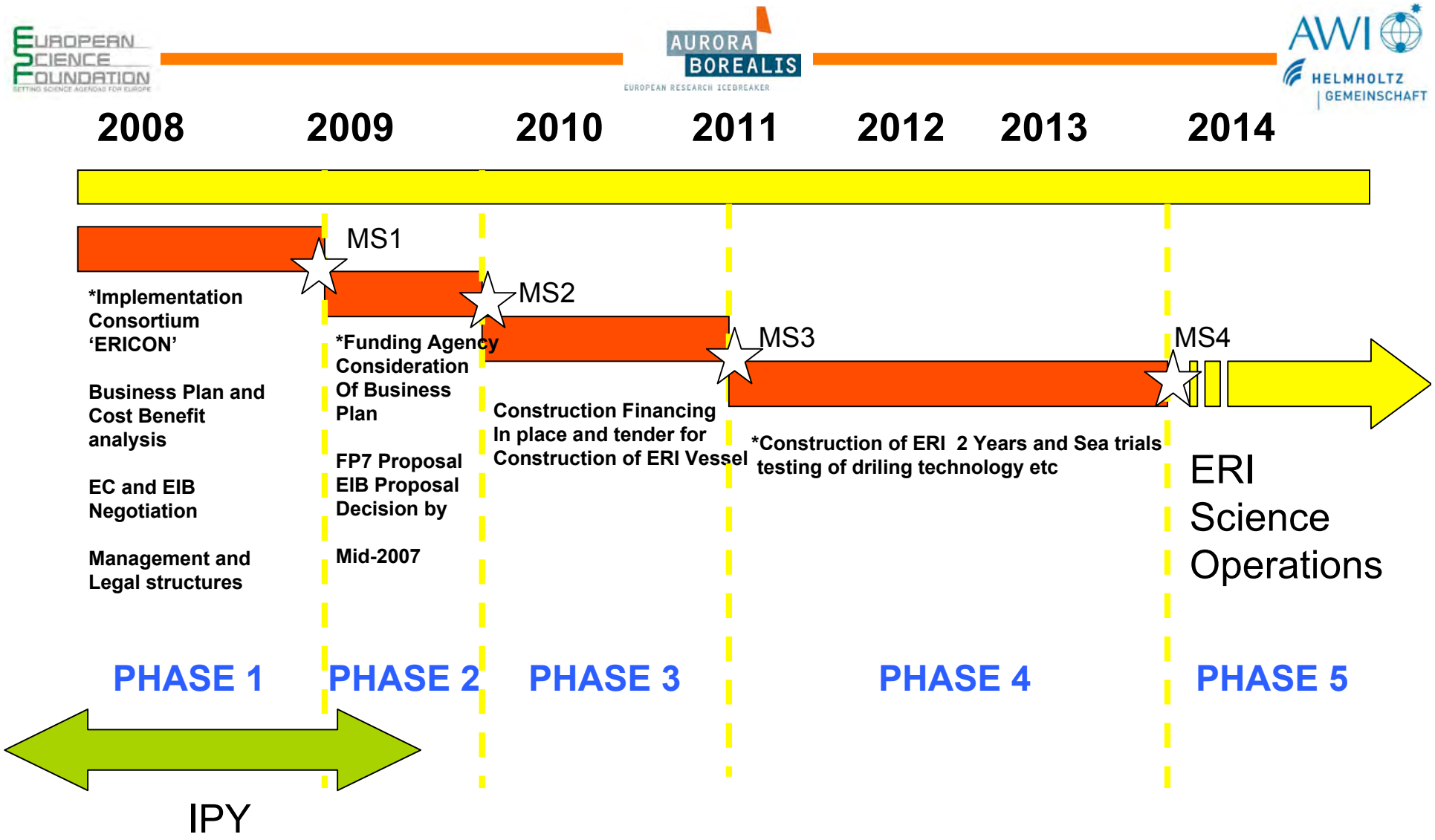
Negotiations with the Commisson on 17. September 2007

Project begins 01.03.2008


ERICON - AURORA BOREALIS WORKPLAN
2008
2009
2010
2011
4 8 12 16 20 24 28 32 36 40 44 48
WP 1: Consortium Management
D.1.1
D.1.2
M.1.1
D.1.3
D.1.4
D.1.5
D.1.6
M.1.2
WP 2: Strategic Integration
D.2.1
M.2.1
D.2.2
M.2.2
D.2.3
D.2.4
D.2.5
D.2.6
D.2.7
D.2.8
M.2.3
WP 3: International Access
D.3.1
D.3.2
D.3.3
M.3.1
WP 4: Financial framework
D.4.1
D.4.2
M.4.1
D.4.3
WP 5: Governance
D.5.1
D.5.2
D.5.3
M.5.1
WP 6: Legal structures
D.6.1
D.6.2
D.6.3
M.6.1
Technical development funded by BMBF
4 8 12 16 20 24 28 32 36 40 44 48
Time in month

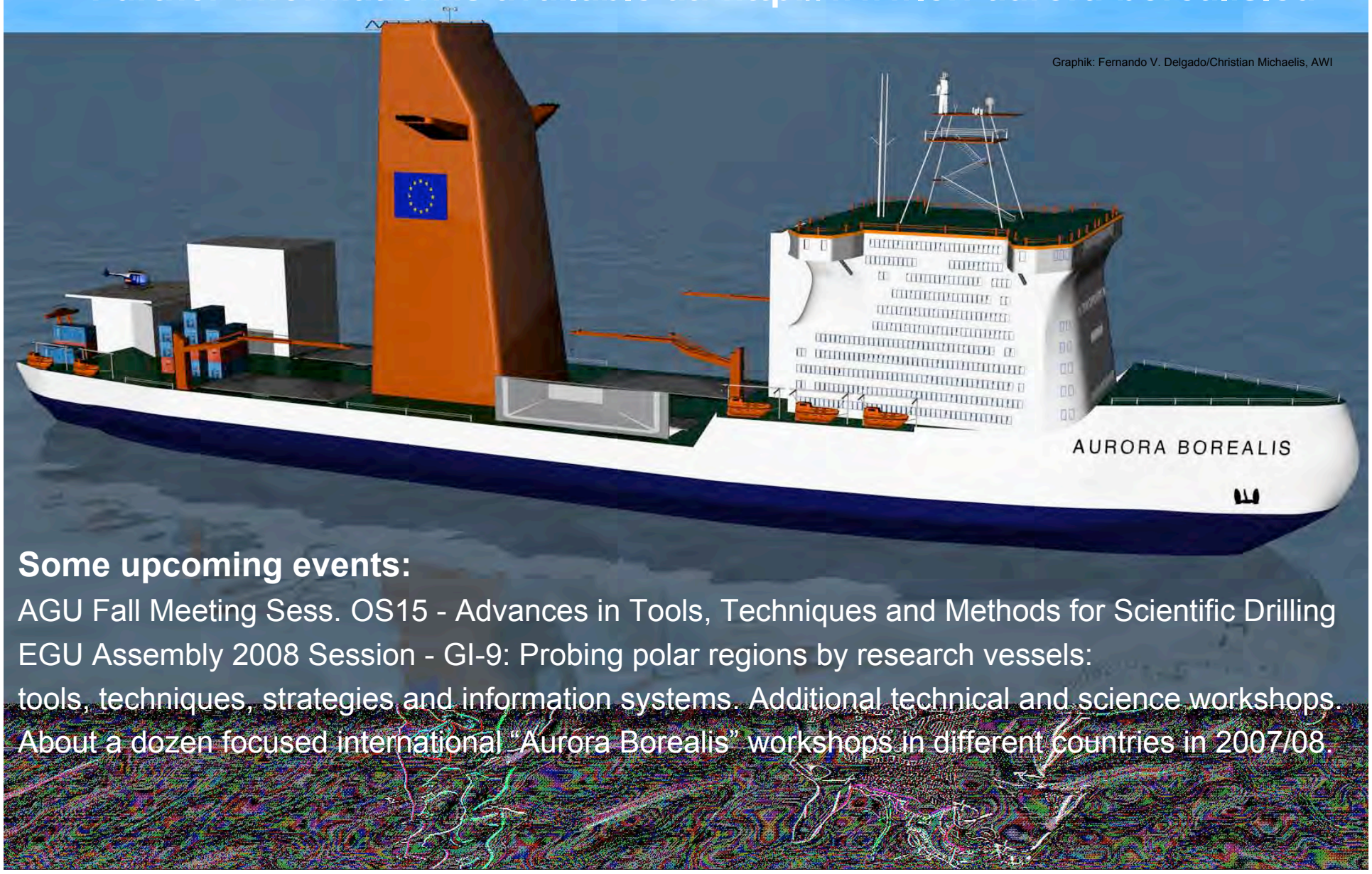
Participants of the ERICON Project

Fondation Européenne de la Science	ESF	France
Alfred Wegener Institute for Polar und Marine Research in the Helmholtz Association	AWI	Germany
Consiglio Nazionale delle Ricerche	CNR	Italy
Programme Nazionale di Ricerche in Antartide	PNRA	Italy
Centre National de la Recherché Scientifique - Institut National des sciences L'Univers	CNRS-INSU	France
Arctic and Antarctic Research Institute	AARI	Russia
Institut Polaire Francais Paul Emile Victor	IPEV	France
Merentutkimuslaitos (Finnish Institute Marine Research)	MTL	Finland
Netherlands Organisation for Scientific Research	N W O	Netherlands
University of Bergen	UIB	Norway
Bundesministerium für Bildung und Forschung	BMBF	Germany
Fonds National de la Recherche Scientifique	FNRS	Belgium
Bulgarian Antarctic Institute	BAI	Bulgaria
Fundatia Antarctica Romana	FAR	Romania
Mazars & Guerard	MAZARS	France
Aker Arctic technology Inc	AARC	Finland



Road-Map and Developmental Stages for Implementation of ERI-AURORA BOREALIS Large-Scale Facility 2008-2014

Further information is available at: http://www.eri-aurora-borealis.eu



Some upcoming events:

AGU Fall Meeting Sess. OS15 - Advances in Tools, Techniques and Methods for Scientific Drilling

EGU Assembly 2008 Session - GI-9: Probing polar regions by research vessels:
tools, techniques, strategies and information systems. Additional technical and science workshops.

About a dozen focused international "Aurora Borealis" workshops in different countries in 2007/08.

Thanks for your attention!

AURORA BOREALIS
EUROPEAN RESEARCH ICEBREAKER

CHIKYU operated by CDEX

IISP-PPG Meeting at Pau

2008.1.28-29

Yoshi Kawamura CDEX

Facts and Conditions

- **CHIKYU was built for IODP.**
  - **CHIKYU was built by Japanese Tax.**
  - **CHIKYU is owned by JAMSTEC.**
  - **CHIKYU operates by government budget.**

  - ***CHIKYU was modified to MODU in 06***

Chikyu POC Scenario

JPFY											
APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FRB	MAR

Ideal World (All Riser Operation):12M X 3Box X 5億円 = 180億円

JPFY											
APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FRB	MAR

Real World (Current POC Budget):19Box X 5億円 = 95億円

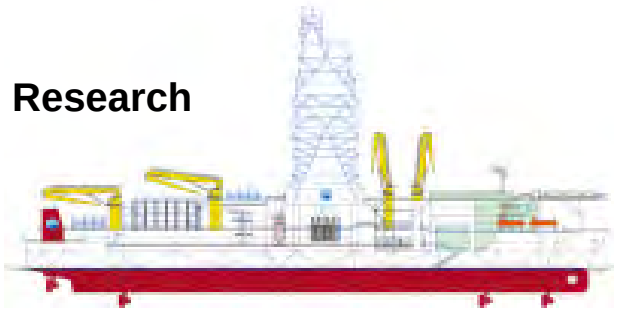
JPFY											
APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FRB	MAR

Taira World (MEXT+ODB):5M X 3Box X 5億円 + 2M X 2Box X 5億円 = 95億円

Activity Priority Guideline

- **IODP operation : MEXT**
  - **Request from Government : METI**
  - **Maintain operation cost:**
    - Related Japan's Economy
      - Others

"CHIKYU"
Dynamically Positioned Scientific Research Riser Drilling Vessel



GENERAL

Rig Type	Drill Ship
Design	JAMSTEC / Mitsubishi Heavy Industry / Mitsui Engineering and Shipbuilding
Built Year	2004
Builder	Mitsubishi Heavy Industry / Mitsui Engineering and Shipbuilding
Clarification	NK (NS*(Deep Ocean Drill Ship, MNS*(M0), DPS B)
Station Keeping	Dynamically Positioned
Accommodation	150 persons
Helideck	EH 101 Capable
Max Drill Depth	10,000m
Min/Max Water Depth	*500m/2500m * Depend on Metocean Condition
Operating Conditions for Drilling	Wind 23m/s, Wave 4.5m significant Current 1.5Knot

PRINCIPAL DIMENSIONS

Length overall	210.0 m
Breadth	38.0 m
Depth	16.2 m
Draft (max)	9.2 m
Gross Tonnage	57,500 MT
Variable load (Operating)	25,500 MT
Variable load (Transit)	25,500 MT

STORAGE CAPACITY

Bulk cement	4 x 4,125 ft^3 (467 m^3) 2 x 1,030 ft^3 (58 m^3)
Bulk Mud	6 x 4,125 ft^3 (701 m^3) 2 x 1,000 ft^3 (57 m^3)
Sack Storage	500 m^2
Active Mud Pit	6 x 85m^3 (510 m^3)
Reserve Mud Pit	8 x 212.5m^3 (1,700 m^3)
Fuel	8,000 m^3
Helifuel	3 X 2,500 lit.
Potable water	600 m^3
Drill water	2,500 m^3
Pipe Storage	1,020 m^2
Riser Storage	780 m^2

MACHINERY

Main Engines	Mitui 12ADD30V, 6 x 5,270kw
Main Generator	Nishishiba, 6 x 5000kw
Auxiliary Engines	Mitui 6ADD30V, 2 x 2,640kw
Auxiliary Generator	Nishishiba, 2 x 2500kw
Emergency Engines	MHI S12A2-MPTA, 1 x 600kw
Emergency Generator	Nishishiba, 560kw

DYNAMIC POSITIONING SYSTEM

Model	Mitsui Engineering and Shipbuilding Triple Redundancy DPS
Class	Class 2+
Primary Reference	2 x DGPS 2 x GPS-GLONASS-Hybrid System
Secondary Reference	1 x Acoustic Position Reference System (LBL, SSBL)

PROPULSION/THRUSTERS

Azimuth Thrusters	2 x Non-Retractable 4,200kw 4 x Retractable 4,200kw
Side Thruster	1 x 2,550kw
Transit Speed	10 knots

MAJOR DRILLING EQUIPMENT

Derrick	Bailey Dual well Derrick 21.95 m(L) X 18.3 m(W) x 70.1m(H)
Drawworks	National Oilwell Model EH-V-5000, DC Drive
Motion Compensator	HYDRALIFT Crown Mounted Type Max Compensating Load : 518MT Max Static Load : 1,250MT Stroke : 25 ft (7.62 m)
Top Drive System	HYDRALIFT Model HPS 1000 2E AC, 1,000ST
Rotary Table	
: Main Hole	Varco BJ Model RST 60-1/2, 1,350ST
: Aux. Hole	Varco BJ False Rotary 49-1/2, 750ST
Dual Elevetor Handling System	Blohm+Voss Hydraulic Operated, Model 675000-Y Load Capacity : 750 ST, Pipe Range : 2-3/8" - 9-5/8"
Pipe Handling System	HYDRALIFT, Model : Hydra Racker IV Vertical Pipe racker for fourble (Quadruple) stand
Mud Pumps	3 X National Oilwell 14-P-220, 7500psi, 2200hp
Solid Control	Gumbo Separator : 2 x Brandt Single Gumbo Scalper Shale Shaker : 6 x Brandt Double VSM 300 Desander : 2 x Swaco, Model 3-12 D-SANDER Mud Cleaner : 2 x Swaco, Model 8T4 D-SILTER with Adjustable Linear Shaker Cenrifuge : 3 x Brandt, Model RT HeviJet 362 Degasser : 2 x Burgess Magna-Vac Model 1500
Cement Pumps	to be advised

BOP/RISER

LMRP	18-3/4" 10,000 psi, Shaffer Dual Spherical BOP
BOP	18-3/4" 15,000 psi, Cameron Model 15TL Double 18-3/4" 15,000 psi, Cameron Model 15TL Triple
Diverter	ABB Vetco Gray, Model KFDS/CSO 60-1/2" suport housing, Working Press. 500 psi,
BOP Control System	ABB Offshore Systems Inc., MUX Control System
Marine Riser	Cameron Load Share Type, 21.75" & 21.375"OD x 90ft jt Connector Type LoadKing 4.0(Load Rating 1,814MT) Choke/Kill : 4.25"ID, 15,000 psi, Booster : 4"ID, 7,500 psi
Telescopic Joint	65 ft (19.8m) stroke, Load Rating 1,814MT Working Press. : 500 psi
Riser Tensioners	HYDRALIFT, Direct Cylinder Tensioner N-line System 6 cylinders, 52' stroke, 363 ton /ea. capacity
Riser Management System (RMS)	Fugro/MCS, On-Line Riser Analysis System
Choke Manifold	Cameron, 3-1/16" 15,000psi / 4-1/16" 5,000psi 2 X Hydraulic remote choke, 2 X Manual choke

PURPOSE-BUILT TUBULAR

Drill Pipe	5.5"DP X 0.506" S-150, 5-3/4"FH NK DSTJ 3,250m 5.5"DP X 0.415" S-140, 5-1/2"FH NK DSTJ 1,500m 5.0"DP X 0.362" S-140, 5-1/2"FH NK DSTJ 5,000m

OTHERS

Deck Crane	Hydralift, Electric-Hydraulic Knuckle Boom Crane 2 x 85MT, 2 x 45MT
Laboratories	2,300m2 Various types of laboratories which are Microbiology, Paleomagnetics, Geochemistry, Paleontology/Petrology, Geochemistry on board
Sewage Treatment Plant	Sasakura Engeering, Super Trident ST-15
Drill Cuttings/Waste Mud Treatment Unit	Sasakura/Telnite/Apollo, IHI MU 1) Mud Drain Concentration System 2) Condesed Water Purifying System 3) Solidify & Dehydration System

"CHIKYU" is constructed with a two phase plan. This Specification is represented the first phase plan.
The following are major Up-Grading plan in the second phase.

*** Maximum Operational Water Depth 2500m to 4000m**
*** Full Dual Derrick Operation**
*** Enhancement of Mud Pump and Solid Control Equipment**

IIS-PPG Future

How can the PPG (or new SAS group based on the PPG) help to foster new ties between IODP facilities and industry.

1. Re-visit issue about an industry task force, in light of the fact that the President of IODP-MI has stated that they cannot form such a task force (see also #4),

2. Current status on industry-IODP proposals and pre-proposals that the PPG has encouraged,

3. Differences in industry interactions in different countries and how this can be used to the benefit of IODP.

4. What is the future direction for the PPG (finish, continue, evolve to a new type of group).

As you mentioned the PPG has a 3 year mandate. Based on the past PPG activities and the potential new opportunities for the industry to directly charter IODP facilities, SPC would like a recommendation for its March 2008 meeting on future activities within the PPG or a new entity evolving from this group.

•

What can we do?

a) Convert the IISPPG into the ITF. What is the proper mechanism for implementing the ITF? NOT AN OPTION
b) De-emphasize the role of the IISPPG on proposal nurturing and focus on industry-IODP collaborations (merging industry and IODP drilling and seismic data sets, sponsoring projects for engineering and service companies on IODP platforms, encouraging interactions between industry and academic scientists, etc.)
c) Establish, or at least encourage, industry funded consortia to work on IODP related projects (on- or off-contract) of interest to various cross-sections of industry.
d) Continue our role in nurturing industry related IODP drilling proposals. This would be best accomplished by establishing task specific PPGs. For example, if we want a formal, public, white paper on drilling in the Arctic there should be a specific PPG for this task, populated with experts on the Arctic.
e) Dissolving the IISPPG (it was only established with a three year life-time anyways) and encouraging more industry participation on the remaining Scientific Advisory Committees.

Geographical Distinctions

It has become clear in my 18 months or so on the IISPPG, that the style and culture of academic-industry collaboration varies significantly among the countries involved. For example, the ILP in the UK is a very active group whose goal, to encourage industry-IODP science proposals, overlaps the IISPPG mandate. Another example, is the industry-IODP workshop that was held after the Sapporo meeting in Tokyo. In planning the future role of the IISPPG, or a similar committee, I think we should consider different strategies for different geographical areas.

Future ILP

IISPPG Consensus Statement 0707-02: Given the already strong proposal pressure and the much reduced availability of the IODP drilling platforms for the remainder of the program, there is little point in further "promoting development of IODP drilling proposals to address industrial priority research within SAS or within the context of the ISP". We recommend an IISPPG meeting in Paris in January-February 2008 to complete the white papers and to consider other avenues for pursuing academic-industry liaisons within SAS (for example, more mini-workshops similar to the Tokyo workshop).

IISPPG Consensus 0707-06: We recommend industry participation at the IODP rapid climate change workshop if approved (Kurt Rudolf).

IISPPG Consensus 0707-07: We recommend that technical sessions and/or panel discussions be held at AAPG, GSA and/or EAGE (Kurt Rudolf, Andy Pepper, and Marty Perlmutter to evaluate).

From Ralph to IISPPG, 19 Sept/07

... 3) Although not stated explicitly in their Consensus Statements, the SPC does not accept the notion that our next meeting in Paris will be our last. (See IISPPG Consensus 0707-02.) I received some serious email from IISPPG members after the July meeting (some from members who were not at the Sapporo meeting) that they were strongly in favor of continuing the IISPPG's original stated mandate, including the white paper process and our outreach activities. The IISPPG was originally established with a three year life (our first meeting was in the Hague in July '06) and a review of our performance is scheduled for the third year. So we will continue to pursue our mandate as best we can. (Actually I think we have been doing an excellent job so far.)

4) For now, there are two groups: the ITF and the IISPPG. At one point there may have been some confusion that the industry members of the IISPPG would transfer their membership to the ITF. This is not the case. I appreciate all of the input that the industry members have made to the IISPPG and I am looking forward to working with everyone at least through to the end of our stated terms. We are making good progress with our white papers, including the Mesozoic source rocks and the Arctic Basin, and progress on these white papers will continue on the IISPPG. ...

To Jim Mori from Ralph 20 Nov/07,

Jim,

It was good speaking with you this morning. Here is a short summary of the salient topics that might guide the next IISPPG meeting:

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2) It has become clear in my 18 months or so on the IISPPG, that the style and culture of academic-industry collaboration varies significantly among the countries involved. For example, the ILP in the UK is a very active group whose goal, to encourage industry-IODP science proposals, overlaps the IISPPG mandate. Another example, is the industry-IODP workshop that was held after the Sapporo meeting in Tokyo. This was viewed as a great success, but I doubt if the same format would have worked as well in Houston or Paris. In planning the future role of the IISPPG, or a similar committee, I think we should consider different strategies for different geographical areas.

3) There are a number of directions that IODP-industry collaboration could take and we should discuss these at our January IISPPG meeting. We can move forward on more than one direction at the same time. These include: a) Converting the IISPPG into the ITF. What is the proper mechanism for implementing the ITF? b) De-emphasizing the role of the IISPPG on proposal nurturing and focusing on industry-IODP collaborations (merging industry and IODP drilling and seismic data sets, sponsoring projects for engineering and service companies on IODP platforms, encouraging interactions between industry and academic scientists, etc.) c) establishing, or at least encouraging, industry funded consortia to work on IODP related projects (on- or off-contract) of interest to various cross-sections of industry. d) Continuing our role in nurturing industry related IODP drilling proposals. This would be best accomplished by establishing task specific PPGs. For example, if we want a formal, public, white paper on drilling in the Arctic there should be a specific PPG for this task, populated with experts on the Arctic. e) Dissolving the IISPPG (it was only established with a three year life-time anyways) and encouraging more industry participation on the remaining Scientific Advisory Committees.

These are just my thoughts at the moment and I welcome feedback on alterations to these topics or on other topics that I have missed.

Regards, Ralph.

Jim Mori to Ralph on 26 Nov/07:

Ralph,

We encourage you to go ahead and finalize plans for the next IIS-PPG meeting with agenda items can address how to wrap up current activities and how the PPG (or new SAS group based on the PPG) can help fostering new ties between IODP facilities and industry.

As mentioned before, we view the membership of the IIS-PPG as a most valuable connection with industry scientists, which in the current climate of reduced program

funding could be of major help to the program. Based on our phone call and your message, I think the agenda should include discussion on the following items, especially 4.

1. Re-visit issue about an industry task force, in light of the fact that the President of IODP-MI has stated that they cannot form such a task force (see also #4),

2. Current status on industry-IODP proposals and pre-proposals that the PPG has encouraged,

3. Differences in industry interactions in different countries and how this can be used to the benefit of IODP.

4. What is the future direction for the PPG (finish, continue, evolve to a new type of group).
As you mentioned the PPG has a 3 year mandate. Based on the past PPG activities and the potential new opportunities for the industry to directly charter IODP facilities, SPC would like a recommendation for its March 2008 meeting on future activities within the PPG or a new entity evolving from this group.

I will contact the IO's to find out if they are interested in attending. At least, I will try to get the information you requested about interest and costs from the IO's. Also, we appreciate your effort to attend the next SPC meeting to report on the activity of the PPG.

Jim Mori
(cc: Hans Christian Larsen)