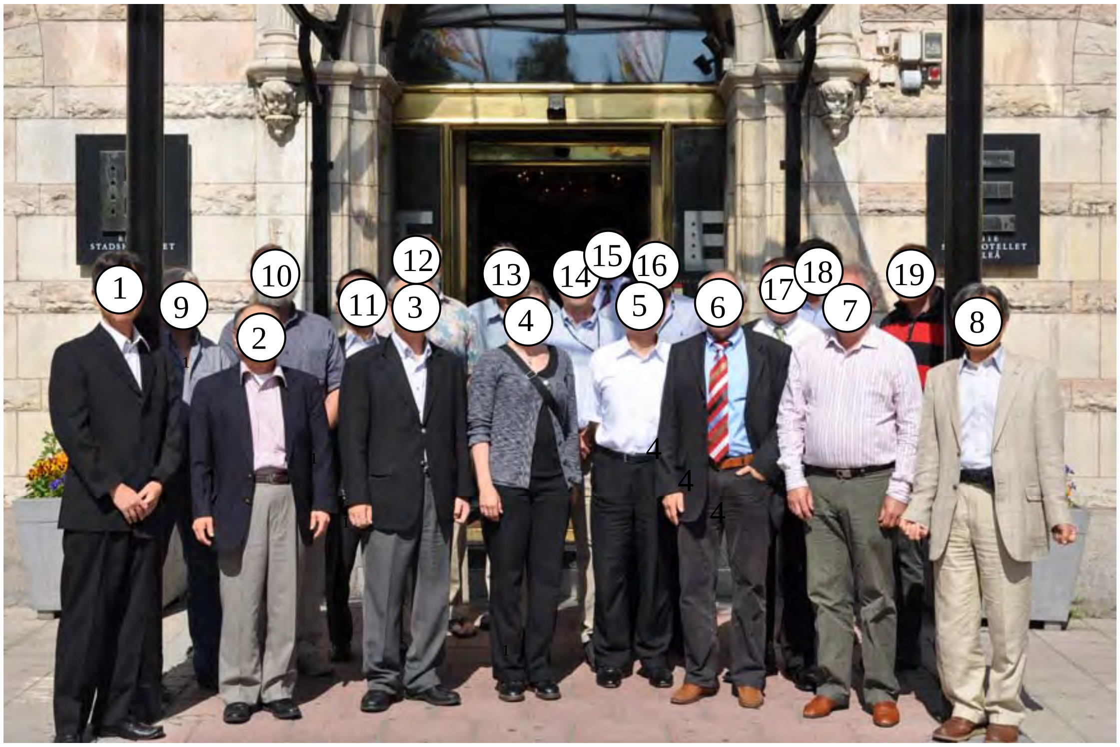
MINUTES
Ninth Meeting of the
Engineering Development Panel (EDP)
of the
Integrated Ocean Drilling Program (IODP)
July 15 – 17, 2009
Luleå, Sweden



1. Mitsuo Tamura, 2. Sakuma Sumio, 3. Makoto Miyairi, 4. Maria Ask, 5. Hisao Ito, 6. Lothar Wohlgemuth, 7. Roland Person, 8. Yoshiyasu Watanabe, 9. Kevin Grigar, 10. John Tauxe, 11. Yoshio Isozaki, 12. Roy Wilkens, 13. Dick Von Herzen, 14. Bill Ussler, 15. Dave Smith, 16. Leon Holloway, 17. Greg Myers, 18. Nori Kyo, 19. Sebastian Krastel-Gundegast. Not Pictured: Hiroshi Asanuma, John Thorogood

LIST OF APPENDICES

IODP Engineering Development Panel
Ninth Meeting
July 15-17, 2009
Luleå, Sweden
Members and Guests

EDP Members

Asanuma, Hiroshi	Japan	asanuma@ni2.kankyo.tohoku.ac.jp
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Holloway, Leon	USA	G.Leon.Holloway@conocophillips.com
Miyairi, Makoto[C]	Japan	makoto.miyairi@japex.co.jp
Person, Roland	ECORD	Roland.person@ifremer.fr
Sumio, Sakuma	Japan	sakuma@geothermal.co.jp
Tamura, Mitsuo	Japan	mtamura@jodco.co.jp
Tauxe, John	USA	jtauxe@neptuneinc.org
Thorogood, John	ECORD	John.Thorogood@DrillingGC.com
Ussler, Bill[VC]	USA	methane@mbari.org
Von Herzen, Richard	USA	rvonh@whoi.edu
Watanabe, Yoshiyasu	Japan	ywata@scc.u-tokai.ac.jp
Wilkens, Roy	USA	rwilkens@hawaii.edu
Wohlegemuth, Lothar	ECORD	wohlgem@gfz-potsdam.de

[C] Chair, [VC] Vice-chair

Observers, Guests and Liaisons

Ito, Hisao	CDEX	hisaoito@jamstec.go.jp
Isozaki, Yoshio	CDEX	Isozaki@jamstec.go.jp
Kyo, Masanori	CDEX	kyom@jamstec.go.jp
Smith, Dave	ESO	djsm@bgs.ac.uk
Myers, Greg	IODP-MI	gmyers@iodp.org
Krastel-Gundegast, Sebastian	STP	skrastel@ifm-geomar.de
Grigar, Kevin	USIO	kgrigar@iodp.tamu.edu

Executive Summary
IODP Engineering Development Panel
Ninth Meeting
July 15-17, 2009
Luleå, Sweden

EDP Consensus Statements, Recommendations and Action Items

The EDP forwards the following consensus statements to SAS panels, IODP-MI, or other entities as appropriate.

EDP Consensus 0907-01: Approval of Agenda
The EDP approves the agenda for EDP Meeting #9.

Routing: IODP-MI
Priority: Medium

EDP Consensus 0907-02: Approval of EDP Meeting #8 Minutes
The EDP approves the minutes from EDP Meeting #8.

Routing: IODP-MI
Priority: High

EDP Consensus 0907-03: EDP SPC Representative
The EDP designates Bill Ussler as the EDP representative at the next SPC meeting to be held August 25-27, 2009 in Kiel, Germany.

Routing: IODP-MI, SPC
Priority: High

EDP Consensus 0907-04: EDP STP Liaison
The EDP designates Hiroshi Asanuma as the EDP representative at the next STP meeting to be held August 17-19, 2009 in Jeju, Korea.

Routing: IODP-MI, STP
Priority: High

EDP Consensus 0907-05: EDP Meeting #10
The EDP recommends that EDP Meeting #10 be held January 13-15, 2010 in Sendai, Japan. Hiroshi Asanuma will be host of this meeting.

Routing: IODP-MI, STP, SPC
Priority: High

EDP Consensus 0907-06: EDP Meeting #11
The EDP recommends that EDP Meeting #11 be held in the USA tentatively from July 14-16, 2010. It is proposed that the meeting be held in either Honolulu or Kona Hawaii, or Santa Fe, New Mexico.

Routing: IODP-MI, STP, SPC
Priority: Medium

EDP Consensus 0907-07: Endorsement of Field Testing of the Riserless Mud Recovery System
The EDP endorses field testing of the Riserless Mud Recovery System (RMR) if an opportunity is presented for using an IODP vessel. Development of a RMR system is an appropriate step for advancing deep water, deep hole drilling technology. Riserless mud recovery offers potential benefits for all IODP platforms.

Routing: IODP-MI, SPC, IOs, STP
Priority: High

EDP Consensus 0907-08: EDP Review of non-Science Operating Cost proposals
The EDP agrees to receive and review non-SOC proposals.

Routing: IODP-MI, IOs, Lead Agencies
Priority: High

EDP Consensus 0907-09: EDP Review of non-Science Operating Cost supported projects
The EDP agrees to provide high-level reviews of non-SOC-supported engineering development projects to IODP-MI.

Routing: IODP-MI, IOs, Lead Agencies
Priority: High

EDP Consensus 0907-10: Development of an External Review Process for Engineering Development Proposals
The EDP requests IODP-MI to develop a formal external review process for consideration at the next EDP meeting. The proposed mechanism should avoid prolonging the present proposal review process.

Background: The EDP will utilize the external proposal review process when the panel needs additional expertise.
Routing: IODP-MI
Priority: High

EDP Consensus 0907-11: EDP Technology Roadmap version 3.0
The EDP formally adopts version 3.0 of the Technology Roadmap. This version is released as a public document. It will be appended to the minutes for EDP Meeting #9 and will be posted on the IODP-MI website. The EDP will continue to review and refine the technology roadmap at future EDP meetings.

Routing: IODP-MI, STP, SPC, SSEP, IOs, Lead Agencies
Priority: High

EDP Consensus 0907-12: EDP co-Vice Chairs
The EDP recommends a one chair, two vice-chair system for future panel leadership. The EDP recommends Hiroshi Asanuma and Maria Ask to become the next EDP co-vice chairs.

Routing: PMOs, SPC, IODP-MI
Priority: High

EDP Consensus 0907-13: IODP-MI Efforts to Integrate Engineering
The EDP endorses IODP-MI's effort to integrate all IODP engineering activities, which include SOC-, POC-, and non-IODP-funded engineering development projects.

Routing: IODP-MI, IOs, SPC, STP, Lead Agencies
Priority: High

EDP Consensus 0907-14: Modifications to the At-sea Engineering Testing Policy
The EDP endorses the proposed changes to the IODP At-sea Engineering Testing Policy. STP was included in the reporting process.

Routing: IODP-MI, IOs, SPC, STP
Priority: High

EDP Consensus 0907-15: Continued IODP-MI Support of the EDP
The current IODP-MI Washington, DC office is integral to the functioning of the EDP. Given the consolidation of the IODP-MI offices, the EDP would like clarification of the plan for providing continuing IODP-MI support of the EDP.

Background: The EDP has had a very productive working relationship with the IODP-MI office in Washington, DC and loss of continuity and corporate memory would have severe impacts on the smooth running of the EDP, and on the systematic engineering development process that is now in place and in its early stages of implementation. IODP-MI staff have conducted scoping studies requested by the EDP, initiated technological development projects such as the Riserless Mud Recovery (RMR) system, and assisted with the engagement with the oil and gas industry in scientific drilling endeavors.
Routing: SPC
Priority: High

EDP Consensus 0907-16: Request for Tool Loss Report for the MSS
The EDP requests receiving a copy of the Tool Loss Report for the Magnetic Susceptibility Sonde (MSS). The panel is particularly interested in understanding the failure mode(s) of the deployment.

Routing: IODP-MI, USIO
Priority: High

EDP Consensus 0907-17: Outgoing EDP members
The EDP thanks outgoing members Makoto Miyairi, Roland Person, and Dick von Herzen for their service to the panel.

Routing: PMOs, IODP-MI
Priority: Medium

Minutes
IODP Engineering Development Panel
Ninth Meeting
July 15-17, 2009
Luleå, Sweden

Wednesday, July 15, 2009

In these minutes, the Recommendations, Consensus Statements, and Action Items are not repeated in detail. Please refer to the Executive Summary for the full text of each, as indicated.

Meeting was convened at 0800.

Agenda Item #1: Welcoming remarks (Miyairi/Ask)

Makoto Miyairi, chairman of the EDP, thanked Maria Ask for hosting the meeting at the Elite Stadshotellet. Ask explained meeting logistics. Miyairi introduced the new Japanese EDP member Sakuma Sumio. He is a drilling engineer for geothermal projects, is involved in research and exploration and construction of geothermal wells, and has the world record for high temperature formation drilling of 500 °C. No representative from China has been appointed to replace Yi Ying. Self-introductions of EDP members, guests, liaisons, and observers occurred. Miyairi reviewed Robert's Rules, the general purpose of the EDP, the EDP mandate (Appendix A). Miyairi requested that the following panel members take notes for the minutes: Ussler—Wednesday morning, Tauxe—Wednesday afternoon, Ask—Thursday morning, Tamura—Thursday afternoon, Wilkins—Friday morning.

Agenda Item #2: Approval of meeting agenda (Miyairi)

Miyairi reviewed the meeting agenda, Appendix B. Motions were made to approve the agenda – 1^{st} by Tauxe, and 2^{nd} by Ask. Having no objections, it was approved by consensus without discussion. Miyairi stated that there were three major tasks for this EDP meeting: (1) review of FY11 engineering development proposals; (2) complete the EDP Technology White Paper for INVEST; and (3) finalize and approve version 3.0 of the EDP Technology Roadmap.

Agenda Item #3: Quorum discussion (Miyairi)

Fourteen voting members comprise the EDP. All members were present. No one planned to leave early.

Agenda Item #4: Approve minutes from EDP Meeting #8 (Miyairi)

The minutes from EDP #8 were approved as amended after one minor correction was made—1^{st} motion Wilkins, 2^{nd} motion by Ask.

Agenda Item #5: Preliminary discussion of the next two meeting locations (Miyairi)

Asanuma presented background information on having the EDP #10 meeting in Sendai, Japan (Appendix C) January 13-15, 2010. Asanuma discussed logistics and transportation details. Transportation from Narita to Sendai is not simple, however the STP has met in Sendai in the past. An optional field trip is planned for January 16th.

Wilkens presented background information on two possible meeting sites in Hawaii, USA (Appendix D).

Tauxe presented background information on a possible meeting site in Santa Fe, New Mexico (Appendix E).

Agenda Item #6: Review status of previous meeting action items and recommendations (Myers)

Myers reviewed previous meeting action items and recommendations (Appendix F). Key points were: (1) three vessels are now operating [JR – Equatorial Pacific, MSP – New Jersey Margin, and Chikyu – NantroSEIZE riser drilling]; (2) the IODP-MI offices are consolidating and will be located in Tokyo. No personnel from the IODP-MI Washington office will move to Tokyo. A lively discussion followed with many EDP members expressing concern over loss of institutional memory with the consolidation of IODP-MI offices, and the loss of momentum for integrating engineering development activities across all the partners and operators, and for strengthening centralized engineering management within the program. Thorogood emphasized that an organizational change of this magnitude carries significant risk and asked if the organizational risks had been thoroughly assessed. Myers pointed out that it appears that an assumption was made that the Washington DC office would want to move to Tokyo, as a consequence of no one moving, the organizational structure of IODP-MI will change. Holloway pointed out that Houston, TX is the world oil center, and being in close proximity would be advantageous. Because IODP works with contractors and vendors, most of whom are located in the Houston area, consolidating IODP-MI to Tokyo will add an additional expense for travel to Houston. Von Herzen understood that financial reasons were a prime motivation for consolidating the IODP-MI offices, however the desire for drilling deeper boreholes to achieve transformative science will require a dedicated effort towards long-term engineering development. Proximity to Houston would be beneficial.

COFFEE BREAK

Agenda Item #7: SPC report (Mori)

No report was presented.

Agenda Item #8: SSEP report (Ask)

Ask reviewed highlights from the SSEP meeting (Appendix G).

Agenda Item #9: STP report (Krastel-Gundegast)

Krastel-Gundegast presented highlights from the last STP meeting and a general report on STP activities (Appendix H). Krastel-Gundegast requested that the EDP send a draft of its INVEST Technology White Paper to the STP for review and input. Discussion centered on improving core recovery from critical intervals. There is strong science demand for better core recovery especially critical intervals. Holloway and Thorogood emphasized that drill bit stabilization and control of feed are two primary parameters that will lead to improved core recovery. Holloway stated that laboratory testing of the AdvancedDiamondCore Barrel (ADCB) clearly has shown it to be superior to the Rotary Core Barrel (RCB).

LUNCH (1200 – 1330)

Agenda Item #10: Technical Review Process for Engineering Development Projects (Myers)

Myers continued his presentation initiated during Agenda Item #6 (Appendix F). He outlined the distinction between SOC and non-SOC funding models. The EDP reviews proposals and projects supported by SOC funds. Non-SOC funded and 3rd party funding have not been reviewed by the EDP. He suggested that IODP-MI and the EDP be included in a review capacity, and has asked the IOs to allow us to review their projects if they are to be used on an IODP vessel.

He reviewed the status of engineering projects supported by SOC funding. The LTBMS prototype is being finalized and field-testing is planned. The simple observatory initiative now comprises the SCIMPI project only. Earl Davis has removed his request for support of the S-CORK concept. The MDHDS is in its first year.

Myers reviewed the status of RMR technology and the feasibility study currently in progress. The RMR does not compete with riser drilling because it does not have a BOP. It will be difficult to put on the *JOIDES Resolution* (*JR*), but it will be possible based on present scoping and planning studies. Myers asked if the EDP would support the following consensus statement/action items: (1) EDP endorses IODP-MI efforts to integrate engineering efforts, (2) EDP endorses changes to the third party tool policy text, and (3) EDP acknowledges the potential utility of RMR to achieve IODP science goals and recommends further development of the technology through field trials on IODP vessels if possible.

Additional discussions involved the increased tasks put forward to the EDP, especially in light of the consolidation of the IODP-MI offices and the potential elimination of technical staff. EDP has also been downsized to reduce travel expenses. The main issue is how to maintain an adequately broad base of engineering and drilling expertise on the EDP

Agenda Item #11: Operator reports and the status of FY10 engineering developments (including 3rd party tools)

a. CDEX (Kyo and Isozaki)

Kyo updated the EDP on the status of the LTBMS telemetry system (Appendix I). Problems with experimental prototype have pushed the development schedule into the future by 6 months. Preliminary land-based tests are underway, currently in a 200-m borehole.

Isozaki updated the EDP on the CDEX technology development plans (Appendix J). CDEX is open to input from the EDP and needs information from the oil industry. These inputs would be beneficial to CDEX. NT2-11 is being drilled now, and will be the first scientific riser drilling project completed by *Chikyu*. Holloway asked about how much time was required to install a joint in the riser system. Isozaki stated that normally, 1 hour is required to assemble a joint. With riser drilling an additional hour is required. Riser drilling joint assembly requires 2 hours. So far the riser drilling has had high core recovery (>80%) with the RCB and they are of good quality. Nine 9-meter cores have been recovered so far. Major goals for CDEX include: (1) drilling an ultra-deep hole, approximately 7 km and (2) drilling in water depth greater than 4 km. Additional objectives include: (1) recovery of higher quality core, (2) measurement of riser motion, and (3) developing the next generation of riser and BOP technologies.

b. ESO (Smith)

Smith updated the EDP on the New Jersey Margin MSP project (Appendix K). Piston coring has been abandoned, and diamond coring has been successful in recovering the loose unconsolidated sands that comprise much of the section and are of scientific interest. Smith also updated the EDP on Expedition 325 to the Great Barrier Reef scheduled for September to December, 2009. Drilling will occur in shallow water 40-190 mbsf, using a brand new drilling system (Bluestone Topaz), which has an API drillstring.

c. USIO (Grigar)

Grigar presented an update on organizational changes at TAMU (Appendix L). Brad Clement has been appointed director. He reviewed sea trials for the newly refurbished *JOIDES Resolution*, termed Expedition 320T (EXP 320T). The sea trials were plagued with both incomplete installations and mechanical/systems failures. He then presented the status of a number of tools and systems on the *JR*: (1) the APCT3, which replaces the APC, (2) wireline heave compensator, which had a few problems, and (3) the loss of the new MSS tool on EXP 320. Discussion centered on the loss of the tool, and the role that the lockable float valve might have had on the parting of the logging cable. A failure analysis is in progress. He also provided updates on the multifunction telemetry module (MFTM), the multi-sensor magnetometer module (MMM), and other tool upgrades. The passive heave compensator (PHC) on the *JR* was repaired and the AHC has been deactivated.

Agenda Item #12: FY11 Engineering Development Proposals – Session I (EDP Watchdogs)

Miyairi asked if anyone in the room had a conflict of interest with any of the proposals. Asanuma was conflicted with one proposal and was not present during that proposal presentation and discussion.

The following proposals were discussed:

Proposal No.	Title	Proponent, Institution
ED-2011-01A	Wireline Hydraulic Testing and Imaging Tool	Cornet, U. CNRS – Institut de Physique du Globe de Strasbourg
ED-2011-01B	Replacement of Magnetic Susceptibility Sonde	Goldberg, LDEO
ED-2011-02B	Development of CFRP riser pipe for 4000m water depth	Watanabe, U. Tokai

Meeting was adjourned at 1715.

Thursday, July 16, 2009

Meeting was convened at 0800.

Agenda Item #12: FY11 Engineering Development Proposals – Session II (EDP Watchdogs)

Discussion of the two remaining engineering development proposals occurred.

Agenda Item #14: Compile Technology Roadmap (Ussler)

Agenda Item #13 was postponed until after this agenda item.

Ussler reviewed in detail changes in the wording of the Technology Roadmap (Appendix M). Table 1 was reorganized, however no change in content has occurred. Two engineering development items have been added.

Regarding B34 (the virtual science party), Thorogood observed that the hydrocarbon industry is utilizing more telecommunications and technology to link shore-based engineers and operations managers with the rig floor with significant success in controlling costs and improving communications. This model is applicable to scientific drilling. He questioned whether 30 scientists running instruments was the best use of berthing and ship-board resources. Many of these tasks might be better done on shore. With the complexity of future drilling operations, it is likely that some drilling and coring engineers may need to be on the ship, which would displace part of the science party. Ask countered by arguing that in many cases being on the ship is the only way to effectively monitor the core and data as it is being produced and to make drilling/coring decisions.

Ussler discussed further the hierarchal chart that is intended to show the dependencies that some technological needs have with one another. This chart has been created using Microsoft Visio, and it is a large and somewhat unwieldy document. However, it has been useful to the panel in identifying high priority items in the technology roadmap.

Once version 3.0 of the technology roadmap is approved at this meeting, it and the hierarchal chart will be posted on the IODP-MI website. The chart will become Appendix D of the technology roadmap. The EDP agreed that some html programming effort should go into creating a means to navigate through the chart on the web.

A question was asked about how progress with achieving some of the technological improvements can be measured. Ussler suggested that this would be a topic for the next EDP meeting in Sendai.

<u>Agenda Item #13: INVEST White Paper – status and open discussion (Ussler)</u>

Ussler reviewed the two requests made by INVEST Steering Committee to the EDP:
(1) Assemble a white paper that summarizes the technology development needed to support future scientific ocean drilling, and (2) review a draft INVEST report at an early stage to comment on any special technological needs that would support the new science that is proposed by the INVEST report. Goals of the EDP with writing the white paper are to outline the technological and fiscal needs at a high-level. Identification of technological gaps would be an important contribution. Ussler pointed out that the INVEST Steering Committee asked about having a link on the INVEST website to the EDP technology roadmap.

Myers mentioned that he has been asked to create a technology poster. He offered to incorporate part of the EDP INVEST technology white paper into his poster. The panel agreed that this would be a good approach to disseminating key elements of the white paper.

Discussion points on INVEST are captured in Appendix N.

LUNCH (1200 –1330)

<u>Agenda Items #16, 17, and 18: INVEST White Paper – group discussion and breakout sessions (Ussler)</u>

Agenda Item #15 was postponed until the next morning.

Ussler led the discussion for the preparation of the white paper for the coming INVEST meeting and all EDP members agreed that the white paper should be a high-level document and easy to understand for the scientific audience.

All EDP members split into 3 groups – (1) improved borehole measurements and sampling, (2) post-drilling borehole science, and (3) exploring new environments to discuss and identify goals, challenges, and possible technical solutions for each item.

Holloway (Group 1) discussed his group's major theme "Step change in core recovery", identifying the challenges, potential solutions, and background information.

Ask (Group 2) presented the "Top 4 technical drivers for science" which included (1) paleoclimate, (2) drilling to the Moho, (3) geohazards, and (4) microbiology and incubation.

Tauxe (Group 3) presented a discussion of the drilling to the Moho, with primary goals outlined, the challenges and potential solutions coupled to EDP Technology Roadmap items.

Von Herzen recommended informing the science community that it will take some time to solve the microbiology issues because it is new to the EDP.

Thorogood highlighted the necessity for a discussion of resources and funding issues related to scientific drilling after 2013, and especially the establishment of a project management organization for complex drilling projects, such as drilling the Moho.

Ito stated that the NantroSEIZE Project Management Team (PMT) is a good example for how to formulate and utilize a project management team.

Agenda Item #14a: Technology Roadmap – discussion of additional technology needs (Ussler)

There was a discussion concerning the wording of an additional technology roadmap item B-34 (the virtual science party), and its integration into the hierarchal chart.

Agenda Item #19: Preliminary Agenda for EDP Meeting #10 (Ussler)

Ussler reviewed a draft agenda (Appendix O) for the January meeting in Sendai, Japan.

EXECUTIVE SESSION (1630 – 1730)

Agenda Item #21: FY11 Proposal Review (grouping number discussion; Miyairi/EDP)

Meeting was adjourned at 1715.

Friday, July 17, 2009

Meeting was convened at 0800.

Agenda Item #20: Finalize INVEST White Paper (Ussler)

Refinement of wording and overall discussion of the draft White Paper occurred. A time table for completing the final draft, circulating this draft first to the STP, collating STP comments, then forwarding it to the EDP, and finally submitting it to the INVEST Steering Committee was agreed upon. The final version of the EDP Technology White Paper submitted to the INVEST meeting is in Appendix P.

Agenda Item #23: Status and Discussion of Scoping Studies (Myers)

Myers presented an update on the scoping studies being conducted by IODP-MI (Appendix F). Stress Engineering is compiling a history and status of tools used by the Ocean Drilling Program (ODP) and IODP. A concern was raised about the possibility that there might be a Stress Engineering bias. Myers acknowledged being aware of a potential bias, and said that this study needs to move forward. The second phase of this study is for Stress Engineering to produce a formal report. Von Herzen asked how this report or results of the study will get back to the drilling community. The content, accuracy, and whether omissions have occurred need to be assessed.

Agenda Item #15: Microbiology Contamination Discussion (Ussler)

Ussler led further discussion of the microbiology contamination report requested by the STP (STP Consensus Statement 0802-06: Detection and Control of Contamination Issues During Riser Drilling**)** that focuses on the effects of drilling muds on microbial sampling (Appendix Q).

Agenda Item #20: Next Meeting Location and Time (Miyairi/Asanuma)

Miyairi and Asanuma presented the proposed location and time for EDP meeting #10. The meeting will be held in Sendai, Japan, January 13-15, 2010. Asanuma will be the host.

LUNCH (1200 – 1330)

EXECUTIVE SESSION (1330 – 1730)

Meeting was adjourned at 1730.

EDP Meeting #9

July 15 – 17, 2009

Lulea, Sweden

Robert’s Rules of Order

- Some basic principles and procedures apply to all decision making processes; these principles and procedures are referred to formally as 'parliamentary procedure'. Parliamentary procedures are the rules that help us maintain order and fairness in all decision-making processes. Robert's Rules of Order is one man's presentation and discussion of parliamentary procedure that has become the leading authority in most organizations today. The basic principles behind Robert's Rules of Order are:

Robert’s Rules of Order

- Each meeting follows an order of business (agenda)
- Only one main motion can be pending at a time
- Only one member can be assigned the floor at a time
- Members take turns speaking
- No member speaks twice about a motion until all members have had the opportunity to speak

Robert’s Rules of Order

- Members take their seats promptly when the chair calls the meeting to order, and conversation stops
- Members raise their hands to be recognized by the chair and don’t speak out of turn
- In debate, members do not ‘cross talk’, or talk directly to each other, when another member is speaking
- Members keep their discussion to the issues, not to personalities or other members’ motives
- Members speak clearly and loudly (and Slowly) so all can hear
- Members listen when others are speaking

Schedule for taking the meeting minutes

Day 1 morning - Bill Ussler
Day 1 afternoon - John Tauxe

Day 2 morning - Maria Ask
Day 2 afternoon- Mitsuo Tamura

Day 3 morning- Roy Wilkens
Day 3 afternoon executive session- Bill Ussler

Approval of Meeting Agenda

DAY 1: Wednesday, July 15 (08:30-17:30)

1. Welcoming remarks; meeting logistics, safety, introduction, Robert's Rules (Miyairi)
2. Approval of meeting agenda (Miyairi)
3. Quorum discussion (Miyairi)
4. Approve minutes from EDP Meeting #8 (Miyairi)
5. Preliminary discussion of next 2 meeting locations and times
   a. EDP #10 – Japan (Asanuma)
   b. EDP #11 – USA (Tauxe, Wilkens)
6. Review status of previous meeting action items and recommendations (IODP-MI)

COFFEE

7. SPC Report (Mori)
8. SSEP Report (TBN)
9. STP Report (TBN)
10. Technical Review Process for Engineering Development Proposals (Myers)

LUNCH

11. Operator Reports and status of FY10 Engineering Developments (including 3rd party tools)
    a. CDEX (45 minutes)
    b. ESO (15 minutes)
    c. USIO (45 minutes)

COFFEE

12. FY 11 Engineering Development Proposals – Session I (EDP Watchdogs)
13. INVEST White Paper – status and open discussion (Ussler)

Day 2: Thursday, July 16 (08:30-17:30)

14. Compile Technology Roadmap (Ussler)
    a. Status
    b. Prioritization
15. Microbiology Contamination Discussion (working group)

COFFEE

16. INVEST White Paper
    a. Group discussion / Status
    b. Breakout sessions and writing

LUNCH

17. INVEST White Paper - continue

COFFEE

18. INVEST White Paper – continue
19. Preliminary Agenda for EDP Meeting #10 (Miyairi)
20. Next Meeting Location and Time (Miyairi/Asanuma)

EXECUTIVE SESSION (16:30 – 17:30)

21. FY11 Proposal Review (grouping number discussion; Miyairi/EDP)

DAY 3: Friday July, 17 (08:30 – 12:00)

22. Finalize INVEST White Paper
23. Status and Discussion of Scoping Studies (IODP-MI/EDP)

COFFEE

24. Review Consensus Items, Recommendations, and Action Items
    a. Phrasing
    b. Routing
    c. Background

DAY 3: Friday, July 17 (13:15 – 17:30) EXECUTIVE SESSION

25. Complete FY11 Proposal Reviews (Miyairi/EDP)
26. Vice-Chair Nominations
27. TR Prioritization
28. Finalize Consensus Items and Recommendations (Miyairi/Ussler)
29. Parting Comments (Miyairi)

The major tasks of EDP Meeting #9

1) Review FY11 ED Proposals

2) Discuss and draw out the EDP White Paper requested by INVEST Steering Committee (EDP Action Item 0901-08).

3) Finalize the EDP Technology Roadmap Ver.3.0 by approving the draft which was distributed through EDP working room in advance (EDP Action Item 0901-12)

FY2011 Engineering Development Proposals

SOC

1) Wireline Hydraulic Testing and Imaging Too l(**EDP-2011-01A)**

Watchdogs; Hiroshi Asanuma*, Maria Ask, Leon Holloway

Non-SOC

2) Replacement of the Magnetic Susceptibility Sonde
3) Development of CFRP riser pipe for 4000m of deep waters (CFRP riser)

EDP will review non-SOC proposals as same as SOC proposal. The review and grouping numbers provided by EDP will be very useful for the proponent as they seek funding. Furthermore, it will be very important for EDP to be kept aware of other developments not funded by IODP-MI.

I ask for one EDP member volunteer to summarize the review for each of the non-SOC proposals.

Volunteer for 2) : John Tauxe
Volunteer for 3) : Lothar Wohlgemuth, Roland Person

EXECUTIVE SESSION (16:30 – 17:30)
21. FY11 Proposal Review (grouping number discussion)

Group Work & Writing

Group 1: “Wireline Hydraulic Testing and Imaging Tool**”**

Hiroshi Asanuma*, Maria Ask, Leon Holloway

Group 2: “Development of CFRP riser pipe for 4000m of deep waters”

Lothar Wohlgemuth*, Roland Person*, (Sumio Sakuma , Mitsuo Tamura, Roy Wilkens)

Group 3: “Replacement of the Magnetic Susceptibility Sonde”

John Tauxe*, (Richard Von Herzen, Yoshiyasu Watanabe, John Thorogood)

Summarize comments
decide the grouping number to propose

EDP White Paper

EDP Action Item 0901-08: Request by INVEST Steering Committee for EDP White Paper on Technological Needs of Scientific Ocean Drilling

The EDP responds to the INVEST Steering Committee request for a white paper on the technological needs of scientific ocean drilling by establishing an EDP Ocean Drilling Technology White Paper Working Group. The working group and their assignments includes:

Bill Ussler (coordinator),

Yoshiyasu Watanabe (deep water drilling),

Sumio Sakuma (high temperature drilling),

Hiroshi Asanuma (high temperature measurements),

John Thorogood (seafloor drilling systems),

Maria Ask (geotechnical measurements),

Roy Wilkins (in situ measurements),

Leon Holloway (improving core quantity and quality)

Lothar Wohlgemuth (ultra-deep drilling).

Technology Roardmap

EDP Action Item 0901-12: EDP Technology Roadmap

The EDP will examine and revise the Technology Roadmap (version 3.0) by email and create a document ready for formal approval at its July 2009 meeting. The approved version will be posted on the IODP-MI website after the July meeting.

EDP Consensus 0901-10: STP Science and Technology Roadmap

The EDP thanks Saneatsu Saito for his informative presentation of the STP Science and Technology Roadmap (STR). The STR is helpful for prioritizing several key EDP technical challenges. We acknowledge the need for continued collaboration.

The prioritization table approach has been replaced by an hierarchal approach that illustrates the dependency of each technology (Appendix D).

EDP_9_draft_Agenda_05_28_09

EDP Meeting #9 Agenda

July 15-17, 2009

Luleå, Sweden

DAY 1: Wednesday, July 15 (08:30-17:30)

1. Welcoming remarks; meeting logistics, safety, introduction, Robert's Rules (Miyairi)	08:30 – 09:00
2. Approval of meeting agenda (Miyairi)	09:00 – 09:15
3. Quorum discussion (Miyairi)	09:15 – 09:20
4. Approve minutes from EDP Meeting #8 (Miyairi)	09:20 – 09:30
5. Preliminary discussion of next 2 meeting locations and times	09:30 – 09:45
a. EDP #10 – Japan (Asanuma)	
b. EDP #11 – USA (Tauxe, Wilkens)	
6. Review status of previous meeting action items and recommendations (IODP-MI)	09:45 – 10:15
COFFEE	10:15 – 10:30
7. SPC Report (Mori)	10:30 – 11:00
8. SSEP Report (TBN)	11:00 – 11:15
9. STP Report (TBN)	11:15 – 11:30
10. Technical Review Process for Engineering Development Proposals (Myers)	11:30 – 12:00
LUNCH	12:00 – 13:15
11. Operator Reports and status of FY10 Engineering Developments (including 3rd party tools)	13:15 – 15:30
a. CDEX (45 minutes)	13:15 – 14:00
b. ESO (15 minutes)	14:00 – 14:15
c. USIO (45 minutes)	14:15 – 15:00
COFFEE	15:00 – 15:15
12. FY 11 Engineering Development Proposals – Session I (EDP Watchdogs)	15:15 – 16:45
13. INVEST White Paper – status and open discussion (Ussler)	16:45 – 17:30

Day 2: Thursday, July 16 (08:30-17:30)

14. Compile Technology Roadmap (Ussler)	08:30 – 09:15
a. Status	

EDP_9_draft_Agenda_05_28_09

b. Prioritization

15. Microbiology Contamination Discussion (working group)	09:15 – 10:00
COFFEE 10:00-10:15	10:00 – 10:15
16. INVEST White Paper a. Group discussion / Status b. Breakout sessions and writing	10:15 – 12:00
LUNCH	12:00 – 13:15
17. INVEST White Paper - continue	13:15 – 15:00
COFFEE	15:00 – 15:15
18. INVEST White Paper – continue	15:15 – 16:00
19. Preliminary Agenda for EDP Meeting #10 (Miyairi)	16:00 – 16:15
20. Next Meeting Location and Time (Miyairi/Asanuma)	16:15 – 16:30
EXECUTIVE SESSION (16:30 – 17:30)	
21. FY11 Proposal Review (grouping number discussion; Miyairi/EDP)	16:30 – 17:30

DAY 3: Friday July, 17 (08:30 – 12:00)

22. Finalize INVEST White Paper	08:30 – 09:30
23. Status and Discussion of Scoping Studies (IODP-MI/EDP)	09:30 – 10:00
COFFEE	10:00 – 10:15
24. Review Consensus Items, Recommendations, and Action Items a. Phrasing b. Routing c. Background	10:15 – 12:00
LUNCH	12:00 – 13:15

DAY 3: Friday, July 17 (13:15 – 17:30) EXECUTIVE SESSION

25. Complete FY11 Proposal Reviews (Miyairi/EDP)	13:15 – 14:00
26. Vice-Chair Nominations	14:00 – 14:15
27. TR Prioritization	14:15 – 15:00

COFFEE	15:00 – 15:15
28. Finalize Consensus Items and Recommendations (Miyairi/Ussler)	15:15 – 17:00
29. Parting Comments (Miyairi)	17:00 – 17:30

Outline of EDP #10 meeting (13-15 Jan., 2010)

Host:
Hiroshi Asanuma, Associate Professor
Graduate School of Environmental Studies
Tohoku University
asanuma@ni2.kankyo.tohoku.ac.jp
TEL&FAX +81-22-795-7399

Outline of city of Sendai

Population: approx. 1 million
(12th largest cities in JPN)
Typical weather in January:
Max. 10℃
Min. -5℃
Possible snow and strong wind
Currency: Yen
1USD≒100Yen
(BigMac Meal≈600Yen)

***Credit cards issued outside Japan may NOT be accepted in small shops.**

***VAT: 5% (uniformly taxed)**

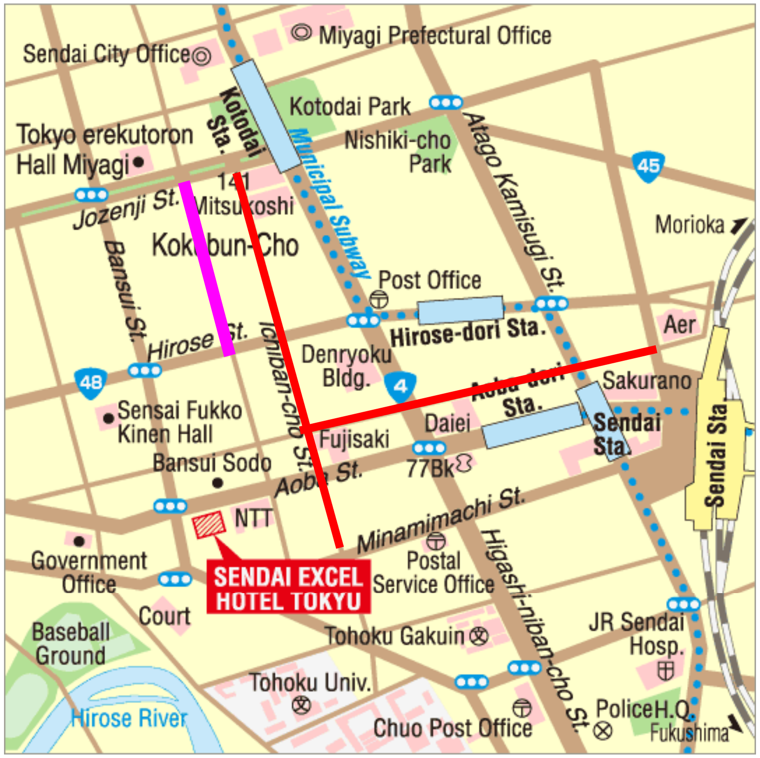
***no tips**

Venue

Excel Hotel Tokyu

2-9-25, Ichiban-cho, Aoba-ku, Sendai-shi, Miyagi 980-0811
Tel (81) 22-262-2411
Fax (81) 22-262-4109
http://www.tokyuhotelsjapan.com/en/TE/TE_SENDA/index.html

***15min. walk from Sendai Station**
***Shops/restaurants nearby**
***Special rate for the EDP participants (per night and person)**
-single 10,000 JPY
-twin/double 8,180 JPY
(incl. breakfast and tax/service)
***Reservation form will be sent in autumn**



Field trip

16 Jan., 2010
Historic/scientific spots around Sendai

Transportation

From Tokyo (Narita)

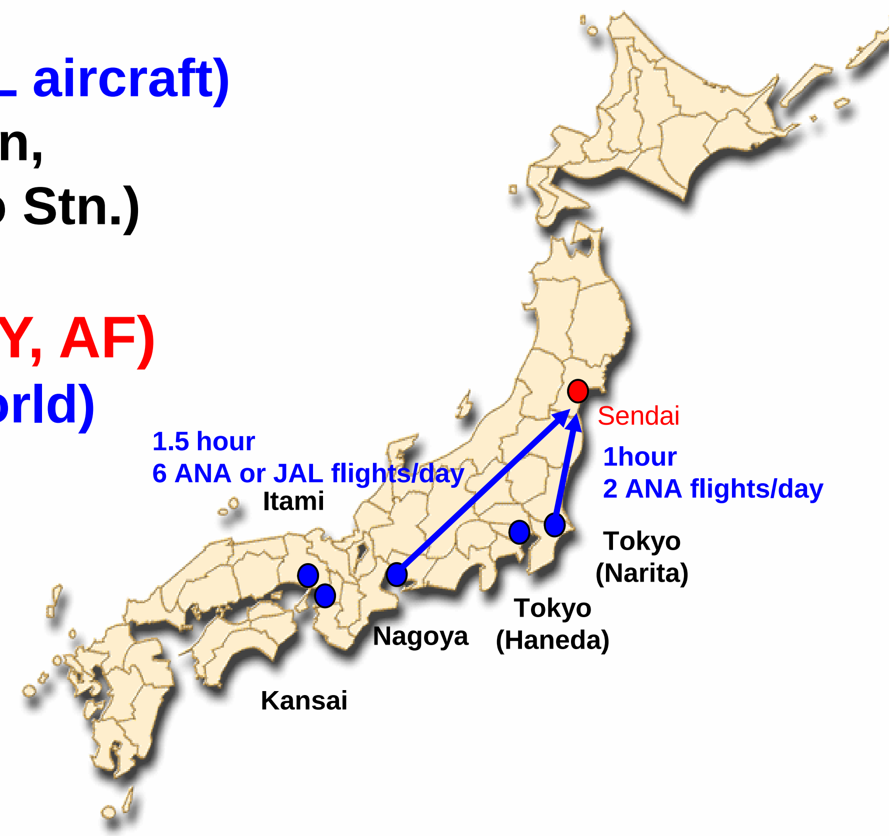
-2 ANA (Star alliance) flights/day
(morning and evening, 1 hour, SMALL aircraft)
-JR railway (Super Express Shinkansen,
3 hours, one transfer at central Tokyo Stn.)

From Nagoya (Centrair) (NW, LH, FY, AF)

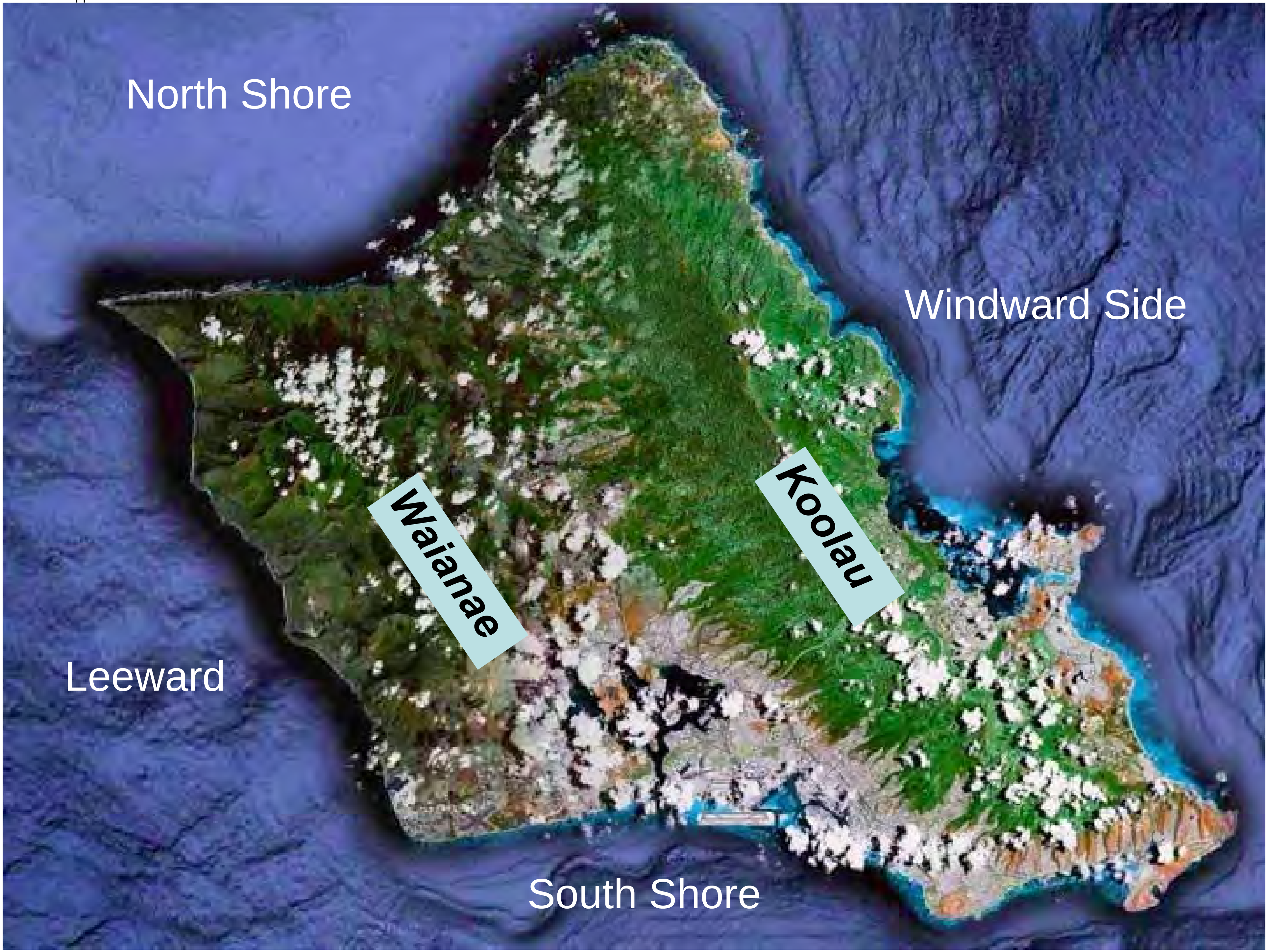
-4 ANA (Star alliance) and 2 JAL (Oneworld)
flights/day

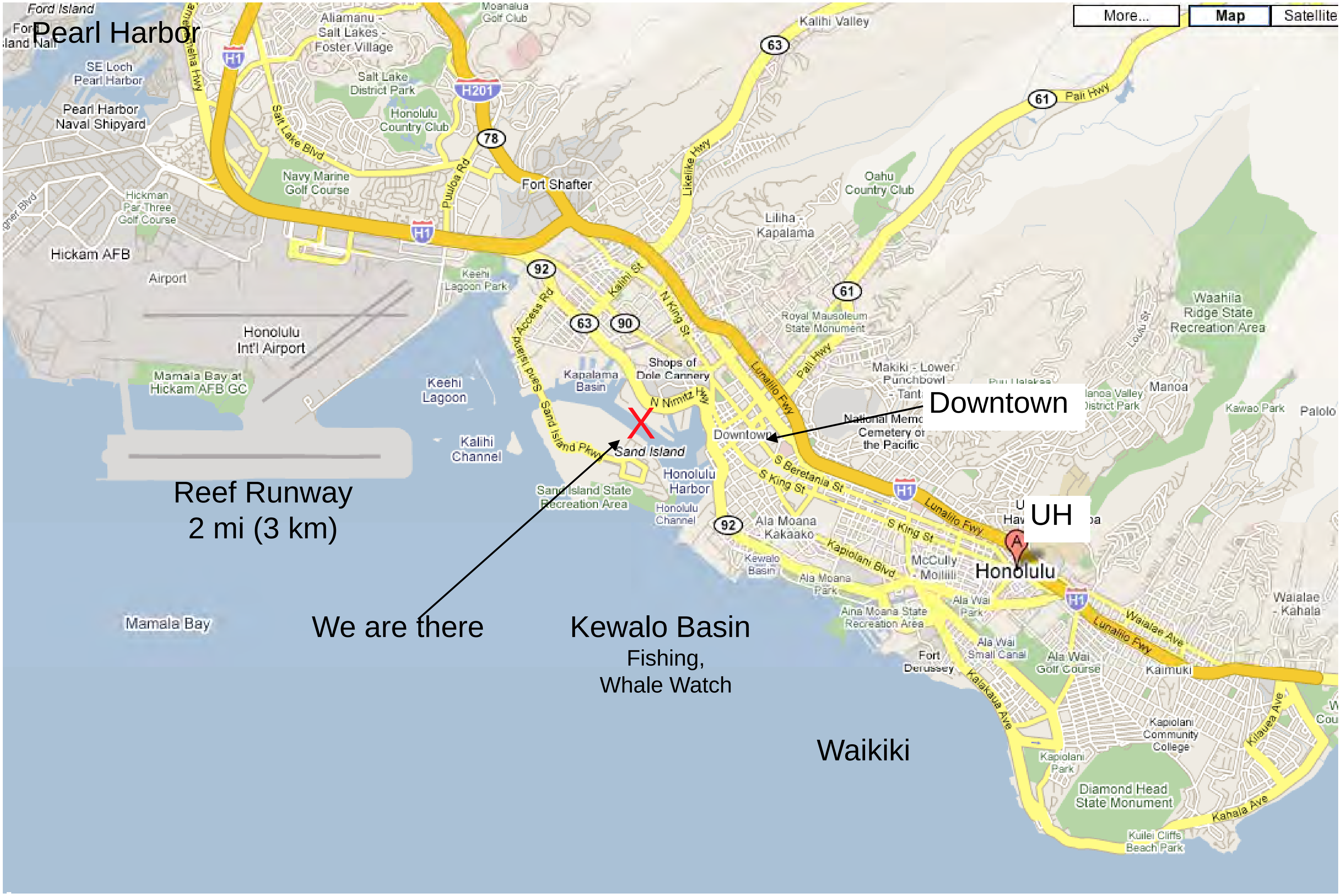
From Sendai Airport to downtown

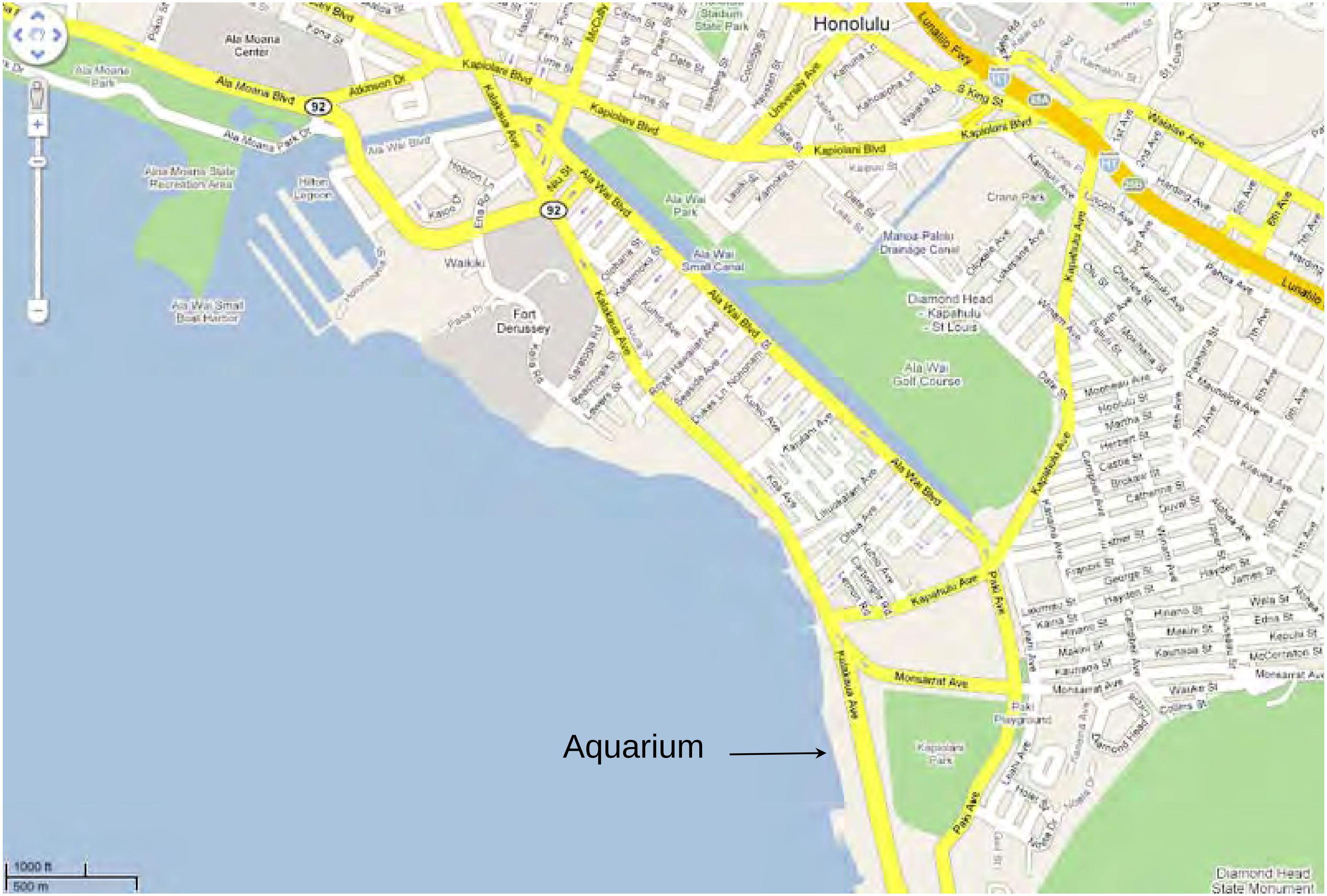
-Local railway (25min., 600 JPY)
-TAXI (40min., 5,000-6,000 JPY)
-Shuttle to the hotel will be considered



Oahu and the Big Island

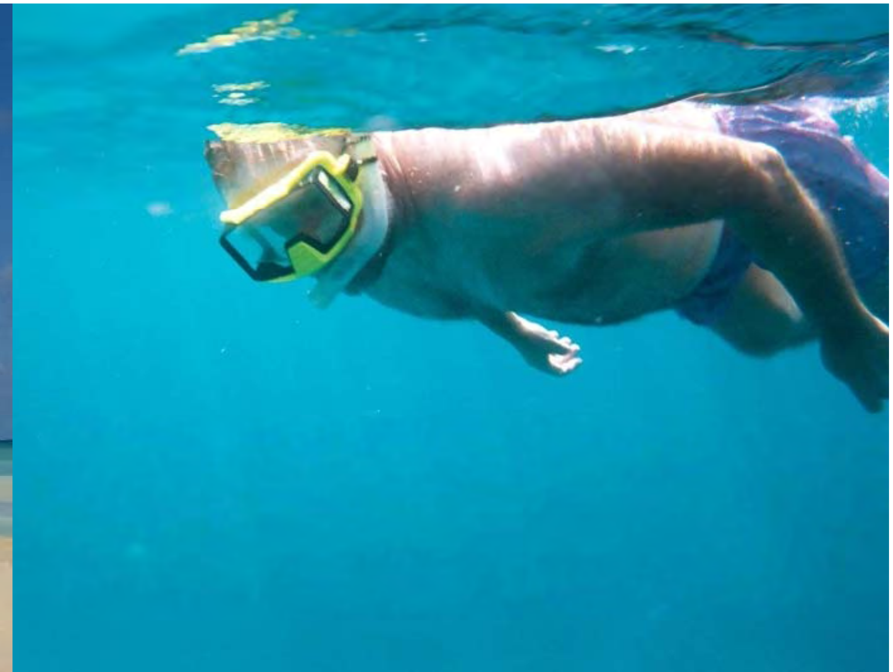

North Shore
Windward Side
Waianae
Koolau
Leeward
South Shore

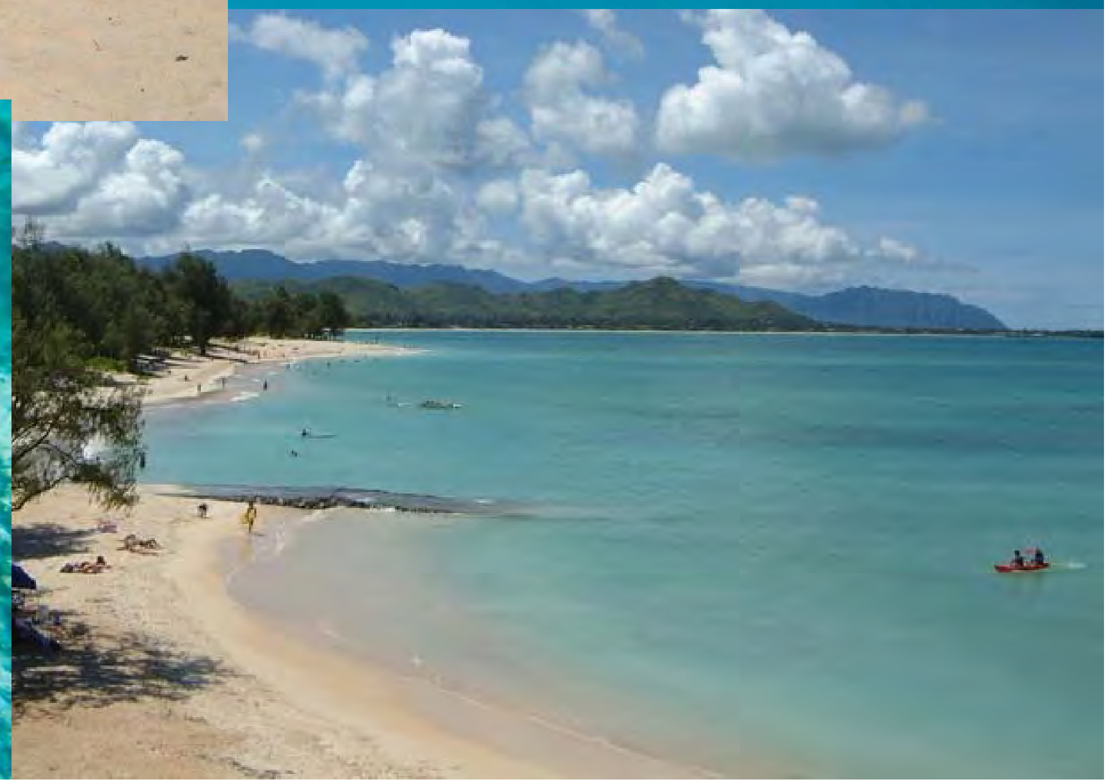

Pearl Harbor
Reef Runway
2 mi (3 km)
We are there
Kewalo Basin
Fishing,
Whale Watch
Waikiki
Downtown
UH
Honolulu
Honolulu Int'l Airport
Hickam AFB
Mamala Bay
Keehi Lagoon
Kalihi Channel
Sand Island
Honolulu Harbor
Ala Moana - Kakaako
Diamond Head State Monument
Fort Shafter
Kalihi Valley
Manoa
Kaimuki
Waialae - Kahala
More...
Map
Satellite

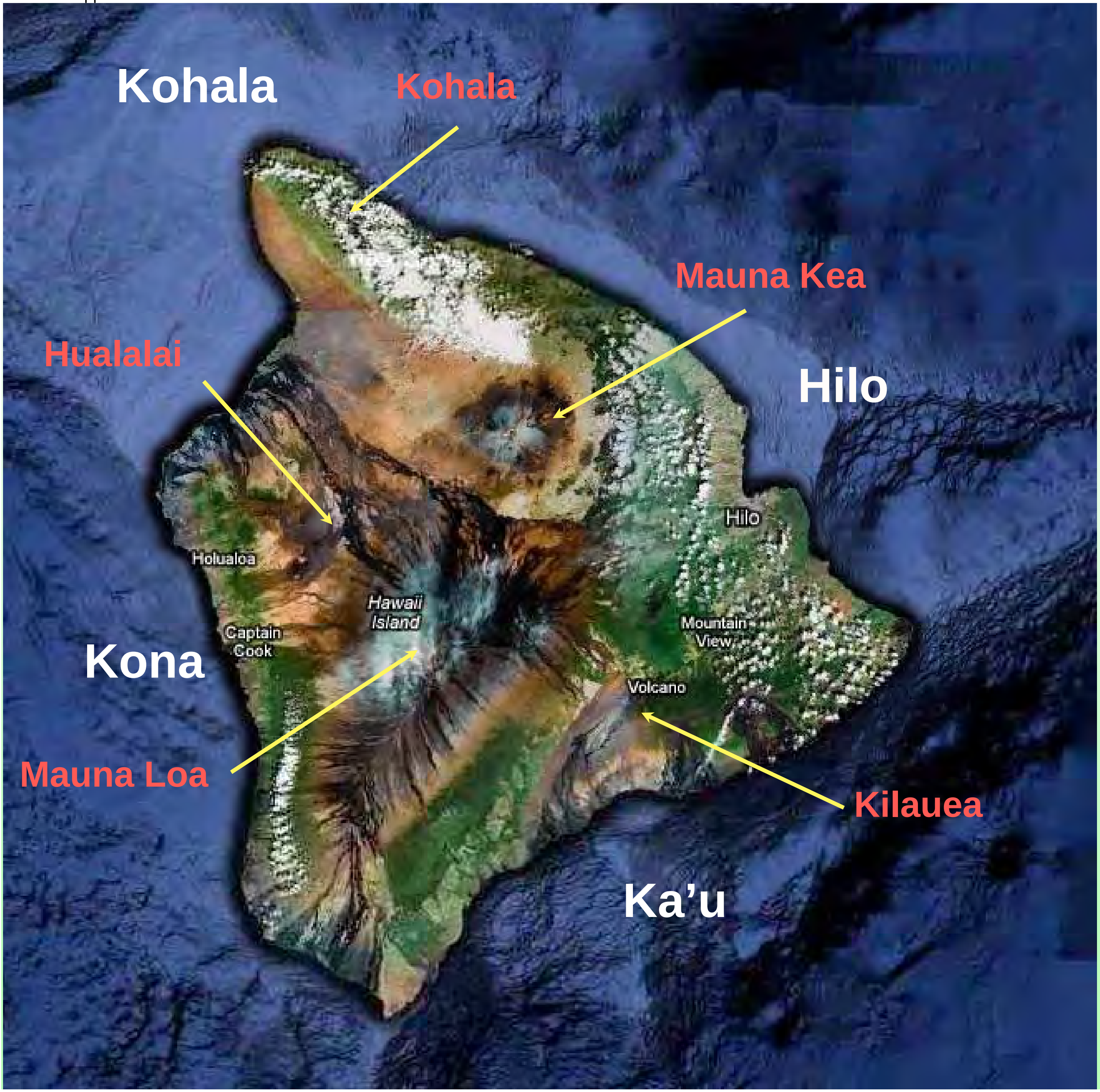

Honolulu
Ala Moana Center
Ala Moana Blvd
Kapiolani Blvd
Ala Wai Blvd
Kalakaua Ave
Waikiki
Fort Derussey
Ala Wai Park
Ala Wai Small Canal
Ala Wai Golf Course
Diamond Head - Kapahulu - St Louis
Kapahulu Ave
Monsarrat Ave
Paki Ave
Kapiolani Park
Ala Wai Small Boat Harbor
Ala Moana State Recreation Area
Diamond Head State Monument
Aquarium
1000 ft
500 m


Kailua
windsurfing,
kayaking
Lanikai
snorkeling
Waimanalo
boogie boards
Makapu'u
hike, whales
Sandy's
don't go
Hanauma Bay
snorkeling
More...
Kahaluu
Ahuimanu
Waiahole Valley Nature Park
Keaiwa Heiau State Recreation Area
Kaneohe Bay MCAS
Mokapu
Kaneohe Station
Nuupia Pond
Heeia
Kaneohe
Kailua Bay
Kailua
Kawainui Regional Park
Hoomaluhia Park
Mid-Pacific Country Club
Pearl Country Club
Aiea
Pali Golf Course
Maunawili
Kalanianaole Hwy
Moanalua
Moanalua Fwy
Likelike Hwy
Kalihi Valley
Luana Hills Country Club
Olomana Golf Links
Waimanalo
Waimanalo Bay State Recreation Area
Salt Lake District Park
Honolulu Country Club
Fort Shafter
Liliha - Kapalama
Oahu Country Club
Waimanalo Bay
Waimanalo Beach
Pali Hwy
Honolulu Int'l Airport
Keehi Lagoon
Kapalama Basin
Downtown
Makiki - Lower Punchbowl - Tantalus
Waahila Ridge State Recreation Area
Palolo
Kalihi Channel
Sand Island
Honolulu Harbor
Lunalilo Fwy
Kuliouou - Kalani Iki
Hawaii Kai
Hawaii Kai Championship GC
Ala Moana - Kakaako
Honolulu
Waialae - Kahala
Waikiki
Ala Wai Golf Course
Kuapa Pond
Waialae Country Club
Diamond Head State Monument
Maunalua Bay
Hanauma Bay
83
63
630
61
78
72
92
H1
H3
H201


Waimanalo





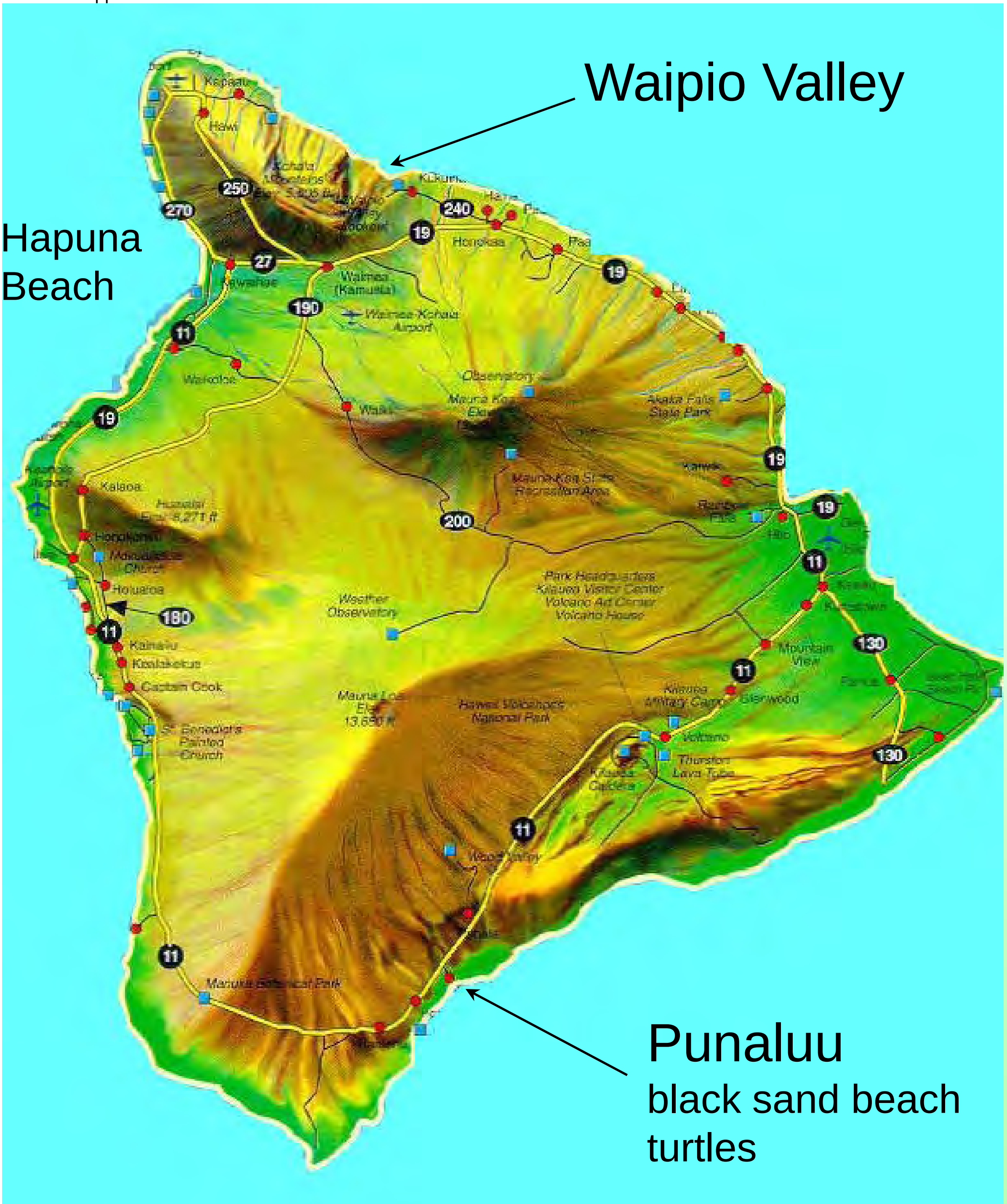


The Big Island

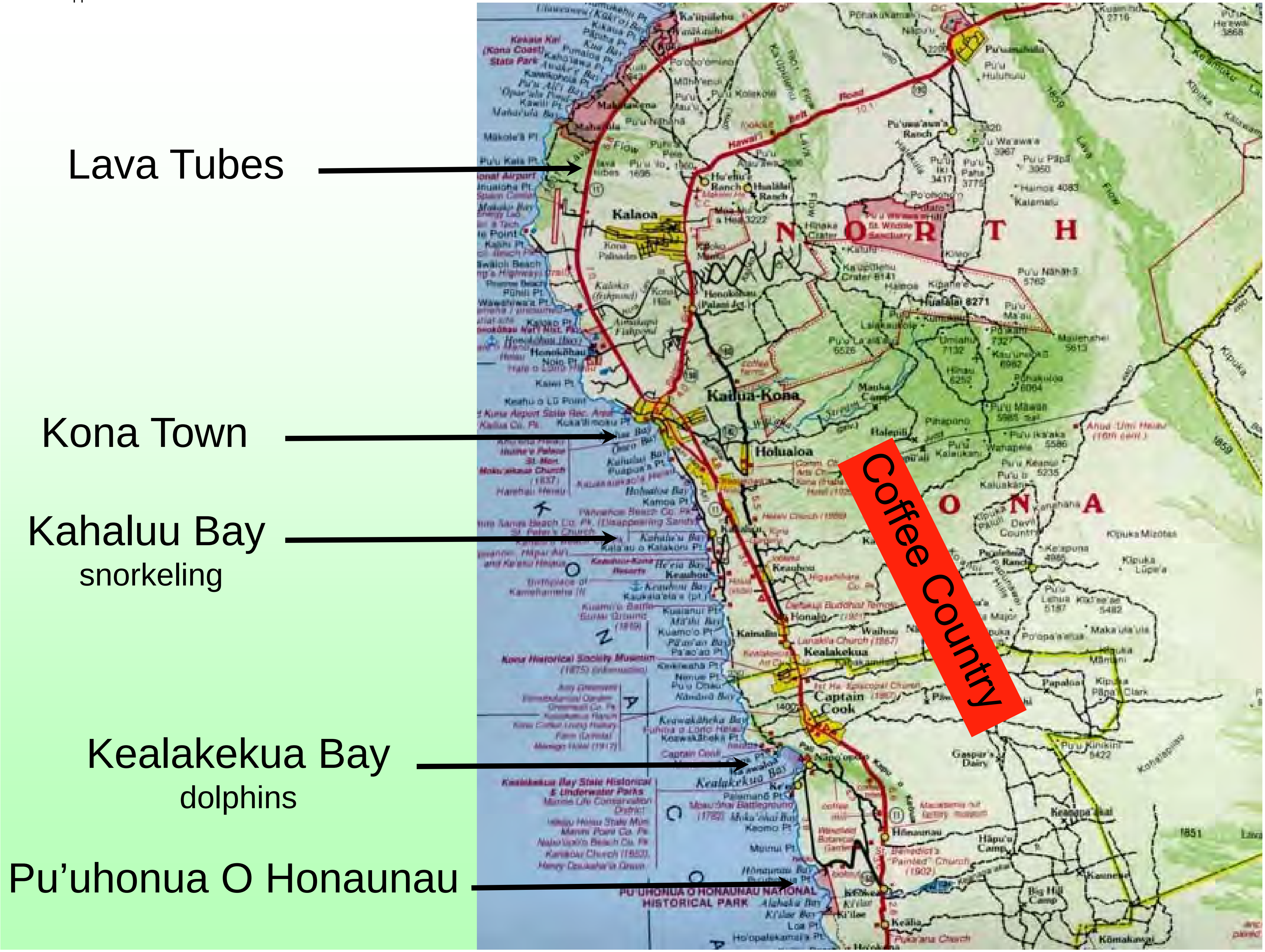
The textbook rain shadow effect

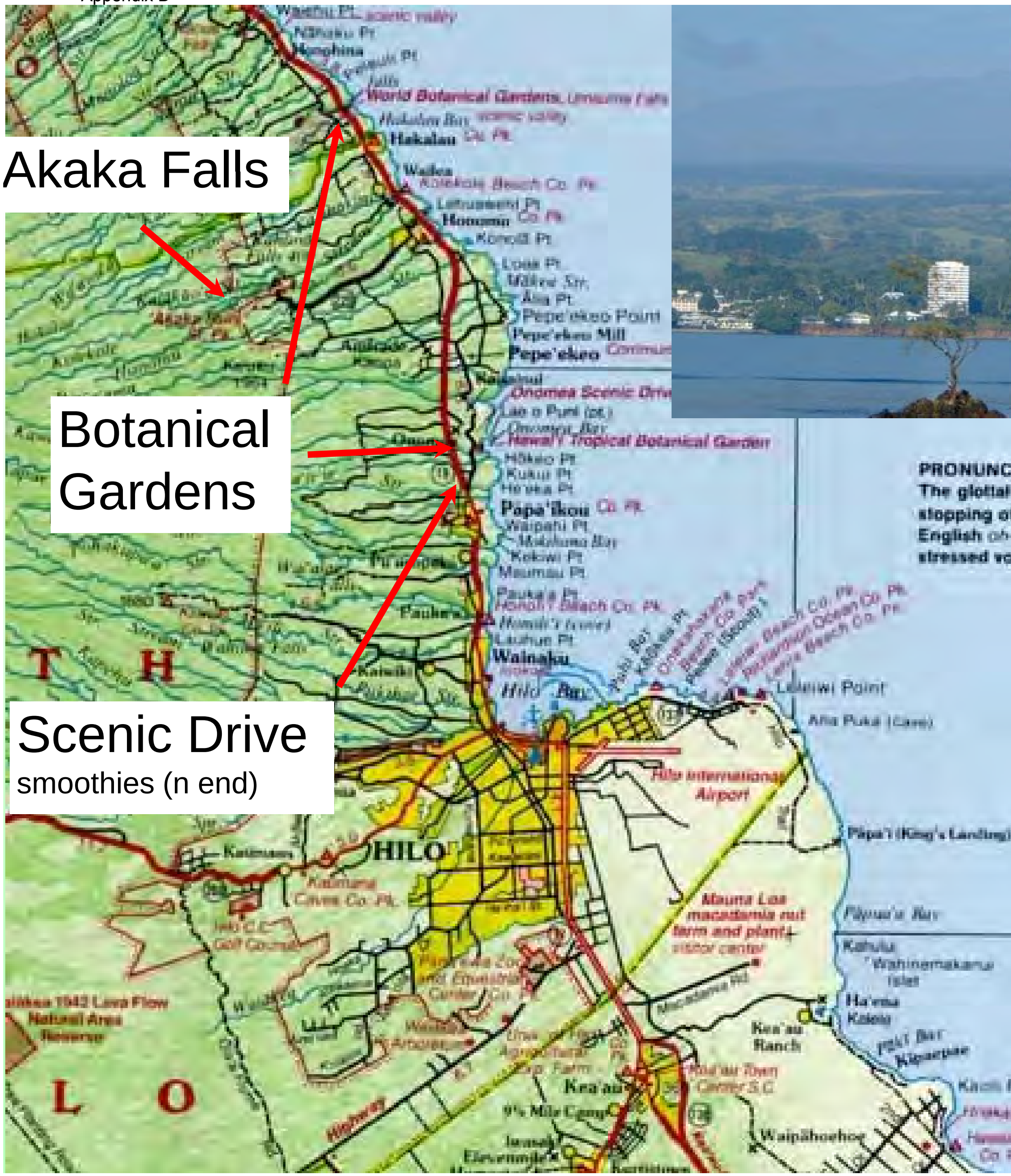
Hilo
5m rain/yr

Kona
30cm rain/yr



Kona to Hilo via the Saddle Road is about 100 miles (160 km)


Lava Tubes
Kona Town
Kahaluu Bay
snorkeling
Kealakekua Bay
dolphins
Pu'uhonua O Honaunau
Coffee Country
NORTH
KONA
Kalaoa
Kailua-Kona
Holualoa
Kealakekua
Captain Cook
Hōnaunau
PU'UHONUA O HONAUNAU NATIONAL HISTORICAL PARK


Akaka Falls
Botanical Gardens
Scenic Drive
smoothies (n end)
World Botanical Gardens
Hakalau
Honomu
Pepe'ekeo Point
Pepe'ekeo Mill
Pepe'ekeo
Onomea Scenic Drive
Hawai'i Tropical Botanical Garden
Papa'ikou
Wainaku
Hilo Bay
Leleiwi Point
Hilo International Airport
HILO
Mauna Loa macadamia nut farm and plant visitor center
Kea'au

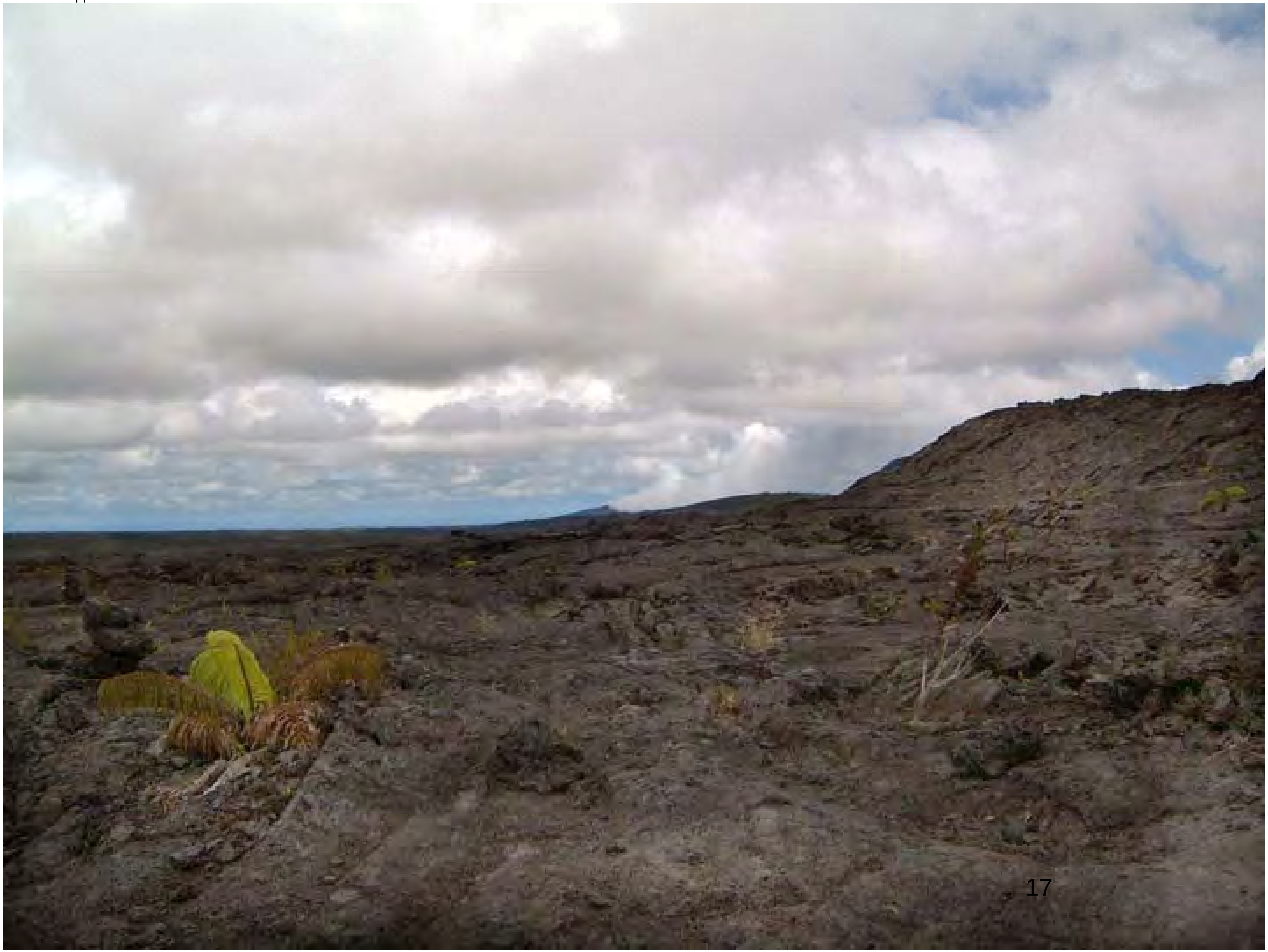

DANGER!
• Avoid fumes
Lava entering the ocean creates a toxic cloud that contains hydrochloric acid, superheated steam, and volcanic glass. These substances will irritate your eyes, skin, and lungs. Leave area at once if acid mist clouds are present.
• Do not approach areas where lava enters the ocean
New lava may appear solid, but often extends into the ocean without a stable base. It may collapse at any time without warning! Steam explosions hurl hot lava rocks inland. Stay away – don't risk your life!
• Beware of getting trapped by lava
Never enter areas where molten lava may cut off your escape route. Keep a safe distance from fresh lava, which is about 2000 degrees F. Be aware, stay alert, and use caution at all times.


P U N A
Kaumuki
Heiheiahulu
1711
Pu'u Kiai
HAWAI'I VOLCANOES N.P.-HILO
25 miles
Kahauale'a
1983-88
Kalalua
2181
East
Lava
Flow
1977
Nāpau Crater
Pu'u Huluhulu Crater
Mauna Ulu
CRATERS
Makaopuhi Crater
1969-74
VOLCANOES
Some roads on the island are subject to closing due to volcanic activity; inquire locally of status
Royal Gardens
Kaimū
Kalapana
Kapa'ahu
Kupapa'u Pt.
Kamoamoa
Lae'apuki
Kealakomo
Ka'ena Pt.
Hōlei Sea Arch
Nāulu Sea Arches
petroglyphs
HAWAI'I VOLCANOES N.P.-HILO
59 miles
PLEASE KOKUA
Help preserve all ar
future generations.

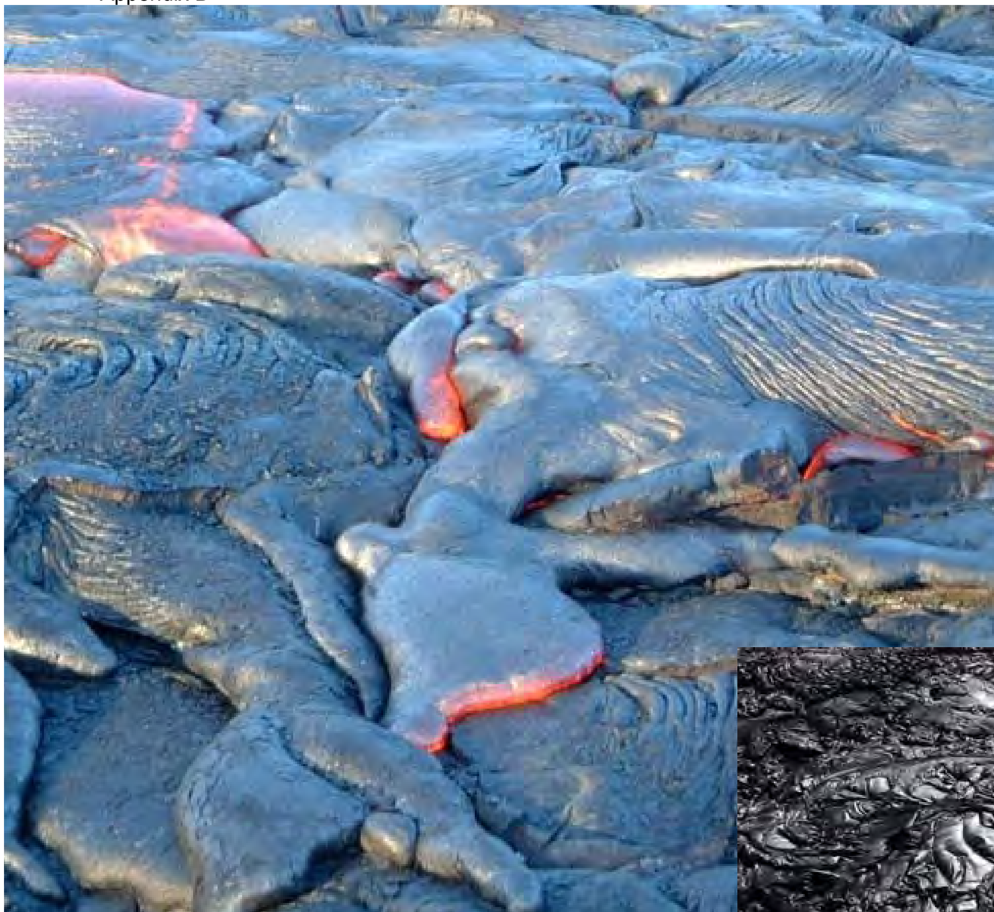
1988

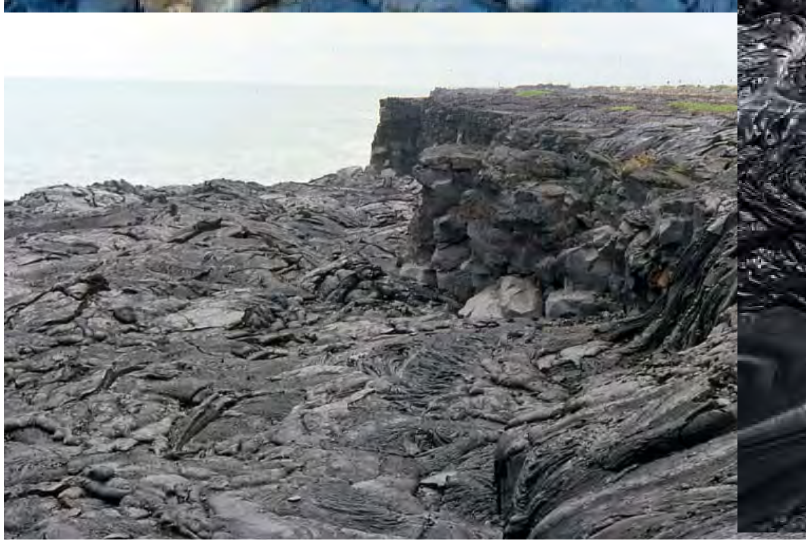
2003


P U N A
Kaumuki
Heiheiahulu
1711
Kahauale'a
Pu'u 'Ō'ō
Kalalua
2181
East
1977
Nāpau Crater
Mauna Ulu
CRATERS
Makaopuhi Crater
1969-74
VOLCANOES
1992-2002 Lava Flows
Royal Gardens
Kaimū
Kalapana
Kapa'ahu
Kamoamoa
Lae'apuki
Hōlei Sea Arch
Kealakomo
Ka'ena Pt.
Some roads on the island are subject to closing due to volcanic activity; inquire locally of status
PLEASE KOKUA
Help preserve all archeologi
future generations. Defacing
and moving or destroying




Federal Law Requires
You To Register At The
Kilauea Visitor Center
Before Hiking Beyond
This Point
This Area Subject To Volcanic
Activity At Any Time
Violators Will Be Cited & Fined





Engineering Development Panel IODP-MI Report

Luleå , Sweden
July 15-17, 2009

Greg Myers
IODP-MI

INTEGRATED OCEAN DRILLING PROGRAM
MANAGEMENT INTERNATIONAL

IODP Status

- Three vessels operating!!!
  - JR-Equatorial Pacific
  - MSP – New Jersey
  - Chikyu – Nantroseize Riser drilling
- IODP-MI offices are consolidating…Sapporo and DC office merging in Tokyo.
  - Most Sapporo staff will move to Tokyo
  - No US personel moving to Tokyo. Some staff *may* be retained as contractors

EDP Consensus and Action Items

EDP Concensus			
0901-07:	Engineering Testing Time Policy on IODP Platforms	The EDP endorses the IODP-MI policy for allocating engineering testing time at sea on IODP platforms.	complete, now put plan into action
0901-09	IODP-MI FY2010 Engineering Development Plan	The EDP re-affirms its endorsement of the existing IODP-MI FY10 Engineering Development Plan.	complete, engineering plan included in the FY 2010 Annual program plan
0901-11	STP Core Disturbance Case Studies	The EDP requests that the STP develop a set of examples that illustrate core quality issues that compromise scientific drilling objectives. These might include drilling biscuits, sapropels, chert/chalk interbeds, and core disturbance.	Need followup?
0901-16	Deep Rock Stress Tester (DRST) Engineering Development Proposal	The EDP recommends to the IODP-MI that an external scientific and technical review be obtained for this proposal. The EDP re-affirms the existing grouping number for this proposal and endorses IODP-MI's efforts to conduct an external review and use this information as part of the IODP engineering plan creation process.	Complete, reviews sent to proponent
EDP Action Item			
0901-15	At-sea Engineering Testing Time Request by the USIO-LDEO	The EDP reviewed a letter proposal concerning allocation of at-sea engineering testing time and is forwarding its response to the IODP-MI.	Complete, response send to proponent. Now must work to schedule
0901-17	Integrated Engineering Development Efforts within the IODP	The EDP recognizes that technology development within the IOs should be better coordinated with the entire POC- and SOC-supported engineering efforts. The EDP will send a letter outlining its concerns and suggestions to IODP-MI.	Complete, letter received by IODP-MI. Progress made with review of all SOC and non-SOC proposals and projects

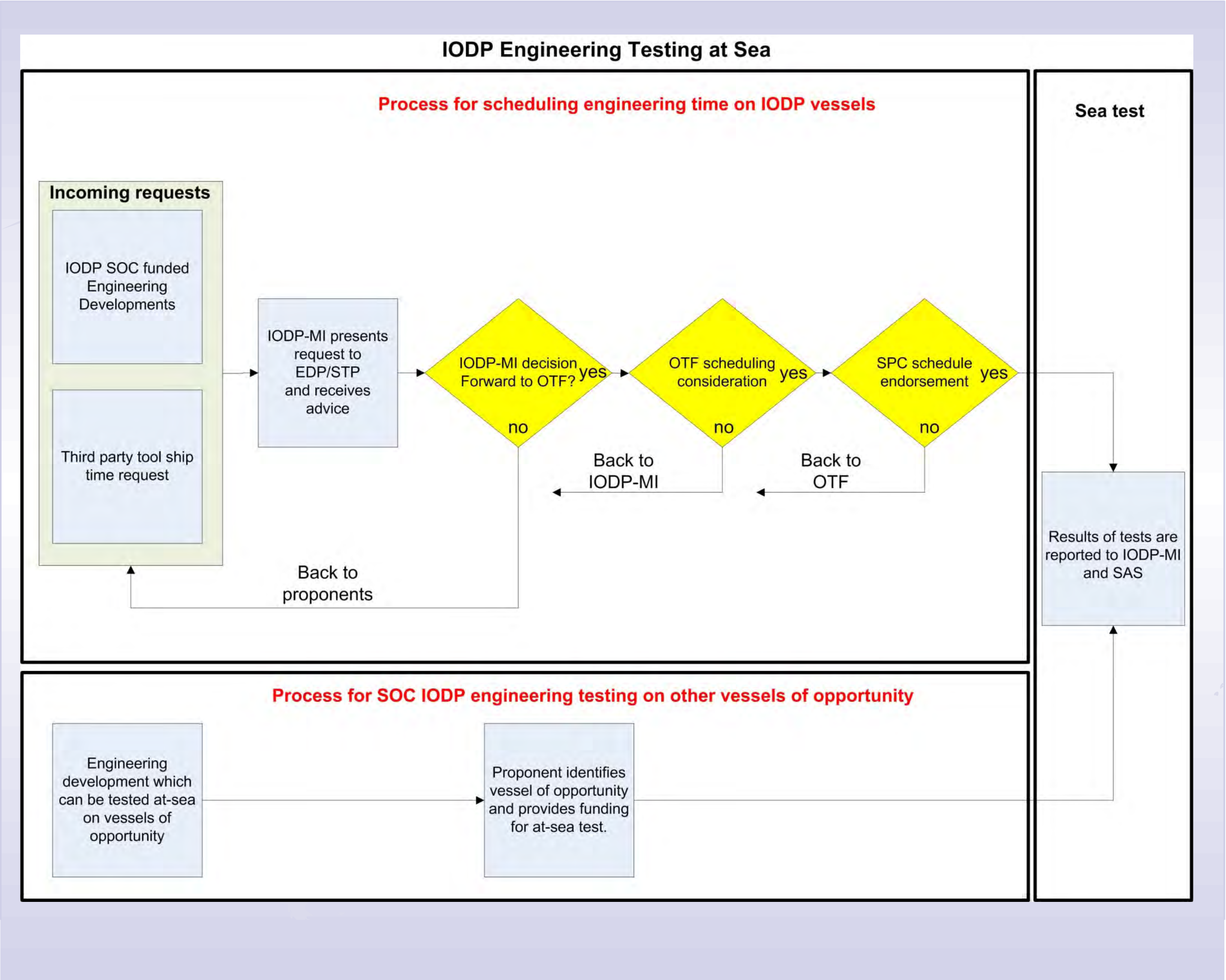
EDP Consensus 0807-12: Engineering Testing Time on IODP Platforms

- At-sea engineering testing is part of any Engineering Development project in the program, whether it is a 3rd party tool development, or an internal engineering project conducted by the IOs. Allocation of engineering testing time is critical for proper engineering development and must be included in future operational planning on an as needed basis. We endorse IODP-MI efforts to develop a means for accepting formal requests for engineering testing time at sea. The EDP is willing to review requests for at sea testing forwarded by IODP-MI.

- SPC Consensus 0808-18 – SPC accepts EDP Consensus 0807-12.

- Presented to Operations Task Force as well

- Status: All panels have acknowledged need to have up to 3 days of ship time for engineering without formal approval of SPC, however SPC must be notified


IODP Engineering Testing at Sea
Process for scheduling engineering time on IODP vessels
Sea test
Incoming requests
IODP SOC funded Engineering Developments
Third party tool ship time request
IODP-MI presents request to EDP/STP and receives advice
IODP-MI decision Forward to OTF?
yes
no
OTF scheduling consideration
yes
no
SPC schedule endorsement
yes
no
Back to IODP-MI
Back to OTF
Back to proponents
Results of tests are reported to IODP-MI and SAS
Process for SOC IODP engineering testing on other vessels of opportunity
Engineering development which can be tested at-sea on vessels of opportunity
Proponent identifies vessel of opportunity and provides funding for at-sea test.

SPC Consensus on Engineering Time at sea

- **SPC Consensus 0903-07:**
- The SPC adopts the principle that time be allocated in each IODP platform schedule to accommodate ancillary project letters (APLs) and engineering testing, and forwards this to the Operations Task Force (OTF) and implementing organizations (IOs) for implementation. As a guideline, three days per two-month expedition (i.e., less than 10% of on-site time) should be allocated for these activities. If the OTF determines that there is no appropriate engineering testing or approved APL for a given expedition, the time will transfer to the scientific objectives of the expedition.

Comments from STP on engineering time at sea

STP Consensus Statement 0903-04: Suggested modifications to the IODP-MI at sea engineering testing time policy

STP endorses the ‘at sea engineering testing time policy proposed by IODP-MI and also already endorsed by EDP (EDP consensus statement 0901-07). The panel suggests the policy be modified to include STP as a recipient of all final test reports, the time needed between request and ship time to be specified, and that specific proponent’s responsibilities be made clear. STP notes that scheduling ship time for at sea testing needs to be flagged to the expedition management team by the pre-cruise meeting and be part of the expedition’s operation plan

STP Consensus Statement 0903-11: Allocation of rig time for static testing and calibration of newly installed wireline heave compensation system

STP thanks Jennifer Inwood for her presentation on the recent operation and successful test of the newly installed wireline heave compensation system on the JR during Expedition 320T. The STP recommends for upcoming expeditions that appropriate rig time on the JR and Chikyu be allocated at the beginning of logging operations at each site for a static test which is necessary for the further calibration and adjustment of the new wireline heave compensated system.

3rd Party Tool Process Change

- Revised text very minimally to reflect inconsistency…the text in question pertains to SPC approval vs. notification requirement for third party tool deployments.

- Based on recent SPC consensus statement

EDP Consensus and Action Items

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EDP Action Item			
0901-15	At-sea Engineering Testing Time Request by the USIO-LDEO	The EDP reviewed a letter proposal concerning allocation of at-sea engineering testing time and is forwarding its response to the IODP-MI.	Complete, response send to proponent. Now must work to schedule
0901-17	Integrated Engineering Development Efforts within the IODP	The EDP recognizes that technology development within the IOs should be better coordinated with the entire POC- and SOC-supported engineering efforts. The EDP will send a letter outlining its concerns and suggestions to IODP-MI.	Complete, letter received by IODP-MI. Progress made with review of all SOC and non-SOC proposals and projects

DRST – external reviews

- IODP-MI located three external reviewers, one European, Japanese and U.S. Following their reviews, IODP-MI has determined that increasing grouping number from 3 does not have significant justification. This information has been passed to the proponent with the accompanying reviews (without the reviewers identity).

EDP Consensus and Action Items

EDP Concensus			
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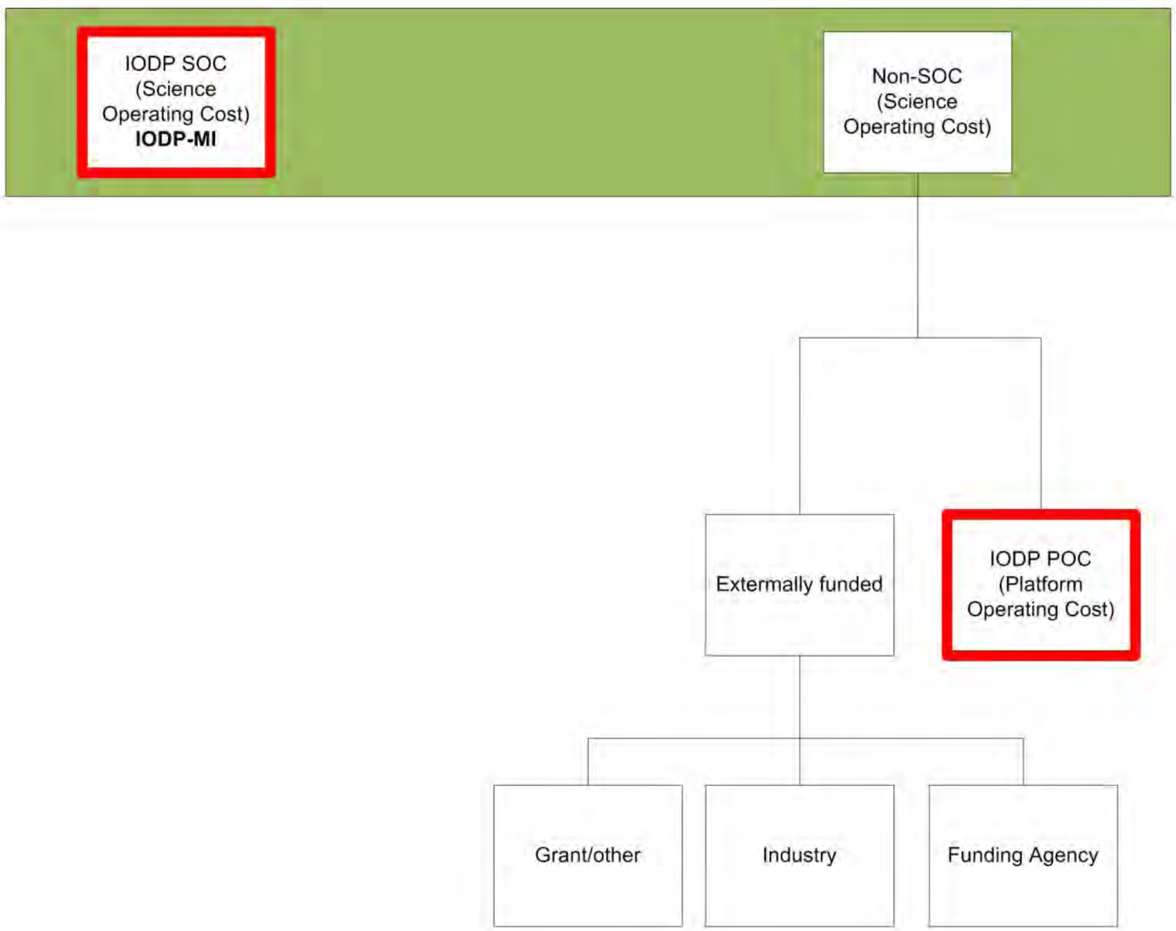
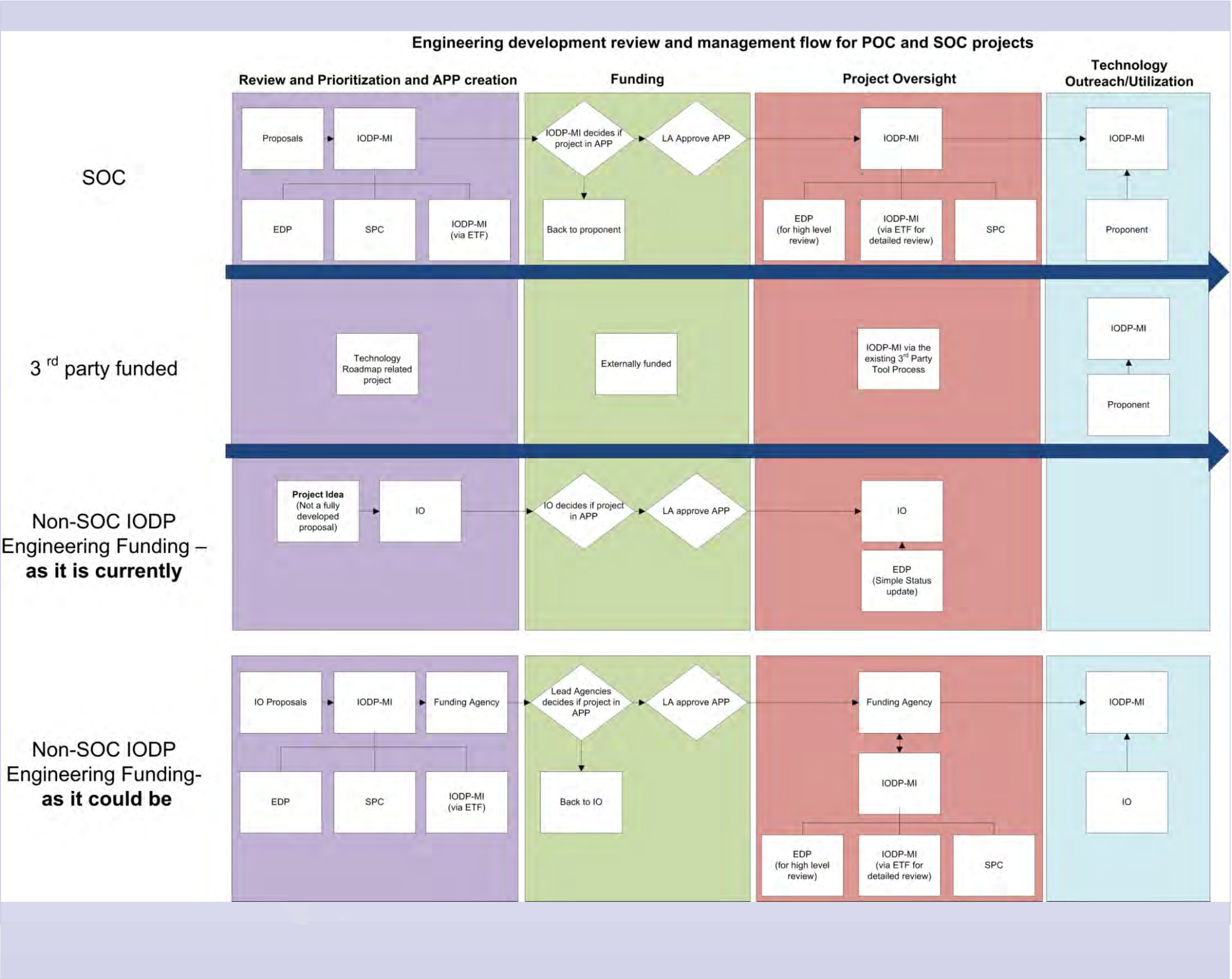
Integrated IODP Engineering Development for all Funding Sources

- **Review and advice for all IODP proposals and projects is critical**
  - Lead agencies provide authority to IODP-MI for SOC funding only
  - Decision was made by EDP to not distinguish between different types of funding, thus TR is funding independent
  - In the past all non-SOC proposals were simply returned to the proponents and all non-SOC projects received no external review
  - We need to ensure full collaboration between all IODP engineering teams

Engineering Funding Paths

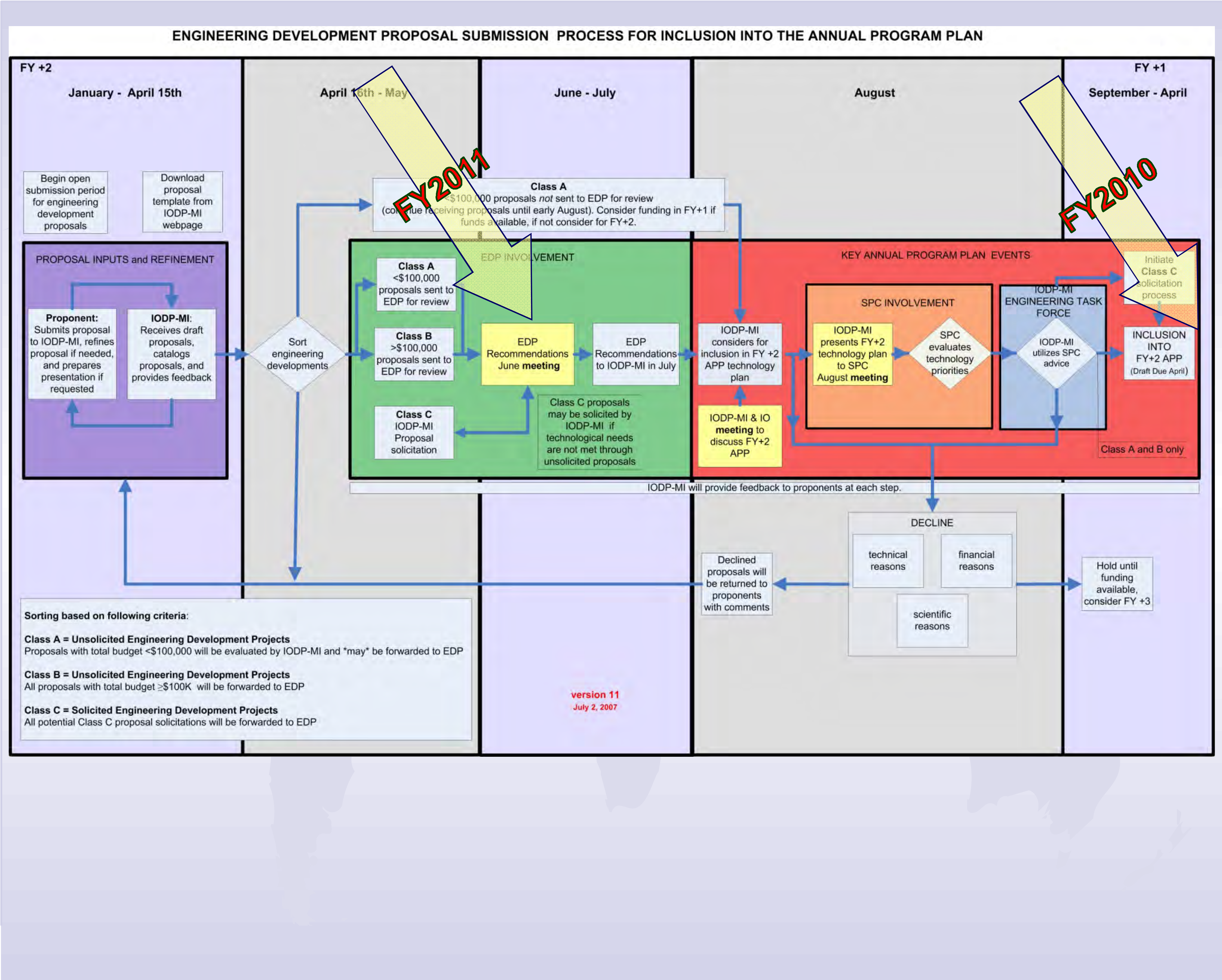


Go to web for proposal routing


Engineering development review and management flow for POC and SOC projects
Review and Prioritization and APP creation
Funding
Project Oversight
Technology Outreach/Utilization
SOC
Proposals
IODP-MI
EDP
SPC
IODP-MI (via ETF)
IODP-MI decides if project in APP
LA Approve APP
Back to proponent
IODP-MI
EDP (for high level review)
IODP-MI (via ETF for detailed review)
SPC
IODP-MI
Proponent
3 rd party funded
Technology Roadmap related project
Externally funded
IODP-MI via the existing 3rd Party Tool Process
IODP-MI
Proponent
Non-SOC IODP Engineering Funding – as it is currently
Project Idea (Not a fully developed proposal)
IO
IO decides if project in APP
LA approve APP
IO
EDP (Simple Status update)
Non-SOC IODP Engineering Funding- as it could be
IO Proposals
IODP-MI
Funding Agency
EDP
SPC
IODP-MI (via ETF)
Lead Agencies decides if project in APP
LA approve APP
Back to IO
Funding Agency
IODP-MI
EDP (for high level review)
IODP-MI (via ETF for detailed review)
SPC
IODP-MI
IO

Engineering Project Status

- FY2009 through FY2011


ENGINEERING DEVELOPMENT PROPOSAL SUBMISSION PROCESS FOR INCLUSION INTO THE ANNUAL PROGRAM PLAN
FY +2
January - April 15th
April 16th - May
June - July
August
FY +1
September - April
FY2011
FY2010
Begin open submission period for engineering development proposals
Download proposal template from IODP-MI webpage
PROPOSAL INPUTS and REFINEMENT
Proponent: Submits proposal to IODP-MI, refines proposal if needed, and prepares presentation if requested
IODP-MI: Receives draft proposals, catalogs proposals, and provides feedback
Sort engineering developments
Class A
<$100,000 proposals not sent to EDP for review
(continue receiving proposals until early August). Consider funding in FY+1 if funds available, if not consider for FY+2.
EDP INVOLVEMENT
Class A <$100,000 proposals sent to EDP for review
Class B >$100,000 proposals sent to EDP for review
Class C IODP-MI Proposal solicitation
EDP Recommendations June meeting
EDP Recommendations to IODP-MI in July
Class C proposals may be solicited by IODP-MI if technological needs are not met through unsolicited proposals
KEY ANNUAL PROGRAM PLAN EVENTS
IODP-MI considers for inclusion in FY +2 APP technology plan
IODP-MI & IO meeting to discuss FY+2 APP
SPC INVOLVEMENT
IODP-MI presents FY+2 technology plan to SPC August meeting
SPC evaluates technology priorities
IODP-MI ENGINEERING TASK FORCE
IODP-MI utilizes SPC advice
Initiate Class C solicitation process
INCLUSION INTO FY+2 APP (Draft Due April)
Class A and B only
IODP-MI will provide feedback to proponents at each step.
DECLINE
technical reasons
financial reasons
scientific reasons
Declined proposals will be returned to proponents with comments
Hold until funding available, consider FY +3
Sorting based on following criteria:
Class A = Unsolicited Engineering Development Projects
Proposals with total budget <$100,000 will be evaluated by IODP-MI and *may* be forwarded to EDP
Class B = Unsolicited Engineering Development Projects
All proposals with total budget ≥$100K will be forwarded to EDP
Class C = Solicited Engineering Development Projects
All potential Class C proposal solicitations will be forwarded to EDP
version 11
July 2, 2007

3 Year Engineering Time Horizons

FY2009	FY2010	FY2011
Active Projects	Preparing for Implementation	Planning Phase
Long Term Borehole Monitoring System - Finalize prototype and field test		
Simple Observatory Initiative - Create HLD and deployment sys.		
Motion Decoupled Hyd. Deliv. System - Year one		
In-house studies - Coring case study analysis		
New Projects - Complete low-dollar scoping studies with contractor?		

FY2009 Engineering Development

1. **Long Term Borehole Monitoring System**
   - Final year of development
   - Extend environmental testing and reporting into FY2010
2. **Simple Observatory Initiative:**
   - SCIMPI High Level Design
     - project kicked off in June
   - S-CORK High Level Design – proponent withdrew project
   - Simple Observatory Common Deployment System
     - Project kicked off in June
3. **Motion Decoupled Hydraulic Delivery System**
   - Year one of two – project kicked off in June
   - Over $100K of cost sharing provided by Univ. of Texas
4. **Continuation of in-house coring study**
   - Kicked off project to analyze core quality results with Dan Curewitz

3 Year Engineering Time Horizons

FY2009 Active Projects	FY2010 Preparing for Implementation	FY2011 Planning Phase
Long Term Borehole Monitoring System - Finalize prototype and field test		
Simple Observatory Initiative - Create HLD and deployment sys.		
Motion Decoupled Hyd. Deliv. System - Year one		
In-house studies - Coring case study analysis		
New Projects - Complete low-dollar scoping studies with contractor?		

FY2010 Engineering Plan

- New Project
  - Multi-sensor Magnetometer Tool
    - Year one of three
- Continuing Projects
  - Motion Decoupled Hydraulic Delivery System
    - (year two of two)
  - Simple Observatory development
    - Construction phase of SCIMPI

3 Year Engineering Time Horizons

FY2009 Active Projects	FY2010 Preparing for Implementation	FY2011 Planning Phase
Long Term Borehole Monitoring System - Finalize prototype and field test		
Simple Observatory Initiative - Create HLD and deployment sys.	**Simple Observatory Initiative** - Begin creating simple observatory	
Motion Decoupled Hyd. Deliv. System - Year one	**Motion Decoupled Hyd. Deliv. System** - Year two	
	Multi-sensor Magnetometer Tool - Year one of three	
In-house studies - Coring case study analysis		
New Projects - Complete low-dollar scoping studies with contractor?	**New Projects - Other project/s potentially added to FY2010 APP**	

Riserless Mud Recovery usage in IODP

- Initial feasibility study completed in February 2009, using Industry funding (DeepStar)
- Feasibility study for water depths up to 12,000ft complete…it is feasible

Whats is next for RMR?

- Field Trial…perhaps

Consensus requested from EDP to acknowledged the potential utility of RMR to achieve IODP science goals and recommend further development of the technology through field trial on IODP vessels if possible.

Consensus/Actions needed from EDP

- EDP endorses IODP-MI efforts to integrate engineering efforts
  - EDP to provide reviews for both SOC and non-SOC proposals
  - EDP to receive and review project info for both SOC and non-SOC projects during the bi-annual EDP meeting
- EDP endorses changes to third party tool policy text.
- Consensus requested from EDP to acknowledged the potential utility of RMR to achieve IODP science goals and recommend further development of the technology through field trial on IODP vessels if possible.

FY2011 Engineering Development Proposals

SOC Proposal

EDP-2011-01A : Wireline Hydraulic Testing and Imaging Tool

Asanuma, Ask, Holloway

Non-SOC Proposals

EDP-2011-01B : Replacement of the Magnetic Susceptibility Sonde

EDP-2011-02A : Development of CFRP riser pipe for 4000m deep waters (CFRP riser)

Engineering Development Definitions

Class A Development

- Total project less than $100,000
- Minimal proposal documentation required
  - These proposals will be further sorted by IODP-MI and may be forwarded to EDP for further review and advice.

Class B Development

- Total project greater than $100,000
- More substantial proposal required
- All Class B proposals will be forwarded to EDP for review and advice

Class C Development

- Proposals are solicited by IODP-MI following SAS consideration
- Multi-page proposal required
- All Class C proposals will be forwarded to EDP for review and advice

General Proposal Sequence

- April 15th - Engineering proposals submitted
- April 23-24 - Proposals reviewed by ETF
    - 3 Proposals received
- May 13th – ETF reviews sent to proponents, and proponents respond
- May & June - Preparation for EDP
    - Proponents create presentation for EDP
    - Watchdogs selected and proposals forwarded to EDP
- July 15-17th - Proposals reviewed by EDP and star ratings assigned
- July 31st - Reviews sent to proponents
- August 14th – Proponent response letters are received by IODP-MI and forwarded to all watchdogs
- August 24th - IODP-MI prepares FY2011 engineering plan based on EDP advice and estimated budget, then presents to SPC.
- January – IODP-MI presents the SPC endorsed plan to EDP

Proposal Review Discussions (From Ussler, Von Herzen, Ask, Fukahara)

- Proposal review discussions are always confidential
- Closed session proposal discussion
  - Chairman identified for closed session; does not vote, unless there is a tie
  - Formal closed session minutes (concise) prepared to document proposal review discussion; archived by IODP-MI; complete archive available at each EDP meeting by request from an IODP-MI representative
  - Non-voting observer(s) by invitation (IODP-MI); administrative function; maintain consistency
- Consensus on proposal review (not public)
- Consensus on grouping (not public)
- If no consensus, straw vote, then if no consensus, then vote; record yes, no, and abstention
- Conflicted proponents not present during discussion or when obtaining a consensus

Conflict of Interest

- **COI Overview:**
- A conflict of interest is a situation in which the interests (for example: personal, professional, or commercial) of an IODP SAS member or designated alternate involved in nurturing, evaluation, or assessment processes, or technological development, have a real or perceived impact, either positive or negative, on the results of the nurturing, evaluation, or assessment processes, or related contractual work.
- The chair/s should clearly announce and document all potential conflicts of interest and resulting actions (included in the minutes).
- In a similar fashion, members of panels who have a financial or commercial interest in tools, programs, etc, by means of their employment will be held to be in conflict of interest.
- At EDP, the specific COI issue of concern is the participation of panel members and other attendees who are proponents of active proposals.
- Panel members and other attendees who are proponents of active proposals are to be excluded from discussions of the specific proposal/s on which they are proponents. Proponents may participate in the discussion of all other proposals, including serving as watchdogs.
- Proponents may participate in nurturing and evaluating all other proposals, with such members declaring their potential conflicts, and the chair/s keeping a record of these conflicts.

Conflict of Interest - continued

Institutional Conflicts are dealt with as follows:

- In general, institutional conflicts are OK.
- Does the situation prevent you from rendering an impartial (fair) assessment?
- Is there a direct supervisory role or collaboration on a larger project that includes IODP?
- Is there a personal conflict?
- If in doubt, inform Co-Chairs. Allow them to document and judge.

Star Grouping Descriptions

Proposals are grouped on the last day in Executive Session. The groupings were based on a 5-star (-*) system, with 5* being the highest and 1* being the lowest. The following describes the grouping system used.

- 5 stars: Extraordinary proposal.

  (ED impacts multiple aspects of the ISP and/or Tech Roadmap. Exceptional cost/benefit ratio: very high probability of success.)

- 4 stars: Very good

  (Impacts the ISP and/or Tech Roadmap: good cost/benefit, high probability of success)

- 3 stars: Good

  (Impacts the ISP and/or Tech Roadmap: acceptable cost/benefit, acceptable probability of success.)

- 2 stars: Could be strengthened

  (Can impact ISP: contains deficiencies in organization, and/or poor cost/benefit, and/or poor probability of success.)

- 1 star: Not Acceptable

  (It does not impact the ISP or contains deficiencies in organization, and/or poor cost/benefit, and/or poor probability of success.)

Scoping Study Topics

- These scoping studies will provide valuable reference for the INVEST white paper
- Integrated downhole coring systems: Build on coring performance study to develop a platform-independent map of downhole coring applications showing how the different systems relate to each other and where future developments are required to overcome quantified performance shortfalls. (Leon, John Thorogood, John Tauxe, Maria, Lothar, Bill, Kevin, Nori, Sumio, David)
  - Use coring study as starting point
  - Contractor should be familiar with IODP needs and tools
    - John Thorogood will help locate key personnel to help
    - Marshall Pardee (sp) could also be useful to help, he was involved in ICDP projects
    - Lothar will contact European experts (Bernd W.)
    - Alister Skinner would be very helpful
  - Complete coring study first, then move on to integrated surface drilling systems.

Scoping Study SOW

- Took SOW generated at the last EDP meeting
- Contracted Stress engineering to conduct coring equipment scoping study.
- First draft of phase 1 is complete
  - See next slide

SSEP Report to the EDP

Maria Ask,

15 July 2009

SSEP #12 meeting

- Utrecht, Netherlands, 25-28 May 2009
- 23 proposals reviewed at the meeting
  - 20 new proposals and 3 proposals with external reviews
  - The 20 new proposals
    - 11 environmental, 6 solid earth, 3 microbiology & sub seafloor
    - 6 full, 11 pre-proposals, 1 complex drilling proposal (CDP), 2 ancillary proposal letters (APL)

Results

Proposal type: response		**Number of proposals**
Pre-Proposal: request Pre2 Proposal	=	4
Pre-Proposal: request Full Proposal	=	5
Full Proposal: forward to SPC	=	3
Full Proposal: send for External Review	=	2
APL: forward to SPC	=	1
CDP umbrella: revise	=	1

Full Proposal: request revision	=	2
Full Proposal: request new submission/deactivate	=	2
Pre Proposal: request new submission/deactivate	=	2
APL: request new submission/deactivate	=	1

SSEP proposals forwarded to SPC

No	Short Title	SSEP disposition
742-APL	Shatsky Rise High-Resolution Climate	SPC
548-Full3	Chicxulub K-T Impact Crater	SPC 4*
681-Full2	Lesser Antilles Volcanic Landslides	SPC 4*
732-Full2	Antarctic Peninsula Sediment Drifts	SPC 5*

SSEP Consensus 0905-3

The SSEP has learned from the IODP Board of Governor meeting minutes and from IODP-MI that there is a plan to close the IODP-MI Washington D.C. office and to relocate a consolidated IODP-MI office from Sapporo to Tokyo between late 2009 and 2010, retaining all functions from the two current offices. The SSEP is extremely concerned about the timing of this decision at a time when all three platforms are finally operational, and just prior to IODP renewal efforts. Any reorganization of IODP-MI must not in any way interfere with the operation of IODP-MI, with respect to the science programs on all three platforms, the potential loss of experienced personnel and corporate memory, and the efficient running of the Engineering and Development Panel (EDP). We are concerned that a disruption of the drilling program at this critical time would undermine support from the scientific community that will be needed for a successful renewal of the program. We suggest that the renewal stage is the most appropriate time to discuss and implement any needed changes in the management structure. The SSEP request SPC to relay these grave concerns to SASEC and the Board of Governors.

SSEP recommendations for INVEST

- Due to time constraints, each SSEP member identified pressing needs from their own research field and experience in a round-table discussion ➔
- 8 pressing needs and 32 “dream cruises”

Points related to EDP during the SSEP INVEST discussion

2 out of 8 overarching comments related to EDP:

- IODP would benefit enormously from the ability to make holes in the ground faster and cheaper. What technological changes could really change the current state of affairs? The desire to drill deeply is really hindered by high cost, and a quick solution is not apparent.
- Microbiology: It is important to drill high quality zones without contamination. The borehole observatory design is important: CORK produces hydrogen which can contaminate in-situ microbiological studies.

2 out of 32 “dream cruises” are related to EDP:

- Recent proposals that were identified as high quality and “Beyond the ISP” include the Gulf of Aden proposal by deMenocal, with important societally relevant links to society and the origin of H. sapiens. Similarly, the K. Edwards proposal combines many of the high priority science that IODP should do: microbial rock, fluid flow properties combined.

- Need to develop better recovery and coring systems for chert and shale sequences in the Pacific.

EDP reviews

- 743-Pre, Gulf of Mexico Hydrate Dynamics by Knapp was viewed upon as a high risk proposal, with the potential for a range of hazards.
- The SSEP’s reviewer suggested EDP review; however, no mentioning of EDP review in the SSEP’s minutes.

STP Report to the EDP

Sebastian Krastel
for
Clive Neal – STP Chair,
Sanny Saito – STP Vice Chair

Outline:
- EDP-relevant items from the STP March 2009 meeting.
- Core Recovery and Core Quality.
- STP Roadmap Update

STP Meeting March 6-9, Honolulu

15 Consensus Statements:

0903-01: Use of Magnetic Susceptibility Sonde on IODP Expedition 320.
0903-02: Establishment of mirror sites for CHRONOS and Neptune databases and subscription to electronic sources of information for micropaleontology.
0903-03: STP Tour of the Refurbished D/V *JOIDES Resolution*.
0903-04: Suggested modifications to the IODP-MI at sea engineering testing time policy.
0903-05: Expedition Measurement Plan Review.
0903-06: Routine sampling for frozen preservation.
0903-07: Drilling in Territorial Waters.
0903-08: Lithology nomenclature.
0903-09: Sea-Surface Magnetometer on JR.
0903-10: Depth Scale Implementation.
0903-11: Allocation of rig time for static testing and calibration of newly installed wireline heave compensation system.
0903-12: NanTroSEIZE Riser Drilling and Stage 1 Review.
0903-13: EDP Report and White Paper Review.
0903-14: Expedition QA/QC Report.
0903-15: Takuro Nunoura.

3 STP Consensus Statements relevant to EDP (in red)

EDP-Relevant STP Consensus Statements

0903-04: Suggested modifications to the IODP-MI at sea engineering testing time policy.

STP endorses the 'at sea engineering testing time policy' proposed by IODP-MI and also already endorsed by EDP (EDP consensus statement 0901-07). The panel suggests the policy be modified to include STP as a recipient of all final test reports, the time needed between request and ship time to be specified, and that specific proponent responsibilities be made clear. STP notes that scheduling ship time for at sea testing needs to be flagged to the expedition management team by the pre-cruise meeting and be part of the expedition's operation plan.

Priority: High

STP suggests this be forwarded to SPC, IODP-MI, IOs, and **EDP**.

SPC response to STP Consensus 0903-04

SPC Consensus 0903-03: The SPC accepts STP Consensus 0903-04 on suggested modifications to the IODP-MI at sea engineering testing time policy and notes that it is consistent with the allocation of ship time, as stated in SPC Consensus 0903-07.

SPC Consensus 0903-07: The SPC adopts the principle that time be allocated in each IODP platform schedule to accommodate ancillary project letters (APLs) and engineering testing, and forwards this to the Operations Task Force (OTF) and implementing organizations (IOs).

EDP-Relevant STP Consensus Statements

0903-11: Allocation of rig time for static testing and calibration of newly installed wireline heave compensation system.

STP thanks Jennifer Inwood for her presentation on the recent operation and successful test of the newly installed wireline heave compensation system on the JR during Expedition 320T. The STP recommends for upcoming expeditions that appropriate rig time on the JR and Chikyu be allocated at the beginning of logging operations at each site for a static test which is necessary for the further calibration and adjustment of the new wireline heave compensation system.

Priority: High

STP suggests this be forwarded to SPC, IODP-MI, OTF, **EDP**, CDEX, and USIO.

SPC response to STP Consensus 0930-11

SPC Consensus 0903-04: The SPC receives STP Consensus 0903-11 on the allocation of rig time for static testing and calibration of the newly installed wireline heave compensation system, and forwards it to IODP-MI for consideration.

EDP-Relevant STP Consensus Statements

0903-13: EDP Report and White Paper Review.

STP would like to thank Bill Ussler for his presentation on the EDP report. STP continues to communicate closely with EDP especially for facilitating the linkage between our two roadmaps. STP is also willing to review the EDP White Paper on the technological needs of scientific ocean drilling for the INVEST meeting. STP will comment on the white paper in a timely manner.

Priority: Medium

STP suggests this be forwarded to SPC, **EDP** and IODP-MI.

SPC response to STP Consensus 0930-13

SPC Consensus 0903-05: The SPC accepts STP Consensus 0903-13 on the white paper review by the Engineering Development Panel (EDP).

STP Action Item 0903-19: Core Recovery and Core Quality Report to EDP

STP recognizes that core recovery and core quality issues are critical to achieve the IODP scientific objectives. STP continues to collaborate with EDP and the IOs to address these problems. Upon request from EDP, STP will submit a report regarding core recovery and core quality issues prior to the 9th EDP meeting.

Priority: High

Leads: Saito and Neal

Deadline: June 15, 2009

Background to STP Action Item 0903-19

Upon the request from EDP Consensus Statement 0901-11, case studies on the core recovery and core quality issues were discussed during the STP meeting.

#9 EDP Meeting

STP Report to EDP

Core Recovery and Core Quality: A case study

- Background and purpose
  - Response to the EDP request
  - Common high-priority items in both two roadmaps
  - Provide a set of examples of technical problems to achieve <u>specific science targets</u> in order to prioritize coring technology developments.

Scientific Technology Roadmap
High priority items: coring

- ST-4: Enhanced core recovery
  - ED A-1, 3, 4, 5, 7, 9, 13, 14, 16, 24, and 30
- ST-33: Coring without disturbance
  - ED A-1, 5, 9, 14, and 20
- ST-18: Large diameter drill pipe and coring system
  - ED A-7 and B-1
- ST-42: Motor-driven core barrel (to enhance geochemistry/ microbiology on hard rock)
  - ED A-10

Engineering Technology Roadmap: Coring

- ED A-1: Thin walled geotech sampler
- ED A-3: RCB Upgrades
- ED A-4: Hard Rock Re-entry system
- ED A-5: Coring Guidelines/Operations Manuals
- ED A-7: ADCB
- ED A-9: Vibro-Percussion Corer
- ED A-10: MDCB
- ED A-13: Robotic Seabet Corers
- ED A-14: Jumbo Piston Corer
- ED A-16: Pressure Coring
- ED A-20: XCB Upgrades
- ED A-24: Transition Corers
- ED A-30: Freestanding, remotely operated deepwater shallow hole coring system

EDP Consensus 0901-11:
STP Core Disturbance Case Studies

- The EDP requests that the STP develop a set of examples that illustrate core quality issues that compromise scientific drilling objectives. These might include drilling biscuits, sapropels, chert/chalk interbeds, and core disturbance.

Core Recovery issues

- Average core recovery or Critical intervals?
- Strong demands from science communities based on various specific science targets

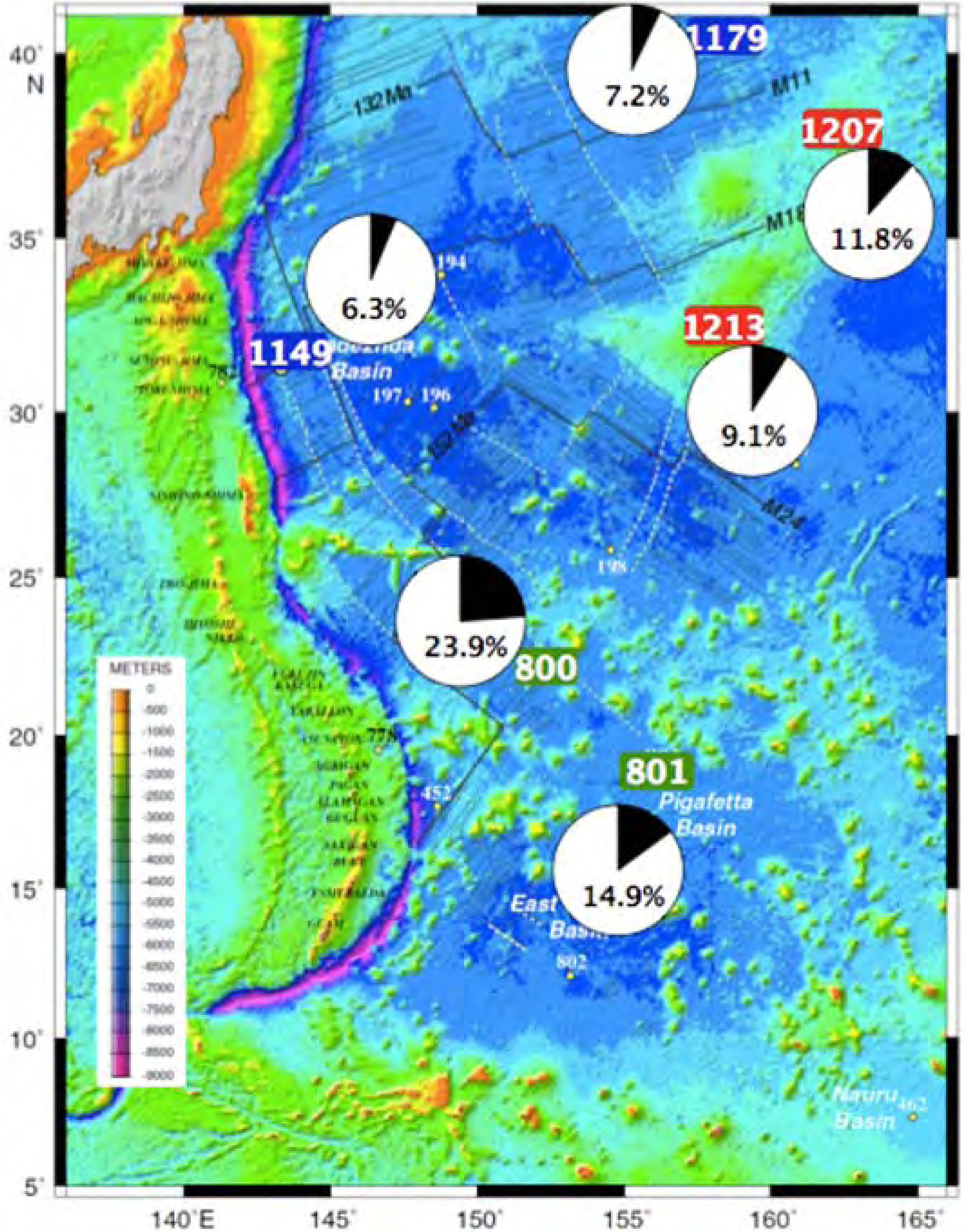
Core Recovery problems: Examples

- Alternating beds of chert/shale
- Carbonates
- Poorly consolidated sand intercalated with mud
- Sand/gravel in high latitude ocean
- Hydrothermal deposits
- Basaltic lava and sheeted dyke complex
- Fault zones

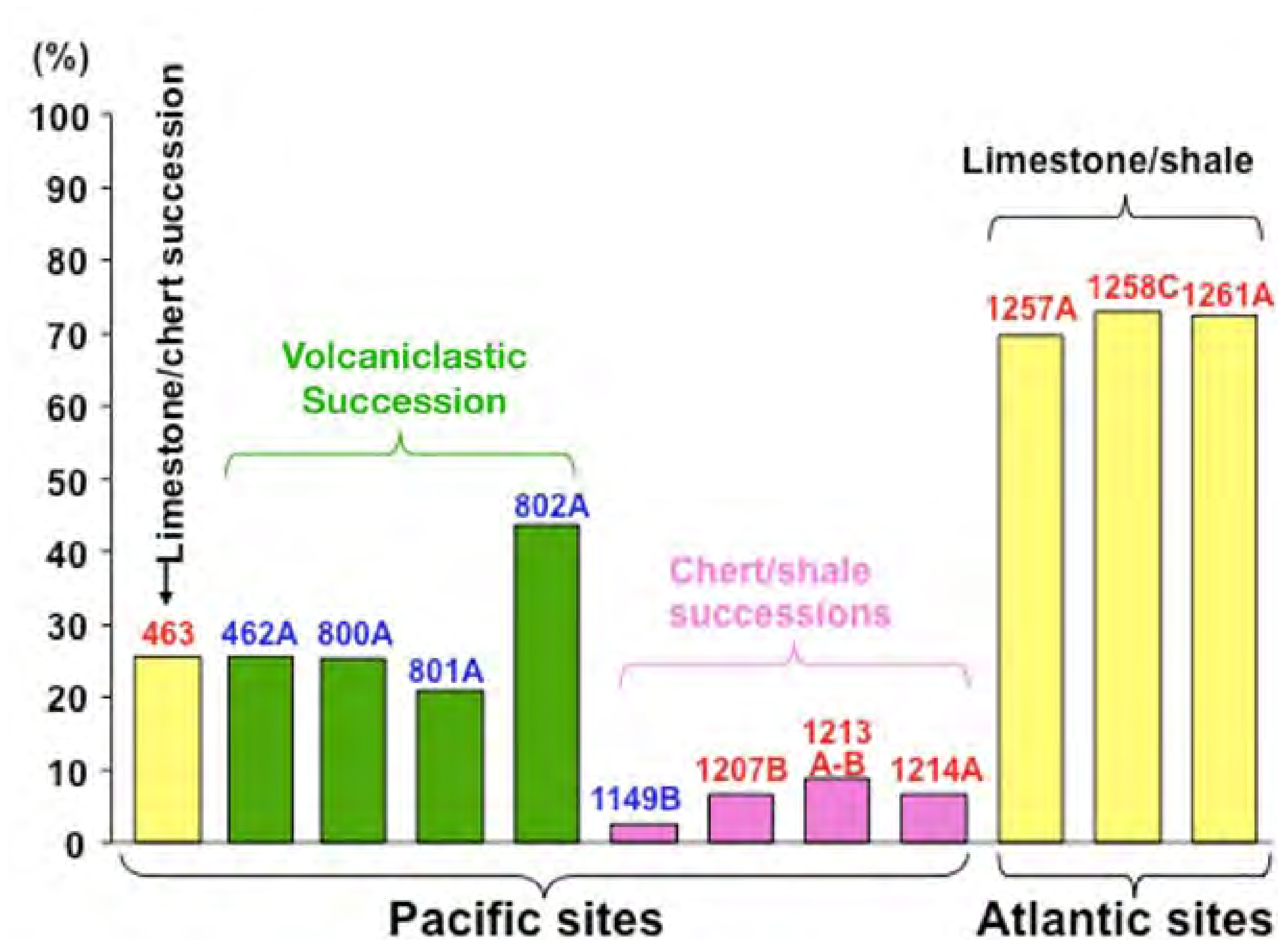
Example 1

- Lithology
  - Chert or alternating beds of chert/shale
- Science
  - Cretaceous carbon-rich sediments and Greenhouse anoxia
- Problems
  - Low recovery of chert
  - No recovery of interbedded shale

Low recovery of Cretaceous interval in western Pacific



Courtesy of Dr. J. Kuroda, IFREE, JAMSTEC



Core recovery from Cretaceous (Aptian~Turonian) sediments

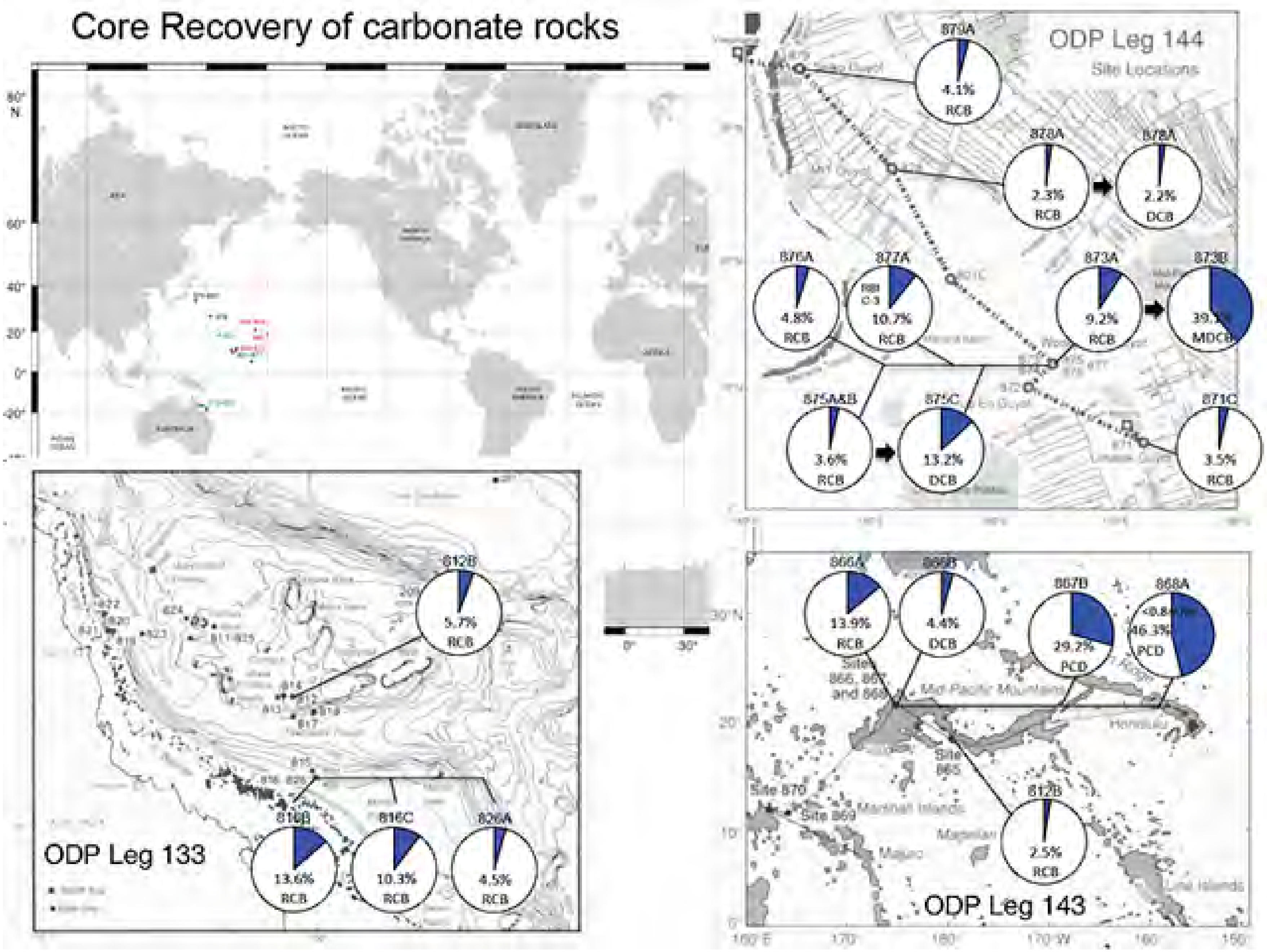
Sites by blue letter --- Abyssal basin

Site by red letter --- Platform, Plateau, or Seamount

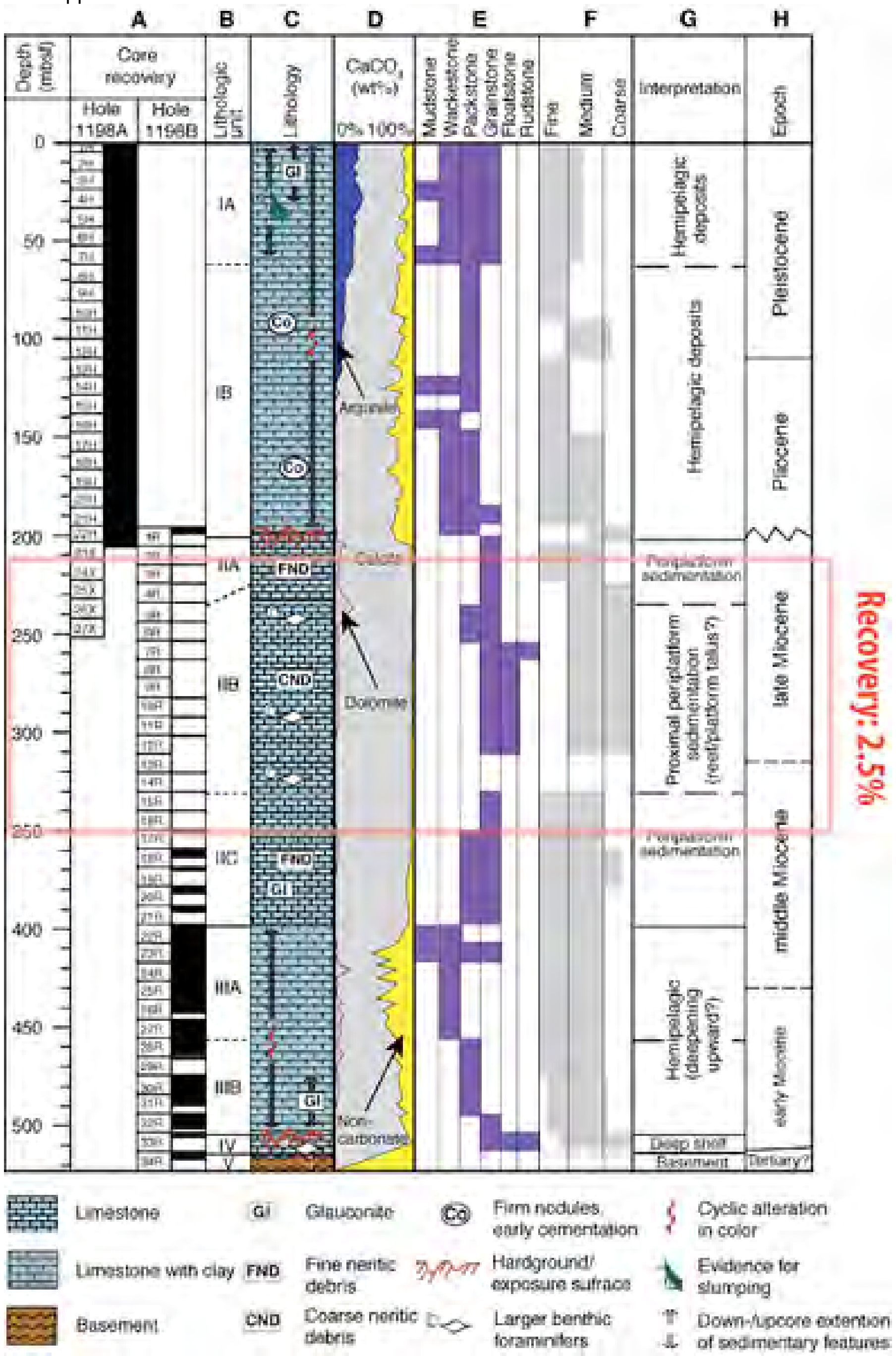
Courtesy of Dr. J. Kuroda, IFREE, JAMSTEC

Example 2

- Lithology
  - Coral reef, Carbonates
- Science
  - Reconstruction of past sea-surface temperatures at annual resolution in tropical coral reef
  - Sea-level change
- Problem
  - Low recovery of porous/brittle sediments with significant disturbance



Courtesy of Dr. S. Sakai, IFREE, JAMSTEC



Core recovery in friable carbonates: case study from ODP Leg 194 (Marion Plateau, Northeastern Australia)

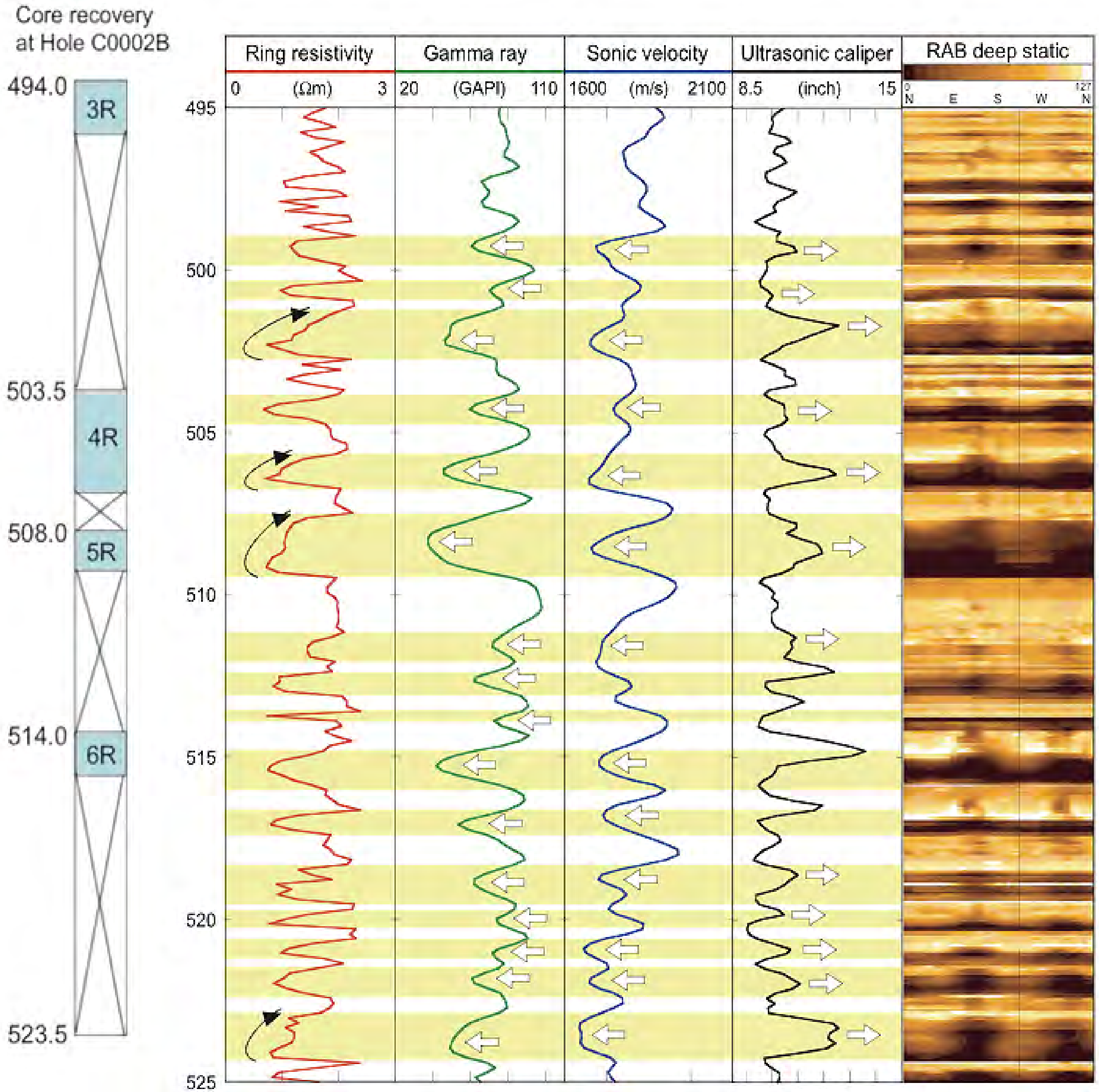
Summary figure for ODP Site 1198, illustrating the very poor recovery (red box) within Megasequence C. This interval was characterized by uncemented carbonate sands.

Courtesy of Dr. Dr. Cedric John, Imperial College London

Example 3

- Lithology
  - Poorly consolidated sand intercalated with mud
- Science
  - Sea-level change / sequence stratigraphy
  - Seismogenic turbidites
- Problems
  - Less/no recovery of sands

Turbidite zone at Site C0002, Nankai Tough (Exp. 314/315)



Turbidite sequence is perfectly imaged by logging-while-drilling in Hole A.

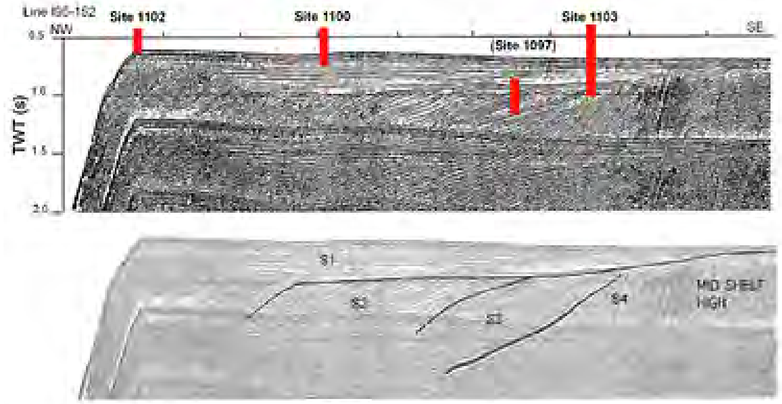
Core recovery at Hole B (RCB) was 20-30%.

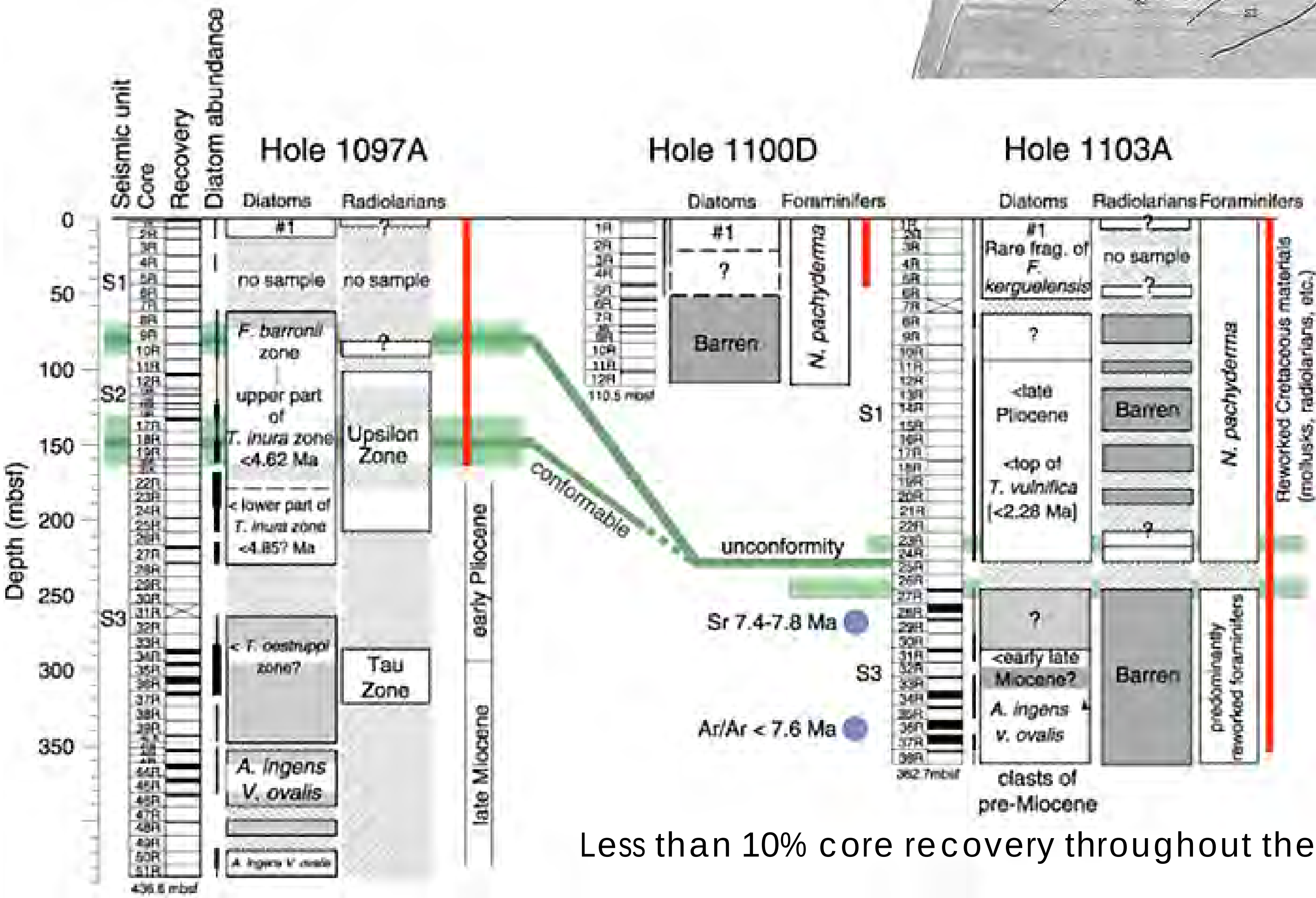
Example 4

- Geologic setting and lithology
  - Poorly consolidated sand/gravel in high latitude ocean
- Science
  - Antarctic ice history, direct evidence of grounded ice
  - Paleoceanography
- Problem
  - Extremely low recovery of glacial coarse sediments

Results from ODP Leg 178

Antarctic Glacial History and Sea-Level Change



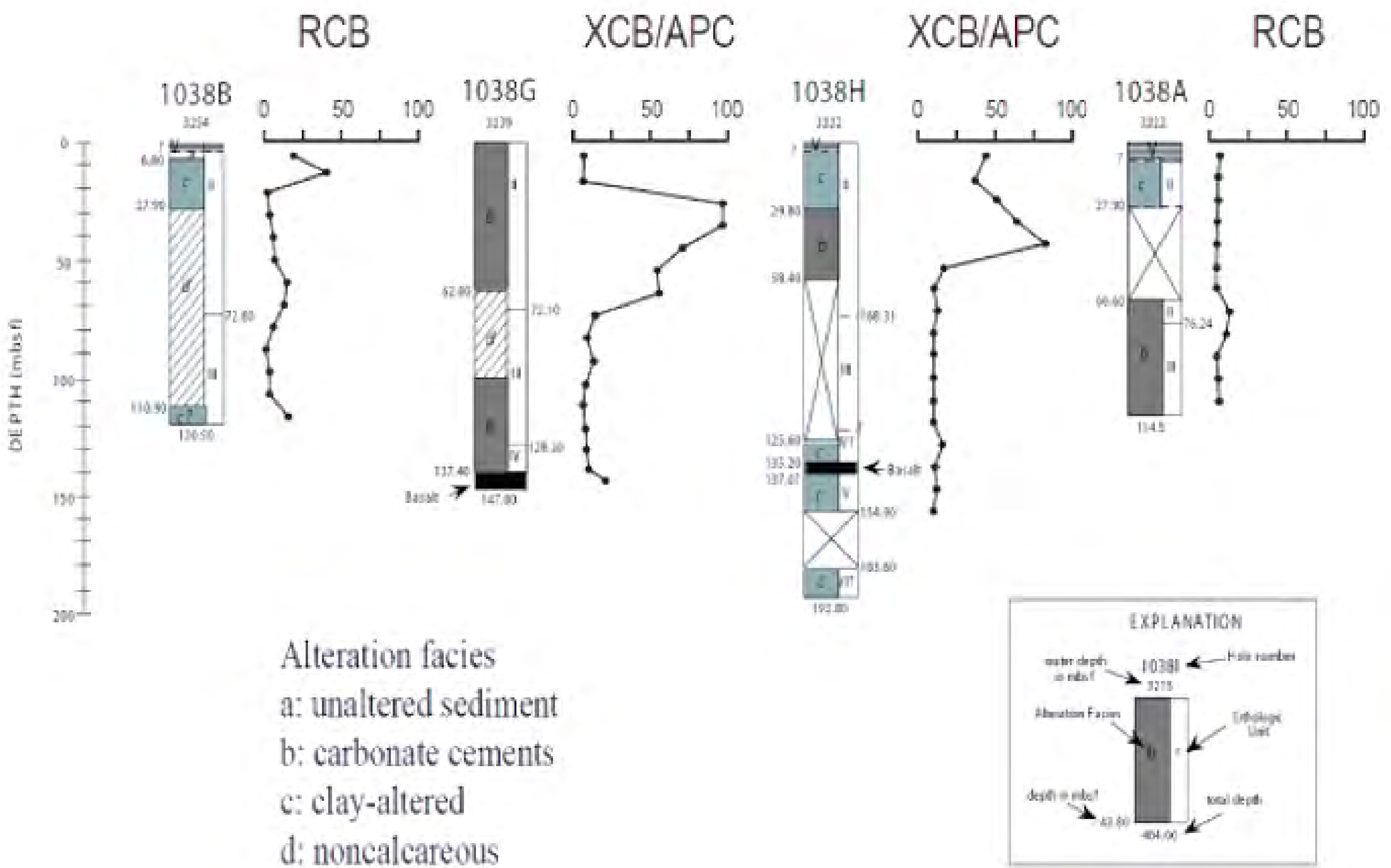


Less than 10% core recovery throughout the hole

Example 5

- Geologic setting and lithology
  - Altered sediments in hydrothermal field
- Science
  - Hydrothermal circulation and deposition, hydrogeology, geochemistry
- Problem
  - Very low recovery except for cemented zones

Hydrothermal Field: Site 1038, ODP Leg 169
Central hill of Escanaba Trough

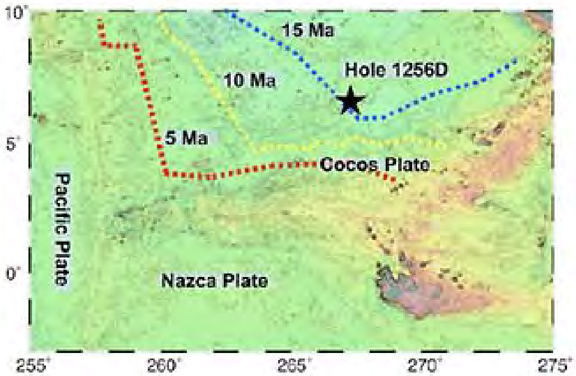


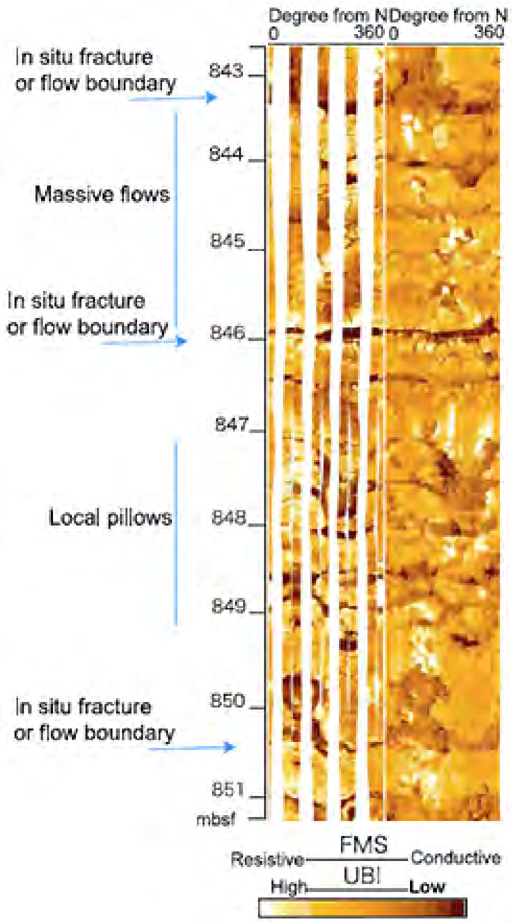
Courtesy of Dr. J. Ishibashi, Leg 169 Shipboard Scientist

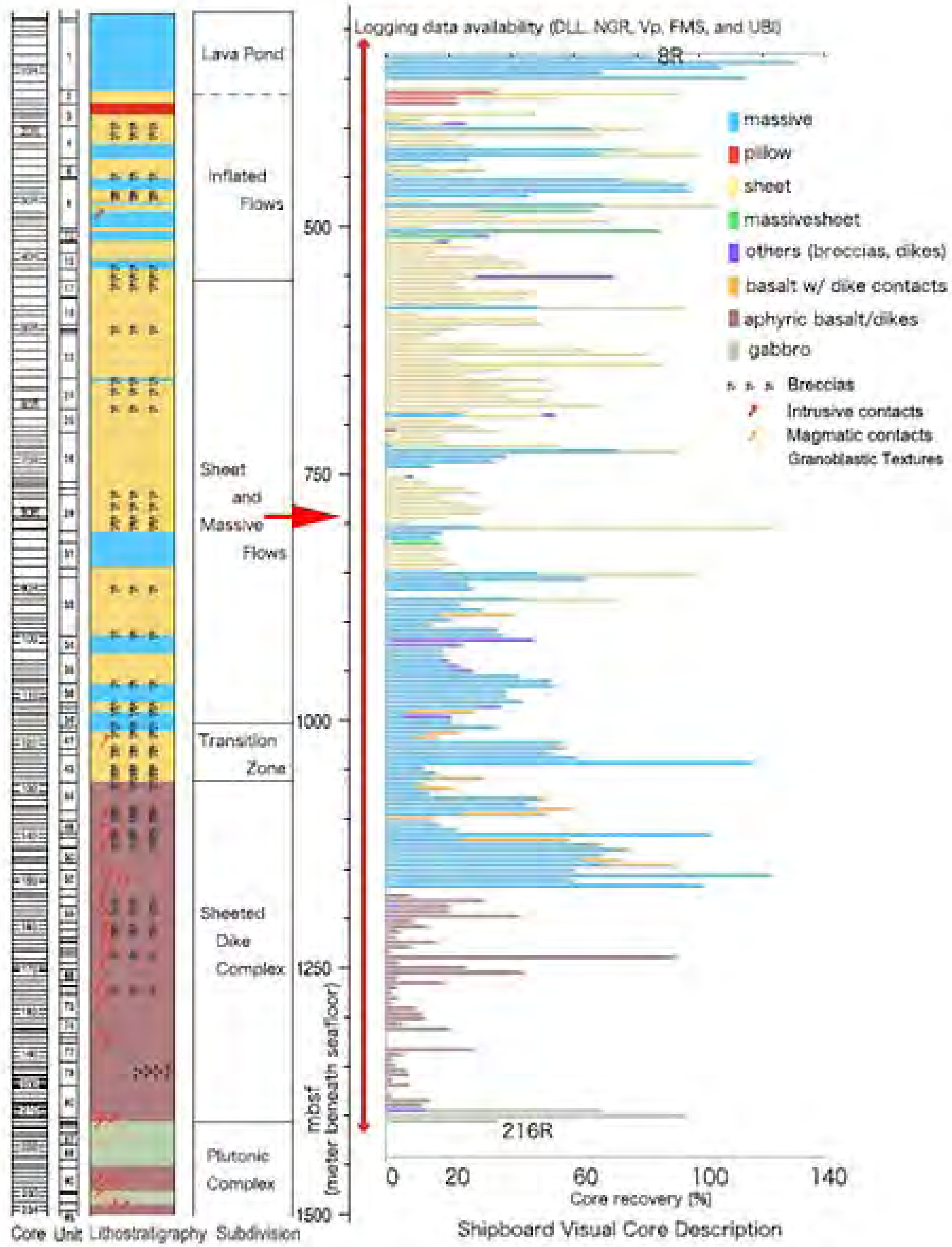
Example 6

- Lithology
  - Basaltic lava and sheeted dyke complex
- Science
  - Architecture and evolution of oceanic crust
- Problem
  - Core recovery is variable. Low recovery in pillow lavas (porous) and dyke complex (very low porosity)

Fast Spreading Ridge (ODP Leg 206, IODP Expedition 309/312)







After Tominaga et al., 2009, G³

Core quality issues

- Core disturbance to soft/transition sediments
  - ST-33 (ED A-1 ,14, 20)
- Contamination
  - ST-29: Real-time onboard evaluation (ED A-21 C-7)
  - Report from EDP contamination WG
- Magnetic properties: Secondary magnetization
  - ST-5: Non-magnetic core barrel (ED B-16, 17, 18)
- Core orientation
  - ST-2 (ED A-12)

Coring Biscuits

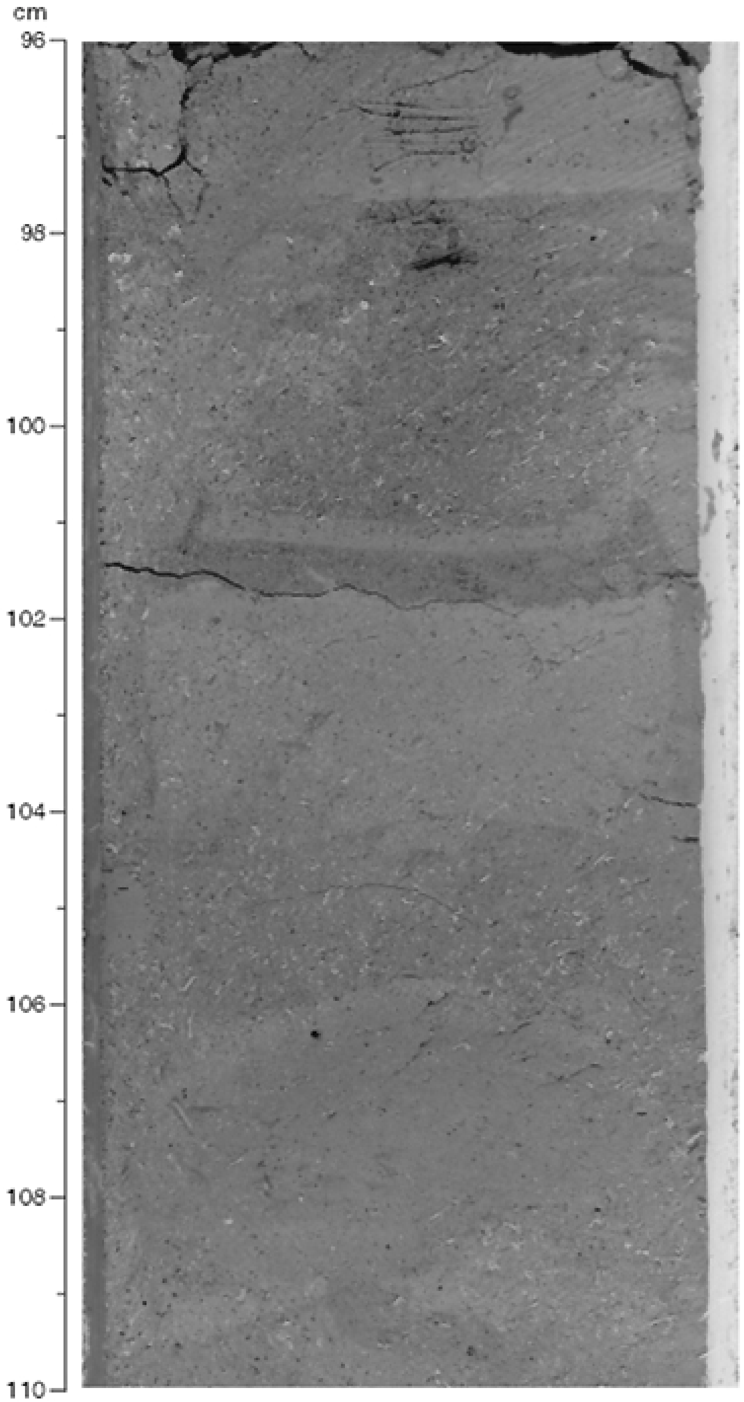
Photograph of typical "coring biscuits" by XCB coring (interval 186-1150A-47X-3, 50-100 cm).

http://www-odp.tamu.edu/publications/186_IR/chap_04/c4_f10.htm

Coring disturbance

Poorly lithified coarse sand of Section 190-1175A-44X-1 (406.86 mbsf) exhibiting apparent web structure. Note, however, that the thick, convex-upward horizontal bands are interpreted as induced by XCB coring.

http://www-odp.tamu.edu/publications/190_IR/chap_06/c6_f13.htm

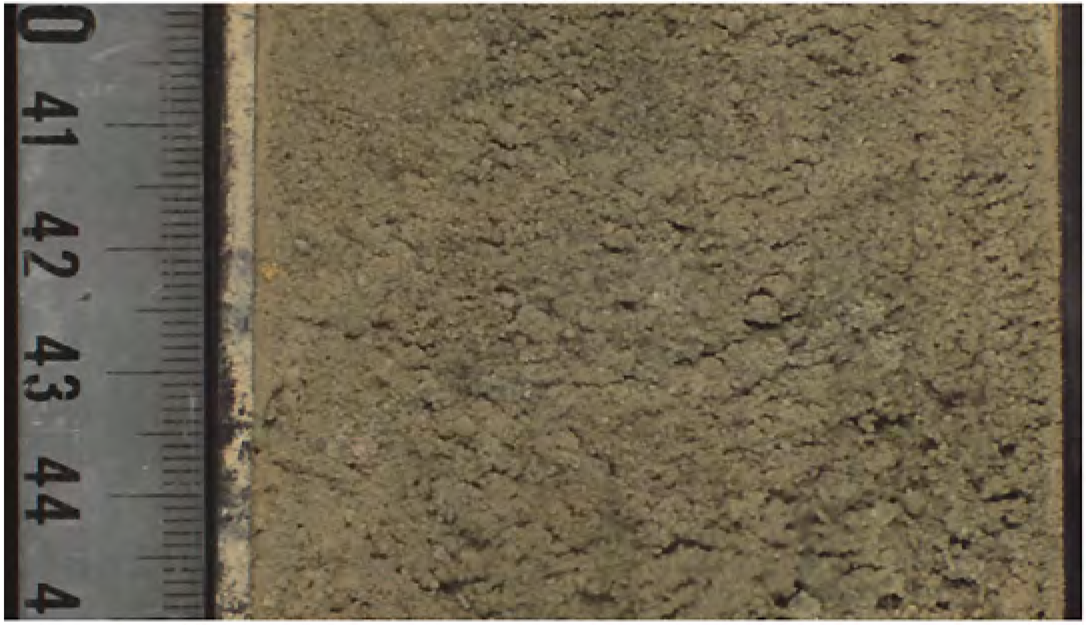


Highly disturbed interval caused by XCB coring.

The harder drilling biscuits (e.g., 96-97.5 and 102-105 cm) are composed of fine-grained, indurated silty clays. The biscuits are surrounded by softer, relatively coarser material that was washed in by coring, resulting in "false bedding" (interval 180-1109C-35X-3, 96-110 cm).

http://www-odp.tamu.edu/publications/180_IR/chap_06/ch6_f16.htm

1194A: XCB system



1194B: RCB system

Coring disturbance on carbonates

Difference in core quality between the XCB system and the RCB system, Site 1194.

The same lithologic interval was cored in hole A and B.

In hole B, where the RCB system was used, the lithology composed of fine bryozoans is well preserved.

Expected Solutions

- Transitional sediments and poorly consolidated sand/gravel
  - Percussion, vibration coring, short coring
- Brittle/porous rocks (lava, carbonates)
  - MDCB, Thin wall, short coring
- Alternating beds of hard/soft rocks
  - Combination of ADCB/MDCB & GEL CORE
- Very hard rocks (chert, aphyric basalts etc.)
  - ADCB

A written formal STP report to EDP will be submitted soon.

#9 EDP Meeting

STP Report to EDP

STP Roadmap Summary

- 67 items in the roadmap;
- Prioritized by working group. Rankings:
  - 1 = highest level of importance for science;
  - 2 = would be good for supplementing science;
  - 3 = would be good to have, but problems exist.
- CD = Core Description; PP = Petrophysics; CMB = Chemistry and Microbiology.
- Overlap with EDP on 17 items.

Item	Working Group	Ranking category (1, 2, 3)	Measurement/Technology	Science	EDP Link
ST-1	PP	1	**Compressive and/or shear strengths of sediments**	Compressive and/or shear strengths of sediments are necessary for various scientific objectives (e.g., landslide at seabed) and even for safety problems during drilling operations.	ED A-2 Cone Penetrometer/Remote Vane
ST-2	CD PP	1 1	**Oriented cores - 1**	Needed for magnetics, structural geology, stress orientations, sedimentary structures etc.	ED A-12 Provide core orientation on standard coring tools
ST-5	CD PP	3 2	**Non-magnetic core barrel**	Palemoagnetic studies.	ED B-16 Non-magnetic collars; ED B-17 Non-magnetic core barrel; ED B-18: Magnetic shield for core barrels / anti-contamination core barrel.
ST-6	CMB CD PP	2 2 2	**Directional Drilling**	Targeting of laterally discontinuous horizons or to follow certain structures; It is useful for drilling near vertical faults as done on land for the San Andreas Fault.	ED B-15: Directional Coring
ST-7	CMB CD PP	2 2 2	**Sidewall coring**	Coring of missed intervals/enhanced samping of critical sections.	ED A-11: Rotary Sidewall Coring; ED B-15: Directional Coring
ST-8	CD PP	2 2	**Logging while coring**		ED B-9: Drilling parameter acquisition while coring; ED B-10 Real time drilling parameter acquisition while coring; ED B-11 Formation logging while coring.
ST-11	PP	1	**Stress measurements**	Understanding stress state will immediately add to our science by adding quantitative data to stress orientations.	EDP LINK in C

Item	Working Group	Ranking category (1, 2, 3)	Measurement/Technology	Science	EDP Link
ST-13	**PP**	**1**	Pore pressure in the formation (different techniques – what are pros/cons, real-time vs. long term?)	Current real time techniques (Davis-Villanger Temperature Pressure Probe and Temperature [DVTPP] and Dual Pressure Probe [T2P] can provide accurate and near-real time formation pressures when correctly calibrated and deployed. Long-term measurements are the only way to look at transients of the system which could lead to understanding strain accumulation prior to major deformation events (e.g. earthquakes, landslides).	ED A-22: New In situ Sensors;
ST-15	**PP** **CMB**	**1** **1**	Collection of formation fluids at in situ pressure and temperature	Routinely done in industry to understand in situ conditions of reservoir fluids.	ED A-23: Fluid samplers, temperature and pressure measurement tools
ST-18	**CMB** **CD** **PP**	**1** **3** **1**	Larger diameter pipe	To decrease the effects of contamination for both geochemistry and microbiology. Larger cores also allow many types of analyses; larger diameter holes allow more downhole logging measurements. Allows more logging robustness, provides more material and the ability to go deeper.	ED A-7: Large Diameter Diamond Coring Systems (ADCB); ED B-1: Larger Diameter Pipe.
ST-19	**PP**	**1**	Downhole magnetometer (GHMT).	Downhole magnetostratigraphy and studies of magnetization in both sediments and igneous ocean crust. Can be used for complete magnetostratigraphy section in sediments.	A proposal by Lamont to build a new magnetometer tool (the Multisensor Magnetometer Module) has been submitted to ETF and reviewed by EDP.
ST-29	**CMB**	**1**	Real time, on board evaluation of contamination of cores (by drilling mud constituents - chemicals and microbes).	Monitoring of contaminants in IW, microbiology, geochemistry, etc.	ED A-21: Anti-Contamination System (Gel Core Barrel); ED C-7: Identifying, tracking, and minimizing drilling contamination.

Item	Working Group	Ranking category (1, 2, 3)	Measurement/Technology	Science	EDP Link
ST-31	CMB CD PP	1 1 1	**Deep hole penetration technologies (deep water, deep drilling).**	To determine the architecture and composition of the ocean crust which hosts life (and its limit) and holds the history of Earth origin and evolution, geologic origin and nature of the seismic reflector that defines the in situ oceanic Moho, and extent of hydrothermal activity.	ED B-21: 4,000 meter class riser system; ED B-22: 4,000 meter class BOP; ED B-26: Cementing protocol for deep drilling; ED B-27: Drill pipe for ultra deep ocean drilling; ED B-29: Mud circulation drilling system over 3,000-m water depth.
ST-33	CMB CD PP	1 1 1	**Coring without disurbance of soft sediments and/or heterolithic sediments (replace XCB system).**	Increased science from cores in terms of recovery, structures, paleomag, low contamination, reliable physical properties data etc.	ED A-1: Thin Walled Geotechnical Sampler; ED A-14: Jumbo Piston Corer; ED A-20: Upgrades to XCB system.
ST-42	CMB PP	1 1	**Motor driven core barrel**	To take hard rock core without drilling fluid contamination in riserless drilling.	should be integrated with EDP
ST-60	PP	1	**Downhole borehole sensors for long-term monitoring in high-T environment.**		ED C-1
ST-4	CMB CD PP	1 1 1	**Enhanced core recovery**	Enhanced recovery of hard-soft sequences, hard rocks (e.g., young oceanic crust), fault zones, poorly consolidated sediments, etc.	ED A-1: Thin Walled Geotechnical Sampler; ED A-3: Upgrade to RCB System; ED A-4: Hard Rock Re-entry System (HRRS); ED A-5: Coring Guidelines/Operations Manuals; ED A-13: Seabed Coring Devices; ED A-14: Jumbo Piston Corer; ED A-16: Pressure Coring systems (PTCS, PCS, FPC, HRC, etc.); ED A-9: Vibracore/Percussion Sampler; ED A-24: Transition Corers; ED B-30: Freestanding, remotely operated deepwater shallow hole coring system.

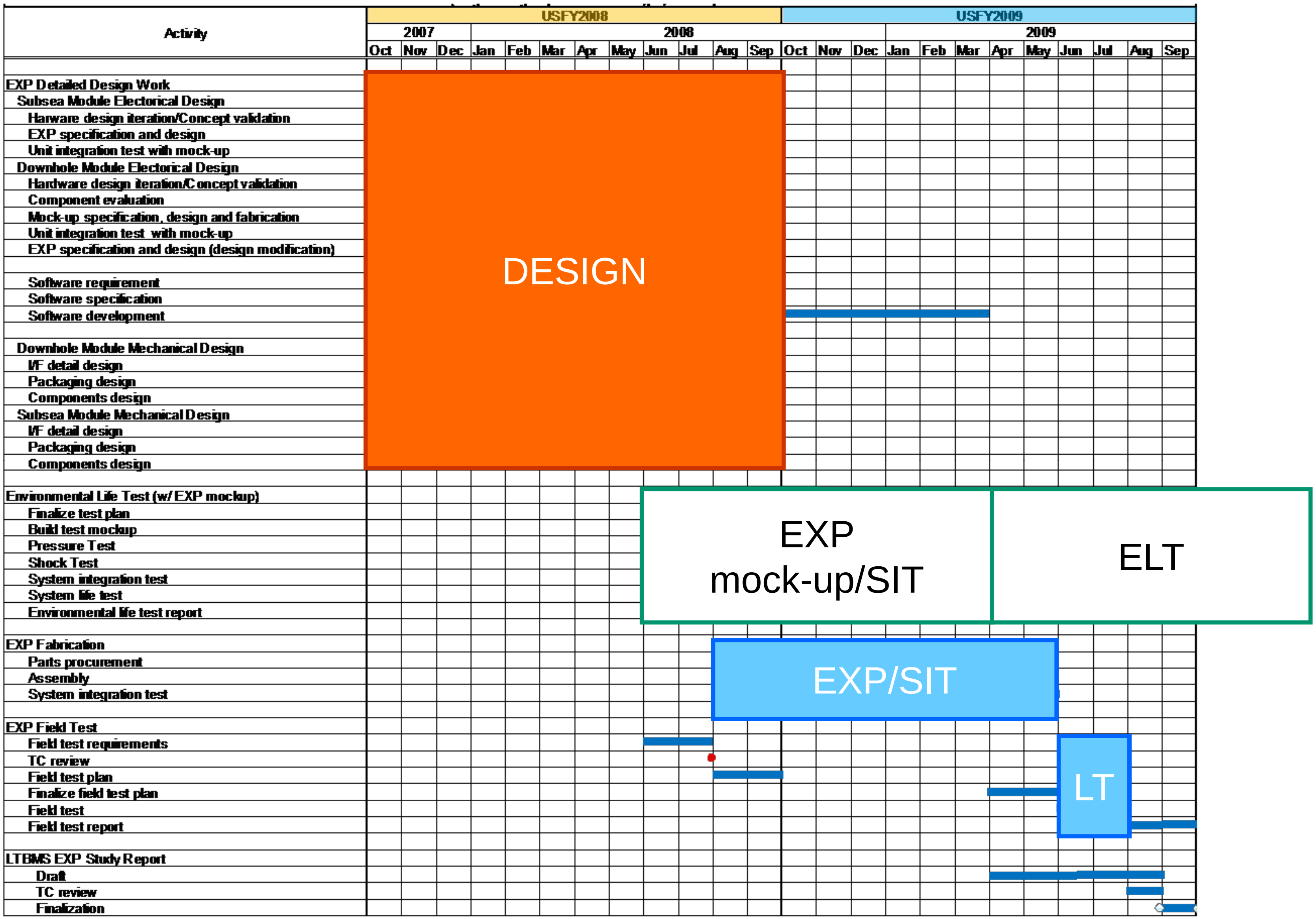
Update on Development of Telemetry System for Long Term Borehole Monitoring System

Nori KYO (kyom@jamstec.go.jp)

C*enter for* **D***eep* **E***arth e***X***ploration*

J*apan* **A***gency for* **M***arine-earth* **S***cience and* **TEC***hnology*

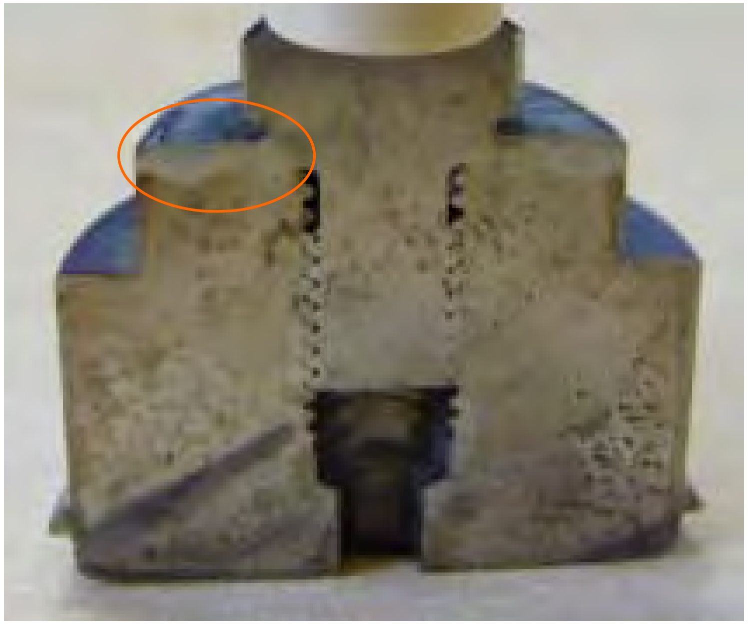
FY08/09 schedule



Tests in FY09

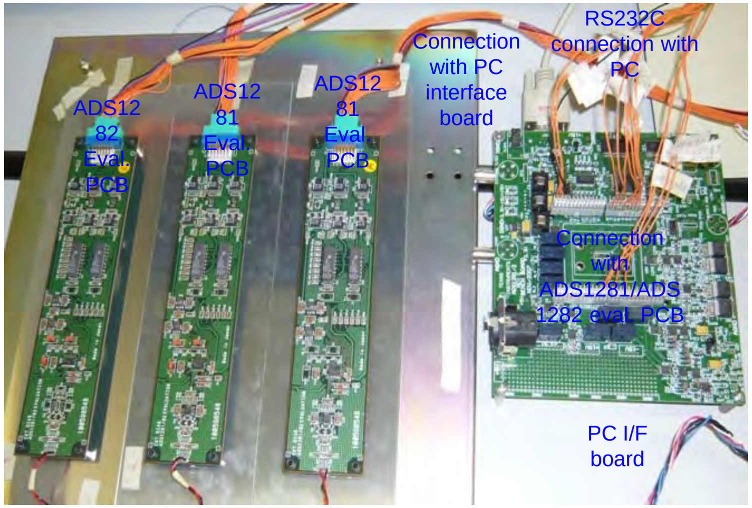
- Component evaluation test
- System Integration test
- Environmental life test
  - System life test (10.9 months in 150 °C)
  - Shock / vibration test (250 G, 2 axis)
  - HTHP test (16000 psi in 135 °C for 1 hour)
- Field test

Component evaluation



Mechanical parts

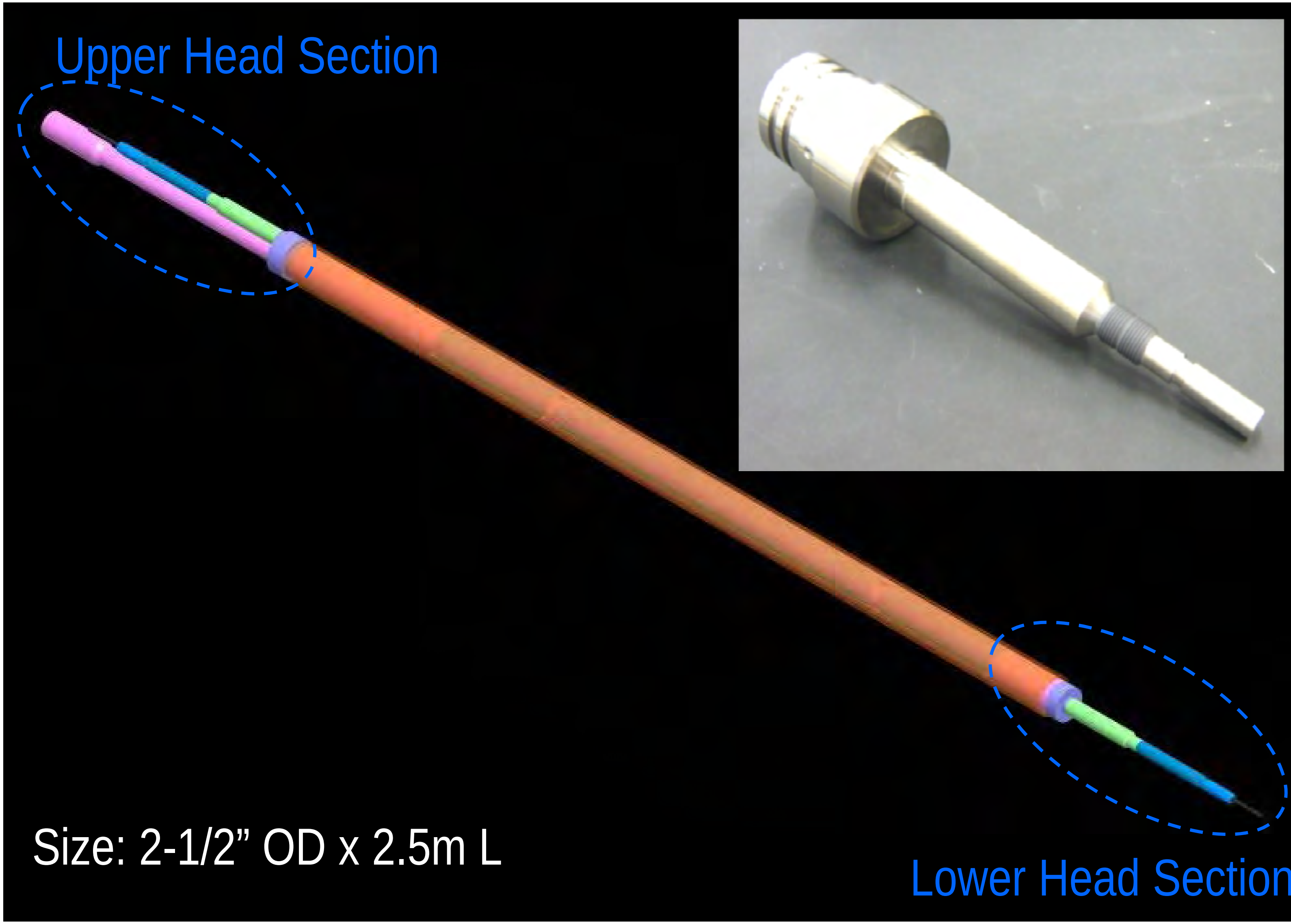
- Upper and lower head welding test
- Bulkhead welding test
- Housing pressure Test



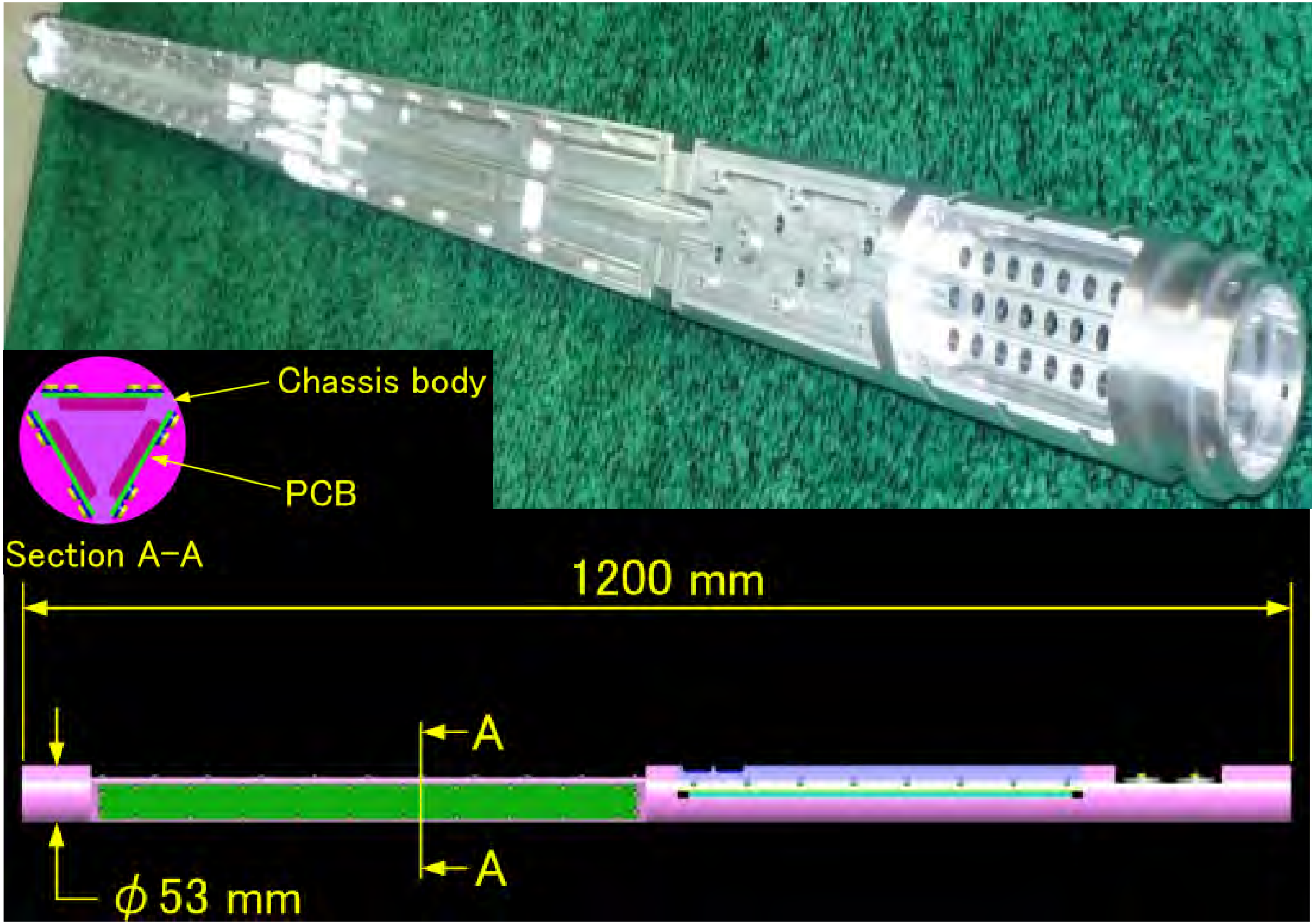
Electrical parts

- Fast sampling ADC
- Slow sampling ADC
- Voltage reference IC
- Voltage controlled crystal oscillator
- Fault recover unit

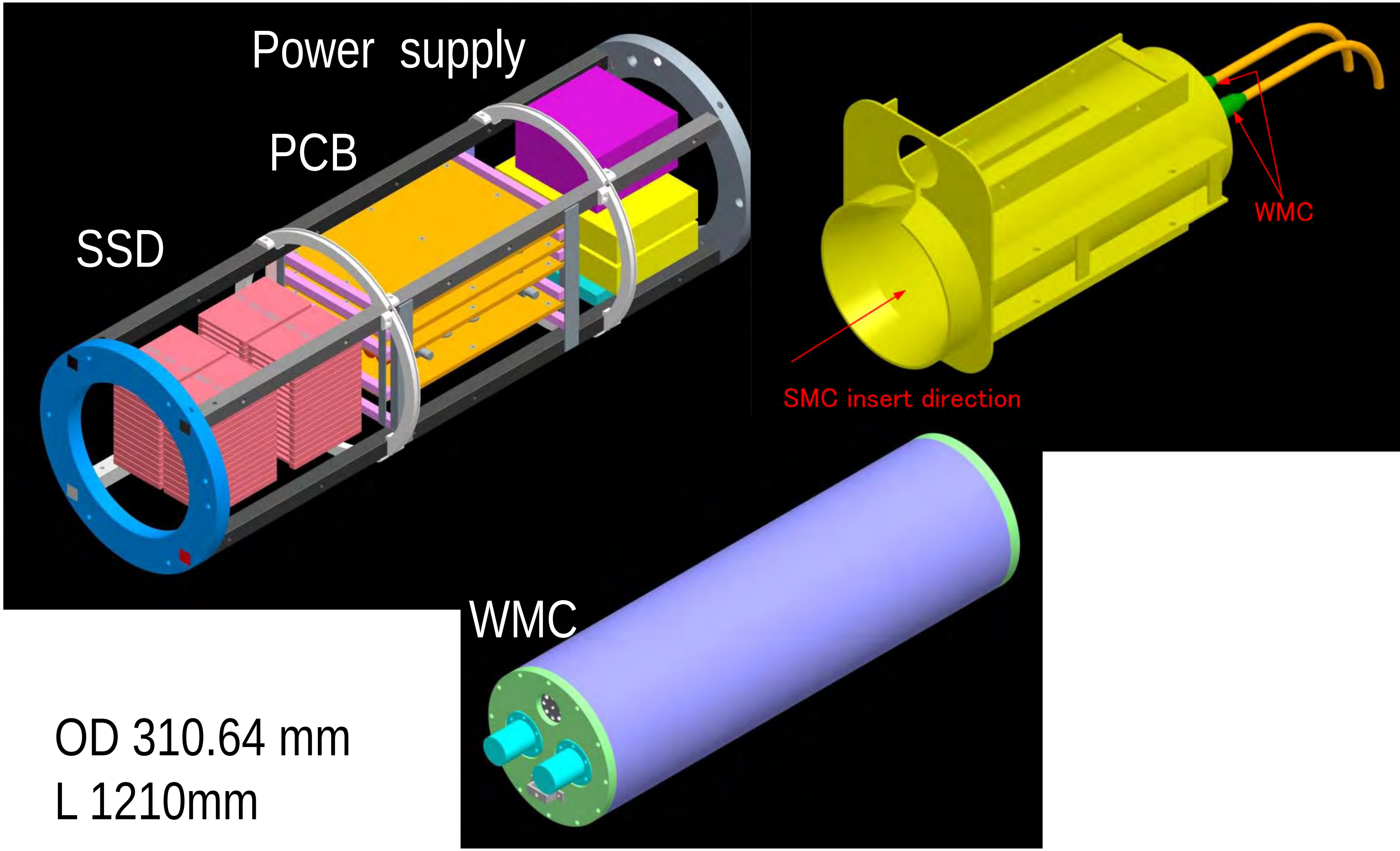
Downhole module (overall view)



Downhole module electronics

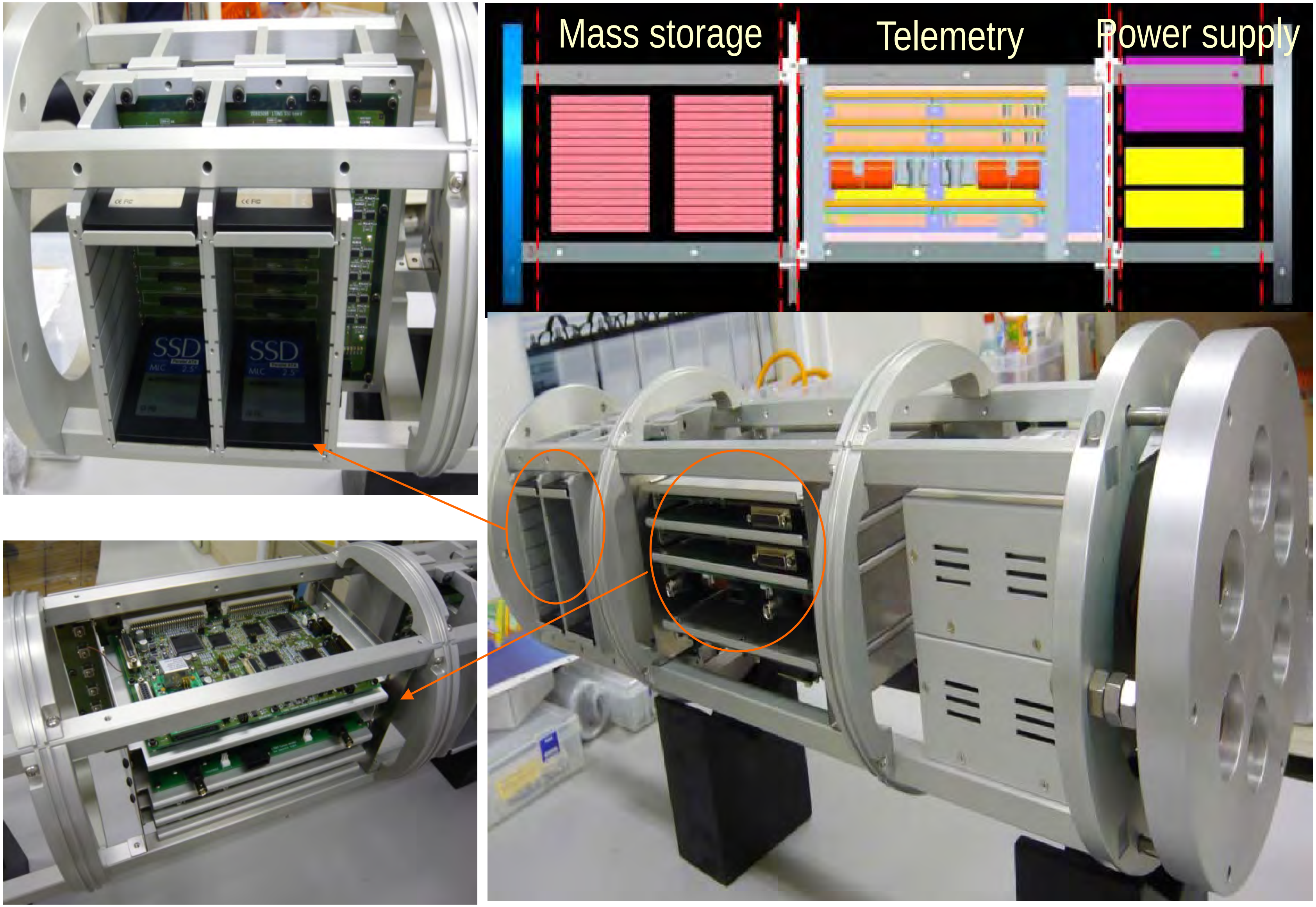


Subsea module

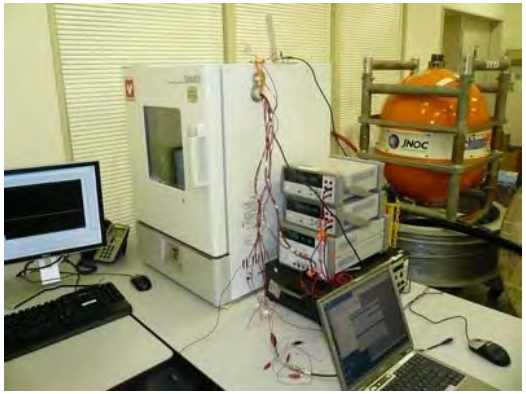


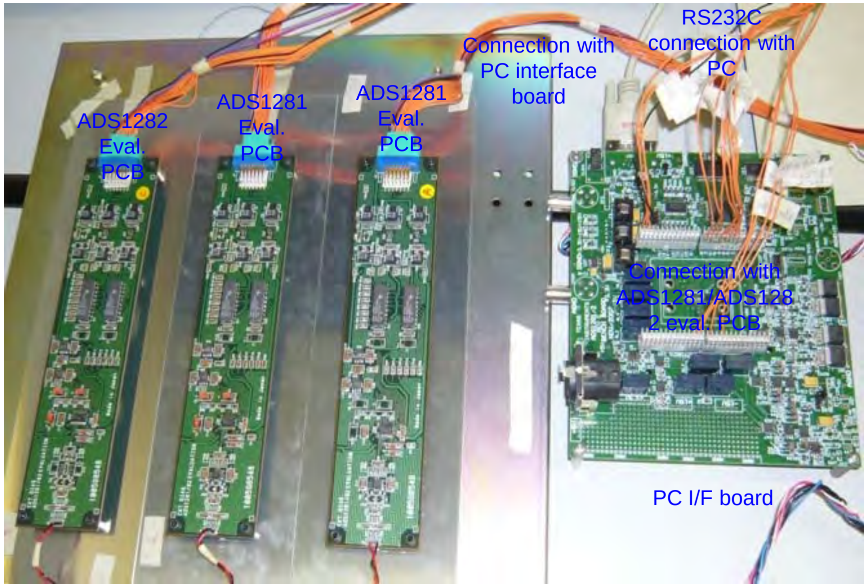
OD 310.64 mm
L 1210mm

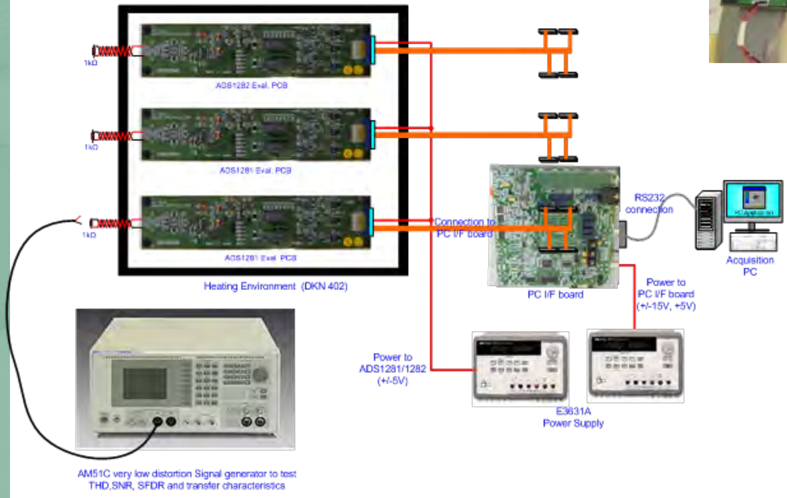
Subsea module

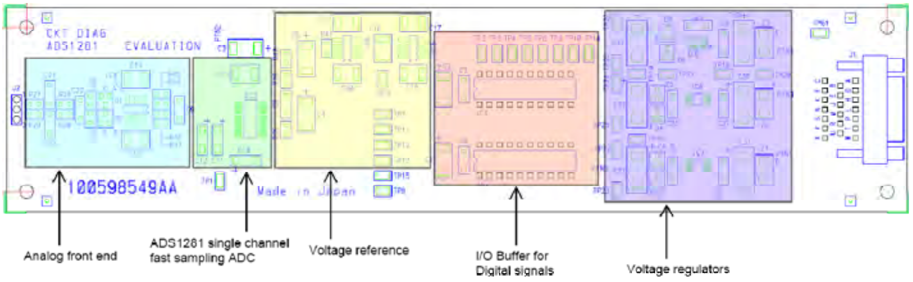


Component evaluation: Fast ADC (ADS1281/1282) Test configuration

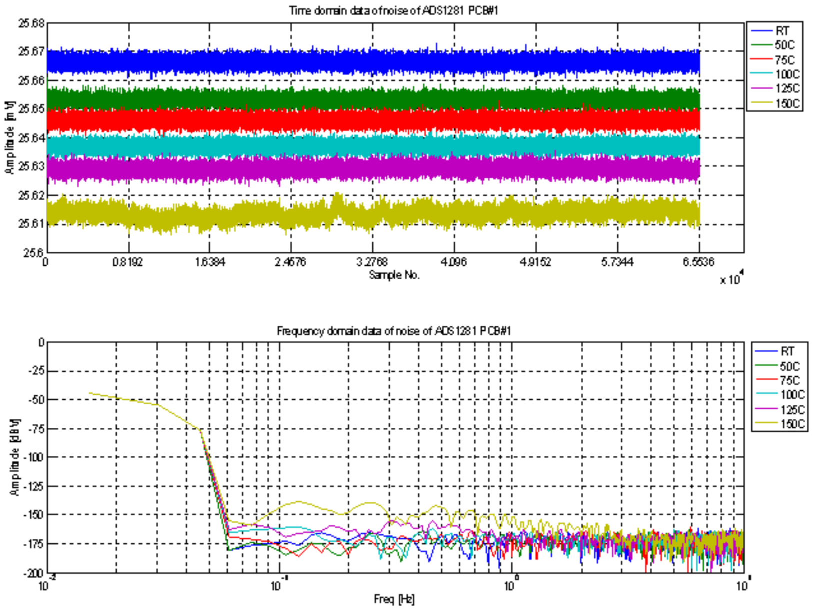




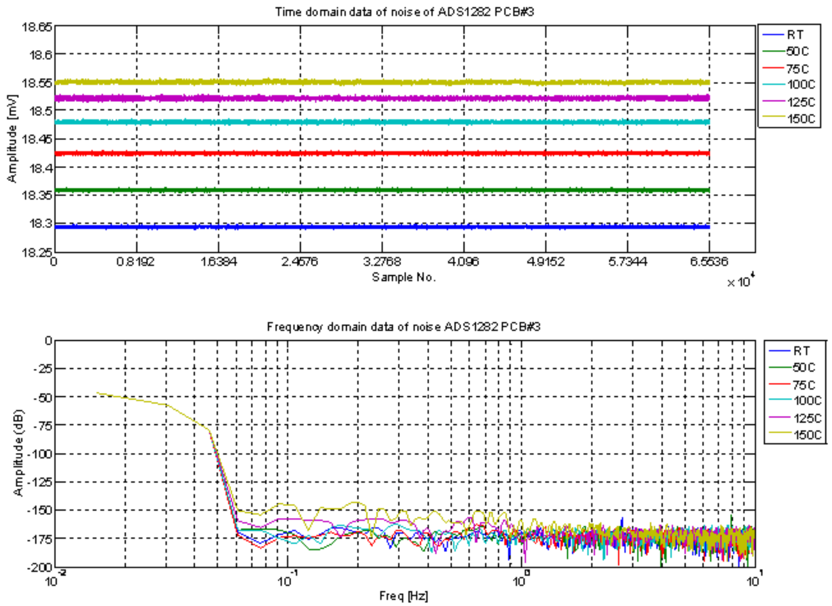




Component evaluation: Fast ADC (ADS1281/1282) Low frequency noise



Time domain data and frequency spectrum of low frequency noise for ADS1281 PCB#1 with ICs replaced



Time domain data and frequency spectrum of low frequency noise for ADS1282 PCB#3 with ICs replaced. PGA gain is set to 1

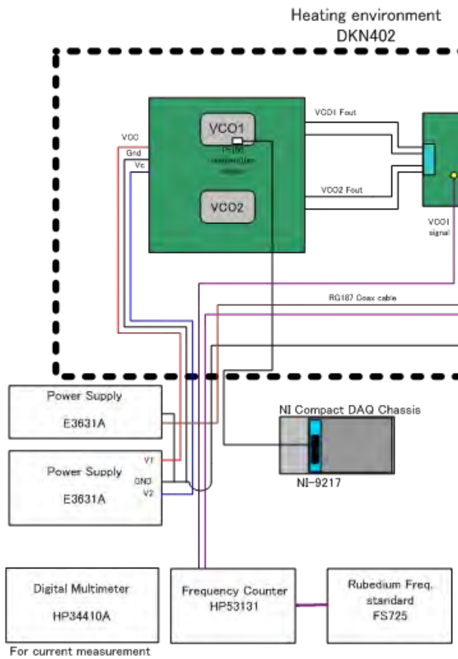
Component evaluation: VCXO (1)

Evaluate Voltage Controlled Crystal Oscillator (VCXO) with respect to the following items in various temperatures up to 150 °C

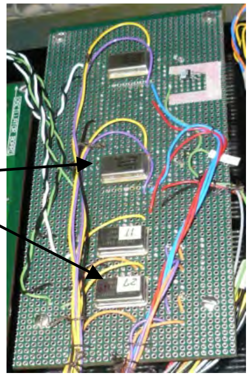
Key items

- Temperature effects on frequency change
- Frequency drift
- Power consumption

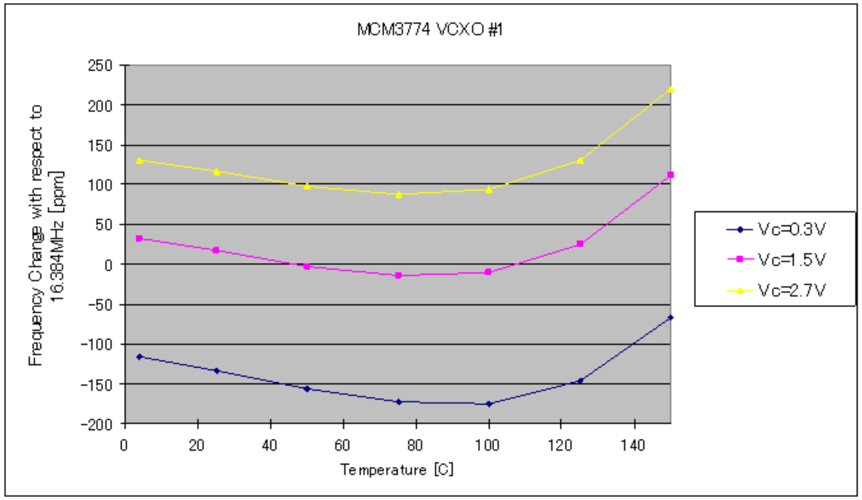
temperature range: -55 °C to +125 °C
Frequency: 16.384 MHz
Output: HCMOS
Supply Voltage:+3.3 V +/-10%
Deviation: +/-100 ppm (max)
Control input: 1.5 V+/-1.2 V
Transfer Function: Positive
Linearity: 10%
Input Impedance: >50 kOHM
Power Consumption: about 6 mA
Stability vs. Supply and Load Changes: +/-4 ppm
Package: 4pin DIP
Shock rating: 100 G 6ms half sine, 500 times

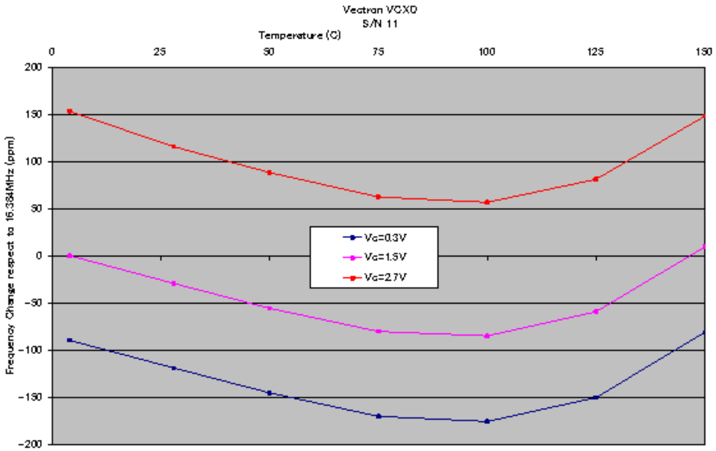


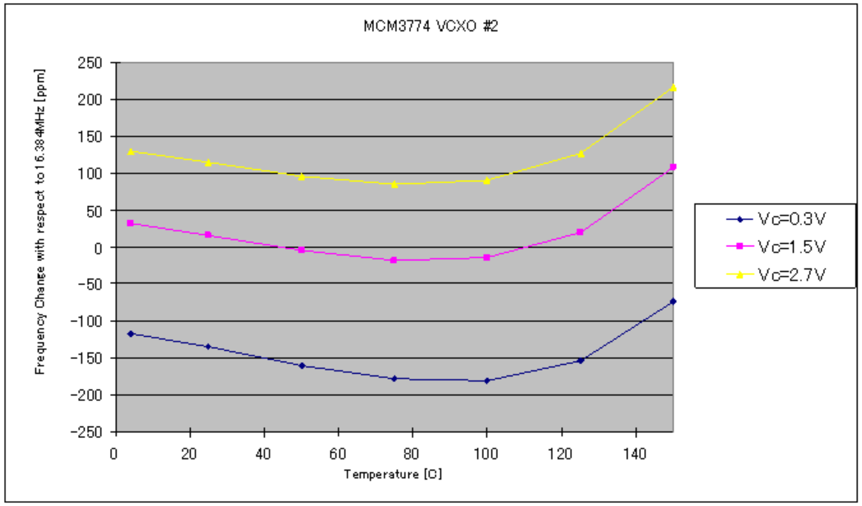
VCXO

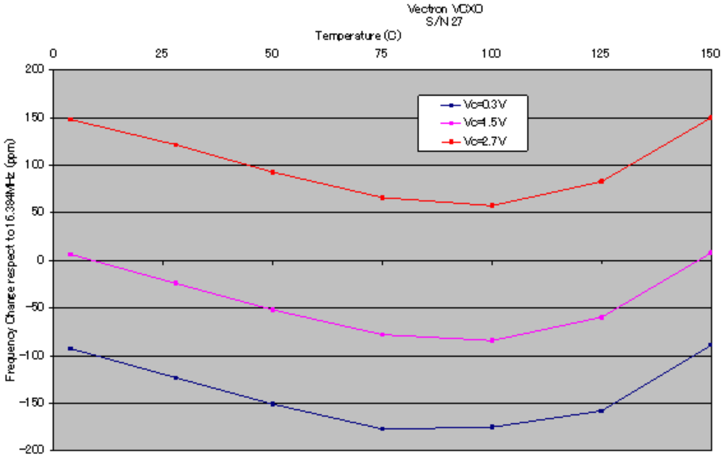


Component evaluation: VCXO (2)

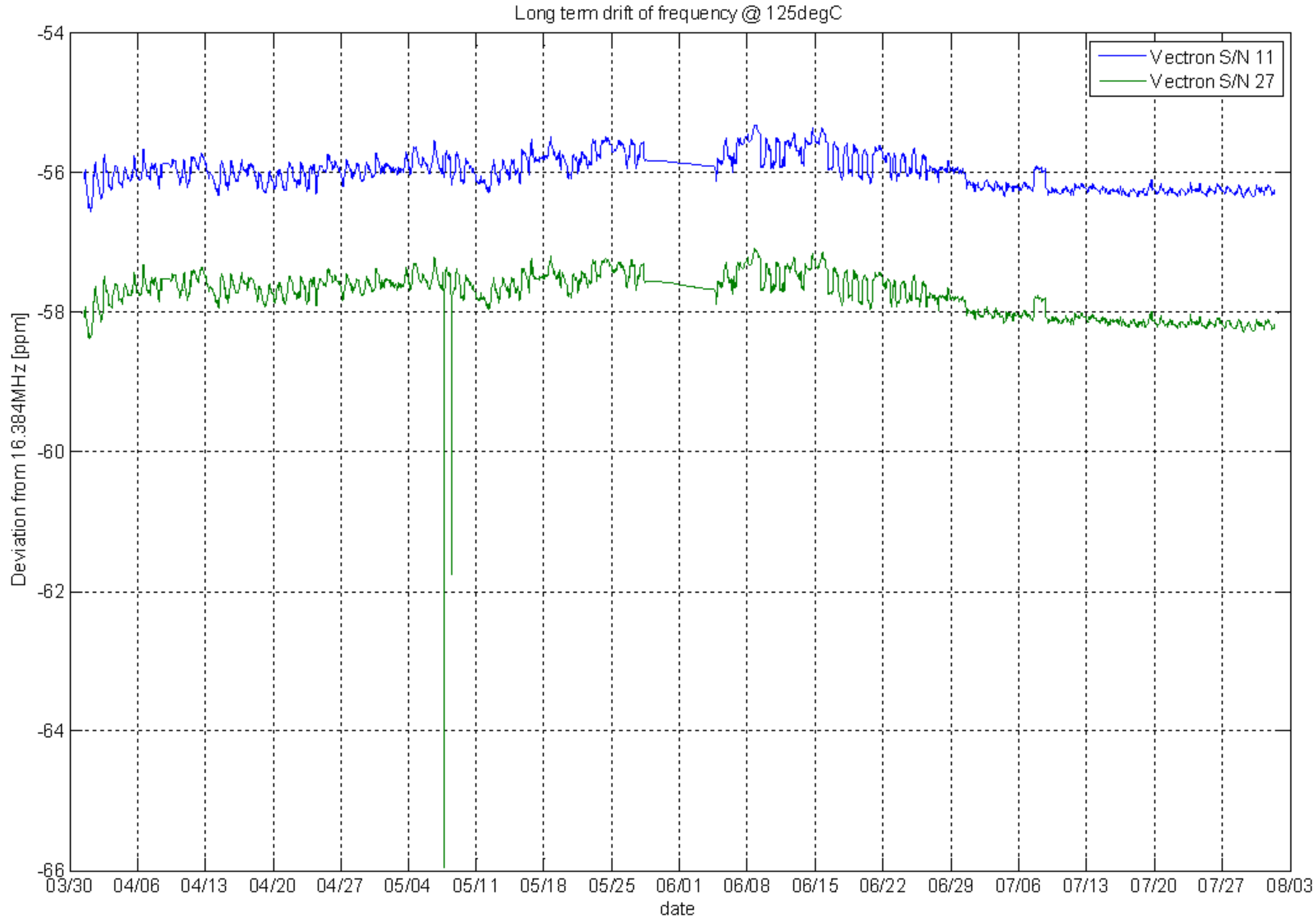








Component evaluation: VCXO (4)



Frequency Drift 125℃ of Vectron

Plan change on environmental life test

Original

Activity	USFY08				USFY09											
	2008							2009								
	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Finalize test plan	■															
Built test mockup		■	■	■												
Pressure test						■	■									
Shock test						■	■									
SIT W/ EXP mockups					■											
System life test						■	■	■	■	■	■	■	■	■	■	■
Test report															■	■

Revised

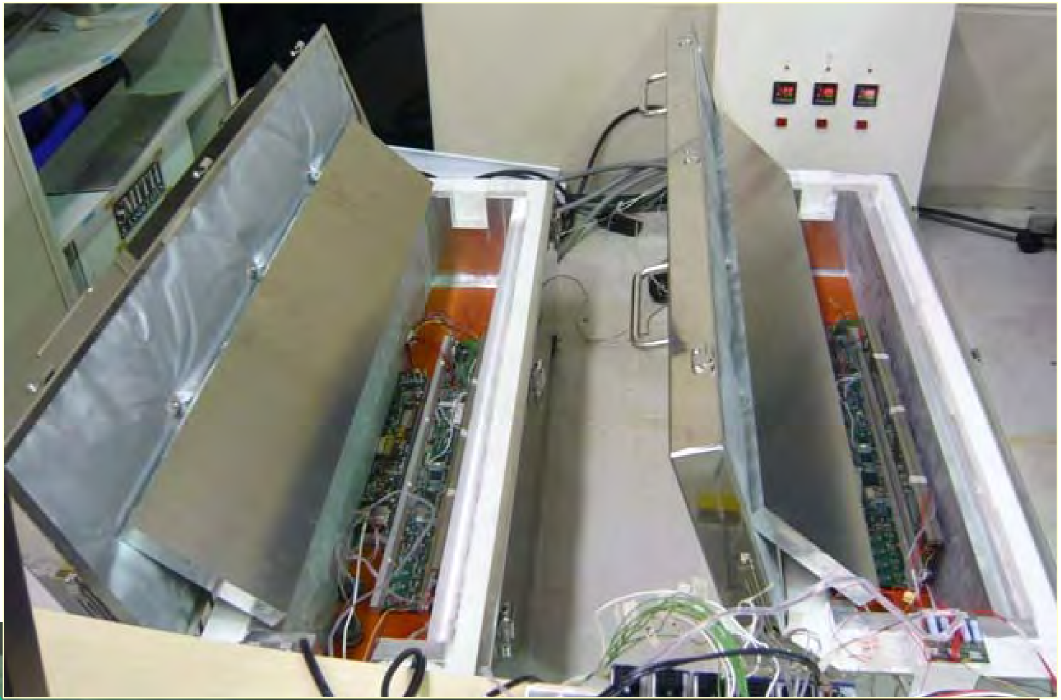
•Trouble shooting

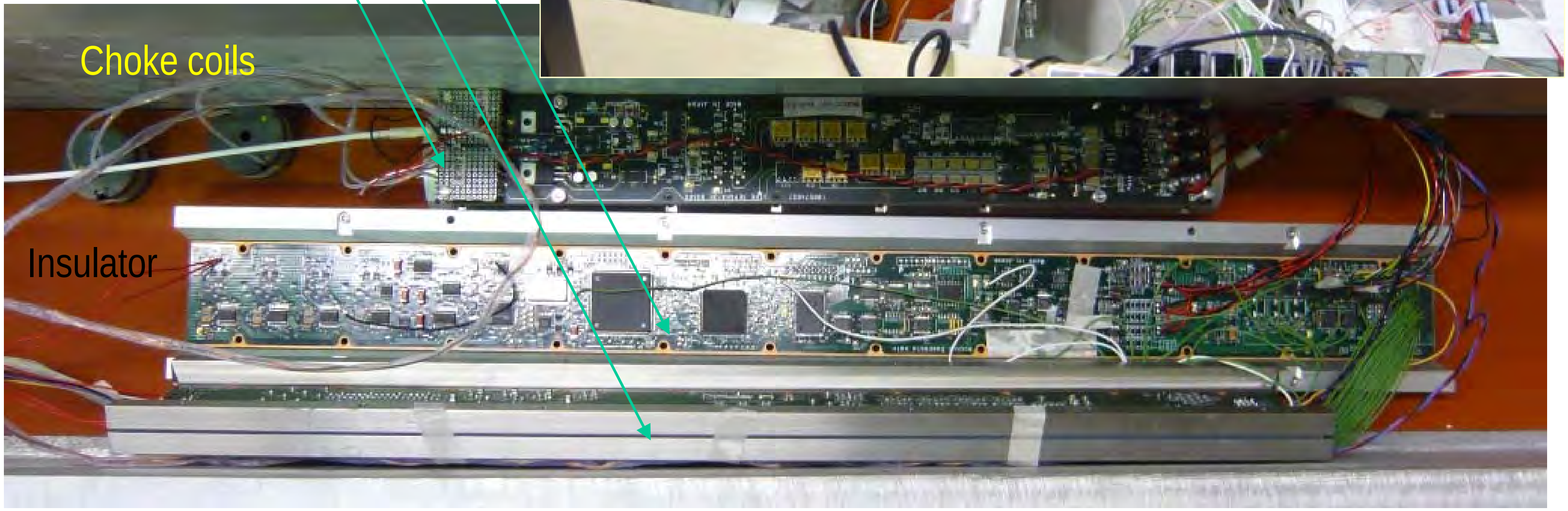
•Lower test temperature

Activity	USFY08				USFY09												USFY10					
	2008							2009												2010		
	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Finalize test plan	■																					
Built test mockup		■	■	■	■ (red)	■ (red)	■ (red)															
Pressure test														■								
Shock test														■	■							
SIT W/ EXP mockups								■	■ (red)													
System life test										■	■	■	■	■	■	■	■	■	■	■	■ (red)	■ (red)
Test report															■	■						
Test report update																						■ (red)

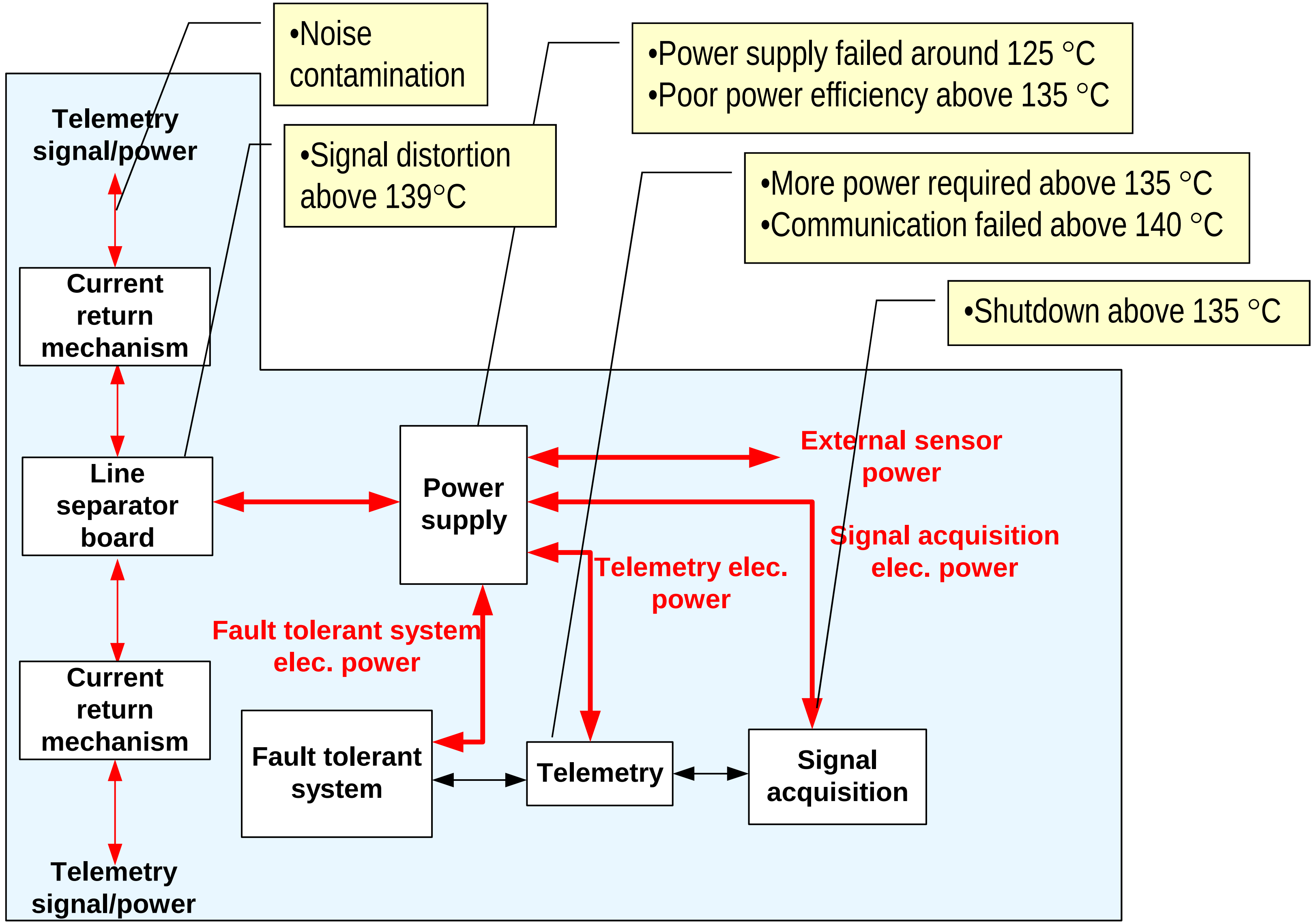
•Specification change
•ADC selection
•Ceramics investigation

EXP mockup in oven





Extension of SIT with EXP mockup



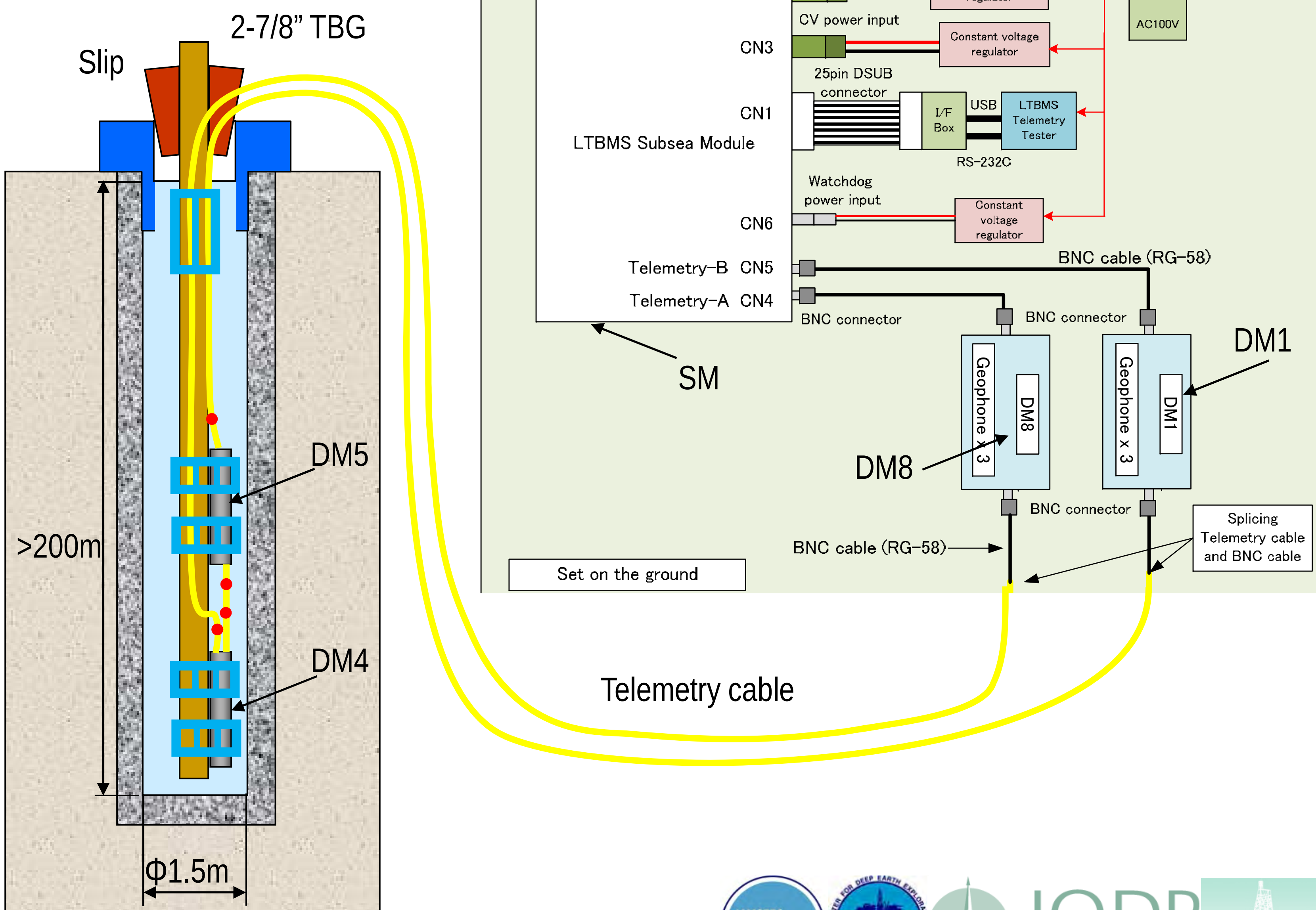
Summary of ELT status

- EXP mockup satisfies with the specification of 125 °C operations.
- Downhole telemetry of EXP mockup operates up to 140 °C .
- Downhole power supply (including line separator)of EXP mockup shows problems around 135 °C.
- Fast sampling ADC and fault recover unit are being evaluated at 150 °C for 10.8 months (equivalent to 125 °C / 5 year)

Proposal for test plan modification

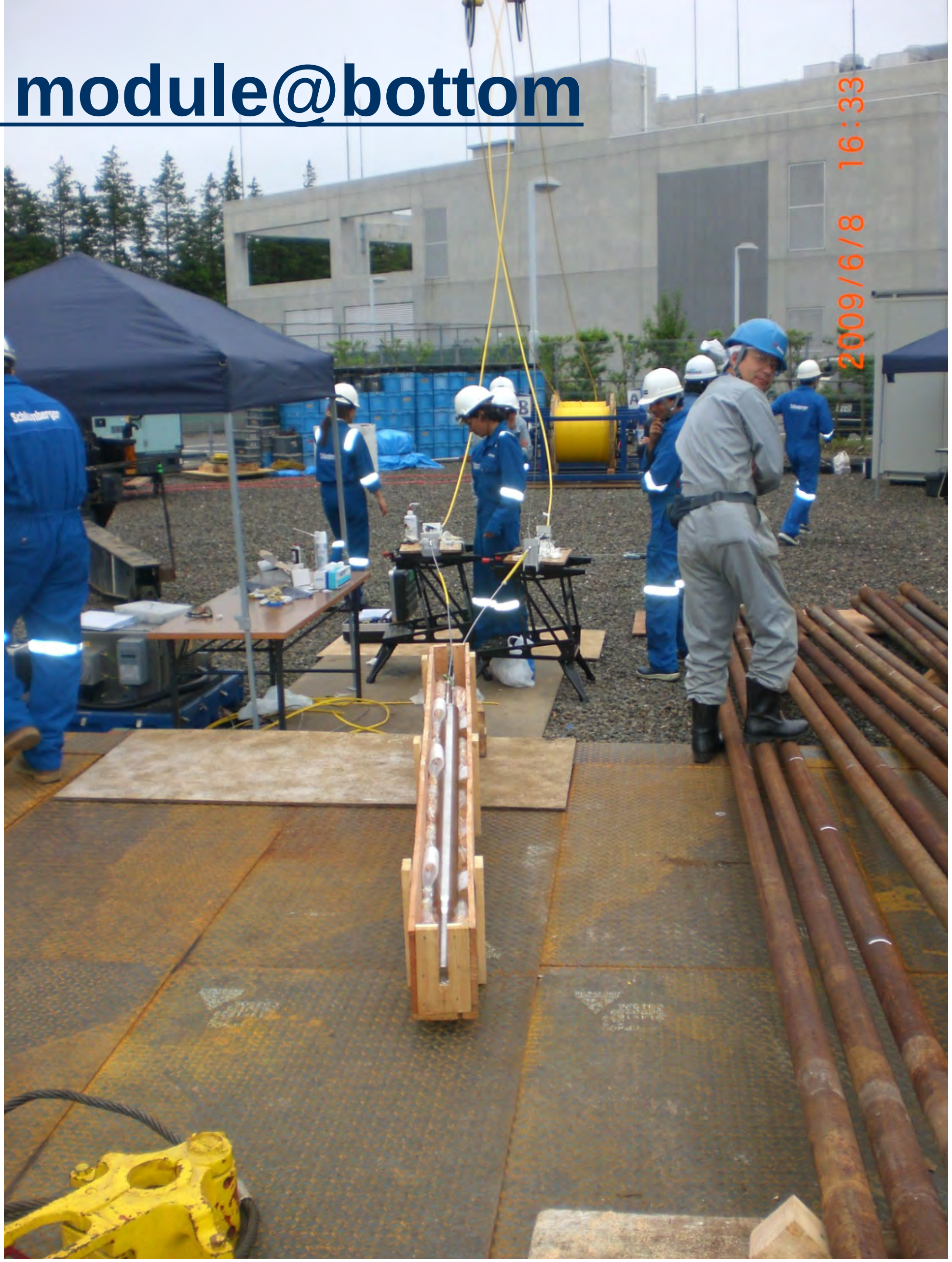
- Evaluating the plastic components (existing EXP mockup) at 140 °C for 13 months in maximum.
  - Equivalent to 118 °C for 5 years
  - 140 °C for 3 months (or 135 °C for 4.2 months) is equivalent to 100 °C for 5years
- Proving "125 °C /5 years" technology by using ceramic components
  - Possible to prepare all components on telemtry PCB but the size and required power should increase.
  - Possible to conduct the test at 175 °C (Required period is 45 days)
- Evaluate downhole power supply at its maximum operating temperature.

Field test



EDP#9@Lulea, July, 2009

Downhole module@bottom



EDMC welding work

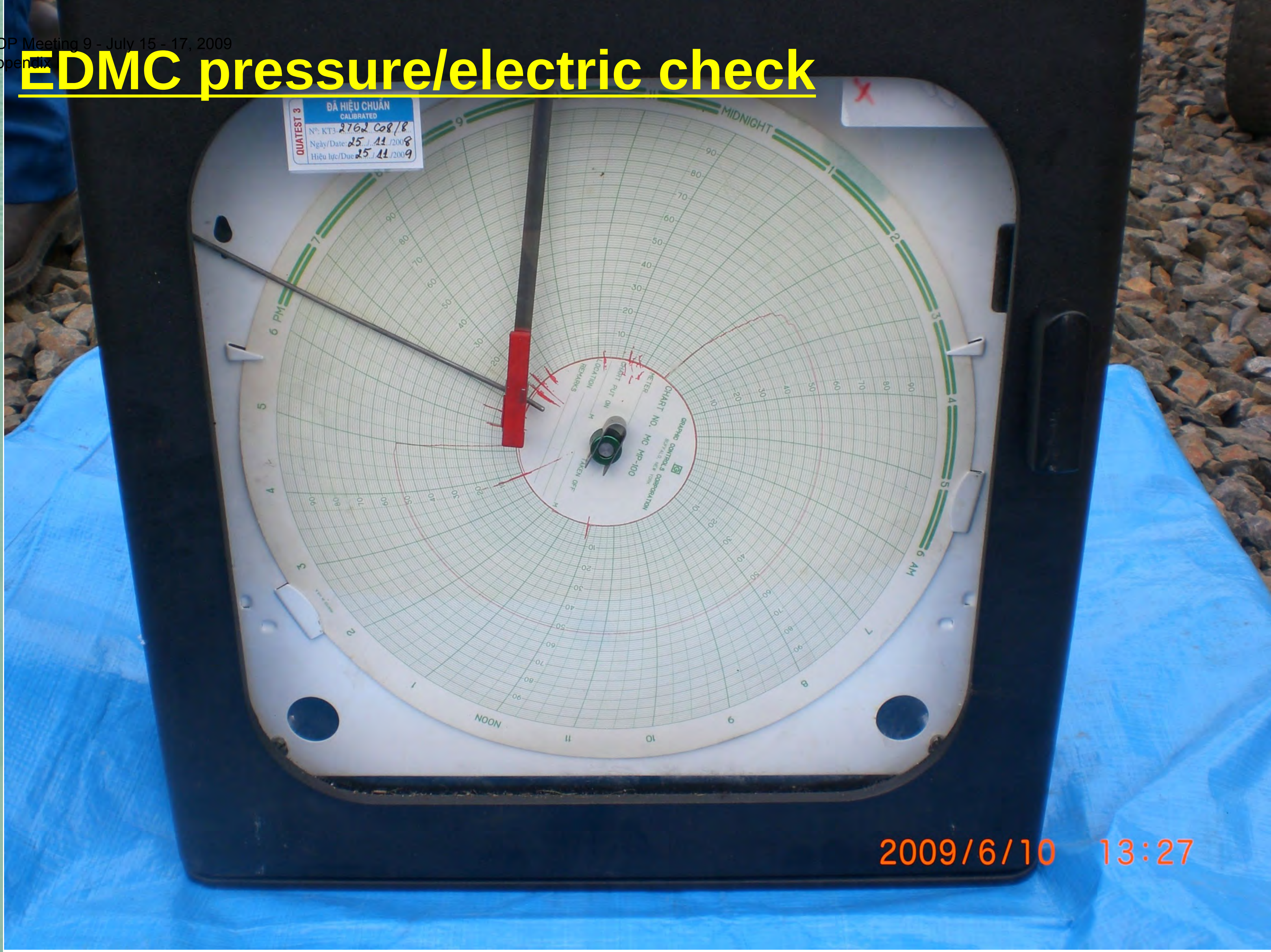
JAMSTEC CDEX IODP INTEGRATED OCEAN DRILLING PROGRAM

EDMC welding tool

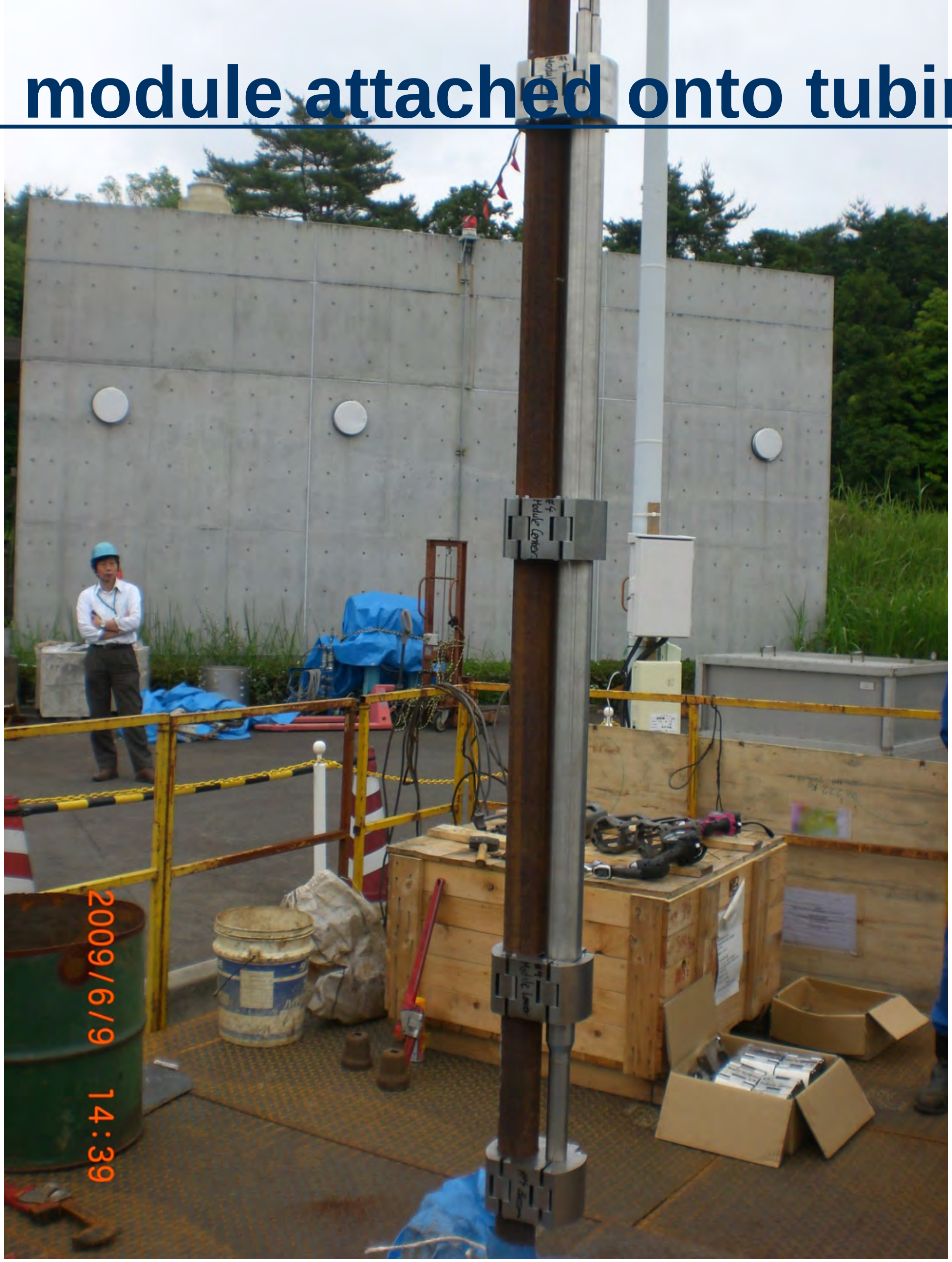
EDMC inside apparatus

EDMC outside apparatus

EDMC pressure/electric check



Downhole module attached onto tubing



Telemetry cable clamped onto tubing

Telemetry cable through tubing joint

Telemetry cable spooler

JAMSTEC CENTER FOR DEEP EARTH EXPLORATION CDEX JAMSTEC IODP INTEGRATED OCEAN DRILLING PROGRAM

Telemetry cable slacked (2 clampers)

Telemetry cable not slacked (3 clampers)

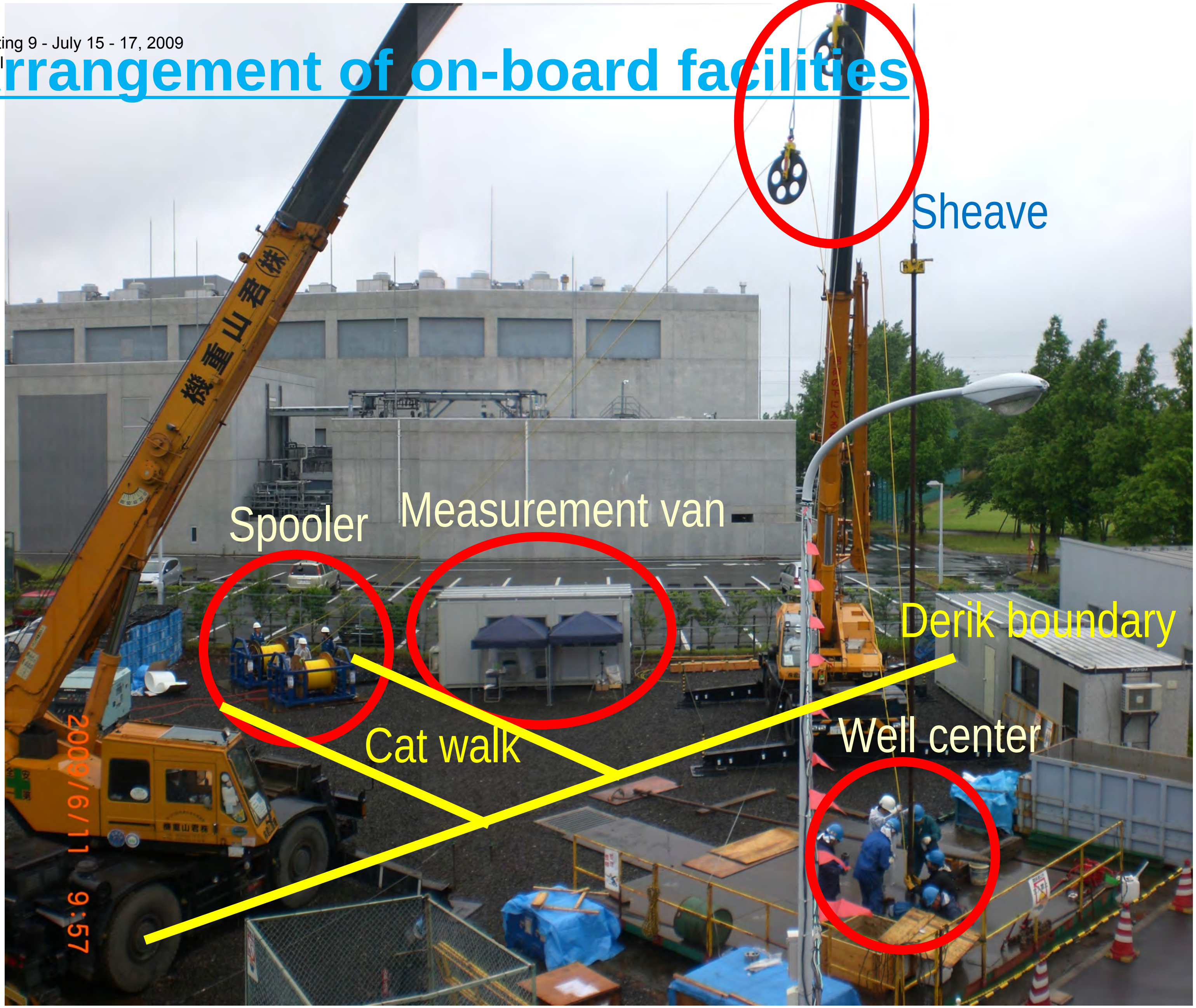
Cable through slip (1)

Cable through slip (2)

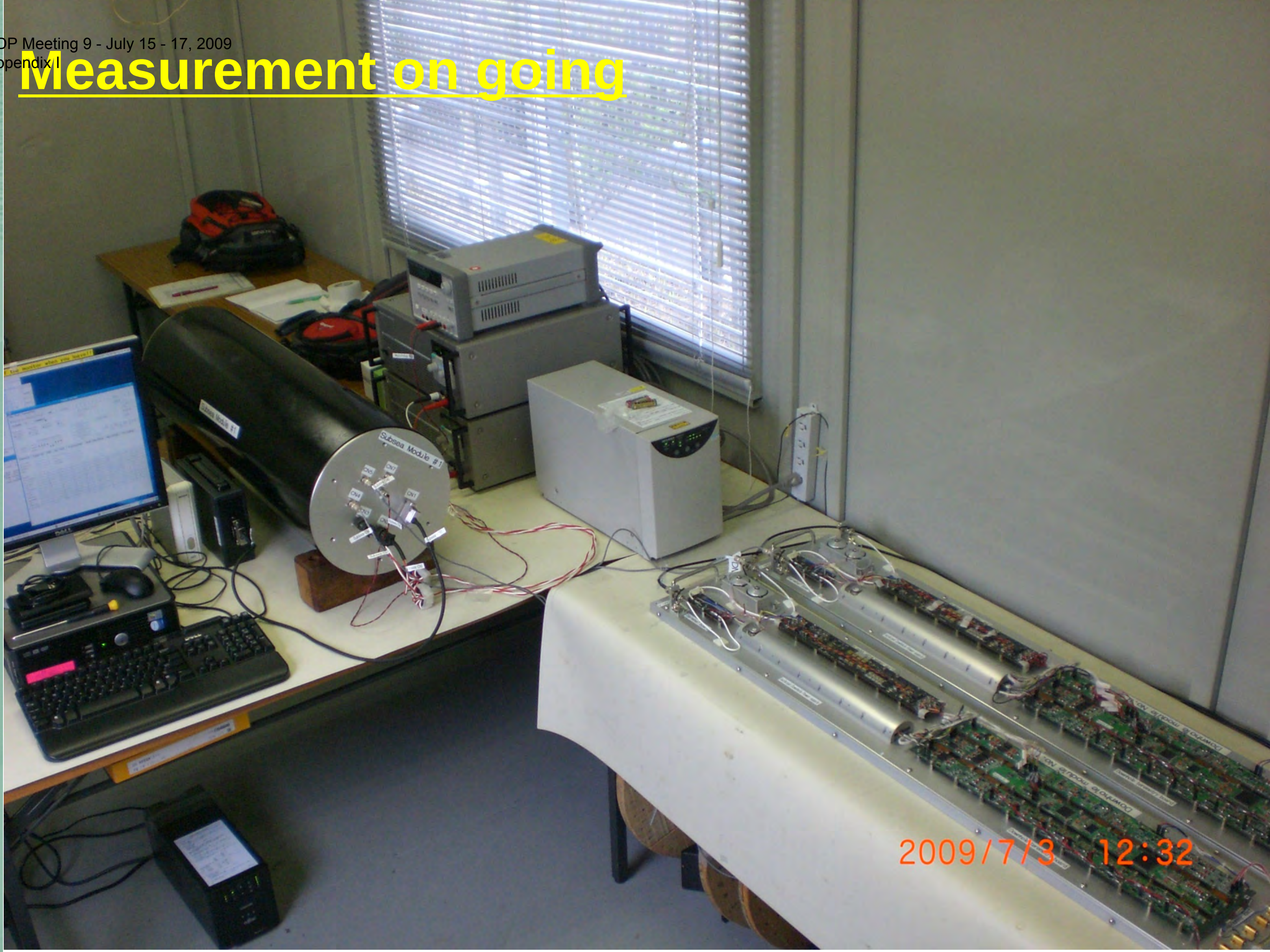
Cable flexibility

Cable handling

Arrangement of on-board facilities



Measurement on going



EDP#9@Lulea, July, 2009

#9 EDP Meeting

CDEX Technology Development

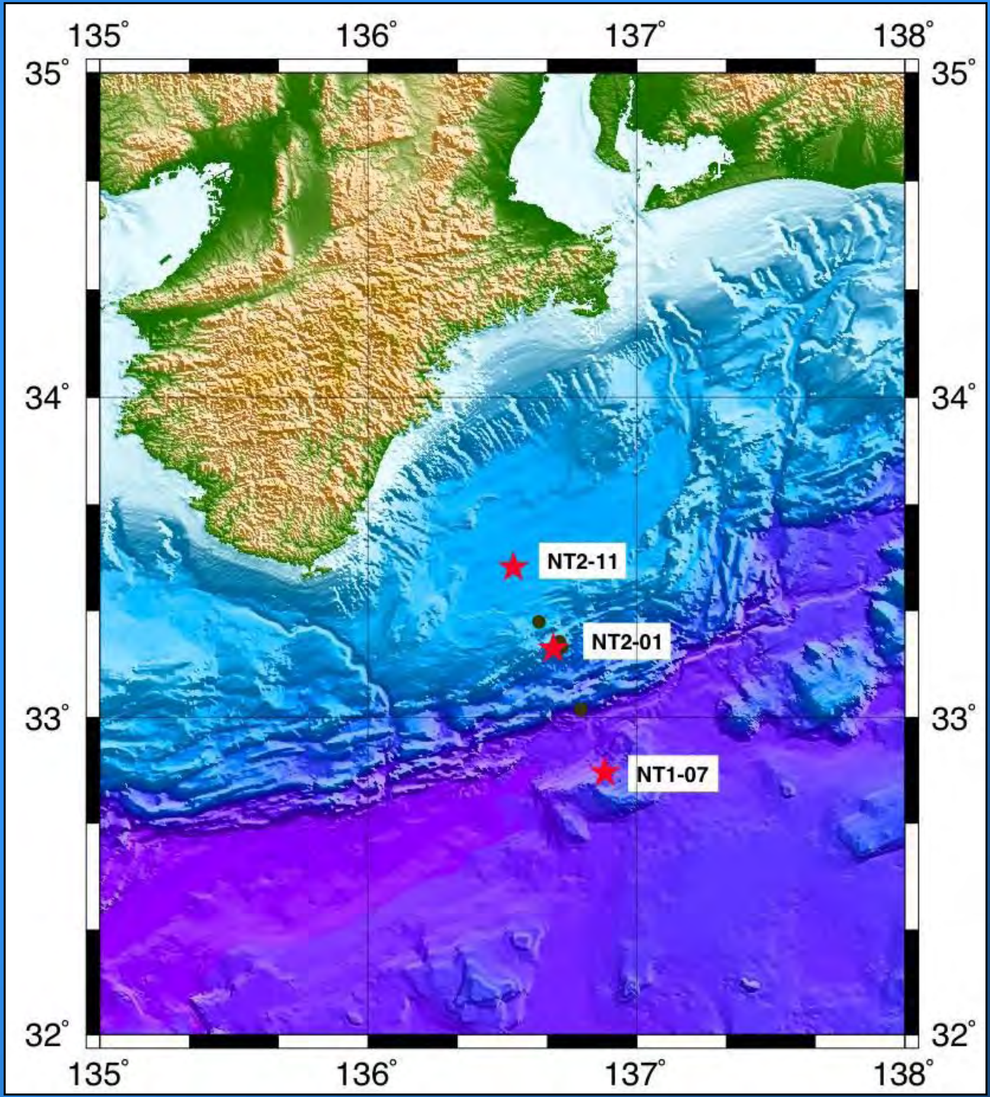
15th - 17th July, 2009

Yoshio Isozaki
Director, Engineering Department
CDEX, JAMSTEC

Current Status of "Chikyu"

NanTroSEIZE Stage 2 (Exp. 319 & 322)

Drilling Location



BOP Lowering (June 8, 2009)

Installation of RALS
(Riser Angle Logging System)

Installation of Riser Fairings

BOP Landing onto Wellhead

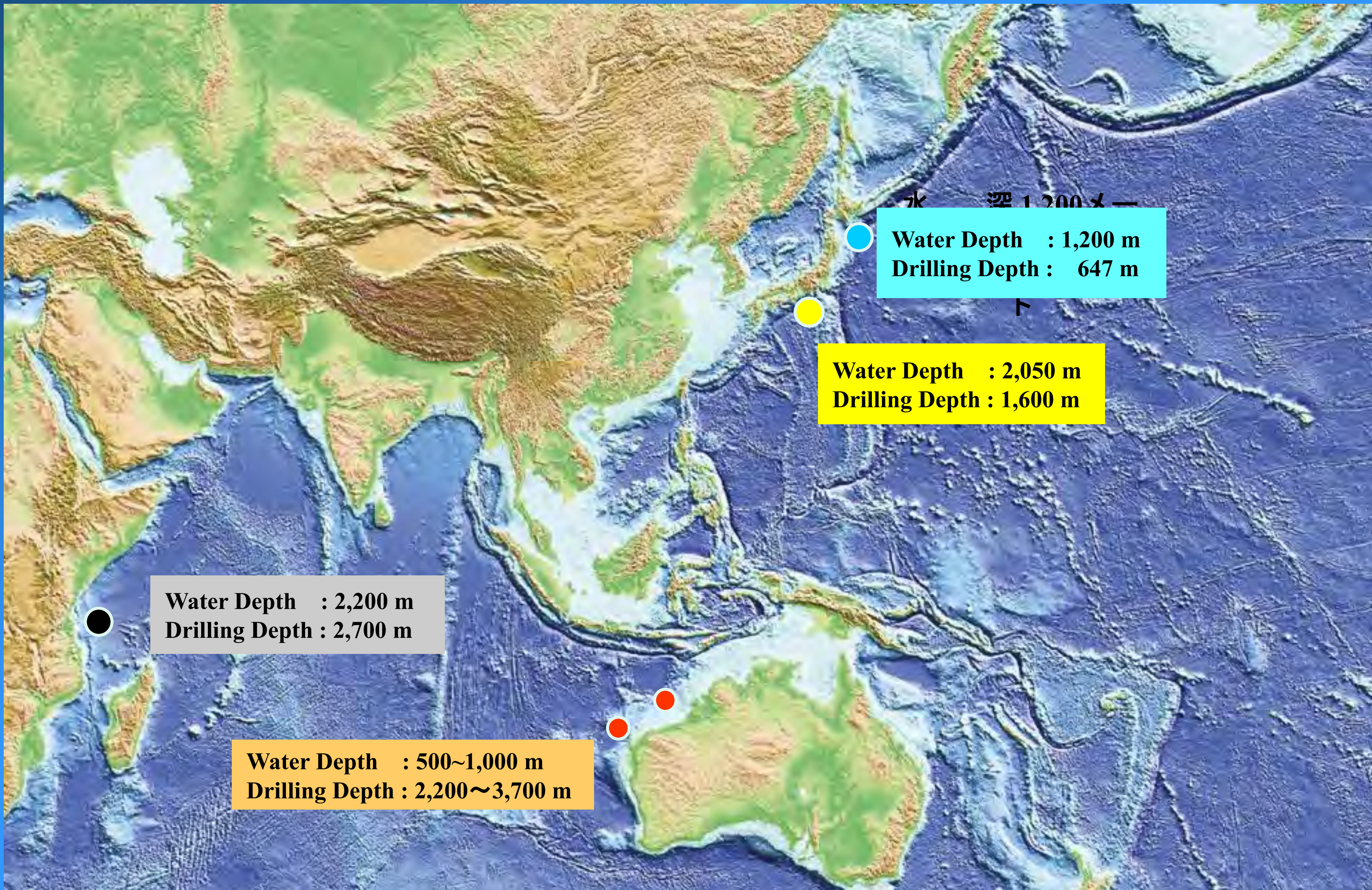
(June 17, 2009)

Water Depth : 2,054 m

Core Recovered
(July 6 - 7, 2009)

The First Core in Scientific Riser Drilling

"Chikyu" Riser Drilling Records

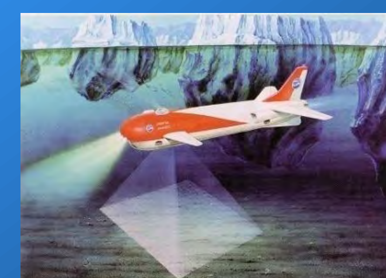


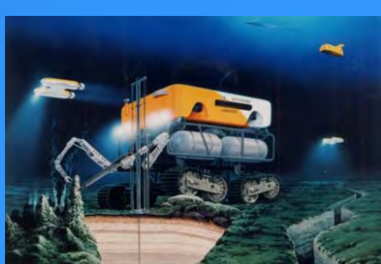
CDEX Technology Development

Technologies for Next-Generation Ocean Exploration

Next-Generation Ocean Exploration

- **Technology Development in Deep-sea Drilling with World's Latest Riser Drilling Vessel *Chikyu***
- Next-Generation Deep-sea Exploration
  - Deep-sea Cruising Vessel
    (Autonomous Underwater Vehicle)
  - Deep-sea Unmanned Research Vessel
    (Remotely Operated Vehicle able to dive 7000 m)



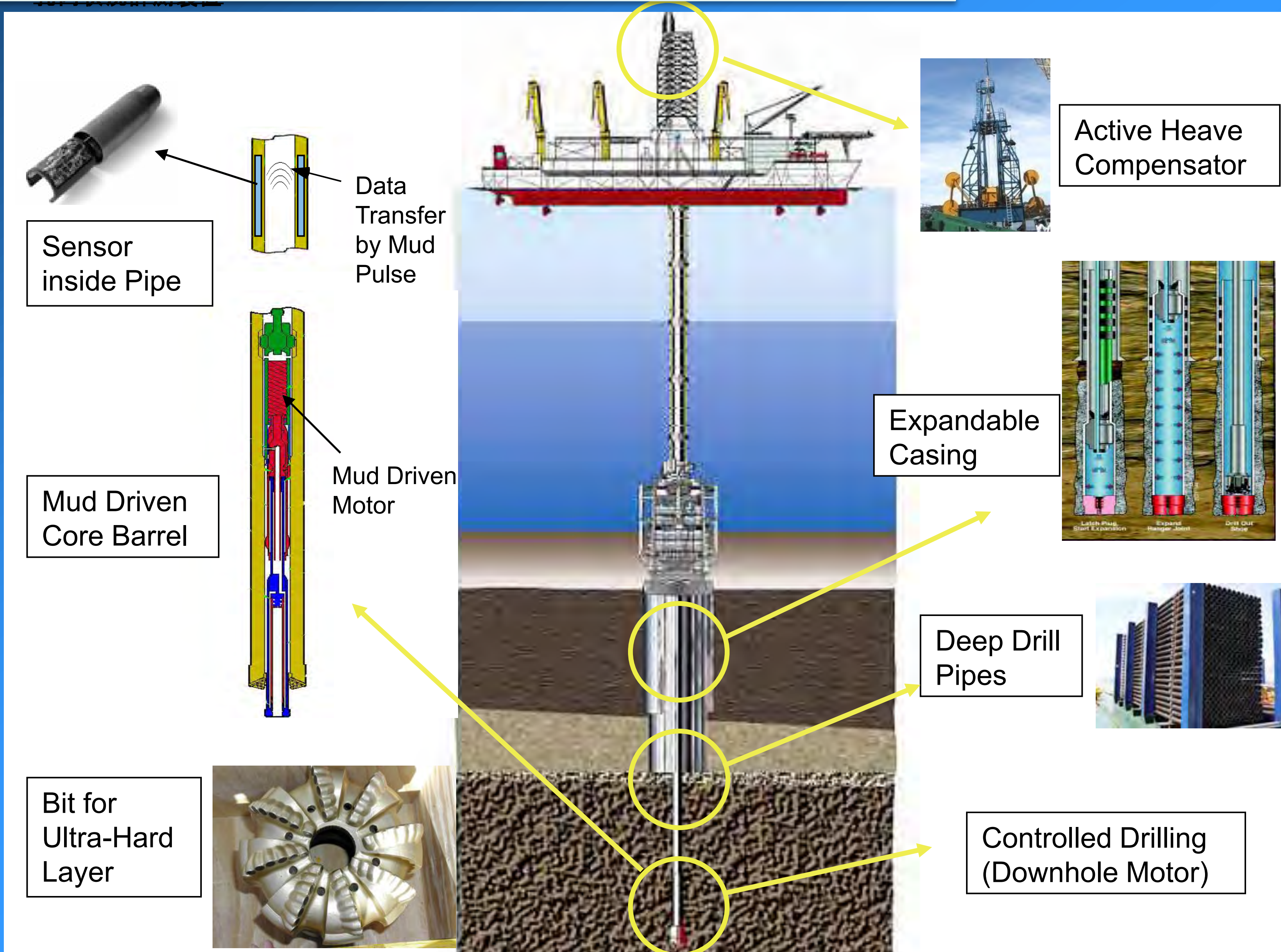


Technology Development in Deep-sea Drilling with World's Latest Deep-sea Riser Drilling Vessel *Chikyu*

Priority Objectives

- Ultra deep hole drilling
  (Target depth : 7,000mbsf)
- Drilling in ultra deep water
  (Target water depth : 4,000m +)
- High quality core sampling
- Sampling of microbes and organisms with maintaining their original environments

Development of Deep Drilling Technology



Technology Development in Deep-sea Drilling with World's Latest Riser D/V *Chikyu*

(1) Development of Deep Drilling Technology

Objectives

Our mission is to contribute to the search for new resources & elucidate seismogenic mechanisms by high quality core sampling from the complex stratum of the oceanic crust at deeper depths than conventional drilling allowed.

1) Deep Drill Pipes

Development of drill pipes that can collect core samples from deep target strata.

2) Technology for Controlled Drilling

Development of controlled drilling technology to drill as vertically as possible while core sampling.

3) Core Barrels for Deep Drilling

Development of extreme temperature core barrels & high speed rotary core barrels for high quality core sampling.

4) Highly Stable and Efficient Active Heave Compensator

Development and evaluation of new control technology for a high strength efficient active heave compensator (AHC) for stable coring operations.

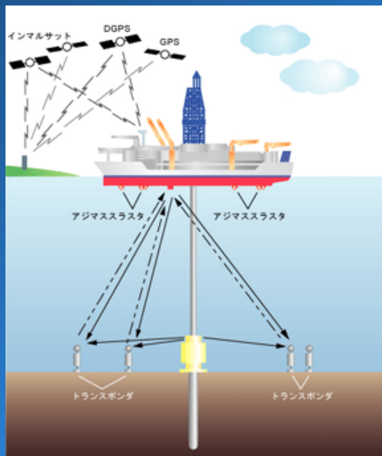
5) Casing Pipes for Deep Drilling

Development of large scale, high strength casing pipes that can be expanded within the diameter allowance to prevent collapse of the borehole under deep-sea pressure.

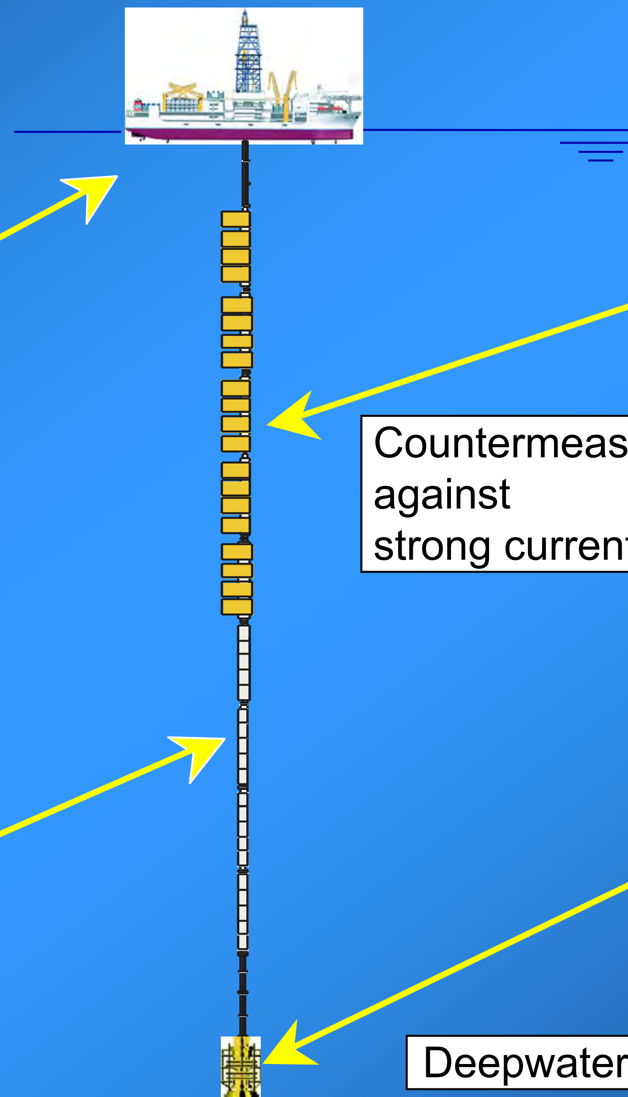
6) High Temperature Drilling Fluid

Development of drilling mud/fluid to be applied under high temperature conditions without loss or dispersion.

Development of Deep-sea Riser Drilling Technology

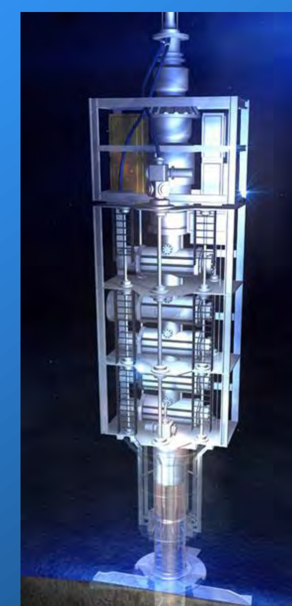


Dynamic Positioning System



Countermeasure against strong current

Light / small risers



Deepwater BOP

Technology Development in Deep-sea Drilling with World's Latest Riser D/V *Chikyu*

(2) Development of Deep-sea Riser Drilling Technology

Objectives

- A riser drilling system enables safe deep-sea and deep seafloor drilling even in strata containing hydrocarbon gases or liquid as well as in complex or unstable strata.
- *D/V Chikyu* is the world's first riser-type drilling vessel for scientific research and exploratory drilling in open sea depths exceeding 2,500 m in the first stage as well as for the development of element technologies in extreme deep-sea conditions.
- By integrating these technological advances, D/V *Chikyu* aims to reach where no man has ever gone before – the earth's mantle.

1) Improving the Safety of the Deep-sea Riser in Stand-by/Hang-off Position

- Appraisal of the riser strength evaluation method by optimizing the accuracy and precision of actual measurement data in order to maximize the safety & efficiency of riser drilling operations.
- Verification of deep-sea drilling depths by innovations in the riser system.

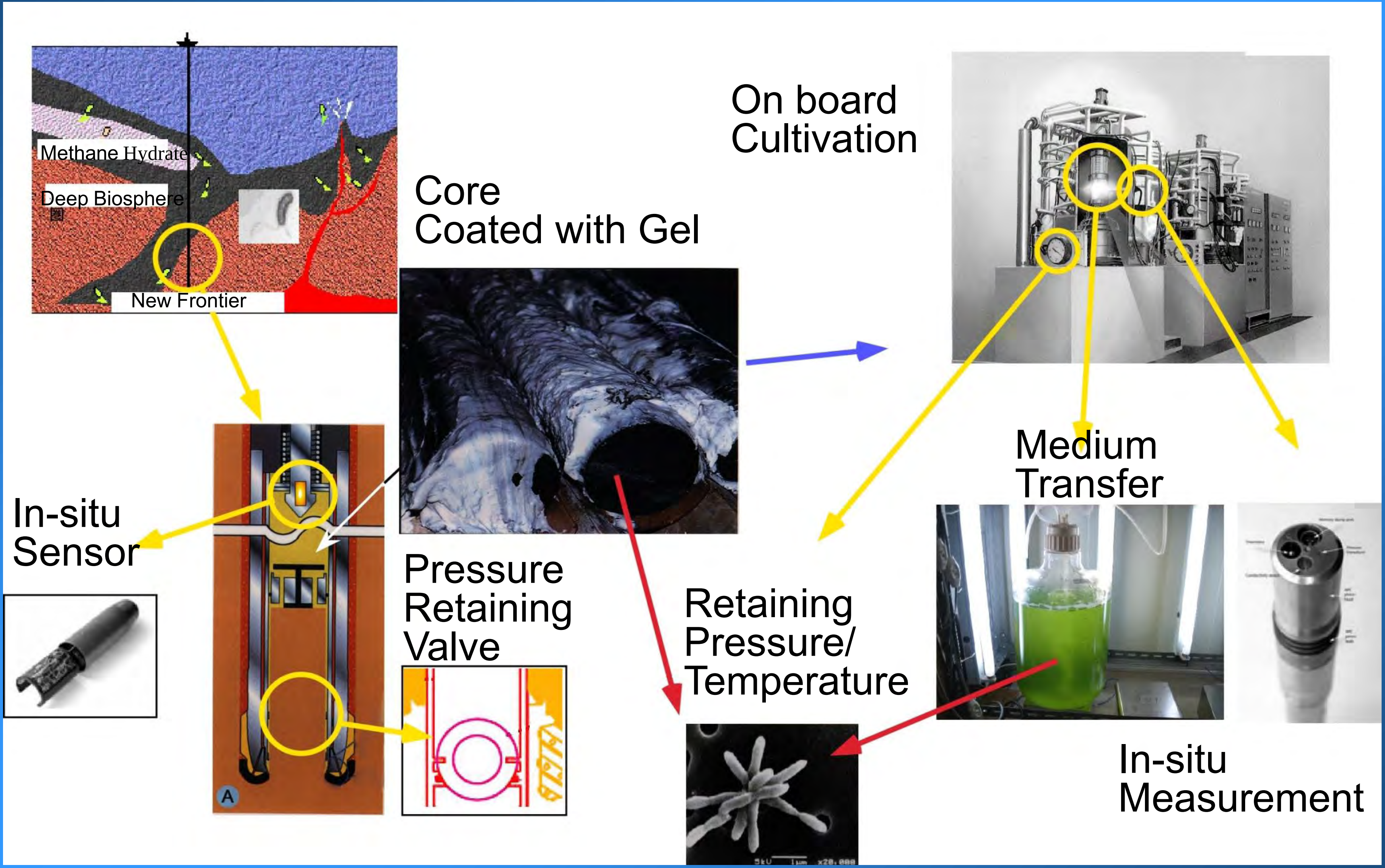
2) Maximizing Safety in Riser Drilling in Strong Current, Open Sea Conditions

- Validating riser VIV fatigue life predictions by collecting actual measurement data.
- Quantification and calibration of the VIV mitigation effect by employing a fairing device.
- Integration of these technologies for riser management system.

3) Development of 4000 m Riser Drilling System

By incorporating new product designs & techniques for a light-weight riser constructed of new materials as well as new borehole fluid circulation & surface BOP systems, we aim to develop the next-generation riser drilling system for the *D/V Chikyu*.

Development of Deep Biosphere System



Technology Development in Deep-sea Drilling with World's Latest Riser *D/V Chikyu*

Objectives

(3) Development of Deep Biosphere System

In order to carry out exploratory research into deep-sea microorganisms collected live from the earth's oceanic crust and to isolate useful materials, technologies that enable their cultivation by creating the same extreme deep-sea environment in which they thrive even on land are being developed. It will, thus, be important to develop systems that can prevent these deep-sea microorganisms from being contaminated by land or air microorganisms and to study their natural ecology.

1) Anti-contamination technology

To prevent contamination by surface microorganisms mixed in the drilling mud circulating from the vessel surface to the borehole bottom, anti-contamination techniques such as encapsulation of the microorganisms within chemical compound gels are being developed to keep the risk of contamination at less than 1%.

2) Extreme environment sustaining technology

Techniques to collect microorganisms live from the deep-sea oceanic crust and to replicate the extreme environmental conditions in which they thrive despite great temperature and pressure changes are being developed.

3) Environment monitoring techniques

In order to research deep-sea microorganisms collected live, a measurement system which can sustain such life forms on land at the same extreme environmental conditions of temperature, pressure, chemical compounds and pH is being developed.

4) Site-specific environment simulation technology

Modeling, simulation and control technologies that can stably replicate extreme environments of temperatures up to 200° C and atmospheric pressures of up to 100 MPa to cultivate and sustain such micro-organic life forms are being developed.

5) Continuous cultivation methods

New tools to elucidate the ecology of microorganisms as well as to enable them to thrive through an automatic nutrient supply system within a temperature and pressure controlled aquatic culture tank are under development.

Relation between CDEX Technology Development & EDP Roadmap

(Draft 2.0)

		A : Sampling, Logging & Coring	B : Drilling /Vessel Infrastructure	C : Borehole Infrastructure
Deep Drilling	1) Deep Drill Pipes		27	
	2) Controlled Drilling	12, 15	7, 9, 10, 11, 15, 28	1
	3) Core Barrels	3, 5, 6, 10, 19	31, 32	
	4) Active Heave Compensator		3, 4, 6, 7	
	5) Casing Pipes		25	
	6) Drilling Fluid		32	
Deep-sea Riser	1) Deep-sea Riser Analysis		21	
	2) Riser for Strong Current		23	
	3) 4,000m Riser System		21, 22	
Deep Biosphere	1) Anti-contamination System	21		7, 11
	2) Environment Sustaining	16, 17		11
	3) Environment Monitoring	22, 23		11
	4) Environment Simulation	22		11
	5) Continuous Cultivation	22		11

Recent Results
of
Technology Development

High Temperature Core Barrels

Objective : Development of extreme temperature core barrels for ultra-deeper layers

Results in JFY 2008

①Performance confirmation tests of 150℃ heat resistant model

②300℃ heat resistance & elemental properties assessment

↑Recovered Core

Top of Core Barrel↑

Situation of Confirmation Test→

Downhole Motor

Objective :

①Vertical drilling with inclination control

②Improvement of core quality and recovered ratio with stable rotation

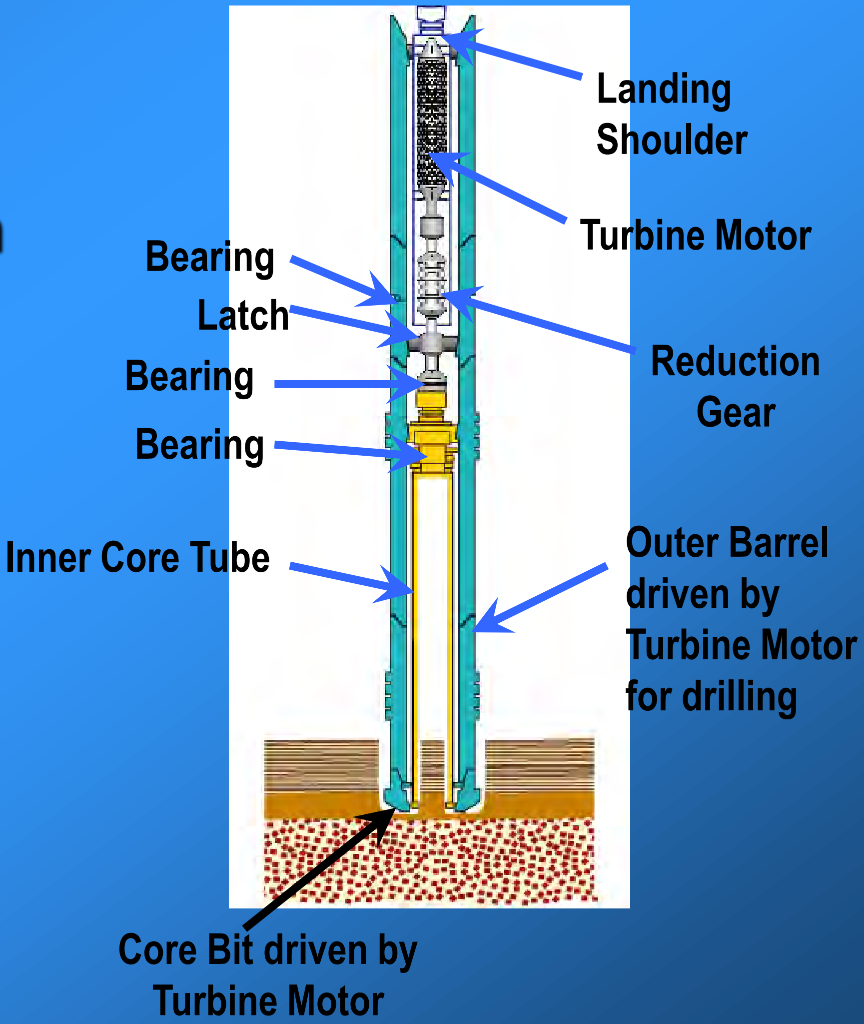
Results in JFY 2008

①Detailed design

②Element model tests

½ model for tests

Coring with Downhole Motor



Motor-Driven Core Barrel (MDCB)

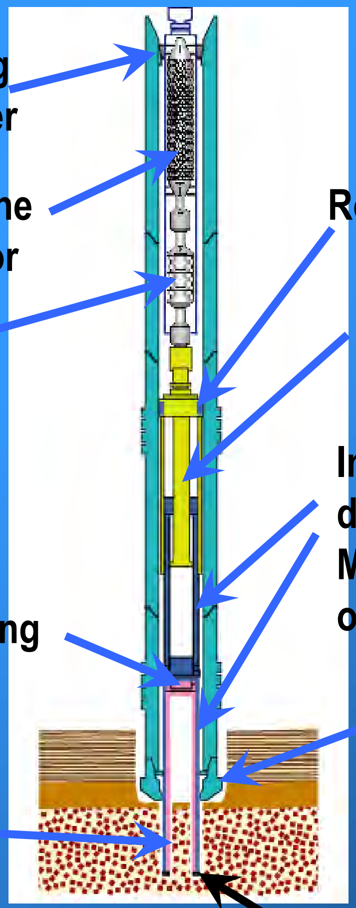
Objective :

Improvement of core quality and sampling ratio with low torque & high speed rotary core barrel

Results in JFY 2008

①Detailed design
②Model tests of push out part

Motor Driven core Barrel



Situation of Model Test

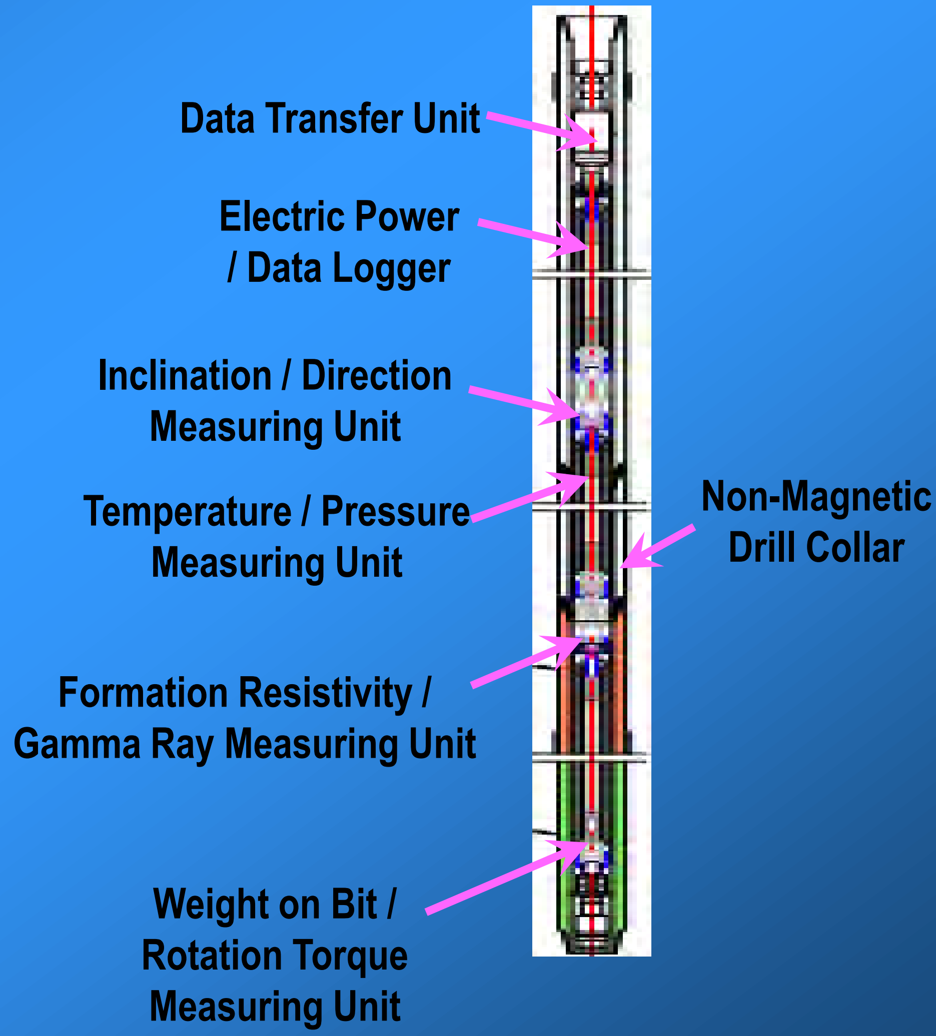
Measurement while Coring (MWC) & Logging while Coring (LWC)

Objective :

Development of technology to collect data in drilling hole and transfer to onboard while coring

Results in JFY 2008

①Settlement of specifications
②Concept design



12,000m long Drill Pipes

Objective :

Development of drill pipes to recover core from upper mantle with 7,000m drilling in 4,000m water

Results in JFY 2008

① Trial production of part of S-150 5-7/8” pipes

② Trial production of part of S-155 pipes and strength tests

③ Fatigue strength tests under tensile load

Trial Production of S-150 5-7/8” Pipes

Trial Production of S-155 Pipes

Riser Fairings

Objective :

Development of technology to conduct riser drilling under strong current with reducing VIV (Vortex Induced Vibration)

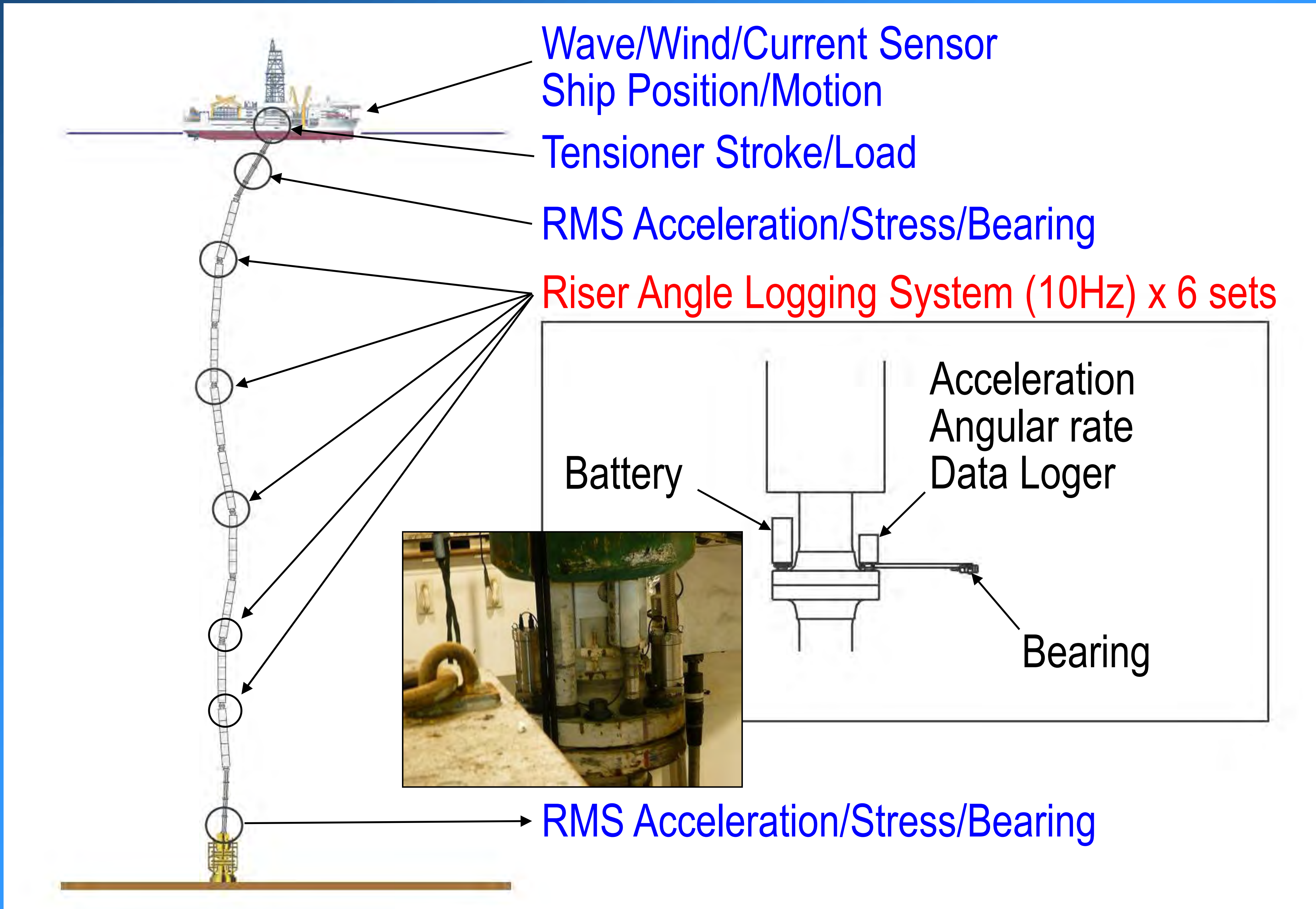
Results in JFY 2008

Manufacture of actual riser fairing for installation under actual condition

One part of Riser Fairing

Installation for NanTro Stage 2

Measurement Riser Motion



Technology Roadmap

Area of technologies to be developed		Years required		
		Present ~ 2	+3 ~ 5	+5 ~ 10
Deep Drilling	12 km Drill Pipe	Experimental Model	Manufacturing	Production Model
Deep Drilling	Controlled Drilling	Experimental Model	Prototype & MWC(*) dev.	Production Model
Deep Water	Riser for Strong Current	Testing & Improvement		
Deep Water	Deep Water Riser	Next Generation Model R&D	Next Generation Experimental Model	

(*) MWC: Measurement While Coring

Brand-New Drilling Vessel

Transocean / "Discoverer Clear Leader"

- Water Depth : 12,000 ft (3,600 m)
- Total Drilling Depth : 40,000 ft (12,000 m)
- Delivery : March, 2009

World Water-Depth Drilling Record
: 10,011 ft (3,051 m) by "Discoverer Deep Seas" in 2003

Next Generation Riser & BOP System

1. Riser System
   1) Pipe Material
      - CFRP
        (Carbon Fiber Reinforced Plastics)
      - Aluminum Alloy
      - Titanium Alloy
      - High Strength Steel
   2) Buoyancy Material
      - Large Buoyancy
      - Low Density Buoyancy

2. BOP System
   - Surface BOP
   - Free Standing Riser System
   - Dual Gradient Drilling System (RMR)

EDP No. 9
Lulea
14th -17th July 2009

Exp 313 New Jersey Shallow Shelf

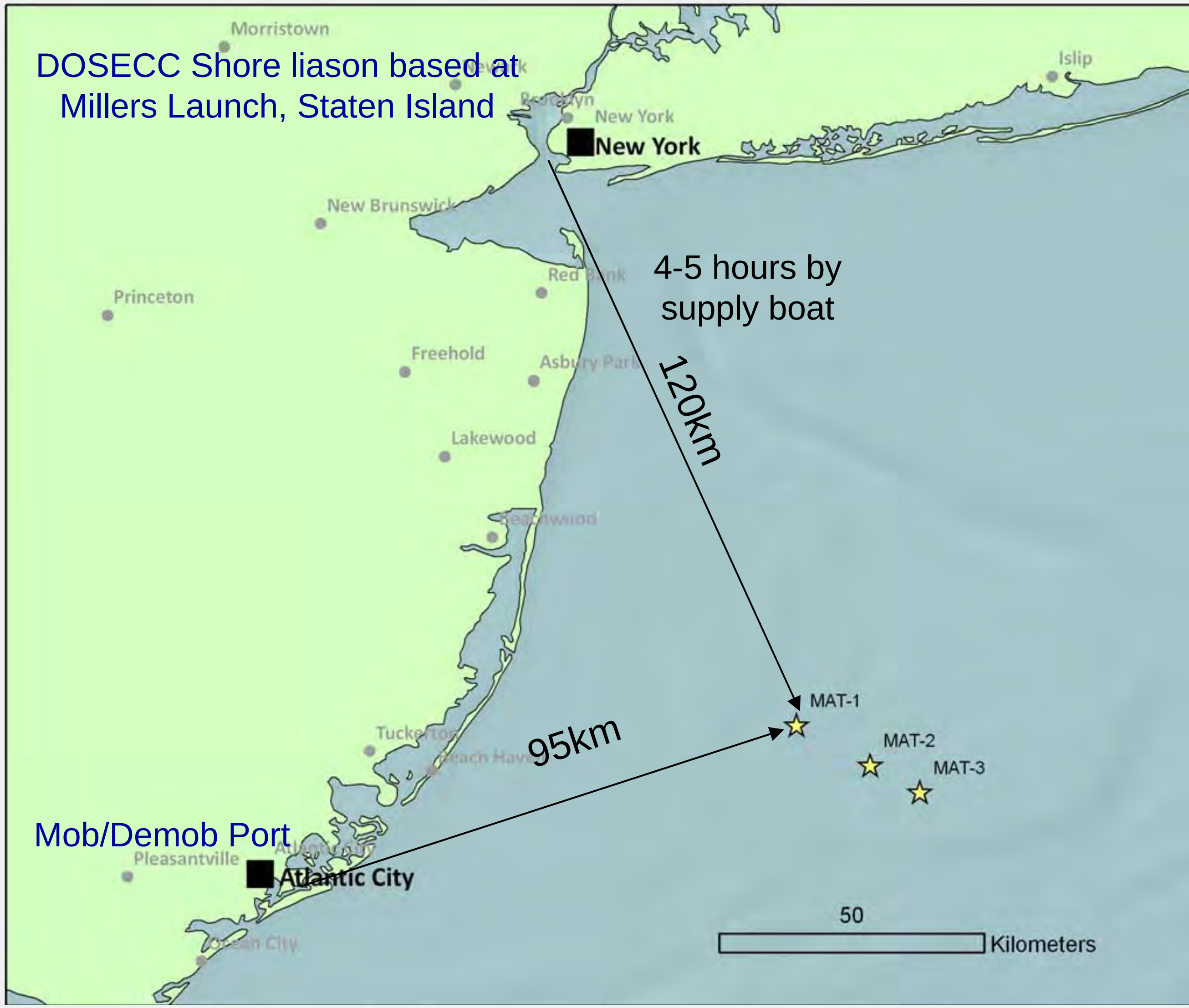
Exp 325 Great Barrier Reef

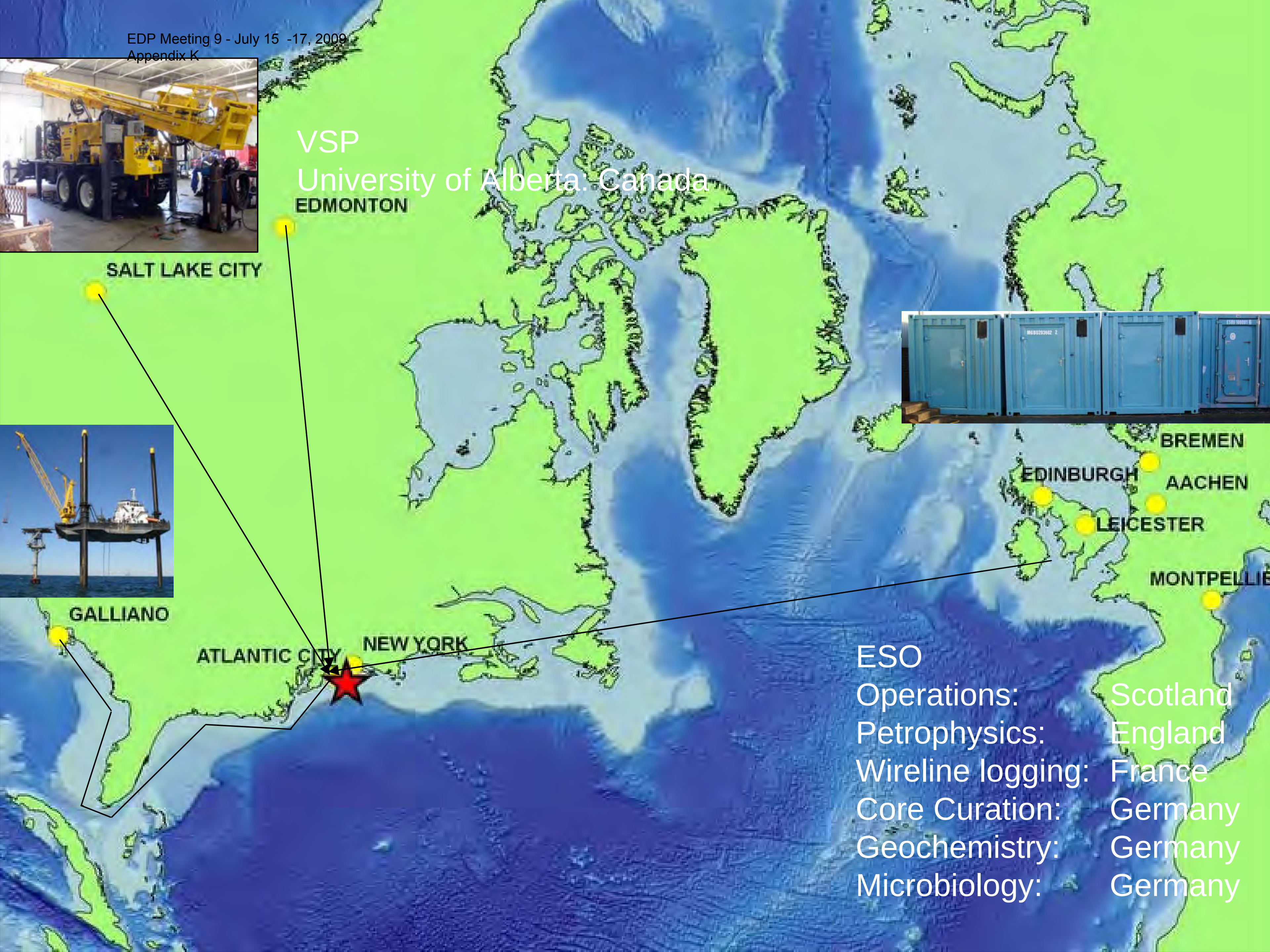
Dave Smith
IODP-ESO Operations Manager
British Geological Survey
Edinburgh
Scotland

ECORD Science Operator

Mobilisation & Demobilisation Port Atlantic City

No. of sites: 3
Depth: up to 750 mbsf




VSP
University of Alberta: Canada
EDMONTON
SALT LAKE CITY
GALLIANO
ATLANTIC CITY
NEW YORK
BREMEN
EDINBURGH
AACHEN
LEICESTER
MONTPELLIE
ESO
Operations: Scotland
Petrophysics: England
Wireline logging: France
Core Curation: Germany
Geochemistry: Germany
Microbiology: Germany

Mobilisation & Demobilisation Port Atlantic City

4th week April start
Sail 30th April


IODP
NEW JERSEY SHALLOW SHELF
IODP EXPEDITION 313
ECORD
icdp
L/B KAYD
12
11
10
9

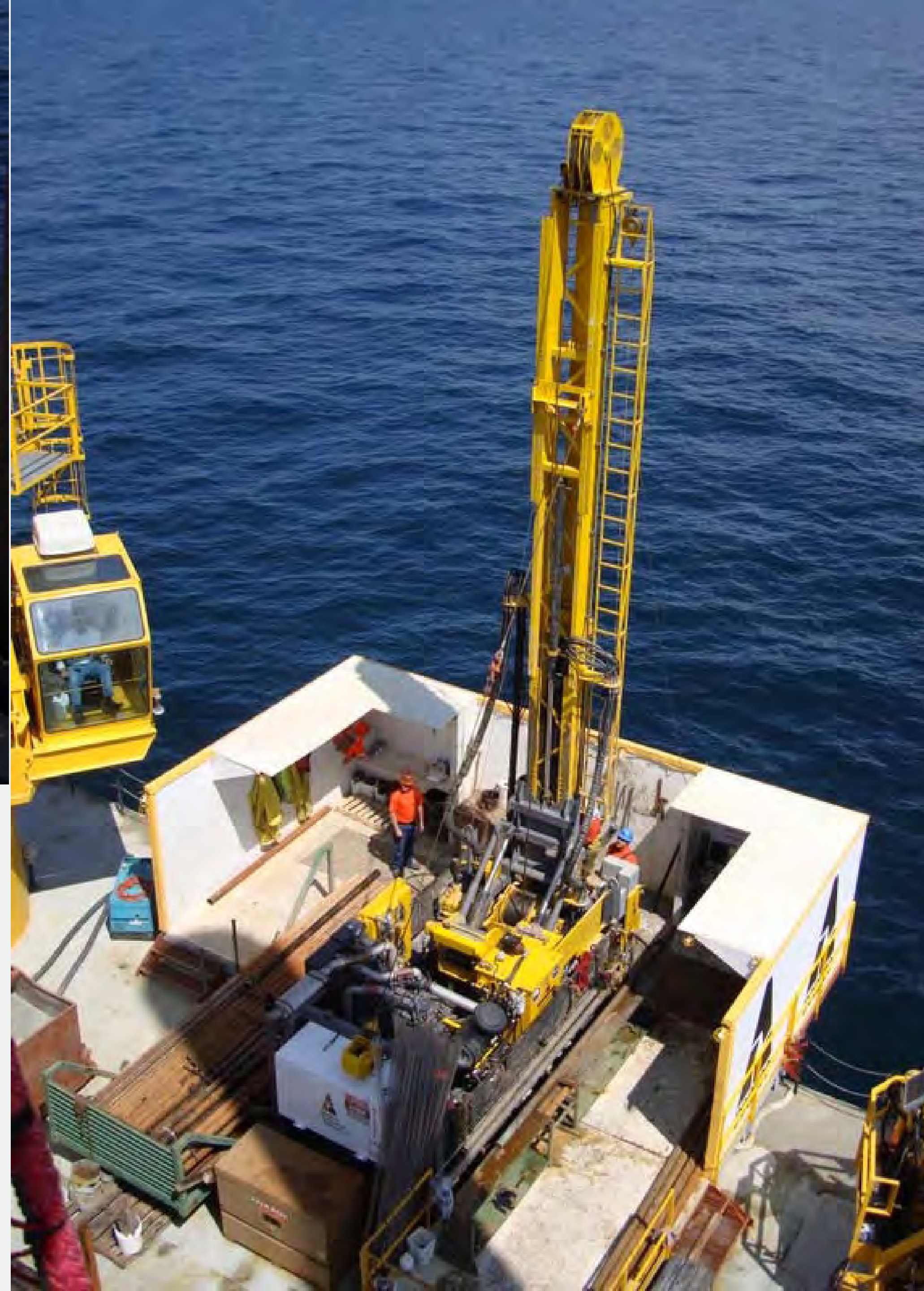

ECORD


L/B KAYD


NEW YORK
N Y


DOSECC
WAN HAI
DOSECC
DOSECC


WAN HAI
DOSECCA



Laboratories Down ‘Main Street’

ECORD Science Operator

Scientist

Database

ESO Operations

Wireline Logging

← **Main Street** →

To The Drill Floor →

2 x Reefers

Geochem Lab

Petrophysics

Core Curation

Wireline & VSP Logging

Media Day

5 Film Crews

IODP - President

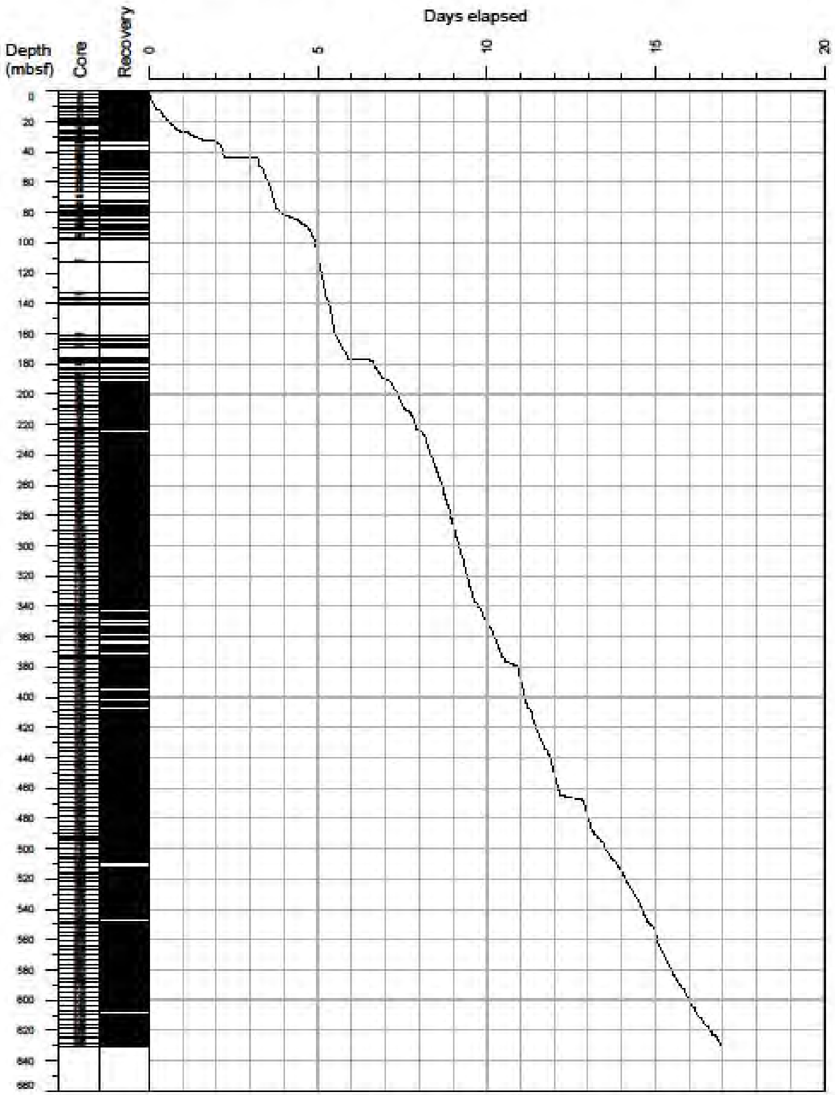
DOSECC - President

MOTCO - Owner

IODP Expedition 313

Hole M0027A progress summary

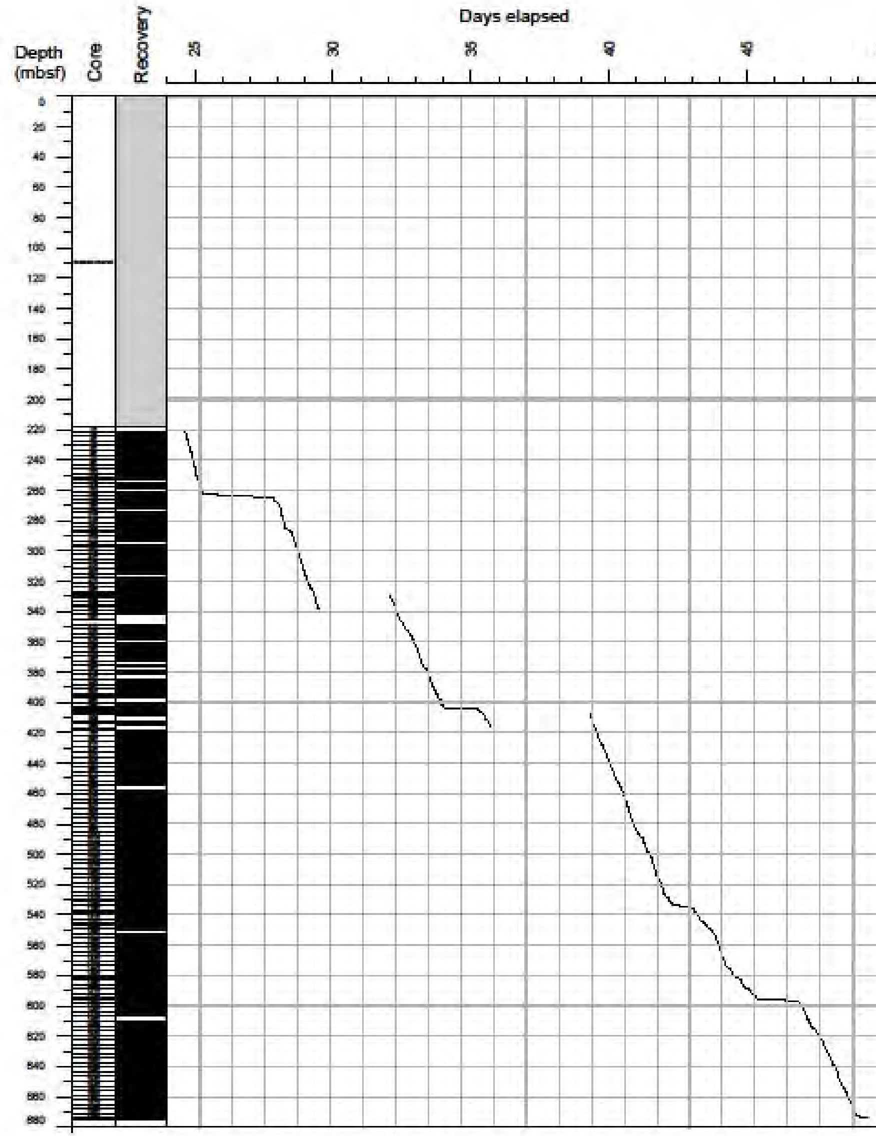
Latitude: 39° 38.04606
Longitude: 73° 37.301
Water depth: 33.5 m

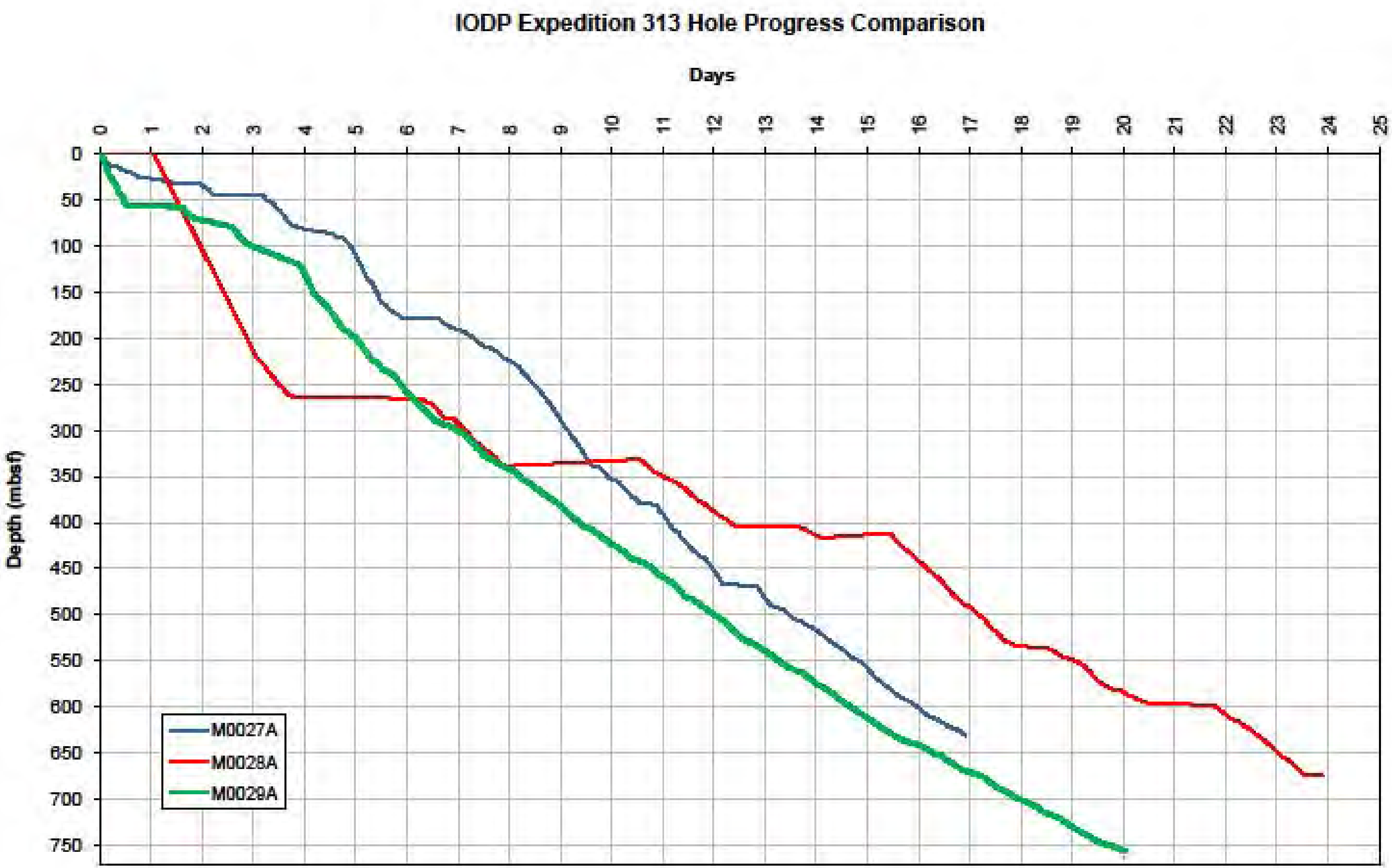


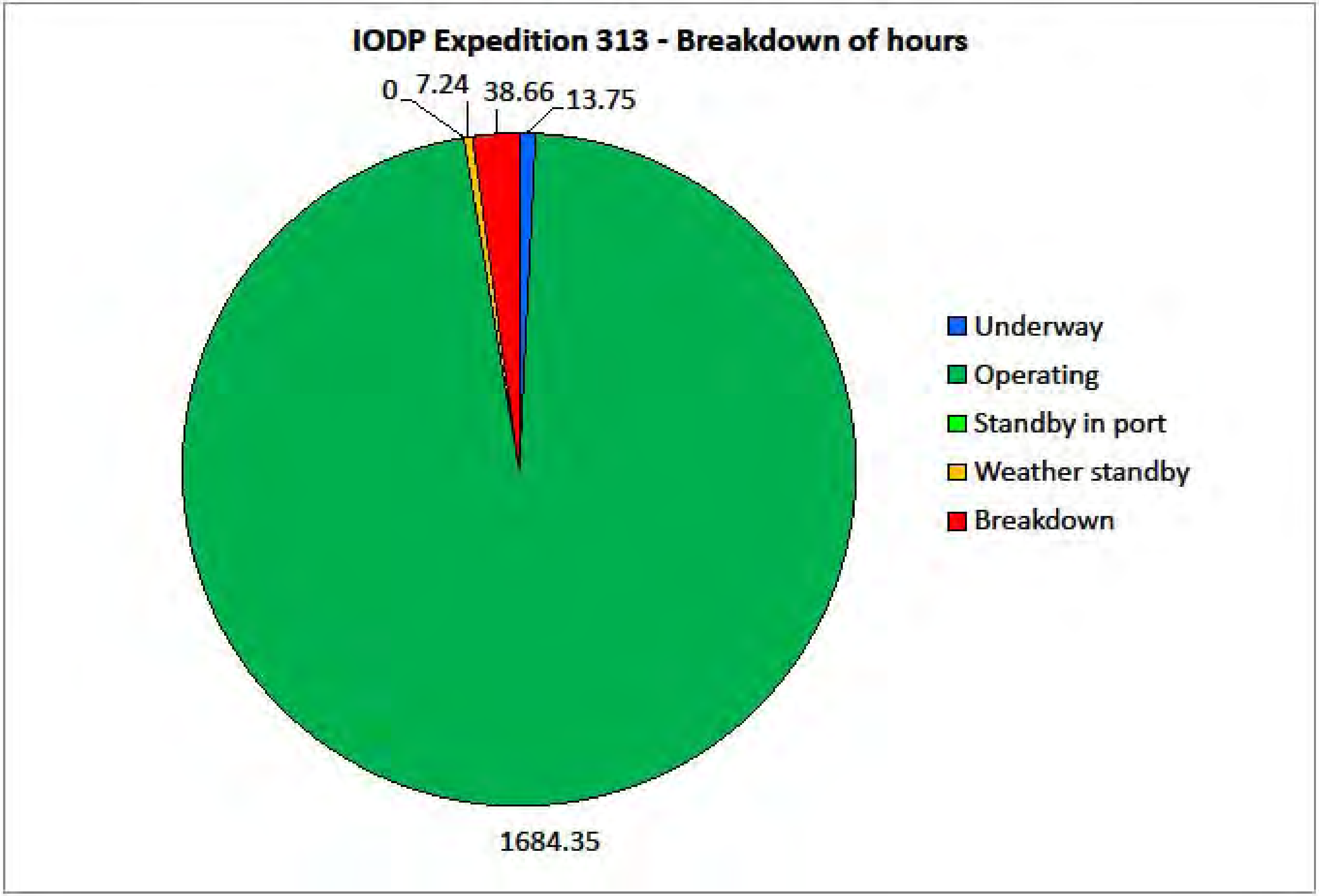
IODP Expedition 313

Hole M0028A progress summary

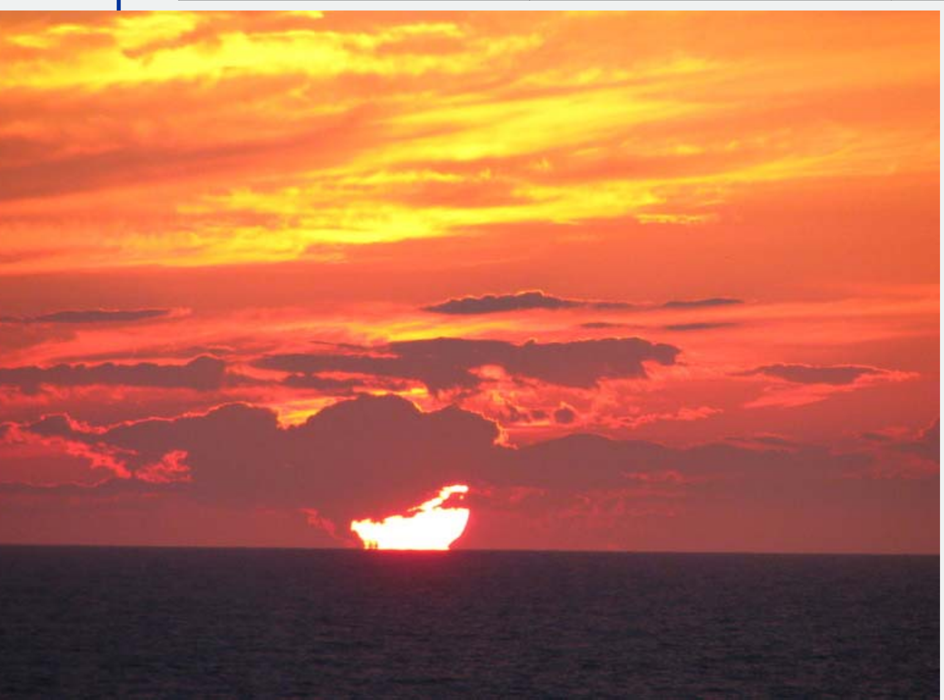
Latitude: 39° 33.94279' N
Longitude: 73° 29.83481' W
Water depth: 35.1 m




IODP Expedition 313 Hole Progress Comparison
Days
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
Depth (mbsf)
0
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
M0027A
M0028A
M0029A


IODP Expedition 313 - Breakdown of hours
0
7.24
38.66
13.75
1684.35
Underway
Operating
Standby in port
Weather standby
Breakdown

Hole	M0027A	M0028A	M0029A	Total
First core	02/05/09 at 00:10	26/05/09 at 15:15	21/06/09 at 17:05	
Last core	18/05/09 at 22:10	16/06/09 at 02:40	11/07/09 at 18:20	
Core runs made	1H to 224R (224 runs)	1R to 171R (171 runs)	1R to 217R (217 runs)	612 runs
Drilled length	547.01 m	476.97 m	609.44 m	1633.42 m
Recovered length	471.59 m	385.5 m	454.31 m	1311.4 m
Core recovery	86.21 %	80.82 %	74.55 %	80.29 %
Final depth	631.01 mbsf	674.34 mbsf	756.65 mbsf	
Hole recovery	74.74 %	57.17 %	60.04%	



Exp 325 Great Barrier Reef
Sept – Dec 2009

Aug: Meetings in Singapore & Australia
Sept: Ship Laboratories, offices and reefer to Singapore
Sept-Oct: Mobilise in Singapore
Oct/Nov: Townville Start Operation – ESO & Scientists Join
Nov: Port call to refuel
Dec: Demob – Townsville
Mar: On Shore Party

ESO
Operations: Scotland
Petrophysics: England
Wireline logging: France
Core Curation: Germany
Geochemistry: Germany
Microbiology: Germany


BLUESTONE TOPAZ

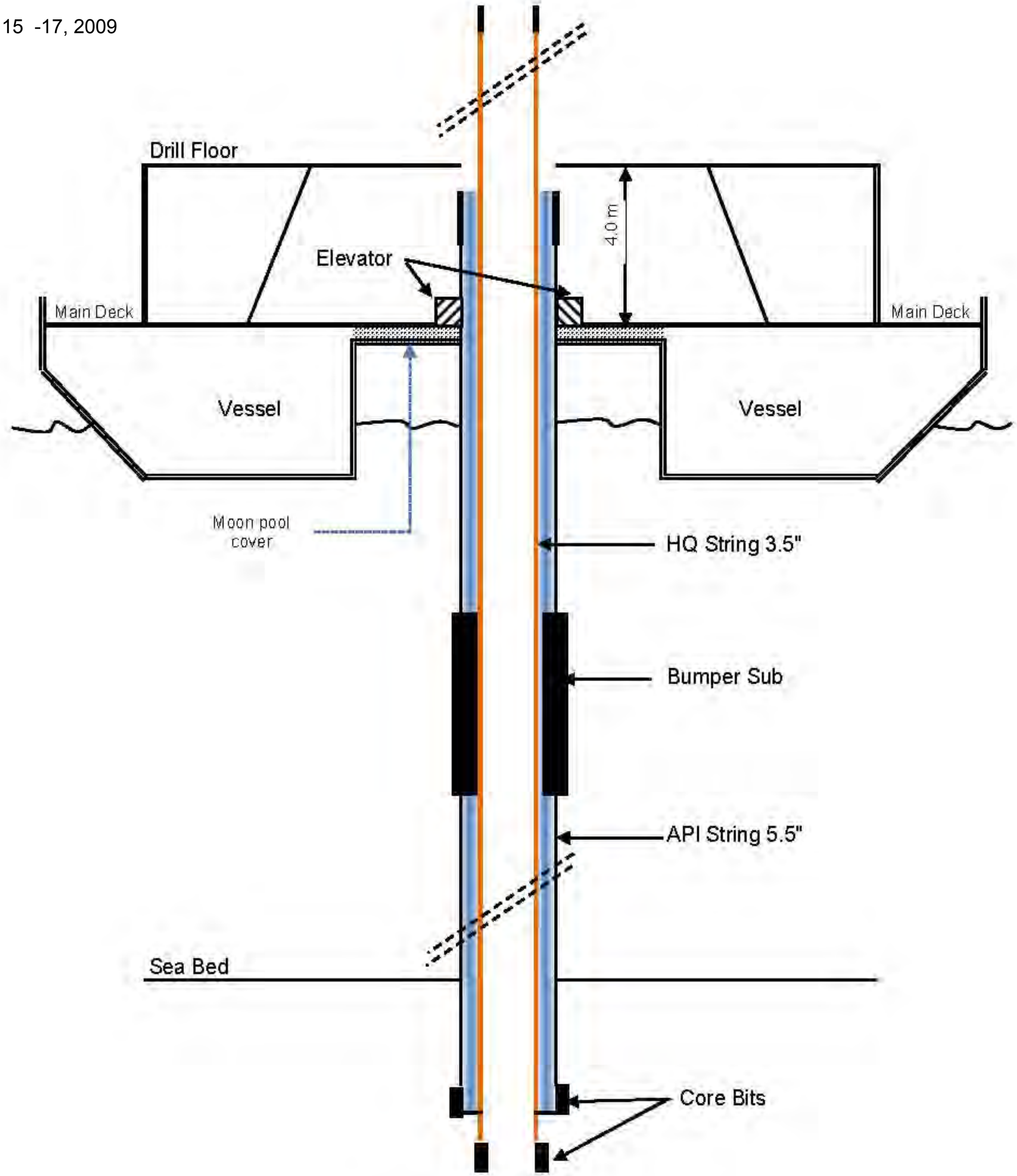


Diagram 1: Drilling/Coring System

Exp 325 Great Barrier Reef
Sept – Dec 2009

Summary

3 Areas

40 sites – will not accomplish all

Water Depth 44-198m

Wireline logging up to 2 per area

40-45 days operations

ESO Projects 2010-2013

Future:

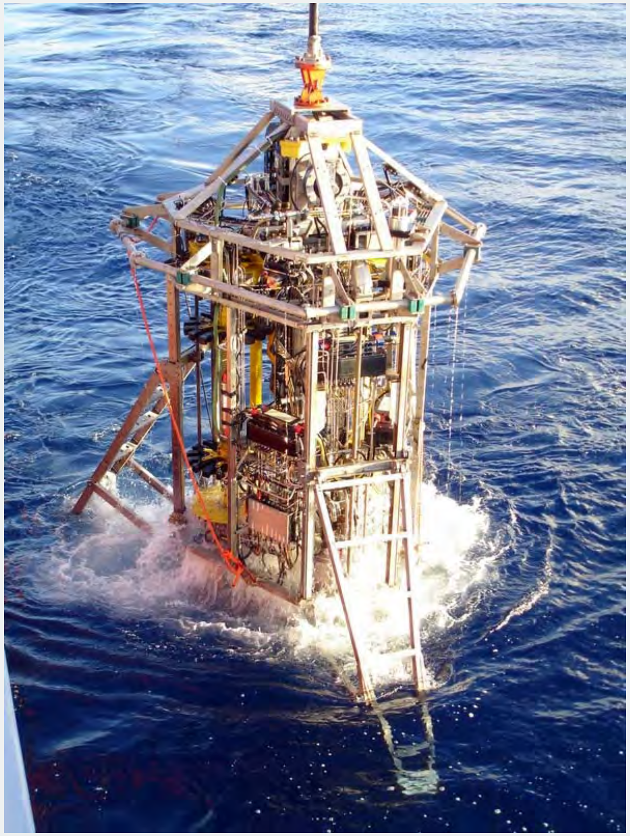
- IODP-313 NJ shore party Nov 2009
- IODP-325 GBR shore party spring 2010
- ECORD aims – to run an MSP each year until 2013
- Operations: No MSP in 2010

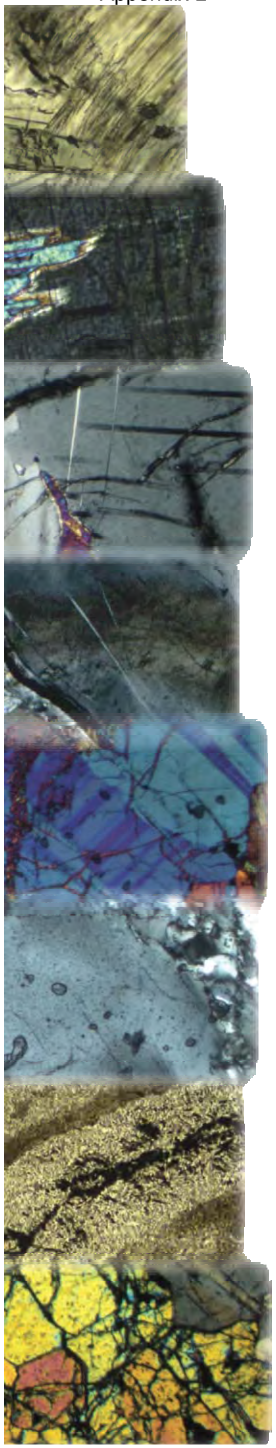
Funding issues to meet ECORD aims

Engineering Developments

Continue to develop Seabed coring systems

More at next EDP meeting





IODP-USIO

Engineering Update

EDP Meeting

Lulea, Sweden, 14-17 July 2009

IODP

Integrated Ocean Drilling Program
United States Implementing Organization

Overview

- **Organizational Changes-TAMU**
- **Sea Trials**
- **FY09 Expedition Schedule**
- **Project updates**
- **Passive Heave Compensator**

Organizational Changes-TAMU

- **Director search**
  - Dr. Brad Clement Appointed Director of IODP TAMU
    - Currently the Chair of the Department of Earth Sciences Department at Florida International University
    - Dr. Clement will begin on 1 August 2009
    - Dr. Steve Bohlen will continue as interim director until 1 August 2009
    - Dr. Bohlen will continue in an advisory role until the end of August
  - Open Positions
    - Managerial positions (to be advertised)
      - Manager of Technical Projects and Deliverables
      - Manager of Tools, Databases and Curation
      - Manager of Business Services
    - Engineering positions
      - Engineering Supervisor (On Hold)
      - Staff Engineer (Advertised)
      - Engineer (Advertised)

IODP
Integrated Ocean Drilling Program
United States Implementing Organization

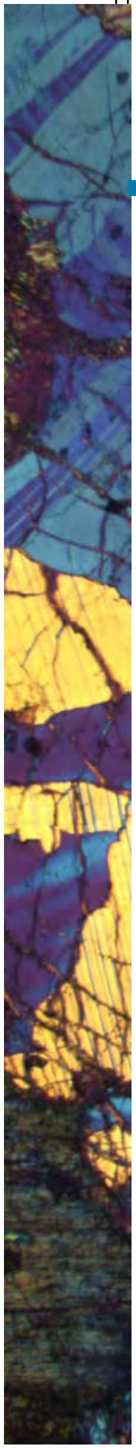
JR Sea Trials and Readiness Assessment

- **Departed from Singapore 25 January**
- **Portcall in Guam scheduled for ~5 February**
  - Pick up Readiness Assessment Team scientists
  - Other staff exchanges
- **Sea trials at Leg 130, Site 807 & U1330 (Ontong Java Plateau)**
  - ~6 days of drilling/coring, formation temperature measurements, wireline logging, shipboard analysis of cores
- **Transit to Honolulu**
- **Began normal operations on Expedition 320**

JR Operations Schedule

IODP-USIO *JOIDES Resolution* Operations Schedule							
Expedition Name (see map)	**Exp #**	**Port of origin**	**Dates[1,2]**	**Total days (port / sea)**	**Days at sea[3] (transit / ops)**	**Co-Chief Scientists**	**USIO contacts[4]**
Pacific Equatorial Age Transect 2[5]	321	Honolulu, Hawaii	5 May–23 June	48 (4/44)	17/27	M. Lyle, I. Raffi	K. Gamage* A. Malinverno^
Juan de Fuca	321T	San Diego, California	23 June–5 July	12 (1/11)	6/5	A. Fisher	K. Gamage* L. Anderson^
Bering Sea Paleoceanography	**323**	**Victoria, Canada**	**5 July–4 Sep**	**61 (5/56)**	**17/39**	**C. Ravelo, K. Takahashi**	**C. Alvarez-Zarikian* G. Guerin^**
Shatsky Rise Formation	324	Yokohama, Japan	4 Sep–4 Nov	61 (5/56)	17/39	W. Sager, T. Sano	J. Geldmacher* G. Iturrino^
Canterbury Basin Sea Level	317	Townsville, Australia	4 Nov–4 Jan'10	61 (5/56)	10/46	C. Fulthorpe, K. Hoyanagi	P. Blum* A. Slagle^
Wilkes Land Glacial History[6]	318	Wellington, New Zealand	4 Jan–9 Mar	64 (5/59)	16/43	C. Escutia, H. Brinkhuis	A. Klaus* T. Williams^

Notes:
1. Dates for expeditions may be adjusted pending non-IODP activities
2. The Start date reflects the initial port call day. The vessel will sail when ready
3. Transit total is the transit to and from port call and does not include transit between sites.
4. The USIO contacts list includes both the Expedition Project Manager (*), the primary contact for the expedition, and the Logging Staff Scientist (^).
5. Scientists disembark but staff continue on Expedition 321T.
6. Wilkes Land activities include operations at Adelie Drift (638 APL).



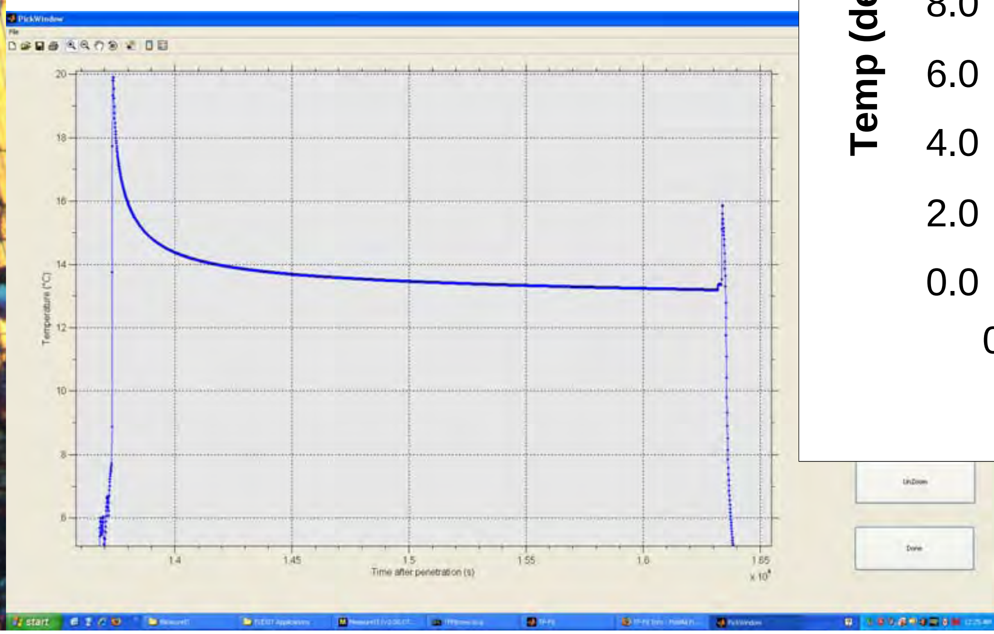
Projects Update

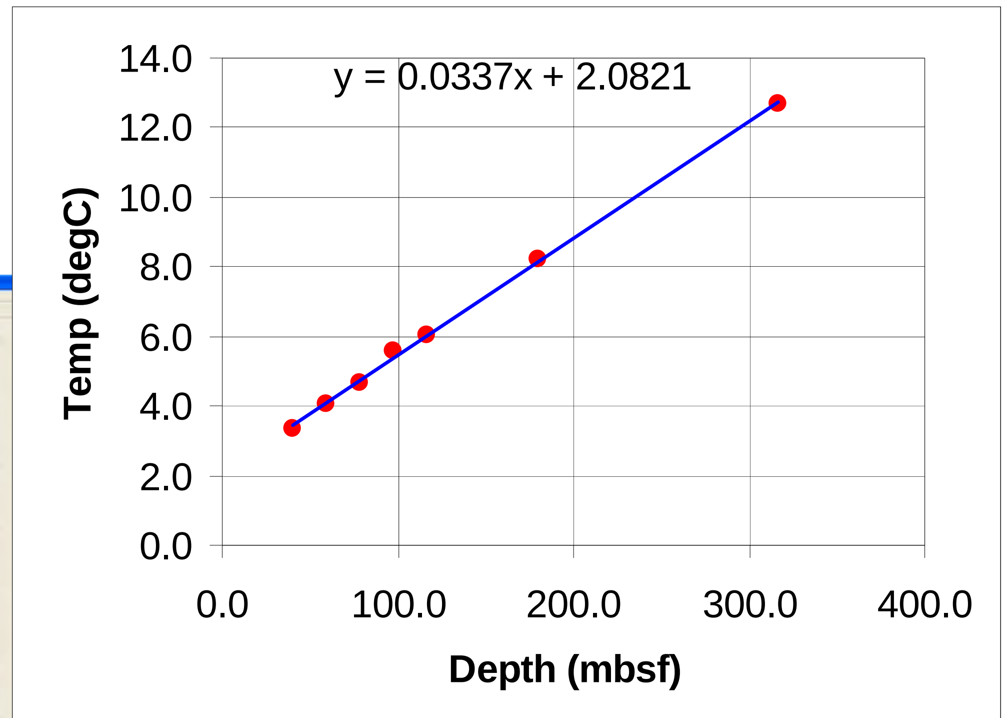
- **Rig Instrumentation System (RIS)**
  - RigWatch installed in Singapore prior to departure with some issues
    - Sensors not available for installation
      - Pipe counter
      - Coreline/VIT depth
    - Ship systems not available for calibration
      - Top drive
      - Compensator stroke indicator
  - Expedition 320T
    - Voltage barrier failed causing some measurements to function incorrectly
    - Computer flooded due to leak in roof of Sub Sea shop – leak fixed
  - Expedition 320
    - RIS available for use prior to leaving Honolulu
    - C-Rio controller (heart of Rigwatch data box) failure caused loss of system during exp.
    - More water in Sub Sea shop caused computer failure
  - Expedition 321
    - Canrig representative available in Honolulu port call to fix issues
    - RIS computer moved to server room
    - RIS functioning properly through Expedition 321
  - Remaining issues
    - Display of VIT and coreline depth – working with Canrig/ODL

IODP Integrated Ocean Drilling Program United States Implementing Organization

Projects Update

- **Advanced Piston Corer Temperature (APCT3)**
  - 2 tools deployed on JR for expeditions 320T, 320, 321
  - Tools performed well on all expeditions
  - New TPFit software significantly improved consistency of extrapolated measurements





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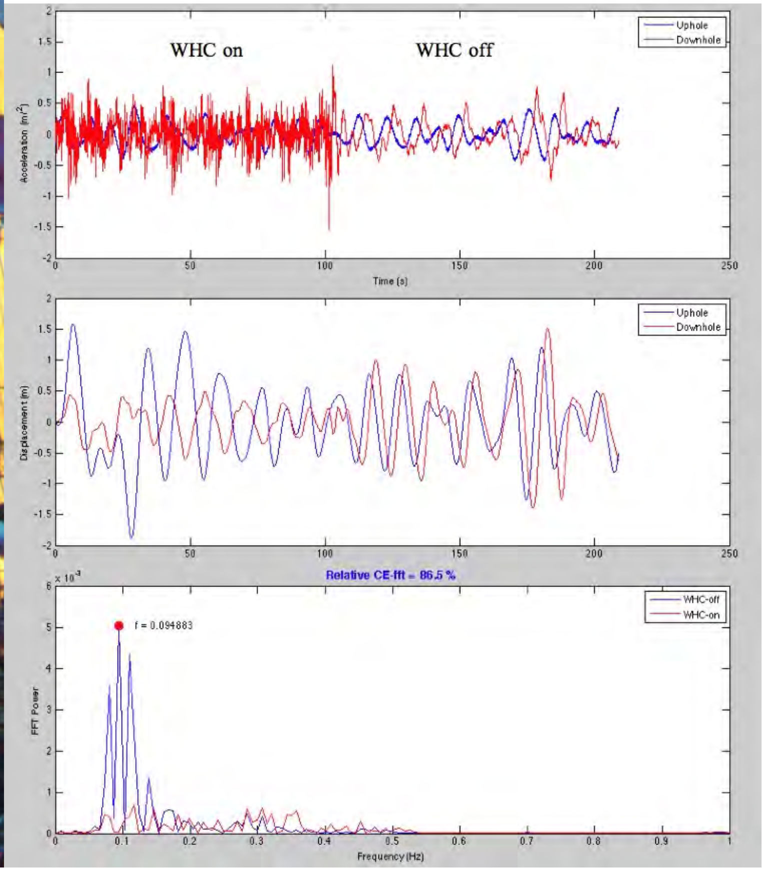
Projects Update

- **Wireline Heave Compensator (WHC)**
  - Sea Trials
    - In order to assess the performance of the DDI-AHC system while operating under typical conditions, a 48-hour period was allotted to deploy a series of logging strings. These logging runs were conducted after drilling a hole to 550 mbsf in 2804 meter deep water in to allow significant cable length, weight and tension.



Based on the quality of the downhole logging data collected during operations on Exp 320T, the wireline heave compensator system is ready for future IODP operations. This system has not, however, been optimally tuned and many of its nuances still need to be assessed.

A Non-disclosure Confidentiality agreement has been entered into by Schlumberger, DeepDown and the Bore hole Research Group with respect to the data and process/software used to determine compensator performance.

Integrated Ocean Drilling Program
United States Implementing Organization

Projects Update

- **Expedition 320**
  - During Expedition 320 a number of failures occurred impacting logging operation.
    - In order to assess Vickers Valve electronic failure. (Cause unknown, waiting for failure report from Eaton-Vickers)
    - Transmission failure on winch unit (Transmission was offloaded in San Diego and shipped to SLB for failure analysis)
  - Honolulu Portcall activities
    - During the portcall there were 2 SLB engineers, SLB mechanic, 2 ElectroWave engineers and the SLB logging engineer present.
    - ElectroWave engineer sailed on Exp 321 for the purpose of engineering and software support during WHC testing.

Logging Cable

Winch Transmission

Upper Support Frame

Vickers Valve

Projects Update

- **Wireline Heave Compensator**
  - Expedition 321
    - U1337A (PEAT-7C) Logging operations were successfully completed using:
      - Triple Combo
      - VSI-SGT-N
      - FMS-Sonic
    - U1338B (PEAT-8D) Logging operations were successfully completed using:
      - Triple Combo
      - VSI-SGT-N
      - FMS-Sonic
  - Data collection for the determination of Compensator Efficiency (CE) and system performance was performed during Triple Combo and FMS-Sonic runs.

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United States Implementing Organization

Projects Update

- **Magnetic Susceptibility Sonde (MSS)**
  - During IODP Expedition 320 at site U1332 Hole A, the wireline tool string, including the MSS and several Schlumberger sondes – commonly known as “paleo string” was lost in the hole while attempting to re-enter drill pipe after logging open hole section
- **Tool Replacement**
  - A plan of action is being implemented with the goal of building two MSS tools to replace the tool lost during IODP Expedition 320

The MSS has recorded Magnetic susceptibility in 3 IODP holes prior to being lost and has generated considerable interest and future demand from the scientific community.

Deployment of the MSS during Exp 320T

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Projects Update

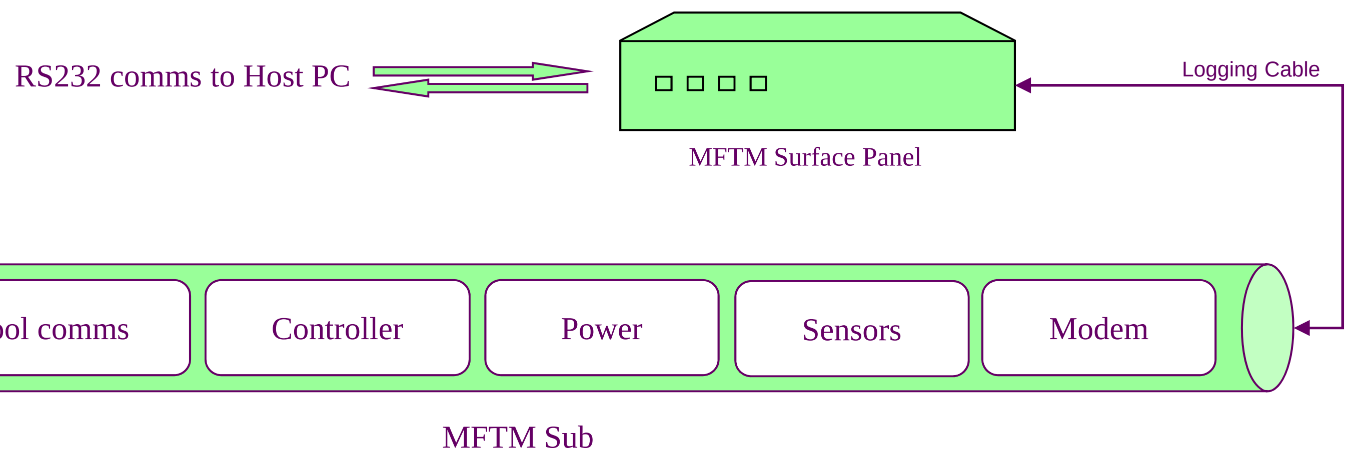
- **Lockable Flapper Valve (LFV)**
  - The USIO is addressing the hardware and/or process issues responsible for the MSS tool string loss. One of the contributing factors, the LFV, is being addressed through a series of initiatives begun in 2008.
  - A LFV task force (LFVTF) is being assembled to address the valve's recurring unlatching issue. The LFVTF is made up of engineering personnel from LDEO and TAMU, along with Schlumberger logging engineers, ODL Core Techs, and a consultant.

LFV on a 250g Shock Table

LFV testing at Schlumberger

Projects Update

- **Multifunction Telemetry Module (MFTM)**
  - Standardized Downhole Telemetry Interface
  - Operating Configurations
    - Standalone LDEO Telemetry Mode (Completed)
    - Schlumberger Mode
    - MDHDS Mode

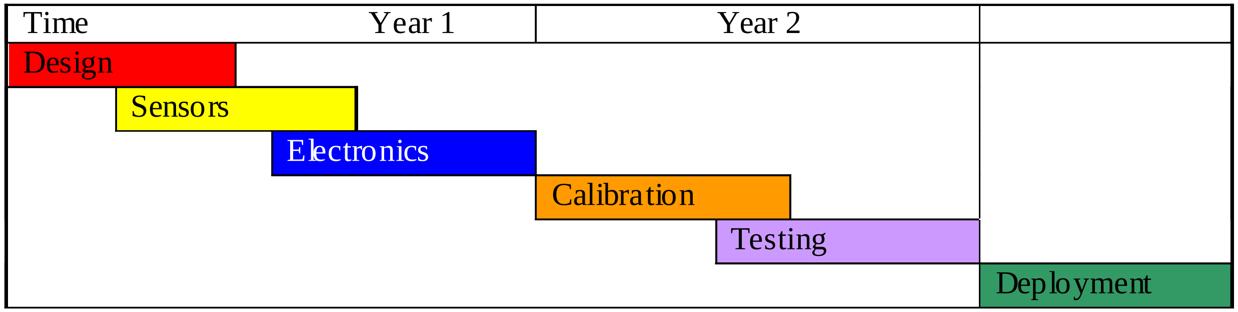


Projects Update

- **Tool upgrades scheduled for FY09:**
  - SETP
    - Preparing one tool for deployment on Chikyu in September
    - Thermistor calibration in progress
  - SET
    - 2 tools currently deployed on JR
      - Successful deployment on Exp 321 Hole U1337C
    - 2 tools prepared for Chikyu deployment
    - 1 being prepared for back-up
    - Thermistor calibration in completed

Projects Update

- **Multi-sensor Magnetometer Module (MMM)**
  - The MMM proposal is approved pending budget allocation and will produce continuous records of the magnetic field in the borehole. From these records, calculations of the magnetization and polarity of the rocks surrounding the borehole can be made. The tool will also provide a mageto-stratigraphy from IODP holes whose cores have been magnetically overprinted wor where recovery is incomplete or disturbed.
- **Work Plan**
  - Year 1: Complete design and manufacture of new tool.
  - Year 2: Calibration of the tool including visit to Schlumberger facility, bench tests, land tests, complete tool user manual and training materials.



Passive Heave Compensator (PHC)

- **Background:**
  - System refurbished while in shipyard
    - PHC rods repaired, straightened, re-chromed, honed, polished and restored to within original tolerance
    - PHC cylinders were re-chromed, honed and polished – ID increased by .050" due to excessive pitting
    - Seals re-designed and manufactured to accommodate increased cylinder diameter
    - Re-assembled and installed prior to departure from Singapore
- **Evaluation Goals**
  - Desire to quantify PHC performance
    - Difficult until method of measuring bit motion relative to ship heave is developed
    - DSS could eventually provide measurements required

IODP Integrated Ocean Drilling Program United States Implementing Organization

Passive Heave Compensator (PHC)

- **Direct Observations:**
  - Drillers believe the PHC is working as good or better than before
  - PHC operation in the past was compromised by having a non-functional AHC system attached
- **Coring results:**
  - Exp 320 and 321 conducted in relatively deep water (helps efficiency of PHC)
  - Sea conditions mild on both expeditions
  - PHC not heavily challenged

Passive Heave Compensator (PHC)

- **Coring results**

Expedition	Coring System	Meters Cored	Meters Recovered	Percent Recovery
Exp-320	APC	2699.5	2804.05	103.9%
(PEAT-1)	XCB	761.2	568.32	74.7%
	X320 Total	3460.7	3372.37	97.4%
Exp-321	APC	1829.7	1886.30	103.1%
(PEAT-2)	XCB	858.1	702.56	81.9%
	X321 Total	2687.8	2588.86	96.3%
Exp-320/321	APC	4529.2	4690.35	103.6%
(PEAT)	XCB	1619.3	1270.88	78.5%
	320/321 Total	6148.5	5961.23	97.0%

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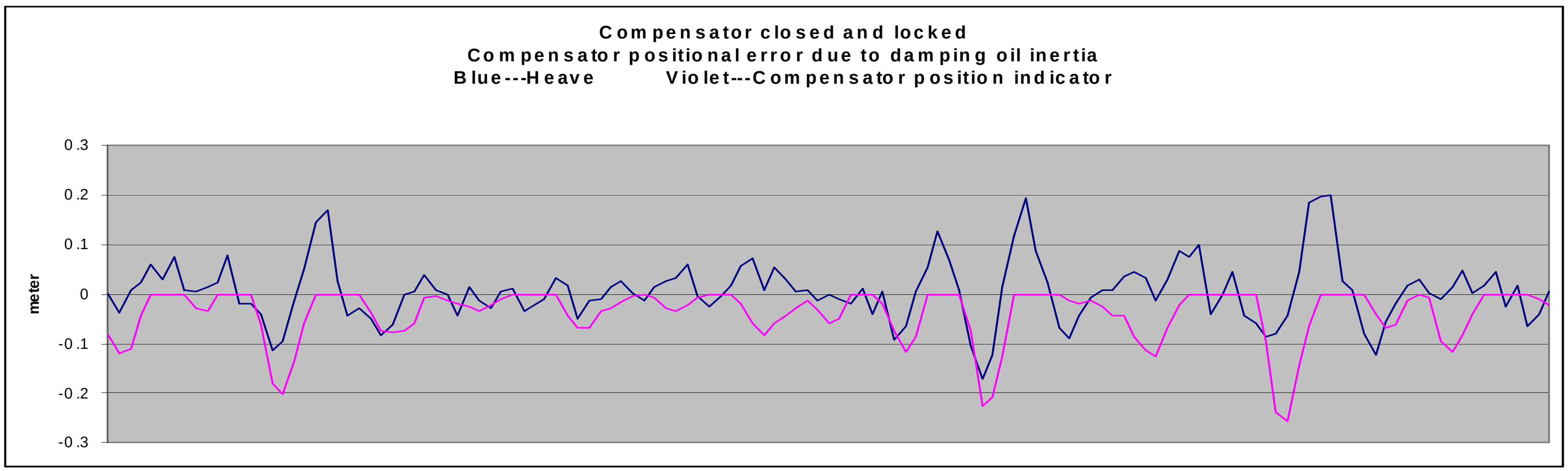
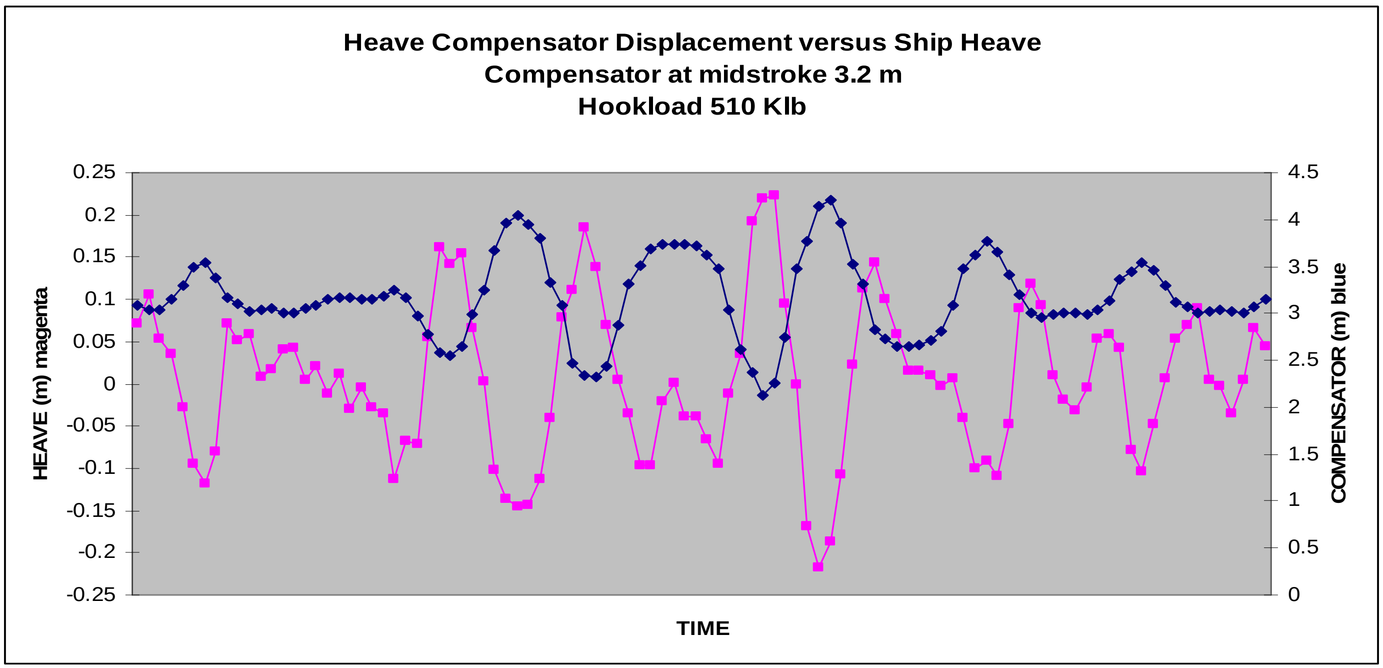
Passive Heave Compensator (PHC)

- **PHC rod displacement**
  - Currently rod displacement is derived from oil pressure sensor
  - Graph shows displacement change though compensator is closed and locked
  - Sensor in oil cans on top of PHC feels internal force as a result of vessel heave
  - Pressure change due to inertial of oil volume – not change in oil level
    - This determination of rod position fine for driller who only needs ~position
    - It is not accurate for determining compensator performance relative to heave
  - Laser distance measuring device ordered by ODL and will be installed on EXP 323



Passive Heave Compensator (PHC)

- **RIS – Heave versus measure of rod stroke**
  - Graph does not accurately reflect PHC rod displacement amplitude (per proceeding slide)
  - Graph does show compensator countering heave – 180~ out of phase



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Passive Heave Compensator (PHC)

- **Conclusions**
  - PHC appears to be functioning better than in Phase I of IODP based on observations
  - Two methods to improve analysis
    - Continue development of DSS to allow better analysis of bit movement
    - Develop better method to determine compensator rod displacement – planned for Exp 323

Technology Roadmap v 3.0

Bill Ussler

July 15, 2009

Changes since the Shanghai meeting

- Table 1 - reorganized, no change in content
- 2 new ED items

- **ED B-34: The virtual science party**

There is a long history in IODP of the research science community undertaking shipboard activities in the spirit of traditional fieldwork. It may be worth questioning this paradigm given the increasing complexity of coring systems and technological sophistication of instrumentation and analysis methods. There may be an economic and competence argument in favor of crewing the vessel with professional technicians who have detailed control over day-to-day operational activities while relying modern communications and visualization technologies to enable a shore-based scientific community to direct operations at the tactical and strategic levels.

Faced with a combination of social factors, the massive expansion in activity supported by an aging population of experienced technologists and the rapid development of communications and networking technologies, industry has reaped great operational benefits from the development and implementation of shore-based real time operations support centers. IODP should undertake a study to assess whether there are scientific and economic benefits similar to those obtained by industry through taking advantage of available communications and visualization technologies.

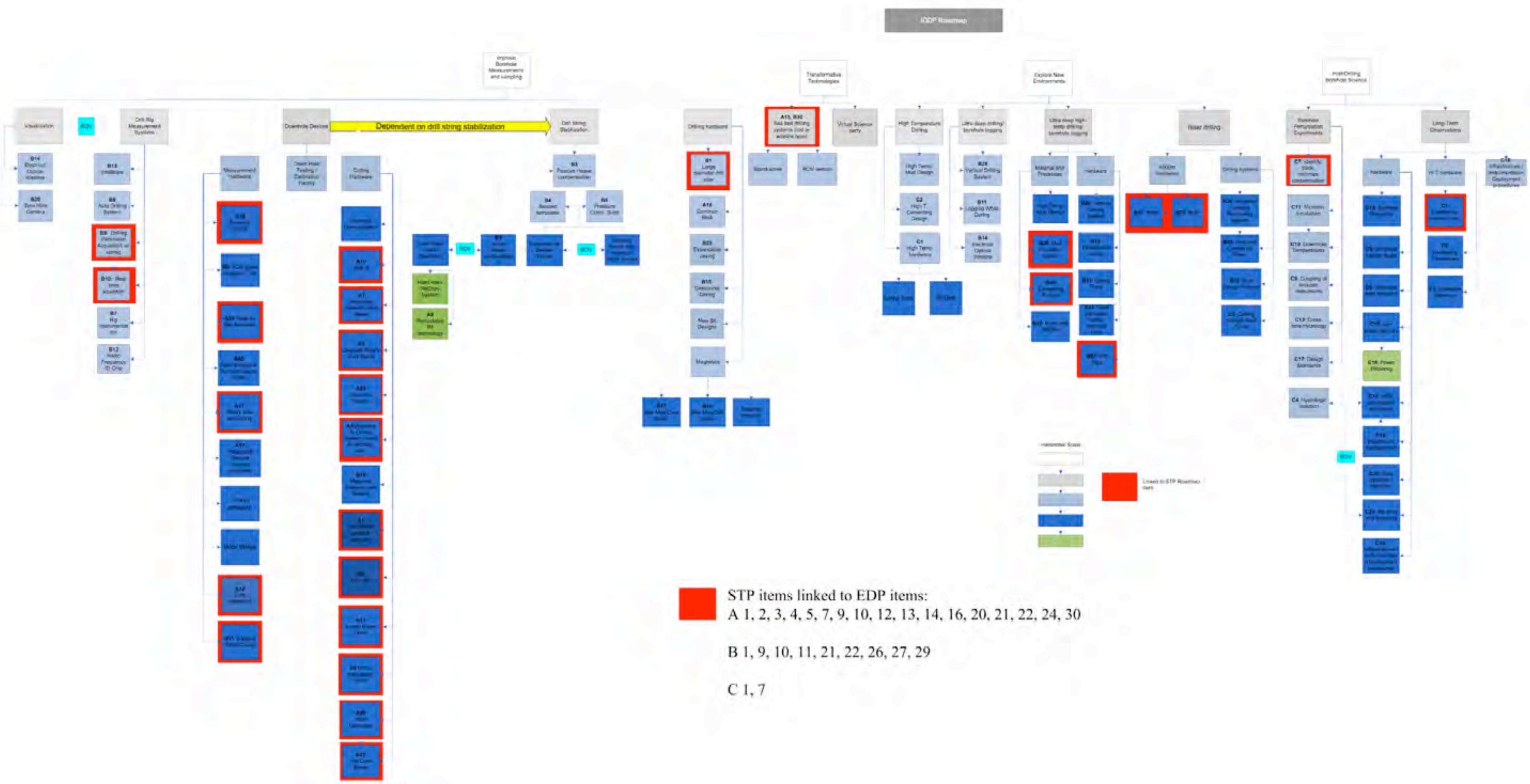
- **ED B-35: Seafloor drilling systems**

One of the primary goals of the IODP is the acquisition of quality cores from a diverse range of deep ocean environments. Coring objectives range from very soft sediments to hard crystalline rock. Studies undertaken by IODP-MI suggest that core quality deteriorates with increasing rock hardness. Industrial experience suggests that accurate control of the downhole drilling parameters, including weight on the core head and torsional stability of the drillstring, is the critical determinant of core quality.

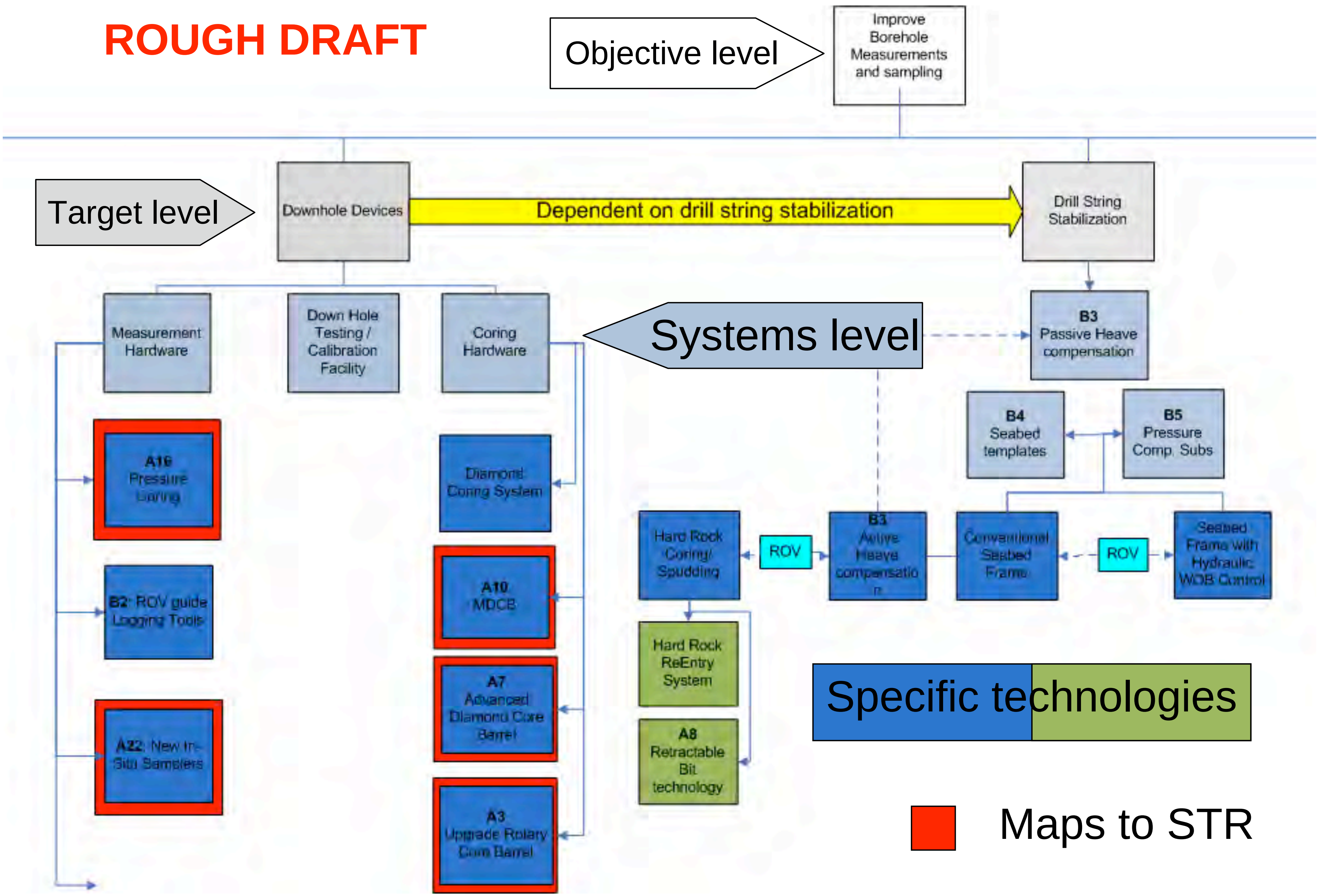
In riserless coring operations, the entire drillstring is subject to the effects of ocean currents and vessel heave. These motions make accurate control of coring parameters almost impossible with the result that core recoveries are much worse that would normally be expected in an industrial context. Isolating the downhole conditions from the external environment by regulating feed and torsion through a seabed coring frame offers the prospect of dramatically improved core recovery.

Seabed drills are already being pioneered by the geotechnical community and certain European scientific activities. This technology should therefore be evaluated for application to the task of deep ocean and 1 to 2 km deep borehole coring operations.

IODP Technology Roadmap Hierarchy and Dependencies – rough draft following EDP #8



ROUGH DRAFT


Objective level
Improve Borehole Measurements and sampling
Target level
Downhole Devices
Dependent on drill string stabilization
Drill String Stabilization
Measurement Hardware
Down Hole Testing / Calibration Facility
Coring Hardware
Systems level
B3 Passive Heave compensation
B4 Seabed templates
B5 Pressure Comp. Subs
A16 Pressure Coring
Diamond Coring System
A10 MDCB
B2: ROV guide Logging Tools
A7 Advanced Diamond Core Barrel
A22: New In-Situ Samplers
A3 Upgrade Rotary Core Barrel
Hard Rock Coring/ Spudding
ROV
B3 Active Heave compensation
Conventional Seabed Frame
ROV
Seabed Frame with Hydraulic WOB Control
Hard Rock ReEntry System
A8 Retractable Bit technology
Specific technologies
Maps to STR

Objective Level

A. Improve borehole measurements and sampling
B. Transformative technologies
C. Explore new environments
D. Post-drilling borehole science

Objectives/Targets

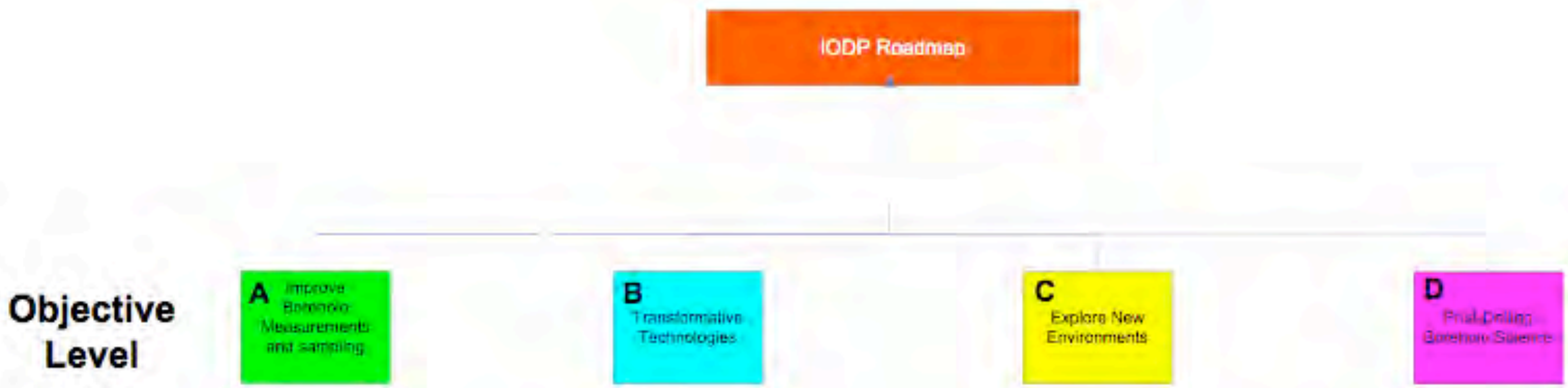
- Improve borehole measurements and sampling
  - Visualization
  - Drill rig measurement
  - Downhole devices
  - Drillstring stabilization
  - Drilling hardware
- Transformative technologies
  - Seabed drilling
  - Virtual science party

Objectives/Targets continued

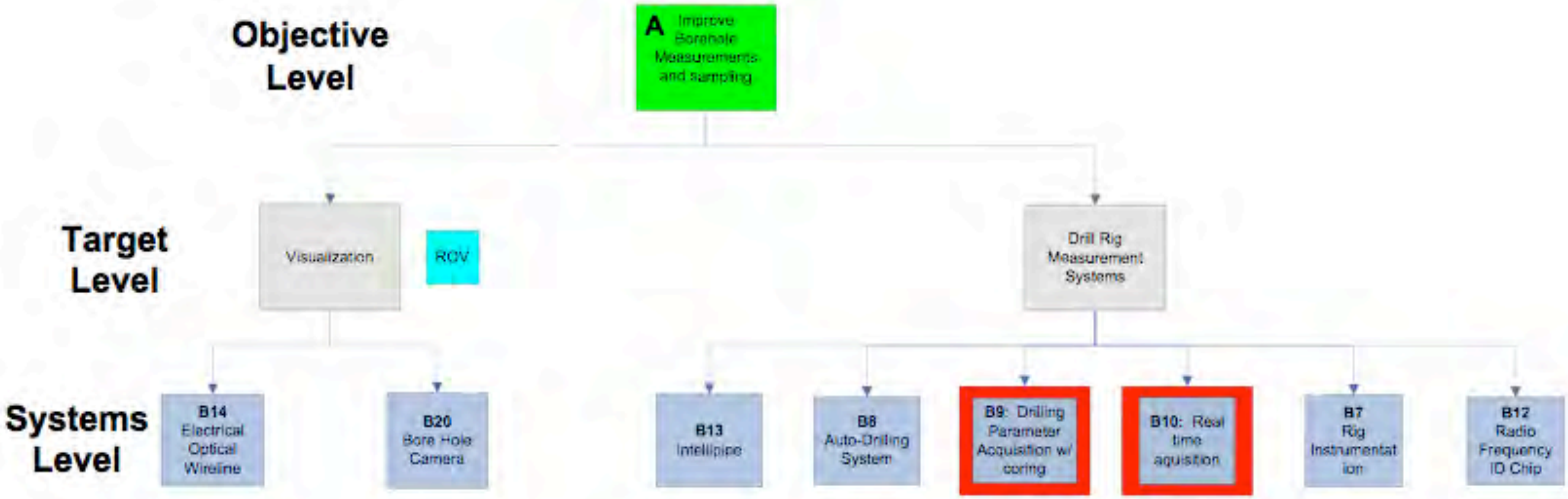
- Explore new environments
  - High temperature drilling
  - Ultra-deep/high temp drilling/borehole logging
  - Riser drilling
- Post drilling borehole science
  - Borehole perturbation experiments
  - Long-term observatories

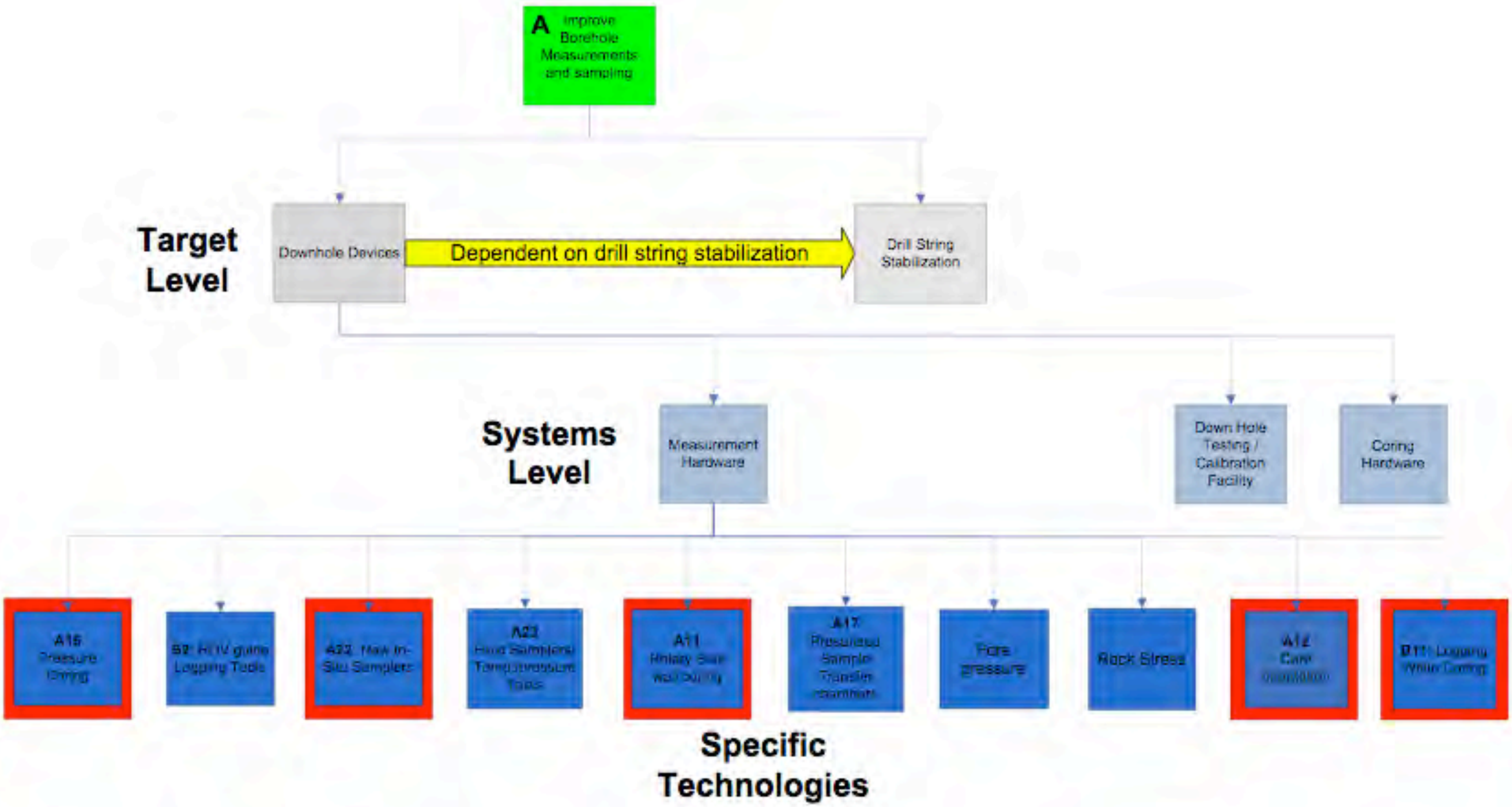
Distribution of Technology Roadmap v. 3.0

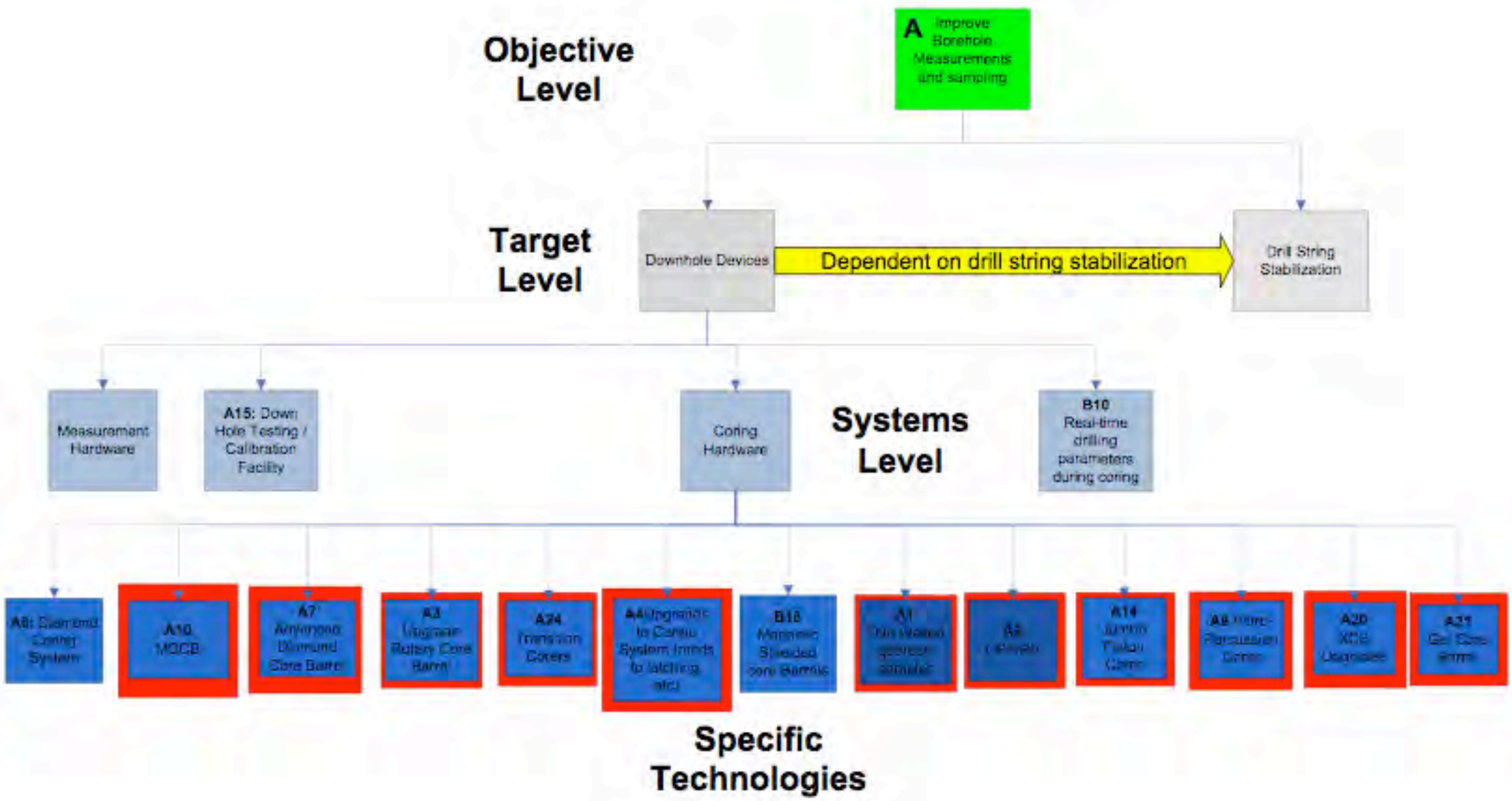
- Post on IODP-MI website
- Appendix D (chart)
  - pdf files
  - web pages
    - links to navigate through the chart
    - links to the text (e.g., Heave Compensation box linked to B3 text)

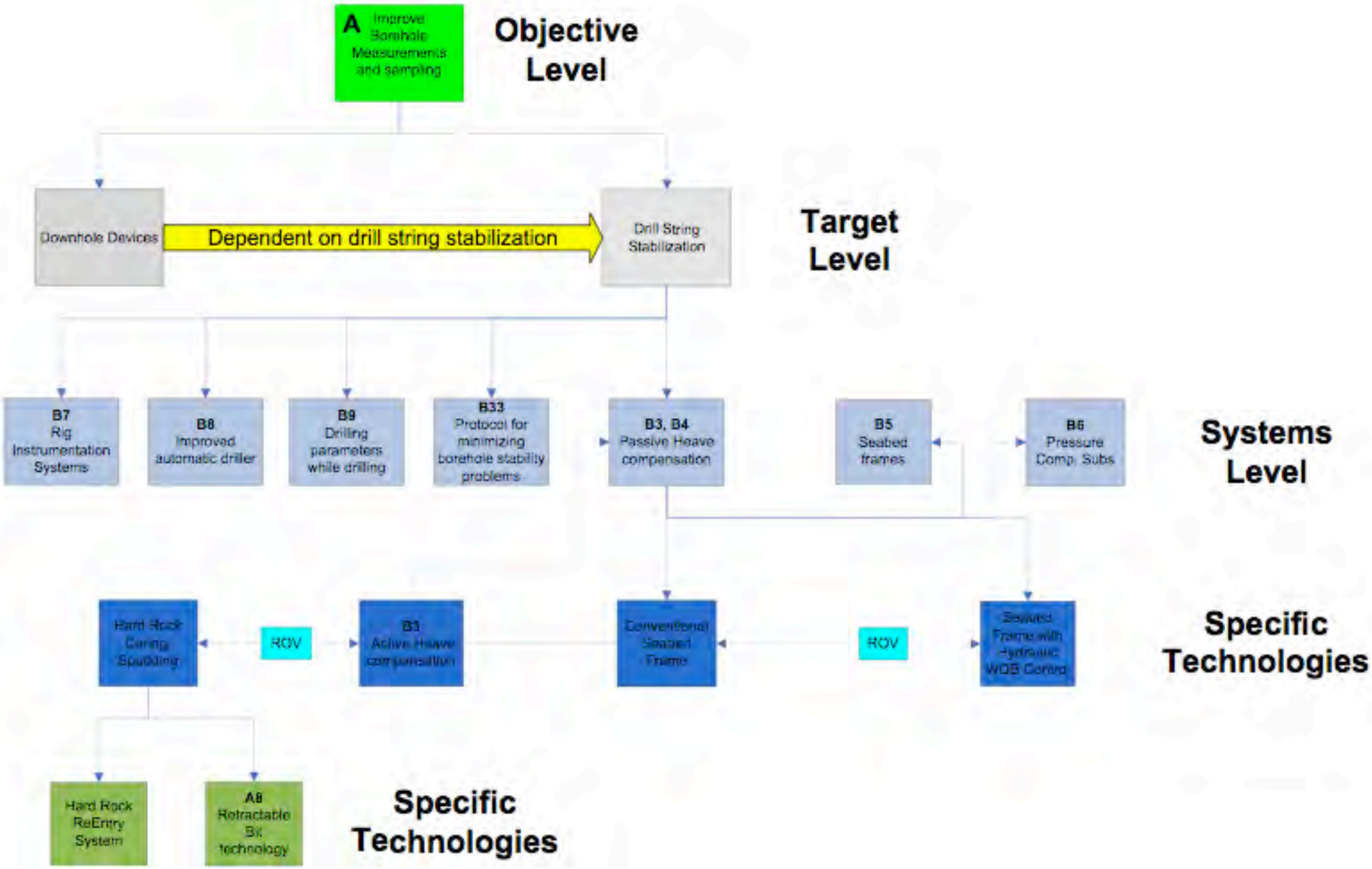

IODP Roadmap
Objective Level
A Improve Borehole Measurements and sampling
B Transformative Technologies
C Explore New Environments
D Post-Drilling Borehole Science

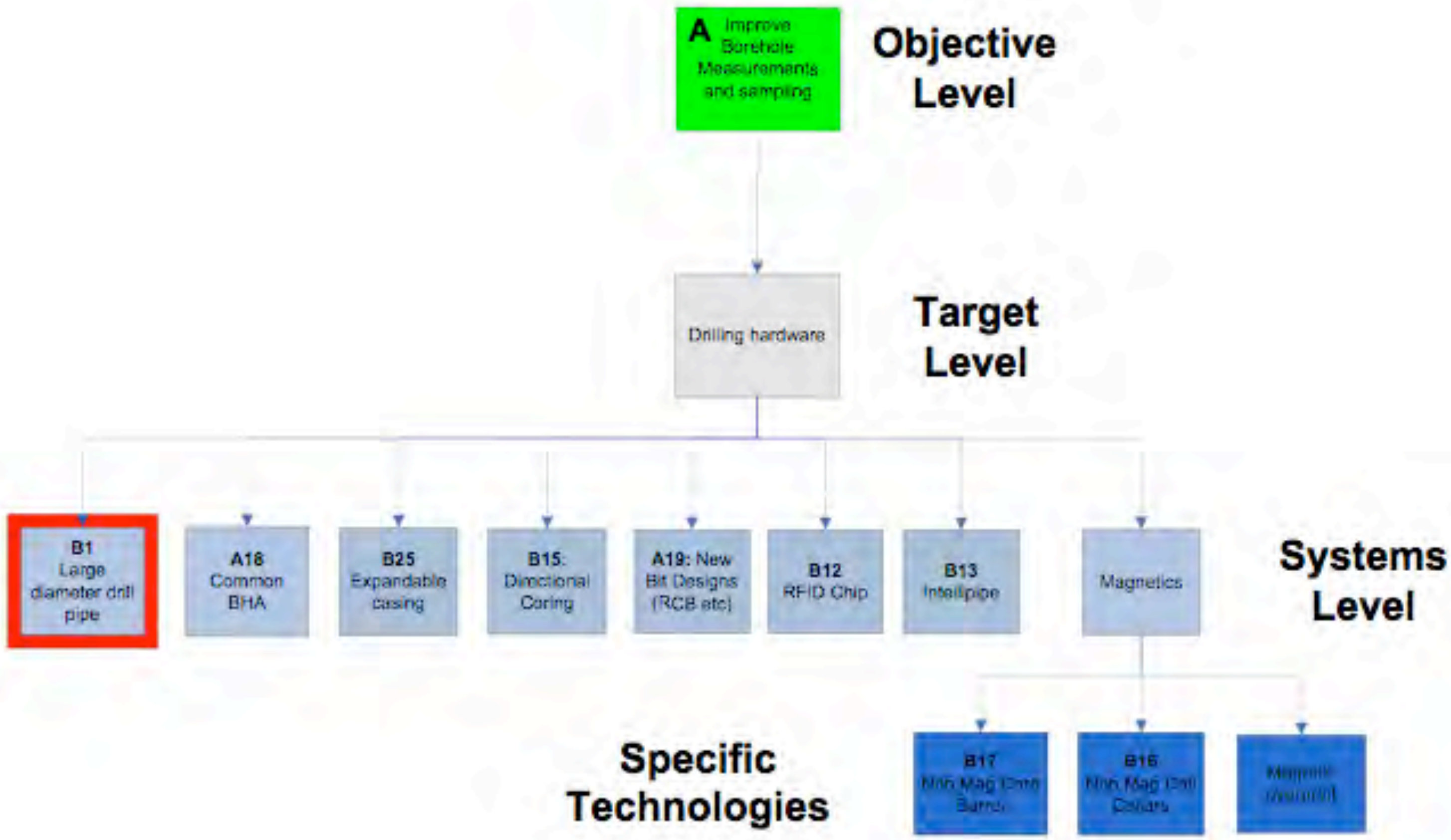

Objective Level
A Improve Borehole Measurements and sampling
Target Level
Visualization
ROV
Drill Rig Measurement Systems
Downhole Devices
Dependent on drill string stabilization
Drill String Stabilization
Drilling hardware

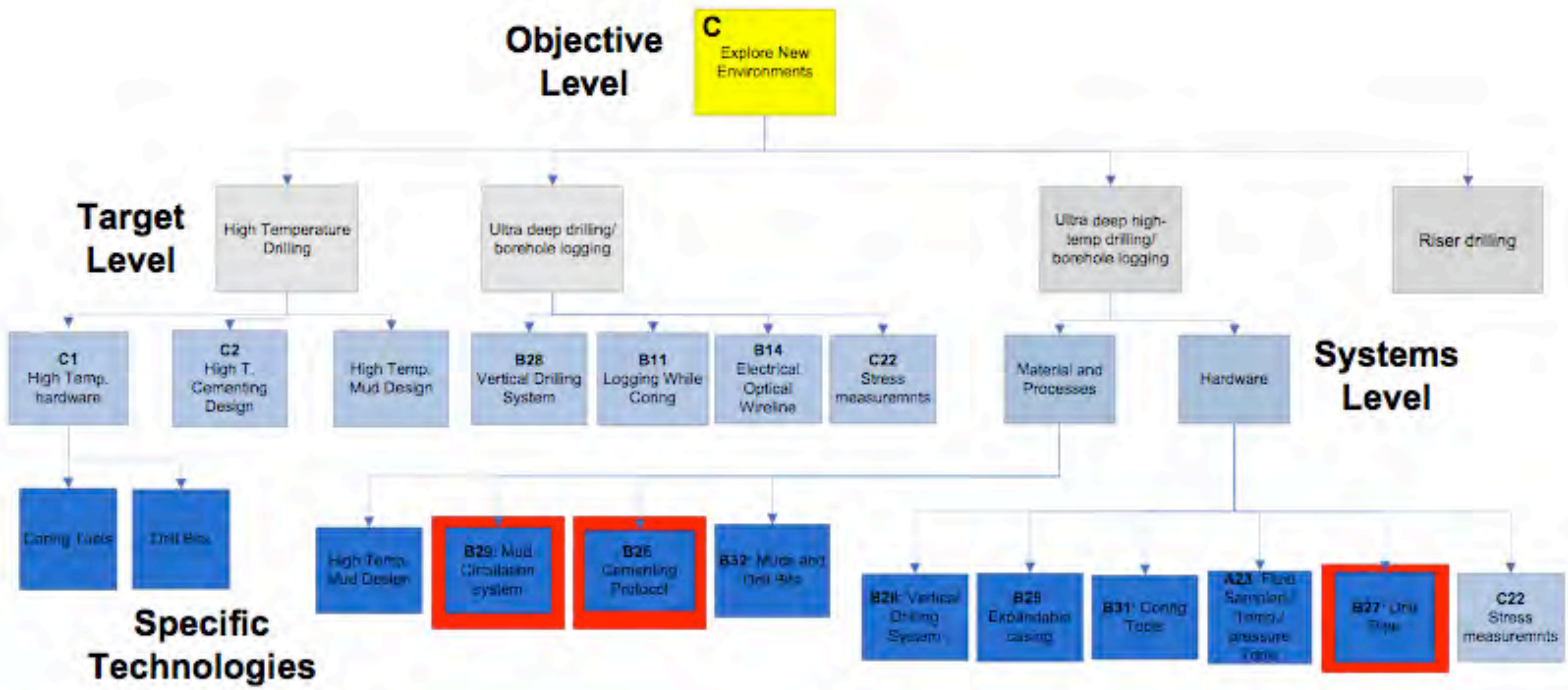

Objective Level
A Improve Borehole Measurements and sampling
Target Level
Visualization
ROV
Drill Rig Measurement Systems
Systems Level
B14 Electrical Optical Wireline
B20 Bore Hole Camera
B13 Intellipipe
B8 Auto-Drilling System
B9: Drilling Parameter Acquisition w/ coring
B10: Real time aquisition
B7 Rig Instrumentat ion
B12 Radio Frequency ID Chip

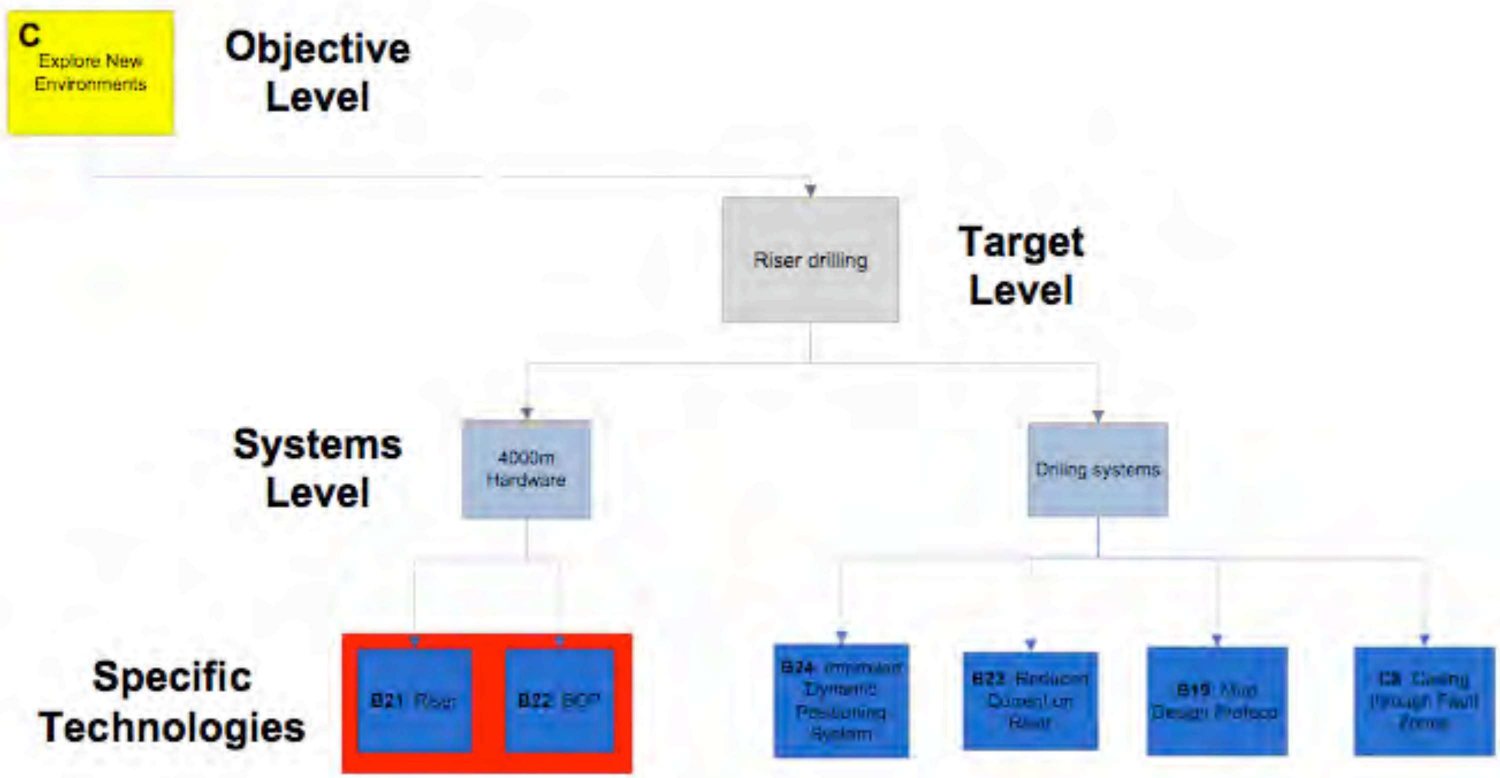

A Improve Borehole Measurements and sampling
Target Level
Downhole Devices
Dependent on drill string stabilization
Drill String Stabilization
Systems Level
Measurement Hardware
Down Hole Testing / Calibration Facility
Coring Hardware
A16 Pressure Coring
Logging Tools
A22 New In-Situ Samplers
A23
A11
A17 Pressurized Sample Transfer
Pore pressure
Rock Stress
A12
B11: Logging While Coring
Specific Technologies

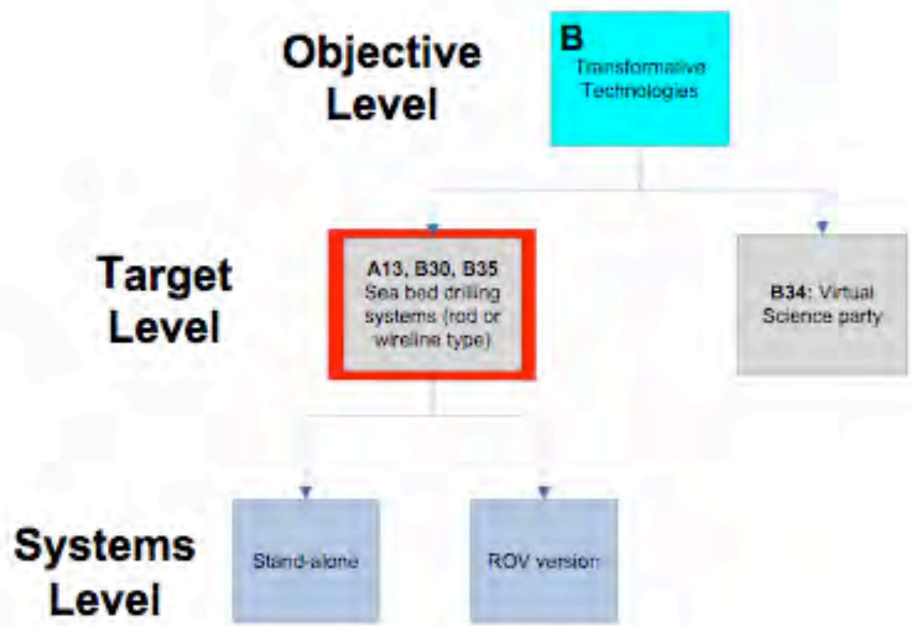

Objective Level
A Improve Borehole Measurements and sampling
Target Level
Downhole Devices
Dependent on drill string stabilization
Drill String Stabilization
Measurement Hardware
A15: Down Hole Testing / Calibration Facility
Coring Hardware
Systems Level
B10 Real-time drilling parameters during coring
Specific Technologies

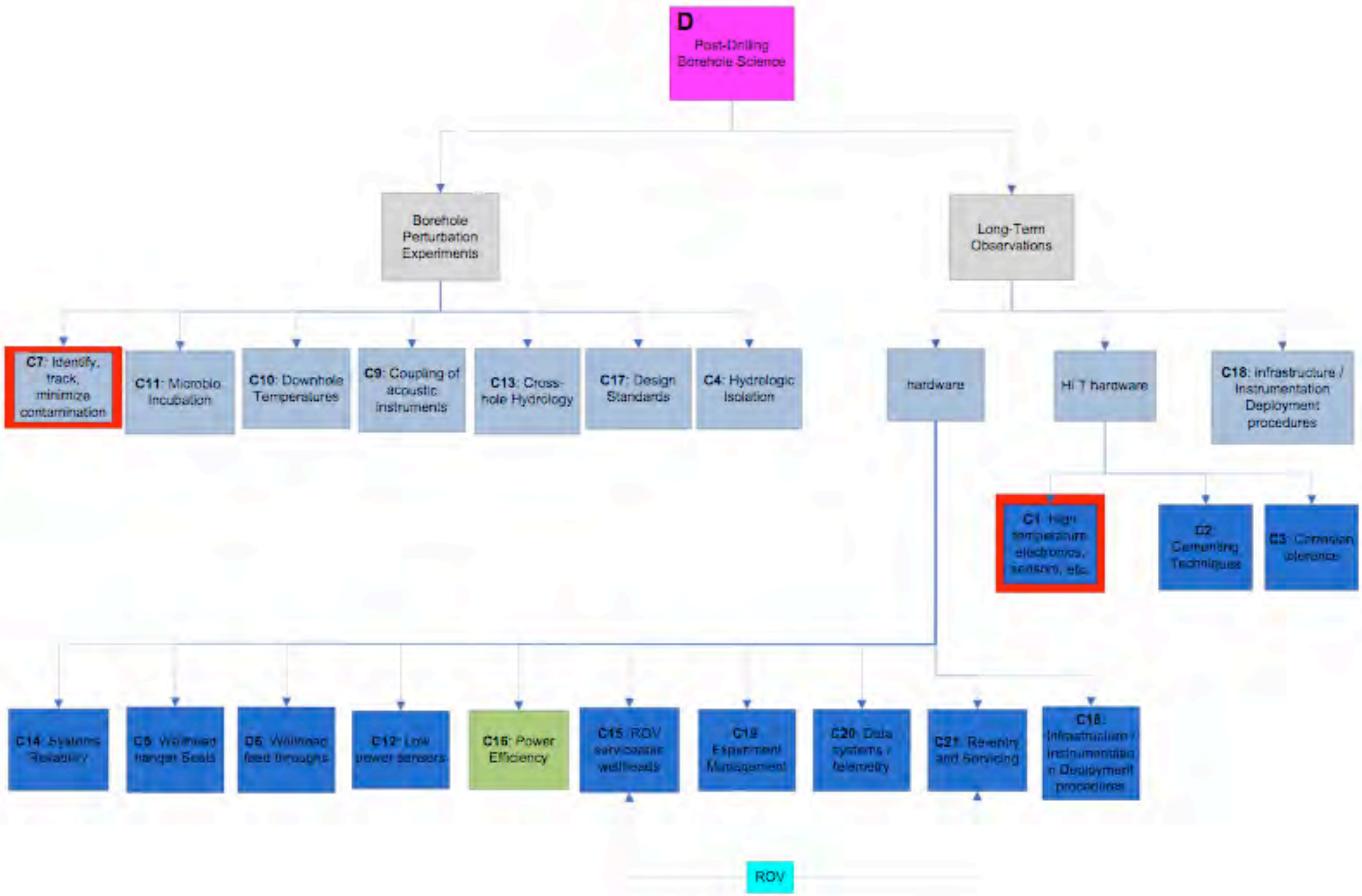

A Improve Borehole Measurements and sampling
Objective Level
Downhole Devices
Dependent on drill string stabilization
Drill String Stabilization
Target Level
B7 Rig Instrumentation Systems
B8 Improved automatic driller
B9 Drilling parameters while drilling
B33 Protocol for minimizing borehole stability problems
B3, B4 Passive Heave compensation
B5 Seabed frames
B6 Pressure Comp. Subs
Systems Level
Hard Rock Coring Spudding
ROV
Active Heave compensation
Conventional Seabed Frame
ROV
Seabed Frame with Hydraulic WOB Control
Specific Technologies
Hard Rock ReEntry System
A8 Retractable Bit technology
Specific Technologies


A Improve Borehole Measurements and sampling
Objective Level
Drilling hardware
Target Level
B1 Large diameter drill pipe
A18 Common BHA
B25 Expandable casing
B15: Directional Coring
A19: New Bit Designs (RCB etc)
B12 RFID Chip
B13 Intellipipe
Magnetics
Systems Level
Specific Technologies
B17
B16

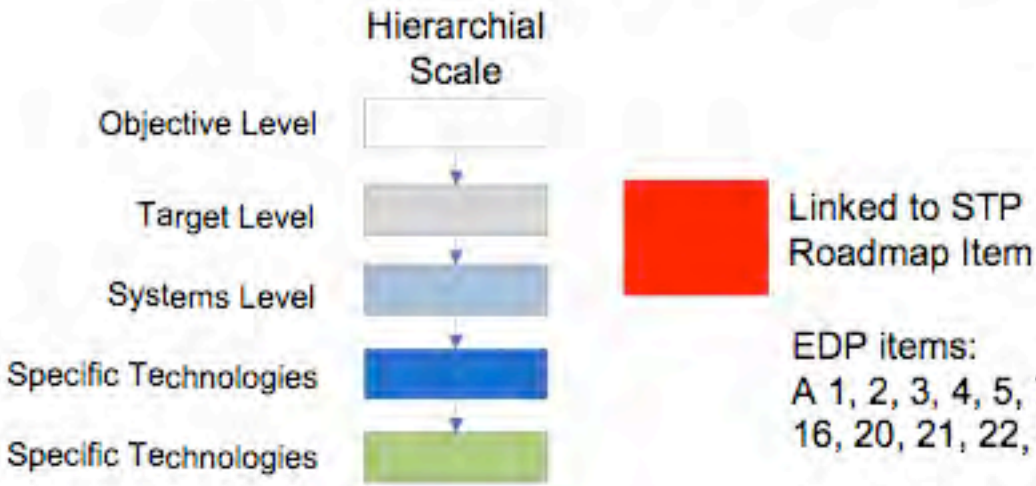

Objective Level
C
Explore New Environments
Target Level
High Temperature Drilling
Ultra deep drilling/ borehole logging
Ultra deep high-temp drilling/ borehole logging
Riser drilling
C1 High Temp. hardware
C2 High T. Cementing Design
High Temp. Mud Design
B28 Vertical Drilling System
B11 Logging While Coring
B14 Electrical Optical Wireline
C22 Stress measuremnts
Material and Processes
Hardware
Systems Level
High Temp. Mud Design
B29: Mud Circulation system
B26 Cementing Protocol
B25 Expandable casing
B31: Coring Tools
C22 Stress measuremnts
Specific Technologies


C
Explore New Environments
Objective Level
Riser drilling
Target Level
Systems Level
4000m Hardware
Drilling systems
Specific Technologies
B21 Riser
B22 BOP
B24 Improved Dynamic Positioning System
B23 Reduced Current on Riser
B19 Mud Design Protocol
C8 Casing through Fault Zones


Objective Level
B
Transformative Technologies
Target Level
A13, B30, B35
Sea bed drilling systems (rod or wireline type)
B34: Virtual Science party
Systems Level
Stand-alone
ROV version


D
Post-Drilling Borehole Science
Borehole Perturbation Experiments
Long-Term Observations
C7: Identify, track, minimize contamination
C11: Microbio Incubation
C10: Downhole Temperatures
C9: Coupling of acoustic instruments
C13: Cross-hole Hydrology
C17: Design Standards
C4: Hydrologic Isolation
hardware
Hi T hardware
C18: infrastructure / Instrumentation Deployment procedures
C1: High temperature electronics, sensors, etc.
C2: Cementing Techniques
C3: Corrosion tolerance
C14: Systems Reliability
C5: Wellhead hanger Seals
C6: Wellhead feed throughs
C12: Low power sensors
C16: Power Efficiency
C15: ROV serviceable wellheads
C19: Experiment Management
C20: Data systems / telemetry
C21: Re-entry and Servicing
C18: Infrastructure / Instrumentation Deployment procedures
ROV

Key to Technology Roadmap



EDP items:
A 1, 2, 3, 4, 5, 7, 9, 10, 12, 13, 14, 16, 20, 21, 22, 24, 30

B 1, 9, 10, 11, 21, 22, 26, 27, 29

C 1, 7

INVEST White Paper Discussion

Bill Ussler

July 15, 2009

INVEST Technology White Paper

Recall that the INVEST Working Group has requested the EDP to:

- Assemble a white paper that summarizes the technological developments needed to support future scientific ocean drilling.
- Review the draft INVEST report at an early stage to comment on any special technological needs that would support the *new* science that will be proposed.

INVEST Meeting

- IODP New Ventures in Exploring Scientific Targets (INVEST)
- http://www.marum.de/iodp-invest.html
- September 23-25, 2009, Bremen, Germany
- Science planning for next phase of scientific drilling (2013-2023)
- Registration - April 4, 2009
- EDP members attending?

Goals of INVEST

- Synthesize and summarize the state of knowledge across major interdisciplinary geoscience themes
- Identify emerging science fields
- Develop new research initiatives and recommend scientific implementation strategies
- Address societal relevance of future drilling
- *Outline* fiscal and *technological needs*

General Comments About Role of Engineering Development in Scientific Ocean Drilling

- EDP take a proactive approach
- Identify technological gaps
  - Facilitate drilling efficiency/effectiveness
  - Achieve better science/more science return
  - Attain goals sooner (ED in parallel with developing science goals - proactive, not reactive)
  - Lower costs
  - New frontiers [extreme drilling targets]
    - high latitudes
    - ultra-deep drilling/coring (Moho)
    - subsurface biosphere

INVEST Technology White Paper Working Group

- Bill Ussler (coordinator)
- *Yoshiyasu Watanabe (deep water drilling)
- *Sumio Sakuma (high temperature drilling)
- *Hiroshi Asanuma (high temperature measurements)
- John Thorogood (seafloor drilling systems)
- Maria Ask (geotechnical measurements)
- Roy Wilkins (in situ measurements)
- Leon Holloway (improving core quantity and quality)
- *Lothar Wohlgemuth (ultra-deep drilling)

Structure of White Paper

- High level - not detailed and not prescriptive
- Highlight items in the EDP Technology Roadmap
  - Achievable in the next phase of drilling (2013-2023)
  - Must be transformative

Format:

- Technological Need (science impact)
  - Potential solution #1
    - Short narrative
  - Potential solution #2
    - Short narrative

    …
  - Potential solution #n
    - Short narrative

Text box with technology highlights (e.g., high temperature drilling)

Some needs and solutions

- Improved borehole measurements and sampling (e.g., better paleoclimate records, clean sample, good geotechnical)
  - Seafloor drilling systems
  - *Rationalized coring systems*
- *Improved drilling, coring, and sampling*
  - *Heave compensation*
- Post-drilling borehole science (e.g., long-term experiments, passive monitoring - seimsics, stresses associated with plate motions)
- *Explore new environments (e.g., Moho, subsurface biosphere)*

RMR, high T, riser, ultra deep water

- Ultra-deep, deep-water, high temperature drilling (e.g., reach deep ocean crust/moho)
  - *Mud circulation*
- *Borehole observatories (e.g., post-cruise scientific monitoring and manipulative experiments)*

Heave compensation

EDP_10_draft_Agenda_07_17_09

EDP Meeting #10 Agenda

January 13-15, 2010

Sendai, Japan

DAY 1: Wednesday, January 13 (8:30-5:30)

1. Welcoming remarks; meeting logistics, safety, introduction, Robert's Rules (Ussler)	08:30 – 09:00
2. Approval of meeting agenda (Ussler)	09:00 – 09:15
3. Quorum discussion (Ussler)	09:15 – 09:20
4. Approve minutes from EDP Meeting #9 (Ussler)	09:20 – 09:30
5. Preliminary discussion of next 2 meeting locations and times	09:30 – 09:45
a. EDP #11 – USA (TBN)	
b. EDP #12 – Europe (TBN)	
6. Review status of previous meeting action items and recommendations (IODP-MI)	09:45 – 10:05
COFFEE	10:05 – 10:30
7. SPC Report (TBN)	10:30 – 10:45
8. SSEP Report (Asanuma)	10:45 – 10:55
9. STP Report (Saito)	10:55 – 11:05
10. Status of Current Engineering Development Projects (Myers)	11:05 – 11:30
11. Status of FY11 Engineering Development Plan (IODP-MI)	11:30 – 12:00
LUNCH	12:00 – 01:15
12. Final EDP Comments on FY11 Engineering Development Plan (Ussler)	01:15 – 01:30
13. Operator Reports and status of FY10 Engineering Developments (including 3rd party tools)	01:30 – 03:00
a. CDEX	01:30 – 02:15
b. ESO	02:15 – 03:00
COFFEE	03:00 – 03:20
c. USIO	03:20 – 03:55
14. INVEST workshop report (Myers/Asanuma/Ussler)	03:55 – 04:45
15. INVEST Technology White paper report (Ussler/Asanuma/Myers)	04:45 – 05:30

Day 2: Thursday, January 14 (8:30-5:30)

16. Discussion of INVEST Technology White paper (Ussler)	08:30 – 10:00

EDP_10_draft_Agenda_07_17_09

COFFEE 10:00-10:20

17. Review of draft INVEST report (Ussler)	10:20 – 11:00
18. Follow-up review of FY11 Engineering Development Proposals and Projects (Myers)	11:00 – 12:00
LUNCH	12:00 – 01:15
19. Technical Review of Active Drilling Proposals forwarded from SSEP (Myers)	01:15 – 03:00
COFFEE	03:00 – 03:20
20. Discussion of EDP response to INVEST report (Ussler)	03:20 - 05:30

DAY 3: Friday January, 15 (8:30 – 12:00)

21. Preliminary Agenda for EDP Meeting #11 (Ussler/vice chair)	08:30 – 09:00
22. Next Meeting Location and Time (Ussler/TBN)	09:00 – 09:20
23. Status and Discussion of Scoping Studies (IODP-MI)	09:20 – 10:00
COFFEE	10:00 – 10:20
24. Review Consensus Items, Recommendations, and Action Items (vice chair) a. Phrasing b. Routing c. Background	10:20 – 12:00
LUNCH	12:00 – 01:15

DAY 3: Friday, January 15 (1:15 – 5:30) EXECUTIVE SESSION

25. Compile INVEST report comments (Ussler/EDP)	01:15 – 02:30
26. Discuss review of FY11 Engineering Development Proposals and Projects (Ussler)	02:30 – 03:00
COFFEE	03:00 – 03:20
27. Review and Finalize Consensus Items and Recommendations (vice chair) a. Phrasing b. Background c. Routing	03:20 – 05:15
28. Parting Comments (Ussler)	05:15 – 05:30

Technological Drivers for Future IODP Science

Progressing from ***application-specific*** *to* ***systematic*** *technological development*

Contributed by the IODP Engineering Development Panel

Abstract

Since its inception with the Deep Sea Drilling Project (DSDP) scientific ocean drilling has always had a technology development component. Technology development has been critical for advancing ocean drilling and scientific progress would not have occurred without it. Resolution of the simpler technical problems have progressed satisfactorily through an application-specific process, however the more difficult and complex problems that limit achieving many of the scientific objectives of the Initial Science Plan (ISP) and active IODP drilling proposals remain unresolved and will require a more comprehensive and systematic effort. This White Paper highlights key technological/scientific goals identified by the Engineering Development Panel (EDP)—Improving Core Recovery and Quality; Addressing Geohazards; Microbiology in the Marine Subsurface Environment; Drilling to the Moho and Other Complex Drilling Projects; and Virtual Staffing—that are derived from the EDP Technology Roadmap v. 3.0 (http://www.iodp.org/eng-dev), the ISP, and active drilling proposals; and reinforced by the Science and Technology Panel (STP) Roadmap (v. 0.93). They offer the greatest promise for transforming scientific ocean drilling. In order to accomplish some of these goals, large-scale engineering developments will be necessary to deliver the transformational science needed by any drilling program beyond 2013.

The Role of the EDP

The EDP lies within the Science Advisory Structure (SAS) of the IODP and is one of the key bodies charged with providing guidance on the development of engineering technologies for scientific ocean drilling. The EDP identifies long-term technological needs determined from active IODP proposals and the ISP, and recommends priorities for engineering developments to meet those needs, both for the annual IODP-MI engineering plan and on a longer term.

The EDP has been focusing on technological issues in support of scientific drilling objectives since its formation in September 2005, and has many recommendations to make to the scientific community in order to promote our understanding of the Earth. While much of the engineering development work in the past has been application-specific in nature, the EDP recognizes the need for a more systematic approach to engineering development, encouraging greater efficiency and improved methods, and delivering better quality of the science.

Key Technological Challenges for the Next Phase of Scientific Ocean Drilling

- **Improving Core Recovery and Quality** – improving borehole stability, core quality and quantity
- **Addressing Geohazards** – enabling the study of underlying geologic and geodynamic processes
- **Microbiology in the Marine Subsurface Environment** – advancing sampling and study of deep-dwelling microorganisms
- **Drilling to the Moho and Other Complex Drilling Projects** – reaching the Mohorovičic discontinuity and deep ocean-crust targets
- **Virtual Staffing** – developing shore-based operation centers to support complex drilling projects

Each of these technological challenges are examined below:

GOAL: Improving Core Recovery and Quality

CHALLENGES

Core recovery has been a significant problem in many drilling environments, including active fault zones, volcanic rubble in Mid-ocean ridge (MOR) settings, unconsolidated coarse material or zones of strong rheological contrast (e.g., chert-shale interbeds), igneous rocks (hard rock), gas hydrates, and gassy sediments (e.g., extruding cores on deck). Significantly higher core recovery of comparable lithologies typically occurs at land-based drill sites because the drill string is not subjected to the effects of ocean currents and vessel heave. These motions make accurate control of coring parameters almost impossible with the result that core recovery and quality are much worse that would normally be expected in an onshore context.

SOLUTIONS

Studies undertaken by IODP-MI suggest that core quality deteriorates with increasing rock hardness or brittleness. Industrial experience suggests that accurate control of the downhole drilling parameters, such as weight on bit and torsional stability of the drillstring, are critical determinants of core quality.

Isolating downhole conditions from the external environment by regulating feed and torsion through a seabed coring frame offers the prospect of dramatically improved core recovery and the ability to use a variety of new and "state of practice" sampling/coring tools as well as *in situ* testing devices (see the EDP and STP Technology Roadmaps for specific technologies and details). The addition of seabed frame technology is critical for aiding future scientific ocean drilling in achieving elusive science objectives and may create new scientific opportunities and targets. As early as 1998, the scientific community identified the need for a "seabed frame" to meet the IODP scientific goals with the new IODP non-riser vessel (CDC, 2000). The May 2004 Autonomous Downhole Tools Workshop participants re-affirmed this need (http://www.oceanleadership.org/programs-and-partnerships/usssp/workshops/past-workshops/usssp-past-workshops-2004/workshop-on-autonomous-downhole-tools-in-the-integrated-ocean-drilling/).

A recommended development pathway to deliver a step change in core recovery would be:

1. Review capabilities of existing deployment systems (vertical motion reduction systems such as vessel heave compensators) for utilizing seabed frames and installing/servicing borehole observatories;
2. Model and calibrate vertical motion reduction systems integrated with a seabed frame;
3. Specify a seabed frame for controlling bit feed, rotation, and ability for *in situ* testing experiments and stabilizing tools used for *in situ* measurements; and
4. Integrate coring and data acquisition systems for a common bottom-hole assembly (BHA).

A development of this nature will require a coordinated and focused effort. It will not happen as the result of application-specific developments by industry or academia. IODP-MI should create an engineering development organization charged with defining the options and producing a firm estimate of time and cost to implement these systems and then, if the Lead Agencies approve, oversee the resulting development program. This proposed engineering development organization would also be responsible for the long-term planning of complex drilling projects, such as a possible effort to reach the Moho, discussed further below.

STATE OF PRACTICE

Seabed drilling systems are already being pioneered by the geotechnical community (e.g., RovDrill and DWACS), and by certain European (e.g., Marum MeBo and BGS Rockdrill) scientific activities. Current depth capabilities of these seabed corers are on the order of 100 to 150 meters. This type of technology in conjunction with new 'state of practice' ship heave compensation equipment should therefore be evaluated for application to the task of deep water and possibly 1-2 km deep borehole coring operations.

Seabed frame technology has been developed within the marine geotechnical industry over the past ~30 years. It provides stability to the drill bit for improved deployment of *in situ* tests, and hydraulics at the seafloor that may be used in conjunction with a seafloor-mounted swivel system to advance the borehole with a controlled feed rate to enable improved weight on bit control. This capability, possibly supported with a deep-water ROV or acoustically activated clamping and pull-down systems, would expand the non-riser drilling capability to meet scientific objectives that require the need for:

1. Recovery of sand on continental margins and deep-water fan systems;
2. Recovery of corals in shallow water environments;
3. Recovery of young or zero age crust;
4. Deployment of *in situ* tools for the measurement of pore pressure, resistivity, and temperature as well as gamma ray density, acoustic velocity and other "wireline" logging measurements in the upper 100 mbsf and in unstable borehole formations;
5. Deployment of specialty tools for the measurement of *in situ* stress (e.g., packers) pressure core samplers, and a variety of "off the shelf" geotechnical tools (e.g., penetrometers); and
6. Recovery of contacts between hard and soft layers (e.g., limestone/chert sequences, contacts between lava flows, soil horizons between lava flows).

Standard geotechnical seabed frames (i.e., without the more sophisticated swivel/hydraulic advancement control), use a set of hydraulic jaws to clamp the drill string eliminating motion at the bit. This operation provides more reaction for the passive heave compensator to work against and in a more efficient operating range to enhance recovery, and to allowing tools such as the motor driven core barrel (MDCB) to be used more effectively, to enable routine spudding of hard rock holes, as well as to improve core recovery using pressure core sampling (PCS) type tools (Figure 1). A further enhancement and one that will result in a step change in technology will be to utilize a more technically-advanced seabed frame that incorporates a hydraulic feed and swivel system to control weight on bit (WOB) from the seafloor, rather than from a heaving ship.

We also note that improving core recovery and core quality is a top priority of the Science Technology Panel (STP) Roadmap, which reinforces its critical importance to scientific ocean drilling. In addition, we emphasize the need for an integrated planning and development approach to acquire and implement drill bit stabilization technology. Ultimately, an integrated system, when coupled with high quality rig and drill string instrumentation, will enable the full suite of present and future downhole tools to work far more effectively in the full range of materials to be cored and tested (Figure 1).

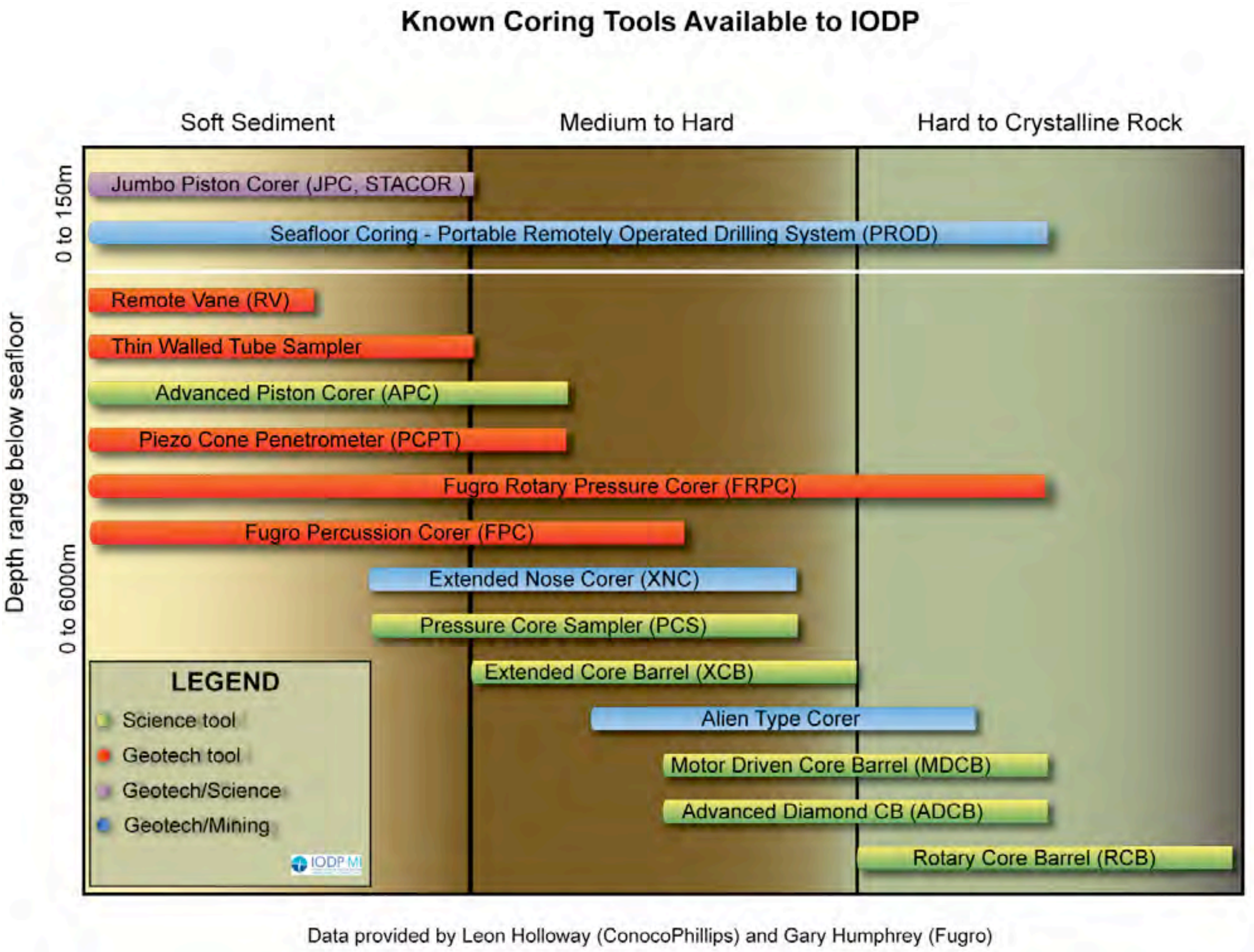


Figure 1: Illustration of known coring technologies available to the IODP and their suitability for various sediment types.

GOAL: Addressing Geohazards

CHALLENGES

The governing processes and recurrence intervals of geohazards are still poorly understood. Data obtained through scientific drilling, coring, logging, *in situ* measurements, and post-drilling borehole observatories provide unique information on potentially geohazardous processes because oceanic sediments preserve evidence of past geohazards (e.g., earthquakes, landslides, volcanic eruptions/collapses, and bolide impacts). The *in situ* conditions of these sediments also provide key information on their state before, during and after a catastrophic event, which may help predict imminent (sub-) seafloor deformation.

SOLUTIONS

Incorporation and/or modification of existing technologies, and new innovations are needed for better data collection of oceanic geohazard processes. Improved drill bit stabilization is critical for increasing core recovery, improving core quality, and for conducting some types of *in situ* measurements. In addition, capability for directional drilling is needed. For shallow sub-bottom depths, thin-walled geotechnical samplers are needed to collect high-quality undisturbed cores for subsequent laboratory measurements. For greater sub-bottom depths, the drilling systems need to be upgraded and/or developed [e.g., rotary core barrel (RCB) and diamond coring systems (DCS, ADCB); Figure 1]. New developments for borehole measurements include characterization of the seafloor (e.g., cone penetrometers), pore pressure and *in situ* stress measurements [e.g., hydraulic fracturing (HF), hydraulic tests on pre-existing fractures (HTPF)], improved logging while drilling (LWD)/monitoring while drilling (MWD) capabilities and further development of logging while coring (LWC). A critical requirement of successful long-term monitoring systems is improved reliability and redundancy of components in systems for high temperature and pressure, and corrosive environments, including cables, connectors, data systems, telemetry, and power systems.

STATE OF PRACTICE

The IODP recently hosted a workshop addressing oceanic geohazards (Morgan et al., 2009). One of the tasks of this workshop was to evaluate, list, and document tools and technologies available for geohazards studies.

The Advanced Piston Corer (APC) is the standard tool for sampiong soft sediments. It penetrates 9.5 meters and is composed of thick-walled material incorporating a blunt nosed cutting shoe. The net result is that the core taken is highly deformed.

The passive heave compensation system on the *JOIDES Resolution* was recently refurbished while in dry dock during 2009. The state of practice for drill string stabilization is discussed above.

Current thin-walled geotechnical sampling tools exist in industry and could be implemented on IODP vessels if a standard type seabed frame were available to immobilize drill bit motion. Piezocone penetrometer (PCPT), remote vane (RV) tools, and a host of other industry available tools from the geotechnical community could be implemented on IODP vessels if a seabed frame were available.

Numerous methods for measurement of borehole stress exist which include geophysical logging, and *in situ* and core testing. Methods used routinely in the oil and gas industry include geophysical logging, leak-off tests and laboratory testing of intact cores. However, most methods only probe parts of the stress tensor. Multiple measurements thus provide the best characterization of the stress tensor and pressure.

GOAL: Microbiology in the Marine Subsurface Environment

CHALLENGES

The sub-surface biosphere has captured the curiosity and interest of the scientific community within the last decade, and what we are learning is revolutionizing how we view the seafloor and what is below it. There is a critical need to obtain uncontaminated sediment and microbial samples that preserve an intact microbial community at *in situ* pressure, temperature, and fluid chemistry. Integral to the sample recovery process is the capability of transferring the samples to laboratory apparatus without further compromising the integrity or contaminating the samples. There is a further need to better integrate the geochemical measurements of the core with microbiology (e.g., interstitial water sampling and analysis with microbiological sampling). This issue is also highlighted in the STP Technology Roadmap.

SOLUTIONS

A system is required to prevent core contamination by fluids (*in situ* formation fluids and circulated drilling fluids) during coring, as the core is advanced up into the inner core barrel. Systems are also needed for *in situ* incubation for properly identifying and describing community composition and function, and for understanding the physiology and nutrient requirements of these organisms. In most cases, recovery of microbiological samples at *in situ* conditions is desired, however some samples could be returned to the surface after completion of an incubation experiment. Long-term monitoring of microbial community composition and associated geochemical and thermal changes may be needed to meet some scientific objectives.

STATE OF THE PRACTICE

Land-based technologies should be thoroughly investigated to determine if there are concepts and approaches that can be used for offshore applications. The ODP and IODP have experimented with novel contamination tracers (fluorescent beads and perfluorocarbon - PFT) with some success. However, the IODP currently has no systems for preventing contamination of microbiological sample during coring, or for incubating them *in situ,* although there are independently-funded projects developing down-hole incubation systems.

The EDP has established a Microbiology Contamination Working Group that is addressing issues associated with minimizing or eliminating the physiological effects of drilling fluid contamination on *in situ* microbiological incubations and core sampling. Drilling fluids and muds used on all IODP vessels are complex mixtures of materials optimized to meet operational and engineering requirements for drilling. Determining the physiological effects of each specific component on microbes is a difficult bio-assay problem, primarily because most of the microbes found in deep-sea sediments cannot be cultured at the present time. What complicates assessment even more is that some formulations or components of drilling fluids and muds are proprietary. At this point, viewing mud components as classes of compounds is most expedient. For example, the use of chemically-reduced constituents that are bioactive, such as magnetite, should be replaced by a physiologically inert substance that meets the same performance requirements for the drilling mud. Investigating and reformulating drilling muds to minimize their effects on microbe physiology is a complex and potentially expensive endeavor. In the near-term, determining whether contamination has occurred would be more expedient.

GOAL: Drilling to the Moho and Other Complex Drilling Projects

CHALLENGES

Exploration of the oceanic crust down to the Mohorovičic discontinuity, as well as other complex deep ocean-crust drilling projects will require a higher level of engineering planning and development, including organization and planning/strategy (pilot hole, long-term project management, on-the-project technological developments) of the project, site characterization, vessel capacity, borehole management, as well as downhole equipment development than has hitherto not been the norm in the IODP.

SOLUTIONS

In comparison with the planning and lead-time for executing a typical 2-month ODP/IODP expedition and the experience gained with land-based ultra-deep drilling (e.g., the KTB and Kola Peninsula SG-3 boreholes), the planning process alone for initiating a Moho drilling project will be on the order of ten years. A dedicated project office will be required to manage such an ambitious goal. This project office should be set up under the auspices of IODP-MI to plan, coordinate and oversee the large-scale engineering developments necessary to execute ultra-deep drilling. It should be managed in the same manner as an industrial project of comparable scale, with all associated project management practices such as goal setting, organization structure, stage-gating, planning, scheduling, risk management and cost control. Global experts from other ultra-deep borehole projects should be consulted and retained as needed.

Time and resources must be allocated to conduct full site characterization of the nature of the ocean crust that will be drilled and the *in situ* state of effective stress, as well as the atmospheric and oceanographic environments to enable selection of an optimal site. Based on the experience gained during several deep-drilling projects (Kola SG-3 and the KTB) the exact knowledge of the stress field and borehole stability are of critical importance for the success of the project. Improved methods for measuring the state of stress must be developed. All equipment, tools and sensors must be adopted for high temperatures and pressures, and for highly corrosive environments. Required advances in drilling technology include developments in drillstring and casing handling [e.g., risers may be constructed from advanced materials, and/or “riserless mud recovery” (RMR™) systems may be implemented], next generation mud motors, cutting removal and high-temperature mud programs, and adequate safety considerations (e.g., blow-out preventer for hydrocarbon occurrence). Data collection should be as redundant as possible, by multiple data collection methods (e.g., LWD, MWD, LWC, cuttings analyses, logging and long-term monitoring) and robust data transfer from downhole sensors, and real-time transmissions to shore-based science and engineering collaborators, IODP-MI, and members of the SAS.

STATE OF PRACTICE

IODP-MI is currently executing a scoping study on ultra-deep boreholes at the request of the EDP to determine the present state of practice for ultra-deep drilling technologies.

Temperature and pressure ratings of all downhole tools are significant issues if the tools are to be deployed in a mud-filled borehole that exceeds 175 °C. The oil and gas and the geothermal industries have been drilling wells with borehole temperatures up to 250 ^{o}C and many downhole tools have been developed to work in these environments for short duration deployments. Limited tools are available for working at higher temperatures. Figure 1 lists coring tools known to be available to the IODP. Most of these would need to be modified for use at high temperatures and pressures, which would represent a significant engineering effort and cost.

There are two approaches to ultra-deep drilling: (1) riser drilling and a relatively new technology termed (2) "riserless mud recovery" (RMR™). Ongoing activities are increasing the depth capacity of the riser ship *Chikyu*, including systems for high-temperature and high-pressure conditions under deep sea floor, and development of carbon fiber reinforced plastic riser pipe. IODP-MI is working with the DeepStar Consortium to develop the ultra-deepwater RMR™ system in collaboration with its industry partner AGR Drilling Services. RMR™ can potentially be deployed on any IODP drilling platform.

ENGINEERING DEVELOPMENT AND OPERATIONS PLANNING

In the light of the future requirement for complex drilling projects and oversight of significant technological developments such as seabed frames, enabling technologies required for future scientific drilling programs will not be delivered through the existing informal arrangements that exist between EDP and IODP-MI. A drilling program of such scale will require a much more formal and structured approach to ensure success within the time-scales required.

It is recommended that a full-time engineering organization be set up under the auspices of IODP-MI to plan, coordinate and oversee the engineering developments necessary to deliver the transformational science associated with the scientific drilling beyond 2013. The organization should consist of two sections, technology development and operational planning.

The technology team, consisting of specialists in subsea engineering, drilling systems and downhole tools, would be responsible for solving the problems associated with drillstring stabilization, next generation coring systems, and ultra-deep water technologies.

The operations team, consisting of experienced well engineers and operations engineers, would be responsible for planning the introduction of the new technologies and also undertaking the long-range conceptual planning and budgeting for frontier exploration projects such as the 21st Century Mohole and other complex deep ocean-crust targets.

Based on current practice in the oil and gas industry, it is envisaged that such a organization would consist of approximately 12-20 people who would manage an annual external budget on the order of 4 to 5 million USD that supports meeting scientific drilling objectives requiring long lead-time planning and development. It should consist of established industry professionals and be located in close proximity to one of the major oil and gas industry centers in either the USA or Europe.

In addition to pursuing the long-term goals, recent experience with technology issues that have come before the EDP indicate that such a group would be well-placed to undertake technology scoping studies, reviews of specific technologies of value across all operators and provide specialist well engineering input to complex drilling projects. It is expected that with sufficient resources the complex problems associated with ultra-deep drilling (deep water, high temperatures and pressures) can be resolved and that drilling to the Moho will become possible.

GOAL: Virtual staffing

CHALLENGES

The anticipated increase in complexity of coring systems and the technological sophistication of instrumentation and analysis during the next phase of scientific drilling will require a larger ship-board crew comprising more professional engineers and technicians than in previous drilling programs. There is parallel need for sufficiently large science parties to take part in complex drilling projects, and to maximize the scientific output of the data collected. The challenge is to optimize the staffing of scientists, technicians and engineers considering the limited space available on the drilling vessels and mission specific platforms (MSPs).

SOLUTIONS

The rapid evolution of global communications and networking technologies offers a potential solution for integrating shore-based scientists and engineers with shipboard operations. Substantial operational benefits will be gained from the development and implementation of shore-based real time operations support centers. Such centers could allow more flexible staffing of scientist, technicians and engineers, and maintain a 24/7 presence on-shore for consultation and guidance. Each expedition should evaluate the Minimum Measurements Recommendation with their science plan to coordinate how to achieve the science with the appropriate ship-based crew supported by the virtual staff.

STATE OF PRACTICE

The practice of virtual science parties is well-established in the ESO MSP missions. Remote operations centers are well-established in the oil and gas industry and they have demonstrated benefits in cost-reduction and mission flexibility.

The EDP Technology Roadmap

Much of the above information has been extracted from the EDP Technology Roadmap, which is a long term vision (3-5 years) of priorities in engineering development that are vital to achieve the science goals of the IODP and future scientific ocean drilling programs. It is an evolving document that undergoes review annually at the summer meeting of the EDP. The roadmap is based primarily on the scientific goals of the IODP as enunciated in the Initial Science Plan and active IODP proposals, and outlines and examines the engineering development needs for achieving these initiatives.

More information

EDP and Roster of Members – http://www.iodp.org/edp

Technical Roadmap and Engineering Development Proposal Submission – http://www.iodp.org/eng-dev

Microbiology Contamination Report

John Thorogood, Bill Ussler, and Mitsuo Tamura

July 16, 2009

STP Consensus Statement 0802-06: Detection and Control of Contamination Issues During Riser Drilling

- STP proposes that multiple contamination tests using PFT (Perfluorocarbon Tracer), and fortuitous or additional inorganic tracers (e.g., barium, lithium bromide, potassium bromide) be used during riser coring. Sampling of drilling mud should be scheduled so that microbial communities in this medium can be compared to those in the samples...
- STP asks EDP to investigate drilling fluids and /or techniques that are less likely to adversely impact interstitial water geochemistry, rock geochemistry, and microbiology.

Major Points

- Drilling mud is a complex physical and chemical mixture, some components are propriety (water-based).
- Oil and gas industry has little experience with contamination issues associated with microbiological sampling.
- To identify and replace components in the drilling mud that cause microbial contamination requires careful analysis on a compound specific basis.
- Microbial groups have different responses to drilling mud constituents; different metabolism.
- This is a major research effort, and a difficult one.
- Specific contamination issues need to be identified by microbiologists and chemists before a meaningful research program can be established.
- Solutions are best tailored to specific drilling targets, scientific objectives, and environments.