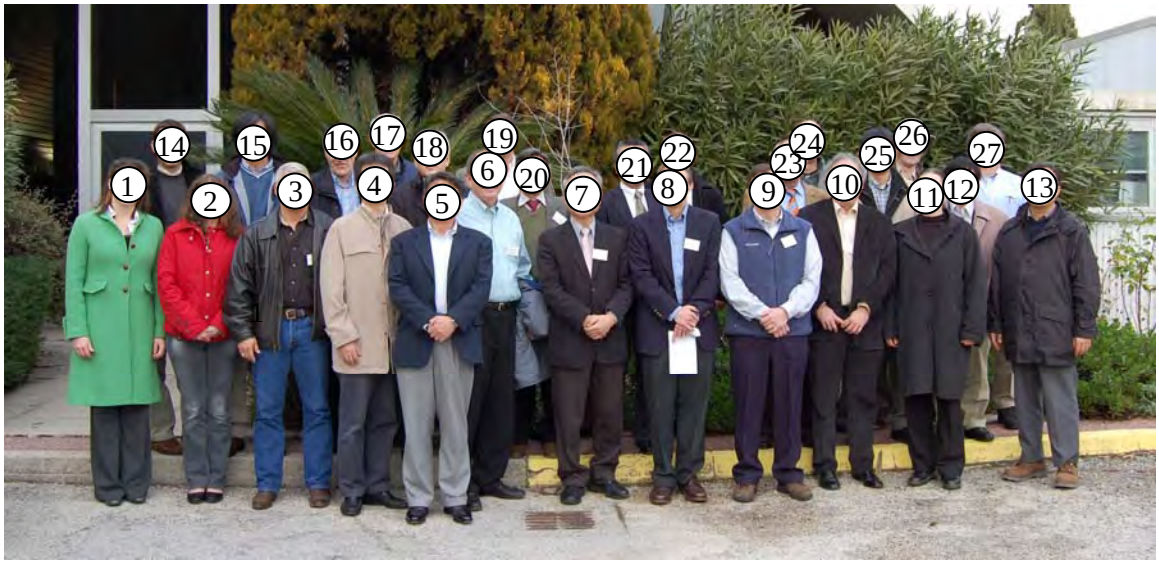
MINUTES

Sixth Meeting of the Engineering Development Panel (EDP) of the IODP

January 9-11, 2008
Nice, France



1. Kelly Oskvig, 2. Nadine Lanteri, 3. Kevin Grigar, 4. Mitsuo Tamura, 5. Hisao Ito, 6. Steven Sears, 7. Makoto Miyairi, 8. Peter Flemings, 9. Jack Germaine, 10. Roland Person, 11. Maria Ask, 12. Jim Mori, 13. Ying Ye, 14. Stefan Mrozewski, 15. Nori Kyo, 16. Dan Evans, 17. Richard von Herzen, 18. Haruya Nakata, 19. Leon Holloway, 20. Yoshiyasu Watanabe, 21. Hiroshi Asanuma, 22. Greg Myers, 23. Lothar Wohlgemuth, 24. Mike Lovell, 25. Masafumi Fukuhara, 26. John Thorogood, 27. Bill Ussler

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Members and Guests

EDP Members

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Draft Executive Summary
IODP Engineering Development Panel
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EDP Recommendations and Consensus Statements

The EDP forwards the following recommendations and consensus statements to the SPC or the IODP-MI as appropriate.

EDP Consensus 0801-01: Approval of Agenda
The EDP approves the agenda for EDP Meeting #6.

EDP Consensus 0801-02: Approval of EDP Meeting #5 Minutes
The EDP approves the minutes from EDP Meeting #5 plus Appendix 14 (version 3.0 dated 1-4-07) – 'Summary of EDP Proposal Evaluation Process used at July 2007 EDP Meeting'.

EDP Consensus 0801-03: EDP SPC Representative
EDP designates Bill Ussler as the EDP representative at the next SPC meeting to be held in March 3-6, 2008 in Barcelona, Spain.

EDP Consensus 0801-04: EDP SSEPs Liaison
EDP designates Hiroshi Asanuma as the EDP representative at the next SSEP meeting to be held May 19-22, 2008 in Busan, Korea.

EDP Consensus 0801-05: EDP Chairperson
EDP nominates Makoto Miyairi for the position of Chairperson of the EDP.

EDP Consensus 0801-06: EDP Vice Chairperson
EDP nominates Bill Ussler for the position of Vice Chairperson of the EDP.

EDP Consensus 0801-07: Modifications of Engineering Development Proposal review process.
In addition to the formal evaluation statement of the engineering development proposals that are forward to IODP-MI. EDP will record concise closed session minutes that will be archived by IODP-MI for exclusive use by EDP in future proposal evaluation sessions at EDP Meetings.

EDP Consensus 0801-08: EDP Comments on Large Diameter Pipe
The EDP notes that there are a number of drilling proposals within the SAS that have scientific objectives requiring water samples and specialized or innovative logging tools and experiments which would benefit from or be made possible by large diameter drill pipe. The EDP also understands that the addition of this drill string has limited depth capability.

The EDP strongly recommends the acquisition of large diameter pipe to provide enhanced logging and sampling capability.

The cost benefits of acquisition of large diameter drill pipe versus development of slim-hole versions of existing tools should be evaluated before any new tool developments are pursued.

EDP Consensus 0801-09: Engineering Development Proposal Evaluation
The EDP discussed the merits of conducting cross-comparison evaluations of proposals that address similar technologies. EDP recommends keeping the current evaluation approach that is focused on individual proposals and will not provide comparative evaluations. However, EDP may provide technical comments within the individual evaluations that help distinguish relative merits.

EDP Consensus 0801-10: Comment on Core Quality Study
The EDP recommends that the core quality and quantity study be separated into two components. The first component, which should be completed most promptly, should provide an assessment of sample quantity based on prior drilling leg experience. The second component, assessment of sample quality, is equally important but requires more extensive research, is less likely to benefit from legacy leg experience, and may require collection of new data.

EDP Consensus 0801-11: EDP Comments on LTBMS
The EDP recognizes the high quality of the initial planning that has been put into the first version of the Operational Requirements document for deployment of the Long Term Borehole Monitoring System. If possible, EDP requests CDEX give a presentation at the July 2008 meeting on the forward plan for the LTBMS project. The presentation could address project organization, project risk management and associated contingency plans and the project assurance plan, with particular reference to the external verification and peer review of the equipment design and installation procedures. EDP would like to be informed of how risk is minimized in the design. EDP would like clarification of the rationale behind differences in design approach between the hardware for the riser and non-riser systems.

The EDP is concerned about the level of risk associated with the plan to proceed directly from a land test to a full deployment. In particular, consideration of a phased approach that includes an offshore test could reduce two key components of the risk: equipment failure and failure to have a successful installation due to logistical complexity.

EDP Consensus 0801-12: EDP Meeting #7 Location
EDP recommends that EDP Meeting #7 be held in or near Salt Lake City, Utah on July 16-18, 2008. Secondary locations include Denver, CO, and Woods Hole, MA, in that order.

EDP Consensus 0801-13: EDP Meeting #8 Location
EDP recommends that EDP Meeting #8 be held in China. Possible locations include Hangzhou and/or Shanghai. Proposed dates for EDP Meeting #8 are January 14-16, 2009.

EDP Consensus 0801-14: VSP
EDP responds to STP Consensus Statement 0708-15 (Open Hole VSP) requesting advice. EDP believes that adopting and adapting industry standard procedures for check-shot surveys should result in high quality velocity profiles. Thus, there is no apparent need for engineering development at this time.

Background: At the 0601 STP meeting in Kochi, Japan, Gulick & Sakamoto presented a report on their attendance at the Core Log Seismic Integration workshop in 2005. This report suggested VSP problems had been encountered in ODP and proposed that these could be improved through help of industry/EDP. Furthermore it encouraged the involvement of EDP in Core-Log-Seismic Integration. It is EDP's interpretation that 'VSP' refers to a vertical check-shot wherein air guns are set off at the surface and the signal is recorded downhole. In considering this matter, Alberty (EDP) and Goldberg (USIO) provided comments by email to the EDP discussion in Nice. The outcome of this discussion suggests that while soft formations and downhole clamping may be problematic, the overarching problem may be that a lack of time is committed for conducting successful VSPs. It was noted that the importance of the VSP varies with the scientific objectives of each expedition, and therefore the resources committed to recording VSPs will vary.

EDP Recommendation 0801-15: FY2009 Engineering Plan
EDP endorses the FY09 engineering plan as presented at the EDP Meeting #6 by IODP-MI. Ussler, Flemings, and Germaine were excused from the discussion due to conflict of interest. Miyairi served as interim chairperson.
(11 votes for, 0 votes against, 2 abstentions).

EDP Recommendation 0801-16: Drilling to the Moho
The EDP recognizes SPC's interest in understanding the technological challenges associated with a future Moho drilling project (in reference to SPC Consensus 0708-30) and is initiating discussions about this problem.

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Wednesday, January 9, 2008

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 0905.

Agendum Item #1: Welcoming Remarks (Flemings/Person)
The host of EDP Meeting #6, Roland Person, made a few opening remarks. Peter Flemings reviewed meeting logistics, safety considerations, and Robert's Rules of Order. He reminded everyone that a meeting requires a certain amount of structure. He requested that Bill Ussler take the morning minutes, and Jack Germaine take the afternoon minutes. Panel members and guests were introduced.

Agendum Item #2: Approval of meeting agenda (version 1.4, prepared on 1/4/08) (Flemings)
Peter Flemings modified Agendum Item #22 by adding a part A and a part B (*Appendix 1*). Part A is now a Roadmap Session and Part B is a Discussion of the IODP Implementation Plan. A motion was made to approve the meeting agenda. Sears provided the second. Agenda was approved by consensus.

Agendum Item #3: Quorum discussion (Flemings)
16 members were present; 12 are needed to carry a quorum. Flemings asked if any members were leaving early. John Thorogood will leave at 12 noon Friday; Nakata at 1pm Friday.

Agendum Item #4: Approve minutes from EDP Meeting #5 (Flemings)
Minutes for EDP Meeting #5 were posted on-line and emailed to each panel member. The issue discussed was whether to include a summary of the engineering development proposal grouping process used at EDP #5 as an appendix to the minutes ('Summary of EDP Evaluation Process used at July 2007 EDP Meeting' - version 3.0 dated 1-4-07). Flemings proposed to add a description of the grouping process, but not to include the actual grouping associated with the engineering development proposals reviewed at the meeting. Flemings asked Dick von Herzen to comment on the proposed appendix. Von Herzen stated that he felt we needed an appendix to record the actual voting record. Flemings noted that feedback from panel members indicated that they are reluctant to publish the actual grouping because that may breach confidentiality. However, he agreed that we should have a record of how the panel voted because questions could come up

later about what had happened at a particular meeting. Flemings suggested that the summary information that is recorded should not identify the individual panel member, but convey general thoughts.

Germaine asked if consensus on proposal groupings was obtained in a closed session. He suggested that closed session minutes be recorded for discussion associated with engineering development proposal review and grouping, and that these closed session minutes should not be made public.

Flemings noted that at the SPC level, proposals are ranked (not grouped) and that the ranking process is clearly different from the grouping process used at the SSEP for science proposals. During ranking at the SPC, paper ballots are used, the vote is tallied, and the paper ballots archived for future reference. The ranking is made public, which contrasts with the SSEP grouping which is not made public.

Mori noted that the reason that SPC ranking is systematic and open is because the SPC has to report back to the proponents and we need to be perfectly transparent and open. However, by grouping a proposal, a panel is giving a recommendation that is a qualitative evaluation. He encouraged openness with the evaluation process by making as much public as is possible; but issues with confidentiality should be avoided.

Flemings stated that the EDP needs an accurate record that is preserved so that down the road the panel can look at what they did. However, we have to determine what should be public and what should be reserved for the proponents. Von Herzen suggested he would be happy with IODP-MI maintaining a record of the minutes of proposal discussion. He noted that this is not normally the responsibility of IODP-MI. Myers agreed with Von Herzen, and noted that IODP-MI does not maintain those sorts of closed session records, although the voting record for the Technology Roadmap, and the engineering development proposal reviews and groupings are archived at IODP-MI.

Flemings asked the panel to approve meeting minutes as they stand, and requested that a draft recommendation as to how to archive proposal information be developed later in the meeting. Thorogood made a motion to accept the minutes for EDP #5; Germaine provided the second. Flemings asked for discussion. Germaine noted a typographical error on page 4 in the first sentence. Ussler proposed a solution ‘were presented’. Minutes were approved by consensus.

Flemings asked a working group to resolve the proposal review process. Ussler, von Herzen, Myers, Fukuhara, and Ask were asked to report Thursday morning during discussion of Agendum Item #18.

Agendum Item #5: Preliminary discussion of next 2 meeting locations and time (Flemings)

Flemings noted that based on on-going discussions with the Consortium for Ocean Leader (COL), the successor to JOI, it is not clear if having the EDP Meeting #7 in California will be possible because the per diem costs for potential meeting locations

exceed the guidelines. A backup option is Washington, DC at COL headquarters. Von Herzen suggested Woods Hole, MA in late June. Flemings noted that late June is generally not a possible meeting time because our Japanese colleagues have corporate meetings in late June. He suggested that we keep the same meeting dates – July 16-18, 2008.

Ye Ying proposed having EDP Meeting #8 in China, the week of January 12-16, 2009. Flemings noted that a 3-day window would have to be selected. Ye Ying commented that IODP-China is strongly in support of the proposal to host EDP Meeting #8. There are two choices—Shanghai or Hangzhou. His university is located in Hangzhou. Hotel accommodations are not difficult to obtain because it is the winter season. Alternative sites include Beijing (very cold) and south China (IODP-China does not prefer this location).

Agendum Item #6: Preliminary discussion of future Chairperson and Vice-Chairperson (Flemings)

Flemings initiated discussion of the future Chair and Vice-Chair, noting that the EDP must make a formal recommendation to the SPC at its March meeting. The SPC will either accept or decline the recommendations. The proposal is for Miyairi to become Chair and Ussler to become Vice-Chair. Von Herzen asked if the proposed candidates are a recommendation from the panel, or from the present EDP Chair? Flemings responded that it matters a lot as to the source of the nomination. He asked the panel to develop a consensus statement, which does not need to be decided at this point. The future rotation of Vice-Chair and Chair should include a European representative.

Agendum Item #7: Review status of previous meeting action items and recommendations (Myers)

Myers reviewed the status of previous meeting action items and recommendations (*Appendix 2*). A discussion following Myers's presentation centered on the Technology Roadmap (TR). Von Herzen asked if the TR wasn't a 'living document' and was constantly changing and evolving. Flemings responded that with the process we have setup, we formally revised the TR once a year, at the July meeting. Ussler noted that the TR should not formally change between the July meetings because solicitation of engineering development proposals by IODP-MI is dependent on a stable document. Nakata asked for clarification of how the TR is changed. Flemings noted that we have two TR sessions at this meeting to discuss the TR and to make changes. The changes are not finalized and released until after the July meeting. Until that time further discussion of the TR can take place.

Flemings commented on scoping studies. One of the issues that needs to be discussed is whether high level scoping studies can be identified that address specific engineering development needs that need near-term (3-5 year) emphasis.

Agendum Item #8: SPC Report (Flemings/Mori)

Flemings started by reviewing the Consensus Statements made at EDP Meeting #5. He presented the TR ranking table created at the meeting, and noted that there has been some

confusion over the numbering scheme. The numbering scheme reflects the order of entry in the TR, not the ranking. The value of keeping the present numbering scheme was recognized because this is the simplest way to key the topics in summary tables to the text of the TR.

Mori presented an overview of the SPC Meeting #10 (*Appendix 3*). The SPC accepted the recommendation of the EDP to send an EDP liaison to every SSEP meeting. The SPC has strong support for the TR. He noted that this is a good way for the panel to set priorities, and other panels should also take this approach. The SPC endorsed the EDP recommendations for funding the 3- and 4-star engineering development proposals reviewed at EDP Meeting #5. There was some discussion at the SPC concerning why two apparently similar systems (SCIMPI and S-CORK) were being supported, however the importance of high level systems design of common elements of both proposals was recognized. He requested that EDP recommendations should be clearer in the future if similar proposals are forwarded to the SPC. The SPC deferred forwarding of proposal 712-APL (sCORK trial installation) to the OTF pending outcome of the high level design phase of the S-CORK and SCIMPI engineering development proposals. 712-APL will be considered at a later date.

Mori reviewed additional actions at the SPC:

1. Expedition scheduling – he reviewed the present status of the ship schedules.
2. Evaluation of proposals at the OTF – the most expensive proposals were discussed at SPC Meeting #10. Three different categories of expensive proposals were identified at the OTF—observatory components, riser, and MSP. Discussion of the less expensive proposals was deferred until the March 2008 SPC meeting.
3. Mission Proposals – were not supported. The purpose of defining Mission Proposals was to showcase projects that addressed focused science themes and integrated new technologies, education, and had broader input from younger scientists and stakeholders. There will be no more calls for Mission Proposals.
4. Complex Drilling Projects (CDP) – are umbrella projects that focus on a science theme, but require multiple platforms and expeditions to complete the scientific objectives. Present examples are NanTroSEIZE and CRISP. Two requests by the SSEP for CDP designation were reviewed: 707 (Sagami Bay) and 694 (IBM). Sagami Bay was designated a CDP; but not the IBM project.
5. Implementation Plan – this is an attempt by SASEC to focus scientific drilling objectives in the next 5 years with the hope that this will help with the renewal process. Overall, a negative reaction has been received, especially regarding limiting the science themes to 4 focus areas. Comments heard at the Fall 2007 AGU townhall meeting indicated that SASEC should not be defining specific science targets. It is undecided as to what will happen. SASEC meets in Santa Cruz, CA 15-16 January and this will be a big topic at the meeting. SASEC still thinks a guiding plan is needed for the next 5 years and that an update of the ISP is needed.
6. Other issues – the IIS-PPG (Industry IODP Science Program Planning Group) is a means to encourage a dialogue among IODP scientists and the hydrocarbon industry scientists. The IIS-PPG has a mandate to encourage proposals, but the

focus of the group has changed because of the current financial problems at IODP. Hybrid IODP-industry proposals (a regular IODP proposal with an industry component) is one approach under consideration.

Germaine asked if the TR was used when considering proposals at the SPC. Mori said no, but input from the EDP liaison to the SPC (presumably the Chair) would be very important. Germaine stated that he would expect that the SPC would want to make sure that the technology needed to successfully complete a drilling leg is ready. Mori said that the SPC has gone through an exercise to better develop long-range planning. Mission Moho technology has been under discussion. The SPC has requested that the EDP look into developing deep borehole technologies. Flemings asked what would be left if proposals with technological challenges were removed from the OTF. Mori stated that Mission Moho was rejected not because of technical challenges, but because the Mission concept was not supported. Missions had fast timelines, and long-term engineering development did not fit well with the Mission concept. Holloway asked if Missions couldn't be an opportunity to test new technologies. Mori stated that Missions are not the vehicle to test new technologies. Flemings expressed concern that because of fiscal realities, the IODP will collapse into year-to-year engineering developments, and that long-term engineering developments needs will not be addressed. The big issue for the EDP is how to move the program forward.

Mori stated that the SPC will not rank a proposal if technology development is necessary for the success of the drilling leg. SPC wants the best science. The EDP has the challenge of identifying engineering development needs in drilling proposals with the potential for large science payoffs. Germaine asked how the EDP could obtain closer links with proposals entering into the SAS. He also asked about the feasibility of short engineering legs. Mori agreed with the short engineering leg concept. It would be most practical for this to be an add-on to another drilling leg. The SPC will listen to the EDP, and at the proposal ranking meeting, the EDP has the greatest voice.

After a coffee break, the discussion centered around whether the 4 scientific focus areas in the draft Implementation Plan were technically achievable. Mori answered that for the most part, these were technically achievable, but the borehole observatory component was technically the most difficult. Germaine asked if the SPC will prioritize proposals using the 4 focus areas. Mori stated that the SPC would do this, if the draft IP were approved. Germaine expressed concern that the emphasis on 4 focus areas would affect the proposal submission process. Maria Ask asked if the SASEC consulted others concerning the four focus areas or were these decided by a few people. Sears expressed surprise at how the SASEC came to identify the 4 focus areas. Mori answered that for the most part, the science in these 4 focus areas is supported by technology available. He understood Sears' point.

Flemings asked Sears about the Shell Oil turbidite drilling program and whether this would be a focus area that would engage industry interest. Sears replied that the most likely vehicle for an industry collaboration would be formation of an industry consortium, not one company sponsoring participation. Evans noted that David Divens

and Manik Talwani are trying to put together a consortium to use the SODV for joint industry-IODP drilling. Several companies have expressed interest, and a workshop will be held in Houston at the end of February 2008.

Agendum Item #9: SAS Activity Report (Myers)

Myers noted that the SPC has accepted the EDP recommendation to send an EDP liaison to every SSEP meeting. Ussler has attended the last two SSEP meetings (Houston, TX and Bordeaux, France) and reported on potential technical issues associated with drilling proposals reviewed at the SSEP. Flemings requested a volunteer from Japan to attend the next SSEP meeting in Busan, South Korea.

Agendum Item #10: SSEP Report (Ussler)

Ussler presented a summary of the presentation made to the SSEP meeting in Archachon, France in November 2007 (*Appendix 4*). He reviewed the mandate of the EDP, its history, the present status of the EDP Technology Roadmap and the table of 'high priority' engineering development needs derived from the TR. In addition, he presented an analysis of how the TR engineering development needs mapped onto the 4 focus areas in the draft Implementation Plan, and an analysis of the technology issues of the drilling proposals under review at the SSEP meeting.

Discussion of how to better learn about and to identify technological challenges confronting drilling proposals ensued. Sears suggested that the technology issue table presented by Ussler should be extended to include drilling depth, water depth, temperature, and sampling strategies. Ussler explained the problem with developing an analysis table like that presented is having sufficient time to complete the analysis (typically the text of the proposals reviewed at the SSEP is released a month before the meeting) and releasing some of the information requested (proposal confidentially is an issue). Flemings noted that by identifying technological challenges early in the history of a drilling proposal, there is a risk that this information would become a liability for the success of the proposal. He stated that he would like to use the process of identifying technological challenges early in the proposal evaluation process as a means for advocating for engineering development and the eventual success of highly ranked science proposals. Sears asked who makes the decision as to whether a drilling project is drillable. Mori stated that in the past, the SPC did not consider the technical aspects of a drilling proposal (nor does the SSEP—note added by Ussler). Now the SPC realizes that this is too late in the development of a high quality science proposal. Technical needs should be flagged by the time the proposal reaches the SPC. The SPC needs to use this list and request the EDP to make specific recommendations. The role of the EDP needs to be discussed further. Germaine noted that extracting information relevant to the engineering needs of proposals is important. Mapping proposals to the TR would be a relevant exercise. Ask agreed with Germaine. Nakata noted that the issue of evaluating the technological needs of drilling proposals was addressed at EDP Meeting #1 in Boston over 2 years ago. There was no conclusion as to how to do this; reading and evaluating a full proposal is too large a task for panel members to do. An overview of the proposal would be more manageable.

Meeting adjourned for lunch at 1300; resumed at 1447.

Agendum Item #11: STP Report (Lovell)

Lovell provided a report on activities of the last STP Meeting #5 held in Beijing (*Appendix 5*). His report was limited to items of specific interest to EDP. The 3½ day Beijing meeting was considered to be very successful. STP covers a wide range of topics and requires multi-dimensional considerations. In addition to the usual topics of business, the agenda included consideration of options for IODP operations given the recent changes in the budget realities. In fact, this topic occupied several hours of discussion. No novel solutions were identified but the committee was concerned that without additional non-IODP work to cover shortfalls in the budget, it may become necessary to have staff reductions.

Lovell then moved on to review recommendations of immediate interest to EDP. (details are in *Appendix 5* and STP minutes)

- Item 708-7 Leak Off Testing
- Item 708-3 Riser Drilling Cores: STP is concerned about the quality of cores obtained using the new riser technology.
- Item 708-8 QA/QC Draft Report: here the goal is to be able to cross compare leg information in order to learn from past experience and continue to improve the technology and improve the planning process.
- Item 708-15 Open Hole VSP: STP no longer has membership with expertise in VSP technology and there are perceived problems with IODP applications. In general, there is a feeling that input would be helpful from industry experience and that this is mostly a matter of cost and desire to perform the measurements, given other possible operations (e.g., collect more core). The best solution may be to hire the technology on an as needed basis. STP would appreciate input form EDP.
- Item 708-10 Internet connectivity: by mere coincidence, the facility for the STP meeting did not have internet access. This had a marked positive impact on the meeting and it was obvious that people were more engaged in the discussions and had improved interaction. Maybe we should consider preventing access?

Next, Lovell moved on to present several Action Items from the meeting. These were:

- Item 708-32 Technology Roadmap: STP will follow EDP's lead in organizing information and begin the process of developing a technology roadmap related to measurement technologies that affect drilling decisions. The specific goal of this effort is to improve cost effectiveness and decision-making.
- Item 708-33 Measurements that affect drilling decisions
- Item 708-34 Modifications of cores due to drilling fluids on cores acquired for microbiology.

Following the presentation, the floor was opened for questions. Ussler asked what issues were identified relevant to microbiology using the riser technology. Lovell replied that actually there are no specific problems identified, but this technology has not yet been done so we have no information and are simply concerned that problems may arise in the absence of experience. Von Herzen asked about the VSP technology and noted that

several groups and academics may have perfectly acceptable VSP technology, so there is no need to focus only on the commercial market. Further, the larger issue relates to the tradeoff between more core versus spending time on conducting VSP measurements. Flemings remarked that IODP and ODP have had a mixed record in the past. Mrozweski added that they have new source technology now and believes this will go a long way to improve the situation. Lovell (based on discussion with Mark Alberty) agreed that the problem does not seem to be a technology issue and may not actually require any EDP input. Fukuhara asked if there were any specific technical problems identified. Lovell reported there were none to his knowledge. Nakata suggested that it is more a matter of correct specification of the requirements. The technology exists, but it is very important to provide clear specifications. Mrozweski agreed and noted that the new equipment has a dual source and will provide a much broader spectrum. Flemings thinks that part of the problem is a mismatch between technology and project needs. He then tabled this item for now so we could return to it later in the meeting. Flemings then asked for comments on the leak off test. Long periods of time are required to collect enough data to interpret the principal stress state. Is this really useful information and should CDEX be encouraged to do this routinely? Alberty is a recognized expert in this area and should be asked for input. Check the STP minutes for full discussion on the topic.

Agendum Item #12: FY2009 Engineering Development Plan (Myers)

Myers spent a few minutes reviewing the administrative process for the decision-making relevant to the Engineering Development Proposals. He limited the discussion to pieces of the process with particular relevance to EDP. See *Appendix 6* for Myers's presentation slides. Proposals are divided into three categories: less than 100,000 USD more than 100,000 USD and IODP specific solicitations. There have been no proposals in the final category. Fiscal year FY09 begins on October 1, 2008.

IODP reviewed the 10 submitted proposals with a near-term focus and selected the most important proposals relevant to IODP ED needs. This review reduced the proposals to 4. These four proposals were reviewed by EDP at the summer meeting for technical comment and grouping. The reviews are confidential and were provided directly to IODP-MI and the proponent. Based on EDP review and other considerations, IODP-MI reduced the list to 3 for presentation to SPC. Myers then gave a brief summary of the three proposals to remind everyone of the objectives for each. SPC approved the intention to proceed with these proposals. The three proposals are:

- SCIMPI – which is for the design of a single observatory that is installed with multiple sensors and deployed in sediments that are weak enough to squeeze the hole closed after installation.
- S-CORK – which is for the design of a single observatory sediment CORK system with multiple sensors and would also be used in weak sediments.
- MDHDS – which is a tool delivery system that hydraulically penetrates the tool and then decouples from the BHA to eliminate the effects of heave.

Von Herzen noted that there seemed to be a big difference in the cost of the two delivery systems, yet one of the justifications for each design was reduction to about 10% of a

current CORK system. Myers noted that the cost of a CORK observatory is between 1 and 2 million USD depending on level of sophistication. The design costs of the SCIMPI and S-CORK proposals are different for the two systems, but once the basic design is complete, the routine installation cost is expected to be similar for the two systems.

Myers reported that IODP-MI has decided to reduce the scope of the two observatory proposals and try to integrate the two designs as much as practical. To that end, they have asked each proponent to conduct a high level design during FY09 and to collaborate in an effort to develop common elements for each system. In addition, IODP-MI will solicit for the development of a common deployment system for the two systems. Construction of the observatories will then require a decision to go forward and would not happen until FY10 at the earliest.

In summary, in FY09 IODP-MI will go forward with the high level designs of the two observatories, design and construction of the MDHDS, and continue with the LTBMS.

Before opening the floor for discussion, Flemings reminded everyone that we have conflicted members present. Germaine, Flemings and Grigar are working on the MDHDS and Ussler is working on SCIMPI. Flemings noted that we can discuss the presentation now but we will return to this under Agendum Item #22. He then asked Myers to review what is actually being paid for in FY09 relative to these three proposals. Myers responded the budget would cover high-level design for SCIMPI and S-CORK as well as design and maybe construction of the MDHDS. This reduces the upfront spending (consistent with the current fiscal situation) and allows us to more forward in a positive and constructive direction.

Sears asked for clarification as to what is being asked of EDP. We have reviewed these proposals and provided advice in the past. Flemings agreed and added that it would be unreasonable to change advice at this time. Ussler noted that the blending of proposals might constitute a changed condition and it might be appropriate to provide advice relative to this change in implementation. Myers agreed and noted the IODP-MI is always interested in EDP advice. Holloway questioned the path forward noting that at the end of this year we will have high-level designs for the two observatory systems that may or may not have integrated elements. What will happen next? Myers reported that these designs will be evaluated and at that point a decision will be made to go forward on each as the conditions dictate. Mori then noted that he was under the impression that the MDHDS was not given SPC approval. Myers said that he was sure that it was in the SPC minutes and that SPC had given approval to the three-proposal plan.

Von Herzen asked what is the scope of a conceptual design? Fukuhara noted that in the LTBMS process this would be considered more detailed than a conceptual design but would not be at the level of a detailed design that would be appropriate for fabrication. Myers concurred and said that they will be using language consistent with the LTBMS process.

Flemings then asked that we move along to the next agenda item and continue this discussion under Agendum Item #22.

Agendum Item #13: Review of the Technology Roadmap (Flemings)

Flemings provided an overview of the status of the roadmap. We have agreed to formally approve the roadmap once per year at the June/July meeting. We currently have provided consensus approval on revision number 2.0 and are working on changes that will ultimately formalized as version 3.0. The roadmap is divided into three theme areas. We have evaluated each item one area at a time and have separated out what are considered the highest priority items and identified those at the start of our executive summary for EDP Meeting #5 and listed these items on the public side of the website. At this point we have not made any attempt to provide individual rankings nor have we given any consideration to the relative ranking between theme areas. There are three tables that are important in our evaluation process and all can be found in the current edition of our technology roadmap. Table 1 outlines the Major Themes and Initiatives for the IODP. Table 2 is a list of what we have identified as the Technical Challenges for the IODP that were identified as important to successfully achieve the goals of the Initial Science Plan. Table 3 contains the current listing of the high priority Engineering Developments Items in each theme area. Remember these items will evolve as needs change. Also note that Appendix A contains a more detailed list of all the roadmap items.

Nakata asked if we would have an opportunity to comment on all the theme areas (A=Sampling, Logging, and Coring; B=Drilling/Vessel Infrastructure; C=Borehole Infrastructure). He noted that each person has been working on their assigned theme area and has not had an opportunity to discuss items in the other two. As an example, he noted that there is no ED item specifically related to borehole stability. He suggested that we find some time to have a discussion across all theme areas.

Sears asked that we get more clarification on the definition of a scoping study. Flemings said this will be discussed in detail under Agendum Item #20 and would prefer to table this discussion for now. Ask asked how the roadmap items relate to the 4 focus areas specifically identified in the new Implementation Plan presented by Jim Mori. Mori noted that the proposed Implementation Plan was intended to help us renew focus in the program given the time and financial constraints, but the initial reaction to the proposal was so strong and negative that we might expect the focus areas to change over the coming months. Ask continued to question how we can proceed if the objectives are unclear and the ISP needs to be refreshed. Mori said that the proposed IP was intended to set the new focus areas but the unexpected negative reaction has caused a delay in the process. Holloway then asked why we needed to be very closely integrated with the IP. We are linked to the ISP and can reprioritize the EDs if and when new objectives are set.

Flemings then asked that we move on to review the ED items with a focus of making modifications to descriptions, thinking about new items, or even elimination current items. We will go through the entire list placing special attention on the current high priority items. He assigned Ask and Holloway to work on the changes to theme area A,

Sears to work on theme area B, and Ussler and Person to work on theme area C. During the discussion, they should make notes on required changes.

Flemings then worked through each item and asked for an oral summary of the high priority items and requested comments on all of the items. These minutes do not contain the summary of each item but only the comments.

A4: This item is mostly a result of Leg 304 experience because there were problems with wing retraction. No work is currently under way to improve this situation.
A11: Should this be on the list? There is a need to develop a new sidewall corer if we are to use small diameter pipe. Several comments were made expressing concern that this would be a very long and difficult effort. Corers currently exist that work in large diameter pipe and it seems much more reasonable to make use of this technology. As a result of the discussion, Flemings asked Sears/Germaine/Fukuhara to draft consensus statement for discussion on Friday.
A12: Short discussion as to what IODP currently has available. Apparently nothing is in place at the moment. The tensor tool is old technology and needs to be upgraded. Technology for sediment sampling exists but there is nothing for rock coring.
A16: New industry tools have been developed.
A17: Some tools are available for specific applications. We should be thinking about using this technology rather than developing new.
A21: No new developments. Tools have been designed and some land testing but nothing has progressed any further.
A23: Again this is a category for which there are tools available for large diameter pipe. It would be very difficult to replicate the technology on a smaller scale.
B1: It is very interesting that this did not make the priority list. There was some speculation that the evaluation for this item was more focused to the single aspect of making the hole rather than considering all aspects related to the pipe diameter. For instance, if we consider the high priority category A items then it is likely that large diameter pipe will become more significant.
B3: Stabilization of the drill string is critical to a number on processes. Many methods can be used to stabilize the string including heave compensation. The choice between active or passive compensation requires a detailed analysis of the dynamics of the entire system. To date, this has not been done. Myers noted that the available information on past experience led to the decision to use passive heave compensation. There is no quantitative performance data and we are relying on indirect observations of things like sample recovery. The active system is being stored so it can be reinstalled if the passive system is not adequate. The passive system is being refurbished to make it more effective. Kyo mentioned concerns with the active system valving and reported they are also using the passive system at this point. Holloway pointed out that the passive system was refurbished once in the past and this did not really improve the performance. Grigar reported that the APV valves are being relocated in the plumbing to reduce drag. Myers pointed out that the new QA/AC analysis and rig instrumentation will help with the long-term analysis and guiding upgrades in the future.

B5: Myers pointed out that while this may be a solution to drill string stabilization, there might also be other equally acceptable solutions. Flemings pointed out that industry has proven this to work and we should be giving it very serious consideration.
B8: The rig instrumentation is being upgraded on the SODV but it does not include automatic drill technology. Thorogood pointed out that automatic drill control is essential to core quality and higher rates of return. Schlumberger has done a lot of the leading work with this technology.
B9: The DSS and RMM systems are being developed to acquire downhole measurement drilling parameters while coring. In contrast, the LWC system under development by the USIO provides geophysical logging data, including resistivity images and natural gamma ray data while coring, but presently does not provide drilling dynamics data.
B10: The PTM would be used to transmit DSS data in the immediate time frame and maybe linked to other tools in the future. Flemings noted that EDP has provided input on this and reinforced the need to prove the functionality of the DSS before spending more effort on the PTM.
B19: Nakata pointed out the fact that the design of the mud program is very different from the topic of borehole stability. He thinks borehole stability should be added to the roadmap as a separate item. Based on further discussion, Flemings asked Nakata and Wohlgemuth to draft a new item B33 for the roadmap to address the topic of borehole stability. This item will be circulated by email and addressed at the next EDP meeting.
The discussion then turned to the measurement of in situ stress since this is closely related to borehole stability. Asanuma discussed various methods that are available to measure in situ stress including leadoff tests, breakouts, hydro-frac tests, core sampling, and frac tests on preexisting fractures. Some discussion followed. Flemings then asked Asanuma and Ask to draft a new roadmap item C22 for consideration at the next EDP meeting.
B21: Watanabe talked about problems associated with the dynamics of long riser pipes. When using steel pipe, the vertical natural frequency of the riser will approach that of the ship as the riser approaches the 4000-m length. This presents a very serious situation and must be avoided. For such long risers, it will be necessary to use a different material such as carbon fiber reinforced pipe (CFRP).
B22: This will require research to develop new technology.
B27: This will also require new technology.

Coffee break (1710-1724)

B28: Nakata feels this item needs to be clarified. Vertical drilling is established in IODP but controlling well trajectory is not. We need to close the gap between the industry standard practice and IODP practice. Flemings asked Nakata and Wohlgemuth to rework item B28 for consideration at the next EDP meeting.
C1: This remains a very important and high priority item.
C4: This is really a requirement to upgrade to current industry standards.
C5: Grigar reported that nothing is in progress at this time. The next step is to test the new design in house and then we may be in a position to implement the technology.
C6: There is no off-the-shelf technology. This will require a systematic design starting from the basic architecture. This is considered a substantial research effort.

C9: This item deals with the various methods that might be used to couple sensors to the formation. Ussler noted that cement might be appropriate for strainmeters. Kyo noted that cement might be a problem for other types of sensors.
C15: Ussler reported that current technology has limited capability and that there is much room for improvement. Some work outside IODP is ongoing.
C17: There are several projects in progress that depend on this technology and hence progress will be made with reference to this specific need. Von Herzen pointed out the importance of being sure the various projects communicate so we end up with common technologies.
C18: Ussler pointed out that there are still problems working with monitoring systems ranging from getting the instruments in place, removing drillpipe without disturbing instrumentation, completing the hole installation, etc. A generic systems approach to the design of monitoring observatories would be very helpful.
C19: As test facilities are created we will need a set of decision-making guidelines to establish such things as protocols for access of the facility, scheduling and schedule conflicts, setting use priorities, and rules for operation, etc.

At this point, Flemings opened the floor for questions and suggestions for other "overlooked" work items. Ask noted that there is considerable variability among the various descriptions and wondered if we had developed any writing guidelines. Flemings responded there were no guidelines and we wanted to keep descriptions as short as possible. Key information considered is: why it is needed, what it would require, and maybe a short narrative on the current status. Our goal was to indicate the needs and allow as much latitude as possible to foster proponent creativity.

Flemings reminded everyone that we have not attempted to set priorities between the three theme areas. Further we have only broken out a set of high priority items within each theme area and have not attempted to rank things with any finer resolution. In addition, these high priority items have not been compared to the current list of proposals at various levels in the system. Approval of new items, revision of items, and priority ranking are all scheduled for the summer meeting. At this meeting, it would be appropriate to discuss the need to establish a finer ranking system or to rank across themes. This we will handle under Agendum Item #22.

Holloway asked if we should work towards tracking the status of each ED in the Roadmap. One option would be to add a column to the table. There was concern that this would increase our workload and be difficult to be sure we were getting correct status information.

Ask noted that the individual items do not have a link directly to the proposals. She wondered if we could add a statement for each item. Flemings agreed that this was important information and suggested that we address this tomorrow under Agendum Item #22.

Agendum Item #15b: Review of FY07 Activities (FY-1) USIO (Grigar)

Grigar reported to the panel using a power point presentation that is included as *Appendix 7*. He talked about the Pulse Telemetry Feasibility Study and the DSS.

For the Pulse Telemetry Feasibility Study, Grigar highlighted the following details. The system is firstly being developed to transmit data in real time from the DSS. They contacted 5 companies with questions requiring a written response. Of these, only one responded. They then requested a quote from the one company that responded. The quotation was for 250,000 USD to fabricate three units. The system would provide one reading per 30-40 seconds.

Holloway asked why they did not solicit quotes from the other companies? Grigar responded that several attempts were made to contact the others and they were unresponsive. At that point there was no reason to continue pressing. He finished the topic by telling the panel to expect an ED proposal in July 2008.

Grigar next provided a short history on the development of the DSS. The FY07 work essentially ended with the determination that the tool had communication problems. He showed some data for weight on bit with sections of reasonable measurements and sections of full-scale output associated with errors in data transfer. The plan for FY08 is to bench-test in a simulator, and then go the Schlumberger land facility to do some downhole testing.

Flemings started the discussion stating that he would not support further investigation unless they provide definitive proof that the DSS is functioning properly and able to make reliable measurements. They should come to the July meeting with data to prove the case. Holloway asked what the contingency plan was if the Schlumberger testing was not successful? Grigar felt they would be in a very difficult situation because they have addressed the communication problem and the manufacturer has declared the tool operational. Germaine asked why not test the tool in a laboratory load frame to get accurate calibration measurements in a controlled setting. Grigar reported that they did not have a load frame for such testing. Thorogood pointed out that the alignment between the DSS and RMM is critical for communication. Holloway asked if a wet test was necessary at this time.

The meeting was adjourned for the day at 1828.

Thursday, January 10, 2008

Meeting convened at about 0945, after a delay in the bus trip to the observatory meeting room. Meeting minutes were taken by Maria Ask in the morning, and Von Herzen in the afternoon.

Flemings reviewed the different assignments made yesterday. Sears was responsible for updating the TR and wrote a consensus statement for Large Diameter Drillpipe. Ussler reported that a statement concerning the proposal review process has been prepared, after

a breakfast meeting with von Herzen, Fukuhara, Myers, and Ask (see *Appendix 15*). Updates to the TR will be provided by Ussler and Holloway (with assistance from Ask). Nakata prepared a new statement ED B33 and reworked B28 of the TR. Asanuma wrote a new ED item C22 with assistance from Ask and Fukuhara. Thorogood had prepared a brief presentation on Scoping Projects. Flemings discussed the content of the TR regarding:

1. Scoping projects – what are they?
2. Current scientific drilling proposals and their basic technological needs – these need to be cross-linked with the TR.
3. Revision of the TR – fast-tracking is needed because there are a few engineering developments that are critical. He asked rhetorically whether we can choose a few things to push for development. He fears that too large a TR will result in too much discussion and too little action (nothing gets done to address the ED needs of the IODP).

Agendum Item #15b: Review of FY07 Activities (FY-1) USIO (Grigar/Mrozweski)

Grigar completed his presentation that was started yesterday (*Appendix 7*). Ye Ying commented that the noisy WOB signal shown by Grigar might have been caused by vibration. He then asked if data processing might solve the noise problem. Grigar responded by saying that in the test, which was through cement, the cone was welded onto the bit and may have been the source of the noise. In some cases there were large excursions that might not have been real signals.

Mrozweski continued the USIO presentation by discussion of the Logging While Coring (LWC) Core Barrel project. The goal is to develop a LWC core barrel that cores and logs simultaneously. To date, there have been mixed results—60% recovery in soft sediments and <1% recovery in hard rock. The RCB cuts larger core than the MDCB core catcher. There is no off-the-shelf solution, but PDC bit was tested at the Schlumberger Genesis facility in Sugarland, TX.

Sears asked about the quality of the logging. Mrozweski replied that the logging is fine, but the batteries need to be decreased in size. Flemings noted that this is a FY07 project, and was wondering what the USIO found. Myers responded by stating that the IODP-MI funded the USIO to make improvements on the LWC. Originally, the proposal was to build a core barrel. The USIO has changed paths, and now is looking at the bit design to improve core quantity and quality, rather the redesigning the core barrel. The LWC project has been underway since 2002, initially funded by the US Department of Energy. Flemings asked if the USIO representative would make a status statement for the project. Mrozweski responded by saying that he believes the USIO has addressed the objectives of the proposal. Better recovery has been achieved by matching the bit size. The BHA could go onto any drilling platform (i.e., SODV, Chikyu, and some MSP). The USIO does not want more funding. Schlumberger is still attached to the project. Mrozweski asked if the EDP has any comments on the status of the project.

Holloway asked a few questions: (1) Regarding, the bit design, why should the core travel 2" before entering the core tube? The core throat should be shortened. (2) Why was it not known that the bit sizes were different when the project was initiated?

Myers responded by saying that he had been involved in the LWC project at LDEO when it was started as a proof of concept project. The mismatch between the MDCB core barrel and the bit was noted. The USIO subsequently took the LWC concept to the next level. Holloway still wondered why ship time was used when it was already known that there was a mismatch in bit size. Grigar responded that the bit size difference was overlooked during the design phase, because the design was created fairly quickly. We looked at the core barrel, but forgot to check the diameter of the core catcher itself.

Holloway asked if the LWC has been run with the diamond bit yet? Mrozweski stated that it has not been tested because it was not available when the latest Genesis tests were conducted.

Germaine asked if the goal of the LWC tool was to correlate a log and core on a 1:1 scale. Mrozweski responded by saying that the goal is core-log integration. He noted that on gas hydrate drilling legs, high lateral variability in lithology gives very different results between two adjacent holes. Germaine then asked if 100% recovery was required. Mrozweski responded by saying that 100% recovery is not required, and that you should be able to fill in the gaps using the log.

Myers notes that LWC could save a significant amount of time because it allows collection of logging data while coring. No special logging trip is required.

Agendum Item #15a: Review of FY07 Activities (FY-1) CDEX (Kyo)

Kyo reviewed the conceptual design of the Long Term Borehole Monitoring System (LTBMS) (*Appendix 8*). The supervisor of the project is Kiyoshi Suyehiro. There are 4 development teams. He noted that after installing the LTBMS, the telemetry equipment to send the data to land would be installed. The LTMBS project started in 2002. IODP-MI began funding the project in 2006 with engineering development commencing in 2007. The plan is for detailed design work to start in 2008 and experimental prototype (EXP) testing to start in 2009. The EXP testing will involve land testing at a borehole. If the land tests provide acceptable results, an engineering prototype (ENP) will be deployed in a riser borehole in 2011.

Kyo discussed the observatory plan for borehole NT2-03. The tubing size has not yet been decided. Increased tubing size reduces the space for the sensors. The tricky part is near the bottom of the borehole. A packer will be set above splay fault #5; then the equipment and sensors in the openhole will be cemented in place before inflating the packer. If the sensors are cemented in place, then they are not retrievable. The coupling method of sensors at the casing is now examined. Kyo reviewed the schematic diagram of the telemetry system, and the schemes used to provide fault tolerance on a single-conductor wire telemetry/power system. A loop topology is used, in that two single-conductor wires are installed in the borehole, and they are joined at the bottom forming

the loop. He also discussed system clock synchronization, power consumption for two constant current scenarios (Total 39.1 W using 100 mA current; 48.3 W for 200 mA current). A maximum of 8 downhole modules can be supported with the present telemetry and electronics design. The design life is 5 years at 125°C. The cable and the downhole module can survive a 250G shock. All pressure cases and telemetry cable penetrations are welded construction.

Asanuma asked if the dynamic range for the data transmission was adequate. Kyo responded by saying that if scientists really require a 200dB dynamic range, we'll prepare two A/D converter with 120 dB dynamic range each to cover such wide range, because we cannot obtain such wide range A/D converter as 200dB.

Fukuhara asked about the difference between the experimental prototype (EXP) and engineering prototype (ENP). If EXP tested on land, will it then be modified and tested offshore? Kyo responded by saying that lab tests will be done to confirm the design life and performance in high temperature. There is a 800-m borehole on land for field testing of EXP. The design will be upgraded to build ENP, which will be deployed at NT2-03. No other land-based borehole tests are planned. Fukuhara noted that the LTBMS is a very complicated system. Why not test ENP in a land borehole? Holloway stated that this is a very ambitious plan, and asked whether it would be better to test the system in stages. Assessment of the high-risk elements is needed.

Kyo agreed that training of the deployment team is necessary for a successful deployment operation. Before deploying the system in the riser hole, there is a plan to deploy the riserless observatory in 2009. This would provide operational/deployment experience.

Holloway asked if the deployment schedule has an allowance for setbacks? Kyo stated that in 2009, the plan is to conduct both a land hole test and a riserless borehole test. Holloway was more concerned about the wellhead and data transmission through the wellhead. Could a wet test be done? Kyo stated that they are planning to do wet testing using the land facilities. Ussler asked if high temperature electronics would be used at the beginning of the development of the equipment. Kyo said yes. Ussler asked about the high temperature test plan. Kyo stated that in the laboratory, components and units would be tested in ovens. The whole system will be tested also in the laboratory at temperatures higher than 125°C, for approximately a year, which will simulate the effects of 5 years at 125°C.

Myers made two comments: (1) He asked the EDP to acknowledge that the work has been completed as proposed; (2) Does the EDP have any specific comments?

Agendum Item #15c: ESO Downpipe Camera System Feasibility Study (Evans)

Dan Evans presented the status of the ESO downpipe camera system feasibility study (*Appendix 12*). He reviewed the design requirements, and the potential paths for development: (1) design from scratch; (2) direct upgrade of the current camera system; (3) purchase a commercial system; or (4) modify a commercially available system. The

conclusion of the study is to either pursue an off-the-shelf system (Hytec DTR 71 250,000 USD) or to downgrade the specifications.

Von Herzen commented that the 250,000 USD does not include the winch, fiber optic cable etc. Maria Ask noted that the present camera system was used in Tahiti to locate live corals, but what is the objective for using a camera at 'full ocean depth', i.e., 6000-m? Evans responded by saying that the success in Tahiti stimulated discussion of adapting the camera system to operate on all the IODP platforms and to have full ocean depth capability.

Coffee break

Agendum Item #16a: Status of FY08 Activities (FY) - USIO (Grigar)
Grigar reviewed the status of the SODV (*Appendix 9*). According to the latest information, ship delivery to ODL had slipped to 31 March 2008. However, the date has now slipped another 30-60 days. Grigar reviewed the status of the heave compensation system (only the passive system will be used; the active system will be mothballed and stored at College Station, TX). The PHC system is being refurbished. He reviewed the status of the SODV upgrades to the rig instrumentation system, the ship network, and database system for rig instrumentation. The USIO has provided engineering and operational services to the Chikyu for use of the APCT3 and DVTP tools. CDEX and USIO have signed an agreement on observatory implementation.

Germaine asked how time is synchronized between the rig instrumentation and downhole tools. Grigar responded that the clocks on the rig instrumentation computers are set to UTC; then the downhole tools synchronize their clocks to the RIS computers.
Von Herzen noted that not much software is provided with RIS products. What types of data plots can the drillers and shipboard scientists obtain? Grigar stated that there are several types of data presentations currently available (WOB-TOB) and the data can be exported to a spreadsheet.

Agendum Item #16c: Status of FY08 activities - Externally funded projects and third party tools (Mrozweski)
Mrozweski provided an update on the Lockable Flapper Valve (LFV). The purpose of the LFV is to prevent fluids from running back into the tool string. This check valve has a 2.75" ID restriction. Because of this, the USIO has decided to redesign the tool. LDEO originally proposed the redesign, but this is a joint project using engineering expertise from the USIO-TAMU.

Mrozweski also reviewed the status of the magnetic susceptibility sonde (MSS). It has two sensors, one similar to the MST sensor (Bartington gauge) that provides fine resolution, and the other sensor (Göttingen) provides a coarse resolution.

Agendum Item #16b: Status of FY08 activities – CDEX (Kyo)
Kyo reviewed the status of the hardware design, functional section mockups of the LTBMS (*Appendix 10*). Power consumption has been evaluated using the mockups. PCB

designs are being prepared. Long-term reliability and high temperature characteristics will be evaluated with components level. At the unit integration test level, system power consumption, unit level anti-shock packaging designs, connectivity with downhole sensors and their high temperature characteristics will be evaluated.

Plans for FY09 include system integrity tests; destructive system life-cycle testing; high temperature testing, shock and packaging testing in pressure tight housing have been made. Plans are being formulated for a field test of EXP in a land well.

Deliverables for FY08 are summarized in Kyo's power point presentation (*Appendix 10*).

Von Herzen asked why only a 7" diameter borehole was to be used for the land testing. Kyo answered that we only have this borehole available to us. We have to mock up the experiment to fit the diameter. Von Herzen asked why not make a 9 5/8" diameter borehole because so much is at risk. Germaine asked how close would you be able to simulate the installation procedures on land compared to offshore installation. Kyo responded that we would learn about cementing when the riserless observatory is deployed in the non-riser borehole in 2009. Ussler asked how heave would be controlled or compensated when cementing the string? Kyo stated that we would need to select appropriate weather conditions. This has not yet been solved.

Kyo noted that risk analysis is very important for the success of this project. Almost 100 items have been listed. Thorogood stated that an operational requirements document is very important and needs to be carefully and thoroughly thought through. Kyo responded by saying that he would present the status of risk mitigation at the next EDP meeting. He noted that riserless testing is a JAMSTEC project, and that another JAMSTEC job includes the riserless hole. Thorogood noted that if risk is systematically analyzed and tested, the riserless borehole is an excellent way to mitigate risk.

Holloway asked if cementing in stages, using port collars has been considered, to reduce risk.

Myers suggested that one approach is to elevate the priority for risk analysis. The EDP should request an analysis and presentation. Thorogood volunteered to draft a consensus statement. Fukuhara offered to assist.

Agendum Item #16b: Status of FY08 activities – Chikyu operations (Ito)

Plans for two riserless boreholes in FY09 were presented (*Appendix 11*). Parameters to be observed include: a seismic/tilt array, strain, pressure, temperature, broadband seismometer, and a strong motion sensor. Flemings asked Ito to highlight the drilling targets and their depths. The primary target of the LTBMS is NT2-03 (3.5 km). The temperature is ~100°C at 3.5 km and we will start drilling in 2009; NT3-01A is the next target and will be drilled after 2013 and the temperature is ~175°C at the bottom of the hole. Flemings noted that several shallow holes are planned that will use CORK technology. He asked if the Chikyu will be operated in non-riser mode and drill and install the CORKs. Ito stated that this was now CDEX's current plan to take over CORK

technology considering the status of the SODV and limited operating budgets. Ask asked if there was any collaboration with the proponents for SCIMPI or S-CORK for development of instrument strings for NanTroSEIZE project. Ito stated that planning is too far advanced to consider this.

Ito reviewed results from Chikyu Expedition 314 LWD. Penetration of the 4 boreholes was: 976, 1401, 530, and 400 mbsf. He reviewed stress orientation differences; occurrence of gas hydrates and a BSR, and real-time monitoring with LWD. Flemings asked if there were any problems. Ito stated that very good results were obtained with the LWD tool. However, there were several operational problems. The main problem was a very strong current, more than 5 knots. The Chikyu was designed for a maximum of 1.5 knots. Another, unfortunate problem, was the loss of the LWD tool and the nuclear source. Nakata asked if loss of the tool was caused by borehole instability. Ito noted that there was a sticky zone at about 500 mbsf. Von Herzen asked, in light of losing a LWD tool and a nuclear source, what mitigation steps will be taken in the future. Flemings asked about the lithology. Ito stated it was mud (more exactly mud/mudstone (LWD lithology), and hemipelagic (silty) mud with fine sand and silt turbidites (core lithology). Nakata noted that the combination of unstable sediments and a stress field elevates risk. Ito stated that CDEX would develop a borehole stability analysis based on existing data.

Agendum Item #16e: Seafloor Drilling Systems (Evans)
Evans reviewed 4 relatively new seafloor drillings systems that would of potential interest to the EDP and to the IODP-MI (*Appendix 13*).

Agendum Item #16c: Status of FY08 activities – Externally funded projects and third party tools (IODP-MI)
Myers provided a status update (*Appendix 14*).

Agendum Item #16d: Status of FY08 activities – Externally funded project and third party tools (Myers)
Myers reviewed the status of the Core Quality and Quantity Assessment (CQQA) project. Kelly Oskvig is the lead for this project that started in October 2007 (*Appendix 14*). Tasks include determining how to create metrics for measuring success. The objective of the project is to identify a framework for quality analysis and obtaining access to industry data. Myers noted that the desire is not create an elaborate system for core quality and quantity analysis. However, quality/quantity data is essential for developing a sound, engineered system, such as the APC system. Flemings asked why it would take a year to complete the study. He recommended a 6-month study. He asked Germaine to draft a recommendation for the CQQA.

Myers then provided a DeepStar proposal update. Planning is underway for a JIP Engineering Field Trial and DeepStar (IODP-MI, USIO, AGR, and BP) deep hole to be drilled in very deep water. Membership of IODP in DeepStar is motivated by the primary objective of drilling through the Moho. He pointed out that mud circulation is achieved by having a station at the seafloor. Outcome of the DeepStar proposal will be determined 11 January 2008. Von Herzen asked how much funding would go to IODP. Myers

responded by saying that the majority will go to AGR. Additional support for DeepStar is not included in the IODP Annual Program Plan. Myers has 3 months of support through DeepStar, and would drop out of IODP for that time. Sears asked what water depths were being considered. Myers stated, 3 depths, the deepest being 12,000 ft.

Agendum Item #18: Engineering Development Process Implementation (Myers)
Myers led the discussion. The proposal review process starts 15 April of each year with the deadline for receipt of ED proposals (*Appendix 14*). Flemings asked about how we did last year and how we could improve the process.

Myers noted that the ETF meeting at the end of April provides a brief review of the proposals and a routing. Selected proposals go to the EDP. The ETF review is sent to the proponents. Watchdogs are assigned to the proposals routed to the EDP. A change from last year, would be encouraging a dialog between the watchdog and proponents. The watchdog will present the proposal at the summer EDP meeting, rather than as Myers did this past year.

Ussler presented the results of the working group that examined the proposal review process (*Appendix 15*).

Sears asked if the proponents are interested in confidentiality. Myers stated that 2 out of the 10 proposal proponent groups were concerned about confidentiality this past proposal season. Novel ideas must be protected and potential proposals not discouraged. Thorogood commented that the proponents' need for confidentiality must be respected; he stated being happy with the proposal by the working group.

Agendum Item #17: Panel Structure/Term (Flemings)
Flemings handed out a table of the future panel structure and terms projected through July 2010 for review and discussion.

Break for lunch 1300-1400

1400-1520 Observatory Tour

The afternoon session began after the tour of the local observatory. Flemings asked for comments on engineering development proposal cross-comparison. Sears mentioned that cross-comparisons of proposal criteria were discussed previously. Thorogood suggested that we focus on engineering criteria only. Myers indicated that a comparison of proposals whenever possible is useful, particularly with any additional technical comments. A consensus summarized by Thorogood was that it was difficult and perhaps undesirable to make relative rankings of ED proposals.

Agendum Item #21: Final EDP comments on FY 09 Eng. Plan (FY+1) (Myers/Miyairi)
Myers presented status and progress on approved proposals from EDP Meeting #5. For this discussion, conflicted individuals were temporarily excluded from the meeting

(Flemings, Ussler, Germaine, and Grigar). Miyairi was appointed acting Chair; Myers lead the discussion.

Motion Decoupled Hydraulic Delivery System (MDHDS) - group 3.
Myers entertained questions as to whether proponents of this proposal did as requested after EDP Meeting #5. EDP members did not get any feedback from proponents nor saw any written responses. Von Herzen indicated that it was his impression that Myers would request a revised proposal from the proponents. A question was raised as to whether we should try to re-group the proposals? Myers indicated that he thought he had sufficient input from panel to go ahead. Panel discussion leaned towards the view that re-grouping might set an undesirable precedent for the future.

S-CORK and SCIMPI – both group 4.
Myers is now considering approval of both, initially with high-level (common) design elements (still 2 proposals). Nothing has been funded yet. Ask suggested that scoping studies may assist choices on which one finally gets funded. Sears felt that we should go ahead with what Myers has done. Von Herzen and Thorogood agreed. Motion by Von Herzen: do we approve of what Myers has done with the FY09 engineering development proposals? Seconded by Sears. Vote: 11 yes, 0 no, 2 abstentions.

Agendum Item #25: Date and location of EDP Meeting #7
The conflicted members returned to the meeting and Flemings resumed as the Chair. The group then considered possible meeting locations for the next EDP meeting: Boston, MA; Woods Hole, MA; Salt Lake City, UT; and Denver, CO. Kelly Oskvig will assist with logistics. The final decision will be made later in the meeting.

Agendum Item #23: 3rd Party Tools Review (Myers)
This topic included discussion of tools developed via different pathways: off-the-shelf, lab measurements, instrument manufacturers (new and used tools), and IODP-certified tools (e.g., the Davis/Villinger probe). (see *Appendix 16*).

Agendum Item #20: Scoping projects (Thorogood)
Thorogood lead a discussion concerning the status of the TR scoping study (EDP Consensus 0707-07: Scoping Studies) (see *Appendix 17*).

He proposed a few approaches to scoping engineering development needs:

(1) EDP supports the IODP-MI coring study already underway.
(2) IODP-MI plans for future "analysis of options" studies for guidance of proponents. IODP-MI scopes out 3 AOO studies:
- Integrated downhole coring systems review
- Integrated surface drilling systems review
- 21st century Mohole

Germaine asked if scoping projects would detract from consideration of more immediate proposals. Scoping should try to resolve ambiguities/choices in how to proceed with ED.

Coffee break (1650 – 1705)

The panel split off into individual groups to work on various topics.

Beginning at 1735 discussion of the venue for EDP Meeting #7 was continued. Voting on preferred location was: Boston (0), Woods Hole (1), Salt Lake (8), Denver (3), no opinion (3) [number of votes in parentheses]. Oskvig volunteered to examine all of these possible sites, especially Salt Lake City and Denver.

Agendum Item #26: Preliminary date and location EDP Meeting #8 (Ye Ying)
Ye Ying discussed further the possibilities for the EDP Meeting #8 to be held in PR China in January 2009 (*Appendix 18*).

Agendum Item #22a: Roadmap Session (Ussler)
Bill Ussler led a discussion of the technology issues faced by drilling proposals at the SSEP. He presented a slide (*Appendix 19*) that summarized the strong signals given by the proposals in the pipeline at the SSEP. There are four major themes:

(1) Deep drilling
(2) Long-term borehole monitoring and observatories
(3) Improved core recovery
(4) Drilling/coring hard rock

and 2 major deficiencies in the structure of the EDP Technology Roadmap (TR):

(1) Does not identify high level technical needs at a systems level.
(2) 'High priority' ED table has ED needs that do not match science/proposal pressure; connection not obvious to high level technical needs listed above.

There are approximately 125 drilling leg proposals in the SAS pipeline. Additional information is needed to match them with TR. Flemings suggested that we use proposals in pipeline to move ED ahead. A general discussion about how to match ED needs with proposals in pipeline followed. The minimum information desired includes: SAS Status, Proposal Number, Lead Proponent, Topic/Location, Platform, Technical Issues, Mapping to the TR, Water Depth Range, Borehole Depth or Maximum, Maximum Pressure, Overpressure, Maximum Temperature, and Data Requirements.

Germaine suggested adding a column to the TR that lists active drilling proposals by number. Thorogood agreed that this would be useful tool to identify ED needs that spans multiple drilling proposals. Cluster of ED needs will help in establishing priorities. Discussion centered around how to extract data from the drilling proposals. It was decided to use the proposal abstracts posted on the IODP website to populate a table summarizing the characteristics and needs of the 125 active drilling proposals. Fukuhara stated he would find it very interesting to map ED needs of drilling proposals to the TR and to establish priorities. We would then find the gaps between the TR and the science.

It was agreed to go through this exercise in the morning. Oskvig volunteered to print out all the proposal abstracts.

The final topic of the day was discussion of what tasks needed to be finished tomorrow, and who will complete them.

The meeting was adjourned for the day at 1823.

Friday, January 11, 2008

The meeting convened at approximately 0900.

Agendum Item #22a: Roadmap Session (Ussler)
Working groups were established to review proposal abstracts and to populate the spreadsheets distributed to the working groups.

After approximately 1½ hours, the panel met to review the outcome of the exercise. Selected comments are listed below:

1. Von Herzen - CO_2 sequestration: we didn't know what to do with this proposal; there is a need for big pumps and special equipment.
2. Germaine – it was difficult to pick out individual items that matched the TR; there are some natural groupings in the TR that match scientific needs.
3. Tamura – found it difficult to extract useful information from the proposal abstract.
4. Asanuma – the scientific objectives were generally clear in the abstract; but the data/core collection needs were not clear and hard to map the TR to the proposal, vice versa.
5. Holloway – this was a useful exercise; more time was needed; the abstracts provided inadequate technical information; there was an inconsistent level of information among the abstracts; there is a need for data in the same format and at the same level
6. Nakata – agreed with Asanuma and Holloway.
7. Ask– this was a good exercise; we need help filling in the gaps that are not covered by the information provided in the abstracts.
8. Watanabe – had the same feeling as Asanuma; it was difficult to connect the proposal abstract with the TR.
9. Flemings – hard to make a connection between the proposal and TR.
10. Person – suggested having the abstract include technical needs.
11. Sears – found reading the abstracts interesting from a scientific view, but almost no engineering data was contained in the abstracts; it was hard to impossible to map the proposals to the TR.
12. Ye Ying – noted that when reading the abstracts, they were clearly written by scientists and the technical issues were not clear.

13. Nakata – suggested that having some keywords listed in the abstract that relate to the engineering needs might provide 40% of the needed information.

Holloway asked if the USIO reviews proposals for technical needs. Can the USIO share this information with the EDP? Flemings stated that the USIO does conduct an analysis of technical need, but it is much later in the process of proposal nurturing. Sears noted that if the EDP TR is to guide ED, then the EDP needs engineering information relevant to those proposals that will be drilled. Flemings suggested that the EDP ask IODP-MI to explore how to get more detailed technical information to the EDP. Myers agreed that this is an important job to do, but it is not clear how to get the data to the EDP. Having proponents fill out a form is one approach.

Agendum Item #27: Finalize Consensus Items and Recommendations (closed-session)

Flemings asked for a motion to close the meeting. Germaine provided the motion; Sears provided a second for the motion. Hearing no objections, the EDP went into closed session at ~1000.

A motion to return to Open Session was made by Germaine; Sears provided the second. EDP returned to an Open Session at ~1430.

Open Session: Final Business

The last item of business was to thank the members present who were rotating off the panel—Nakata, Flemings, and Sears.

Flemings presented a powerpoint slide (*Appendix 20*) of Nakata and made a few remarks thanking Nakata for his wisdom and contributions to the EDP and the IODP. Ussler then presented a powerpoint slide show (*Appendix 21*) thanking Flemings and Sears for their contributions to the EDP and the IODP. Takemura and Alberty also rotated off the EDP after this meeting, but were unable to attend. Their contributions are significant and are appreciated.

Meeting adjourned at 1500.

EDP Meeting #6 Agenda

Agenda 1.4 (prepared 01/04/08)

MEETING GOAL

The primary goal of EDP Meeting #6 is to: 1) assess the outcome of previous fiscal year Engineering Development projects, 2) learn the status of current fiscal year issues and projects, and 3) make final comments on the engineering development component of next year's Program Plan.

Wednesday: January 9, 2008

9:00 – 1:00 – Morning Session

1. Welcome, meeting logistics, safety, introduction, Robert's Rules (20 minutes)
2. Approval of meeting agenda (10 minutes)
3. Quorum discussion (5 minutes)
4. Approve minutes from EDP Meeting #5 (10 minutes)
5. Preliminary discussion of next 2 meeting locations and times (20 minutes)
6. Preliminary discussion of future Chairperson and Vice-Chairperson (20 minutes)
7. Review status of previous meeting action items and recommendations (IODP-MI) (20 minutes)
8. SPC Report (Mori/Flemings/Myers) (20 minutes)
9. SAS Activity Report (IODP-MI) (20 minutes)
10. SSEP Report (Ussler) (10 minutes)
11. STP Report (STP Liaison) (10 minutes)
12. Status of FY09 Engineering Development Plan (IODP-MI) (20 minutes)

1:15 – 2:00 – Lunch

2:15 – 6:30 – Afternoon Session

13. Review of Technology Roadmap 2.0 (Flemings) (20 minutes)
14. Roadmap session (80 minutes)
15. Review of FY 07 activities (FY-1)
    a. CDEX (20 minutes)
        - Long Term Borehole Monitoring System
    b. USIO (20 minutes)
        - Pulse Telemetry Module Feasibility and Design Study
        - Logging While Coring Core Barrel
    c. ESO (20 minutes)
        - Downpipe Camera System Feasibility Study

Thursday: January 10, 2008
9:00 – 1:00 – Morning Session

16. Status of FY08 activities (FY)
    a. USIO (20 minutes)
        - SODV Status
        - Externally funded projects and third party tools
    b. CDEX (20 minutes)
        - Long Term Borehole Monitoring System
        - Chikyu Operations
    c. Externally funded projects and third party tools (10 minutes)
        - Status update
    d. Externally funded projects and third party tools (IODP-MI) (20 minutes)
        - DeepStar proposal update
        - Core Quality and Quantity Assessment
17. Panel Structure / Terms (Flemings / IODP-MI) (15 minutes)

18. Engineering Development Process Implementation (Myers) (60 minutes)
    a. Proposal review process
    b. 2008 proposal submission season for FY2010 funding

19. Discussion of STP Consensus Item 0708-15, Open Hole VSP (30 minutes)

20. Status roadmap scoping study (EDP Consensus 0707-07: Scoping Studies) (IODP-MI)

1:15 – 2:00 – Lunch
2:00 – 3:00 – Tour of Observatory
3:15 – 6:30– Afternoon Session

21. Final EDP comments on FY 09 Eng. Plan (FY+1) (EDP-led) (30 minutes)
22. Roadmap Session 2 (100 minutes)
23. 3rd Party Tools Review (Myers) (10 minutes)
24. Finalize and Review Roadmap Additions (60 minutes)
25. Date and location of EDP meeting # 7 (20 minutes)
26. Preliminary date and location EDP meeting #8 (10 minutes)

Friday: January 11, 2008
9:00 – 3:00 Executive Session
27. Finalize Consensus Items and Recommendations
    a. FY09 engineering development plan
    b. Proposal review process
    c. Technology Roadmap changes
    d. Clear definition of project scoping study
    e. Select chair and vice-chair
    f. Parting comments

EDP #5 Consensus Items

Item No.	Title	Description	Comments
0707-01	**Approval of Agenda**	The EDP approves the agenda for EDP Meeting #5.	**Closed**
0707-02	**Approval of EDP Meeting #4 Minutes**	**The EDP approves the minutes from EDP Meeting #4.**	**Closed. Minutes were posted on website.**
0707-03	**EDP SSEPS Liaison**	One important way that EDP can learn of engineering development needs is through interaction at the SSEP meetings. In addition, EDP can provide to SSEP important insight regarding the state of engineering development and current engineering capabilities in the IOPD. EDP requests SPC modify EDP's Terms of Reference as follows: Current wording: "The EDP chair shall be liaison to the SPC, with vice-chair as alternate. The SPC chair shall be a liaison to the EDP, with the SPC vice-chair as alternate. A science coordinator from the IODP-MI Sapporo Office shall attend each EDP meeting. Representatives from the IOs shall also be invited to attend the meetings." Revised wording: "The EDP chair shall be liaison to the SPC, with vice-chair as alternate. The SPC chair shall be a liaison to the EDP, with the SPC vice-chair as alternate. A representative from IODP-MI shall attend each EDP meeting." Representatives from the IOs shall also be invited to attend the meetings. EDP will send a liaison to SSEP meetings.	**Closed**. SPC endorsed the change of wording to allow for an EDP liaison to SSEP

EDP #5 Consensus Items con't

Item No.	Title	Description	Comments
0707-04	**High Priority Engineering Developments**	EDP, in closed session, discussed and debated the merits of each of the Engineering development items in the Roadmap. The EDP has formulated a list of about 10 unranked items in each of the three sub-groups (1) Sampling, Logging, Coring; 2) Drilling, Vessel Infrastructure, 3) Borehole Infrastructure) that are of high priority (Table 1.0, below). No effort has been made to establish relative priorities between sub-groups. EDP will continue to discuss the relative merit of every item in the Roadmap and it is expected that priorities will evolve over time.	**Closed**. Table is included in roadmap and posted as a stand-alone document on the ED website.
0707-05	**EDP Technology Roadmap 2.0**	EDP Technology Roadmap 2.0 will be recorded as an appendix to the EDP Meeting Minutes. This document is released as a public document. It is a second draft and it is a work in progress. EDP will continue to refine the EDP Technology Roadmap in future EDP meetings.	**Closed**. Version 2.0 is posted on the ED website.

EDP #5 Consensus Items cont'd

Item No.	Title	Description	Comments
0707-06	**IODP-MI Coring Study**	EDP Supports the IODP-MI proposed coring study.	**Closed**. Coring study was included as Engineering Development project in IODP-MI Annual Program Plan.
0707-07	**Scoping Studies**	EDP recognizes that there are many entries in the technology roadmap that address related technology challenges (Table 2). EDP recommends that IODP-MI carry out "analysis of options" studies to prioritize alternative approaches. In future meetings EDP will recommend specific studies.	EDP to further define this task.
0707-08	**Location/Time EDP Meeting #6**	EDP proposes EDP Meeting #6 be held in France (Paris and Nice have been proposed as possible locations) from January 9-11, 2008 (Wednesday-Friday). The meeting will be hosted by Roland Person. EDP proposes EDP Meeting #7 be held in the United States July 14-16, 2008 (Monday-Wednesday). Washington D.C. and Monterey have been proposed as possible locations.	**Closed**. Here we are in Nice! Location of EDP Meeting #7 to be determined.

10th Science Planning Committee (SPC) Meeting

August 27-30, 2007
Santa Cruz, California

Report to January 2008 EDP meeting
Jim Mori, SPC Chair

1. Expedition Scheduling
2. Evaluation of Proposals at OTF
3. Missions
4. CDP's
5. Implementation Plan
6. Engineering Development Proposals
7. Other Issues

1. Expedition Scheduling

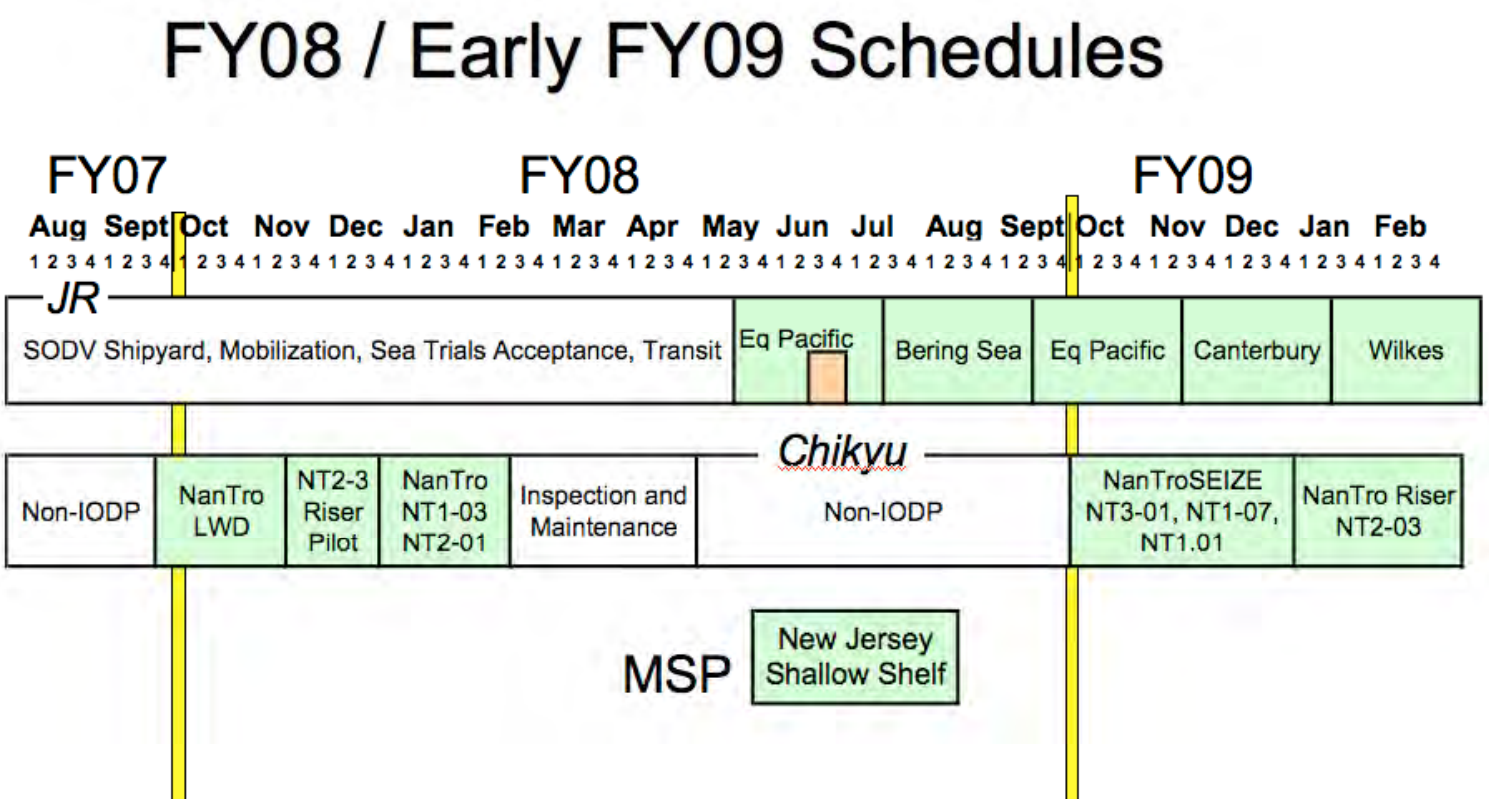
- First Chikyu expedition in Sep. 2007 ! (At sea right now).

- Delivery of new JOIDES Resolution delayed several months until April/May 2008 because of shipyard schedules. Previously approved schedule needed to be delayed.

- For MSP, non-availability of platform resulted in one year delay for New Jersey expedition to spring 2008 (Great Barrier Reef in 2009).

- New financial situation (only 8-9 months/year of ship operations) introduces complex problems for IODP scheduling.

Schedule approved by SPC



Moving to the Atlantic Ocean is a priority for FY2010 JR expeditions

2. Evaluation of Proposals at OTF

- Currently 23 proposals sent by SPC to the Operations Task Force (OTF) await scheduling
  (4 to 5 non-riser expeditions will be scheduled per year)

- SPC needs to re-prioritize these proposals
  (otherwise scheduling will be decided by OTF
  mainly on cost and logistical issues)

- Need priorities for longer range planning of riser and other challenging programs

Because of lack of time, not all proposals were discussed.
It was important to discuss the 'high cost' proposals, because OTF needs guidance in the present fiscal situation.

Proposals were discussed in 3 groups

- Proposals with observatory components
- Riser proposals
- MSP proposals

For each proposal, one of the following actions was decided

- Remain at OTF as high priority proposal
- Return to SPC to be re-ranked with new proposals
- Deactivate

Proposals with Observatory Components

505	Mariana Convergent Margin (coring program without CORKs)	Leave at OTF
537A	Costa Rica Seismogenesis Project Phase A	Return to SPC
537B	Costa Rica Seismogenesis Project Phase B	Return to SPC
553	Cascadia Margin Hydrates	Return to SPC
589	Gulf of Mexico Overpressures	Return to SPC
621	Monterey Bay Observatory	Deactivate (permitting not possible)
633	Costa Rica Mud Mounds	Return to SPC
677	Mid-Atlantic Ridge Microbiology	Leave with OTF
693	APL S. Chamorro Seamount CORK	Leave with OTF

Riser proposals

537B	Costa Rica Seismogenesis Project Phase B	Return to SPC
595	Indus Fan and Murray Ridge	Leave with OTF

* This decision sets the current priority for the next riser drilling program.

Mission Specific Platform (MSP) Proposals

548	Chicxulub K-T Impact Crater	Return to SPC
581	Late Pleistocene Coralgal Banks	Return to SPC
637	New England Shelf Hydrogeology	Return to SPC

Proposals Not Discussed

These proposals need to be discussed at the next meeting

477 Sea of Okhotsk Plio-Pleistocene
549 Northern Arabian Sea Monsoon
605 Asian Monsoon
522 Superfast Spreading Crust
552 Bengal Fan
644 Mediterranean Outflow
654 Shatsky Rise Origin
659 Newfoundland Rifted Margin
661 Newfoundland Sediment Drifts

3. Missions

Over arching principles for Missions

(1)Effectively and efficiently address scientific themes of global significance that originate from the scientific community;
(2) Missions do not replace regular proposal process
(3) Definition and planning should integrate scientific strategies, technological approaches, management and education and outreach plans
(4) Should be proposed only when there are compelling reasons for development of complex strategies or coordination of multiple expeditions
(5)Engage a broader array of scientific stakeholders, including the younger generation and new communities

Criteria for Mission designation

(1)Plan should lead to considerable scientific success and be a high IODP priority

(2) Has compelling reasons for considerable technological development and/or complex drilling strategies require advance planning on a longer term than for typical expeditions

Discussions included,

- Watchdog comments
- SSEP reviews
- Reviews from an external review panel

Mission Monsoon

- Not designated as a Mission

- Mission designation not needed to accomplish scientific goals.
  There are several good proposals at OTF and in the system.

- Components should be unbundled and submitted
  as individual proposals

- As requested by SSEP, a DPG is to be formed for coordinating
  active proposals on Asian Monsoons
  (Not yet started because it has been difficult to find a willing chair)

Birth of Oceans

- Not designated as a Mission

- Does not have a clear description of a coherent and integrated plan for reaching its scientific goals

- There are currently a sufficient number of proposals on continental break-up and initiation of seafloor spreading

Mission Moho

- Not designated as a Mission
- Split SPC vote
- Proponents should improve proposals through normal process
- Request EDP to look into developing deep hole technologies

Pros	**Cons**
Ambitious high-profile project, that addresses long-standing goal in geophysics.	Not feasible for time lines specified in the Implementation Plan
Challenging engineering issues for a deep hole	Challenging engineering issues for a deep hole
Received high reviews from the external review panel	Low social relevance
	Some components are not ready
	High cost, not possible before 2013

4. CDP's

SPC discussed the CDP designation for umbrella proposals, using the following criteria

(1) Strong potential to significantly advance understanding of ISP themes
(2) Comprised of an umbrella and closely interrelated component proposals
(3) Has overarching objectives that can be attained solely by completion of components, not by a series of independent proposals
(4) Requires multi-phased and/or multi-platform expeditions

4. CDP's

707 Sagami Bay Seismic Monitoring **was designated** as a CDP

- Satisfies CDP criteria
- Important to extend land-based observations off-shore
- Addresses seismic hazards in a densely populated area

694 Izu-Bonin-Mariana Arc Evolution **was not designated** as a CDP

- Split vote
- Maybe, some difference in SPC and SSEP definition of CDP
  (SPC watchdogs recommended CDP designation)
- Some components can stand alone as individual proposals.
  Is this a reason 'not' to designate a CDP ?
- Decision probably reflects current fiscal situation, especially in regards to drilling a deep 6 km hole.

5. Implementation Plan

SASEC Guiding Principles for Phase II

1. High scientific impact in next 5 years;
2. Necessary precursor for future investigations - build for future;
3. Reach major milestones
4. Balance among risk, cost, and scientific impact
5. Integrated, interdisciplinary approach
6. Societal relevance
7. Minimum requirements

    MSP - one program every two years;

    Chikyu - average of 7 months/year over two-yr period (must include riser operations);

    JOIDES Resolution - average of 7 months/year over 5-years

Implementation Plan

SASEC Special Focus Areas for Phase II of the IODP

1. Limits of life - microbial biosphere
2. Rapid and extreme climate and sea level change
3. Seismogenic zone and initiation of borehole observatories
4. Deep crustal section

- *SPC support for Guiding Principles*
- *SPC support for the 4 focus areas*

6. Engineering Development Panel

- SPC accepts recommended changes to terms of reference of EDP to send liason to SSEP meeting
(SPC Consensus 0708-13)

- Support for the long-term roadmap

- Engineering Development Proposals
10 proposals submitted to IODP-MI, 3 were rated
4 stars SCIMP and S-CORK
3 stars Motion Decoupled Hydraulic Delivery System

SPC endores EDP FY2009 engineering develoment plan, including development of borehole measurement tools, and a phase approach for the development of SCIMPI and S-CORK tools. (SPC Consensus 0708-18)

- Why are there 2 systems under development ?
- Importance of high level system design

SPC deferred forwarding to OTF

712-APL Sediment CORK Trial Installment

7. Other Issues

See meeting minutes for details

- Approval of new SSEP co-chair Heiko Pälike (July 2007)
- Nominations for *Scientific Drilling* Editorial Board
  (Camoin, Ohkouchi, Yamamoto, Behrmann, Becker)
- Site Survey Panel (**SSP**)
  (Data Bank working well, wants to meet twice a year)
- Environmental Protection and Safety Panel (**EPSP**)
  (looking at pre-prop, may shift to 1 meeting/year, cannot reduce size of panel)
- Science and Technology Panel (**STP**) recommendations
  (microbio recommendations, no benefit in merging or joint meetings with EDP)
- Report of the Hotspot Geodynamics DPG Report
- Industry-IODP Science PPG (**IIS PPG**)
- Consideration of Hybrid Industry-IODP proposals

SPC thanks **Nobu Eguchi** for his dedicated and skillful service as Science Coordinator

SPC thanks the following members for their knowledgeable and conscientious efforts

Tim Byrne
Chris MacLeod
Hiroyuki Yamamoto
Barbara Bekins

SPC especially thanks **Keir Becker** for his wise and careful leadership as chair of the committee

Summary of EDP Presentation to SSEP 9

Bill Ussler
Monterey Bay Aquarium Research Institute

January 9, 2008

ISP Principles of Implementation

1. Coordinated use of multiple platforms within a single program
2. Engineering development and use of special measurement and sampling tools
3. New logging program
4. Coordination with observatory sciences
5. Establishing a Site Survey Program
6. Cooperation with other initiatives and industry

EDP Mandate

- Identify long-term (two to five year lead time) technological needs
- Recommend priorities for engineering developments

Appropriate activities shall include:

a. Assess commercial, off-the-shelf technology

b. Identify modes for pursuing engineering development

c. Develop performance requirements

d. Formulate procedures to develop and evaluate program contracts

EDP Biannual Meetings

- EDP 1 - Boston, MA (September 26-28, 2005)
- EDP 2 - Fuchinobe, Japan (January 25-27, 2006)
- EDP 3 - Windischeschenbach, Germany (June 27-29, 2006)
- EDP 4 - New York, NY (January 25-27, 2006)
- EDP 5 - Tokyo, Japan (July 9-11, 2007)
- EDP 6 - Nice, France (January 9-11, 2008)

Major EDP Activities

- EDP 1 - reviewed 3 proposals forwarded by SSEP; established 3 working groups for developing the TR
- EDP 2 - discussion of TR
- EDP 3 - draft TR, version 1.0
- EDP 4 - review of TR, ranking schemes
- EDP 5 - revision of TR, version 2.0; ranking of ED; ED proposal review
- EDP 6 - review FY07 & FY08 ED activities; revision of TR

Technology Roadmap (TR)

- Linked to ISP - Major Themes and Initiatives (Table 1)
- Identified major Technology Challenges (Table 2)
- 3 Engineering Development (ED) Subgroupings in TR
  - A. Sampling/Logging/Coring (24 needs)
  - B. Drilling/Vessel Infrastructure (32 needs)
  - C. Borehole Infrastructure (21 needs)
- Ranking of ED priorities - identified top 10 in each TR subgrouping with no internal ranking
- Consider ED needs for all 3 drilling platforms
- An evolving document (http://www.iodp.org/eng) - version 2.0 posted

'Top 10' Unranked Engineering Developments Deemed 'High Priority' at EDP 5

Sampling/Logging/Coring	Drilling/Vessel Infrastructure	Borehole Infrastructure
A1) Thin Walled Geotechnical Sampler	B3) Heave Compensation	C1) High temperature electronics, sensors, and sensor systems
A2) Cone Penetrometer/Remote Vane	B5) Seabed Frame	C4) Hydrologic Isolation
A4) Hard rock re-entry system (HRRS)	B8) Improved Automatic Driller	C5) Realiable wellhead hanger seals
A11) Rotary sidewall coring	B9) Drilling Parameter Acquisition while coring	C6) Electric, optical fiber and fluid feed-throughs at wellheads and in subsurface casing completions
A12) Provide core orientation on standard coring tools - Structural Orientation of Hard Rock Cores	B10) Real Time Drilling Paramater Acquisition while coring	C9) Physical coupling of acoustic instruments to formations and decoupling from noise sources
A13) Seabed coring devices	B14) Electric/Optical Wireline	C14) Systems reliablity for LTMS

Ranking algorithm - priority is weighted by the self-determined expertise of the panel member. Each subgroup ranked separately.

'Top 10' Unranked Engineering Developments Deemed 'High Priority' at EDP 5 - continued

Sampling/Logging/Coring	Drilling/Vessel Infrastructure	Borehole Infrastructure
A16) Pressure coring systems (PTCS, PCS, FPC, HRC, etc.)	B19) Protocol for Proper Mud Design	C15) ROV-serviceable wellheads and submarine cable connections
A17) Pressurized Sample Transfer (autoclave)	B21) 4000 m class riser system	C17) Design standards for electrical, communications, mechanical, and fluid systems
A21) Anti-contamination system (gell core barrel)	B22) 4000 m class BOP	C18) Deployment procedures/soft-landing for borehole infrastructure and instruments
A23) Fluid samplers, temperature, and pressure measurement tools	B27) Drill pipe for ultra deep ocean drilling	C19) Managing borehole experiments
A24) Transition corers		

Mapping of New Focus Areas (2008-2013) to Technology Roadmap

- Deep biosphere and limits of life
- Rapid climate change, extreme climates, and sea level change
- Ocean crust formation and deep crustal section
- Seismogenic zone and initiation of borehole observatories

Deep biosphere and limits of life

- Improved core recovery and quality
- Heave compensation (B3 & B4)
- Pressure coring systems (A16)
- Pressurized sample transfer (A17)
- Anti-contamination system (A21) - gel?
- Fluid samplers, temperature and pressure measurement tools (A23)

Rapid climate change, extreme climates, and sea level change

- Improved core recovery and quality
- Heave compensation (B3 & B4)
- Seabed frame (B5)
- Improved rig instrumentation system (B7)
- Controlling inadvertent magetization (B16, B17 & B18)
- Borehole camera (B20)
- Vibracore/percussion sampler (A9)
- Core orientation (A12)
- Seabed coring devices (A13)
- Jumbo piston corer (A14)
- Upgrades to XCB system (A20)
- Transition corers (A24)

Ocean crust formation and deep crustal section

- Fluid samplers, temperature and pressure measurement tools (A23)
- Heave compensation (B3)
- Hard rock drilling and coring systems (A4, A6 & A7)
- Retractable bit technology (A8)
- New RCB bits (A19)
- Mud design (B19)
- 4000 m class riser system and BOP (B21 & B22)
- Improved DP (B24) - Chikyu
- Improve expandable casing system (B25)
- Cementing protocol for deep drilling (B26)
- Drill pipe for ultra deep ocean drilling (B27)
- High temperature/High pressure vertical drilling system (B28)
- Mud circulation for riser drilling >3km water (B29)
- Temperature tolerant mud/drilling bits (B32)

Seismogenic zone and initiation of borehole observatories

- Thin walled geotechnical sampler (A1)
- Retractable bit technology (A8)
- Pressure coring systems (A16)
- Fluid samplers, temperature and pressure measurement tools (A23)
- Heave compensation (B3)
- Mud design (B19)
- 4000 m class riser system and BOP (B21 & B22)
- Improved DP (B24) - Chikyu
- Cementing protocol for deep drilling (B26)
- Drill pipe for ultra deep ocean drilling (B27)
- Mud circulation for riser drilling >3km water (B29)
- Temperature tolerant mud/drilling bits (B32)
- Borehole Infrastructure (C1 thru C21)

IODP-MI Role in Executing the TR and ED

- Formulated the Engineering Development Proposal Process
- Established an ED website: http://www.iodp.org/eng
- Greg Myers and Kelly Oskvig - points of contact
- April 15, 2007 - 1st ED proposal deadline
- Prior to April 15, confidential feedback from IODP-MI was available to proponents
- Selected ED proposals for evaluation by EDP

ED Proposal Evaluation Process

- Four proposals received from IODP-MI
- Watchdogs assigned
- Full panel presentation, evaluation, and discussion
- Conflicts of interest were self-identified and noted in minutes; conflictees excused
- Written comments and grouping (5 star grouping) passed along to IODP-MI
- IODP-MI passed 3 proposals to the SPC for consideration for inclusion in Annual Program Plan - 3 stars and above

ED Proposals Forwarded to SPC

- SCIMPI - Simple Cable Instrument for Measuring Parameters In-situ
- Sediment-CORK (S-CORK)
- MDHDS - Motion Decoupled Hydraulic Delivery System

Proposals Evaluated at SSEP9

- 22 proposals evaluated
- Only 3 were new (1 Pre; 2 APL)
- Themes:
  - Deep biosphere and subsearfloor - 2
  - Environment - 8
  - Solid Earth - 12
- Forwarded to SPC - 7 + 1 APL
- Sent out for external review - 2

SSEP Proposal Evaluation Process

- Pre proposal - Pre
  - request Pre2, Full, or 'new proposal'
- Full proposal - Fullx
  - request Full2, or 'new proposal'
- Ancillary Project Letter - APL

- SSEP review - watchdogs assigned; working group review; feedback to proponents
- SSP and EPSP reviews - sent to proponents
- External reviews - sent to proponents
- Send to SPC with grouping
  - 5, 4, or 3 stars only
  - by consensus

Proposal	Lead	Topic	Platform	Tech Issues
535	Dick	Atlantis Deep Bank (Moho?)	NR/R (?)	deep drilling in basalt/gabbros/serpentinites
567	Thomas	South Pacific Paleogene	NR	core recovery in Eocene chert/carbonate interbeds
636	Kopper	Louisville Seamount Trail	NR	drilling/coring hard rock (350 m in basalt)
658	Planke	N. Atlantic Volcanism and Paleoclimate	R/MSP	drilling/coring hard rock; continuous core recovery required; proposed branched drilling of 2-3 holes across the P/E boundary to ensure complete core coverage; overpressures
662	D'Hondt	S. Pacific Gyre Microbiology	NR	core contamination; drilling/coring hard rock (100 m)
669	Sager	Walvis Ridge Hotspot	NR	drilling/coring hard rock - high resolution paleomag
672	Andren	Baltic Sea Basin Paleoenvironment	NR	none
681	LeFriant	Lesser Antilles Volcanic Landslides	NR	high recovery of undisturbed sediments; complex subsurface structure/fractures/volcanic breccia
686	Jaeger	S. Alaska Margin 1: Climate-Tectonics	NR	none
692	Hopper	Flemish Cap Rifted Margin	NR	conical side entry sub?
696	Pearce	IBM - Deep Forearc Crust	NR	sidewall core sampling; drilling/coring hard rock (1750 m)

NEW

Proposal	Lead	Topic	Platform	Tech Issues
697	Tamura	IBM - Mariana Rearc Crust	NR	high T in borehole?
698	Tatsumi	IBM - Mariana Middle Crust	R	8000 m borehole; 7200 m in basement; sidewall coring; high T
701	Wortman	Great Australian Bight Deep Biosphere	NR	core contamination; pressure core sampling
703	Brown	Costa Rica SeisCORK	NR/R	borehole observatories; seisCORK development
705	Kennett	Santa Barbara Basin Climate Change	NR	none
717	Muller	Western Australia Breakup Volcanism	NR	drilling/coring hard rock
724	deMenoca	Gulf of Aden Paleoenvironment	NR	none
725	Huisman	Volcanic Rifted Margins Norwegian-Greenland Sea	NR	1 deep hole (NR-industry); recovery of volcanic sequences
726	Mitchell	Canyon Evolution - S. Barbados	NR	none
727	Orihashi	Gulf of Aden Drillling	NR	drilling/coring hard rock
728	Droxler	Gulf of Papua Drowned Coralgal Reef	MSP	2 100-m diamond drilled holes in coral; add to 519-Full2

Technical Needs Discussed at SSEP9

- A vocal minority (3) expressed interest in the technical needs of the program and made supportive statements concerning technology development within the IODP.
- One member asked why CORKs and associated observatory technologies (ex. pressure transducers) have not had a performance evaluation.
- CORK technology is in high demand by highly ranked proposals - but expensive and prone to failures.
- IBM & Costa Rican Margin - technological needs were discussed in WG (fluid sampling, CORKs, Pducers, borehole seismometers).

5th Meeting of the IODP Scientific Technology Panel

20th-23rd August 2007
Beijing, China

Scientific Technology Panel Report to EDP

STP met officially for 3.5 days in Beijing.

In addition to the original agenda, STP considered at length the budget models/reduced service as requested by IODP-MI.

In discussing the budget models, STP provided some positive suggestions for further investigation.

In preparation for possible future budget reductions STP proposes a way forward in determining further options.

This is important in case the financial situation is not remediated by non-IODP work for the SODV and the CHIKYU.

At this meeting STP generated:

8 recommendations

23 Consensus Statements

3 Action Items

STP Recommendation 0708-07: Leak Off Test

STP Recommendation 0708-03: Effects of Riser Drilling on Cores

STP Recommendation 0708-08: QA/QC Draft Report

STP Consensus Statement 0708-15: Open Hole VSP

STP Consensus Statement 0708-15: Open Hole VSP

STP requested advice from EDP (Consensus 0601-03). STP wishes to follow up this general request and again seeks advice from EDP on whether there are "off the shelf solutions" or whether STP should seek to investigate technology development in seeking solutions to IODP requirements.

Background: Industry has a long history of successful VSP operations. EDP is the perfect group within the SAS to investigate this issue due to its strong connection with industry. Both improved downhole receiver technology or even downhole source technology could be considered.

STP Consensus 0708-10: Internet connection during STP meeting sessions

STP recommends limiting internet access within the meeting sessions be adopted as a general policy of STP and considered across all SAS meetings.

Background to STP Consensus Statement 0708-10:
At the STP 0708 meeting in Beijing internet connections during the formal meeting were not available.

Rather than being an obstacle, this lack of a readily available internet connection in the meeting room was found to be a great advantage.

The inability to have real-time connection e-mail communication during the meeting allowed the focus of the Panel to remain exclusively on the agenda items enabling excellent discussions involving all panel members.

Internet connections could be made available outside the meeting room, during the breaks, or at the hotel.

STP Action Items

STP Action Item 0708-32: Science Technology Roadmap Development

STP Action Item 0708-33: Measurements that Affect Drilling Decisions

STP Action Item 0708-34: Modifications to Drilling Fluids During Riser Drilling on Cores Acquired for Microbiology.

Next STP meeting:
February 18th-20th 2008

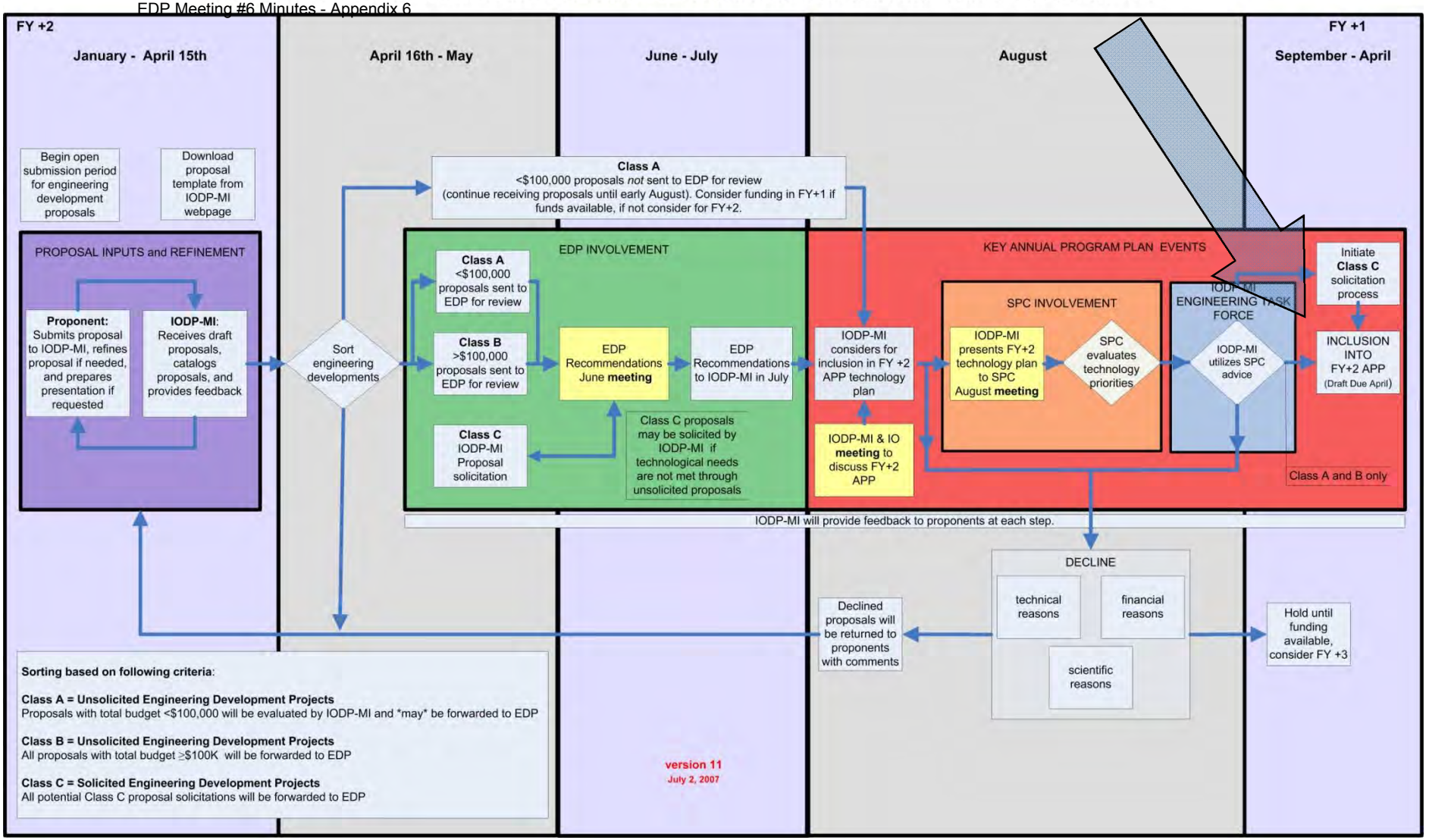
Location Sendai, Japan

Host: Noritoshi Suzuki

FY2009 Engineering Plan: how it was developed

…it began with implementing an engineering development proposal process

ENGINEERING DEVELOPMENT PROPOSAL SUBMISSION PROCESS FOR INCLUSION INTO THE ANNUAL PROGRAM PLAN



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

Near-Term Engineering Development Focus

Sampling, Logging and Coring

- Improving systems fundamental to IODP (refinements to core barrels, logging tools, etc.)

Drilling, Vessel Infrastructure

- Understanding the factors that control core quantity and quality (rig instrumentation, heave comp, drilling dynamics, etc.)

Borehole Infrastructure

- Standardizing equipment where possible, between platforms, observatories and procedures.

General Proposal Sequence

- April 15th - Engineering proposals submitted
- April 16th - Proposals reviewed by ETF
    - 10 Proposals received, 4 forwarded to EDP
- April 22nd – 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 9-11th - Proposals reviewed by EDP and star ratings assigned
- July 18th - Reviews sent to proponents
- August 10th - Proponent response letter sent to IODP-MI
- August - IODP-MI prepares FY2009 plan based on EDP advice and estimated budget, then presents to SPC

Outline

1. EDP# 5 Consensus Items
2. FY2008 Engineering Developments
3. FY2009 Engineering Development Plan
    1. Review of process
    2. Proposals
    3. Recommended plan
4. Proposal Review Process
5. Other

Proposal Summary

- 10 Proposals submitted
  - 6 - returned to proponents
  - 4 - forwarded to EDP
    - Well Head Interconnection System – (WHIC)
    - Motion Decoupled Hydraulic Delivery System (MDHDS)
    - Sediment CORK – (S-CORK)
    - Simple Cabled Instrument for Measuring Parameters In-situ - (SCIMPI)

Proposal Groupings by EDP

Forwarded for SPC consideration

4 Stars

- S-CORK
- SCIMPI

3 Stars

- Motion Decoupled Hydraulic Delivery System
  - (based on PRL and reviewers comments, this is likely to be rated higher)

2.5 Stars

- WHIC

Outline

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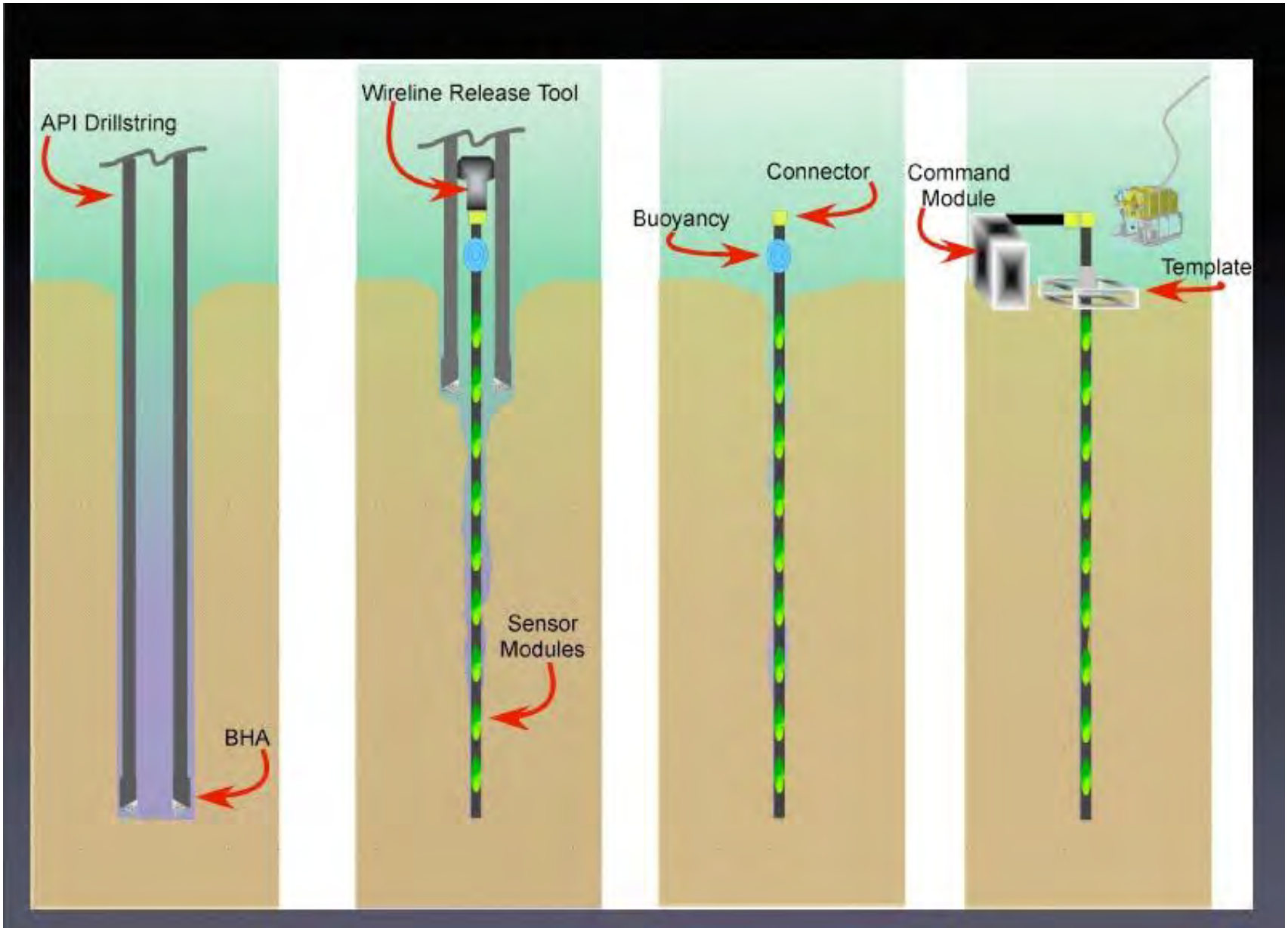
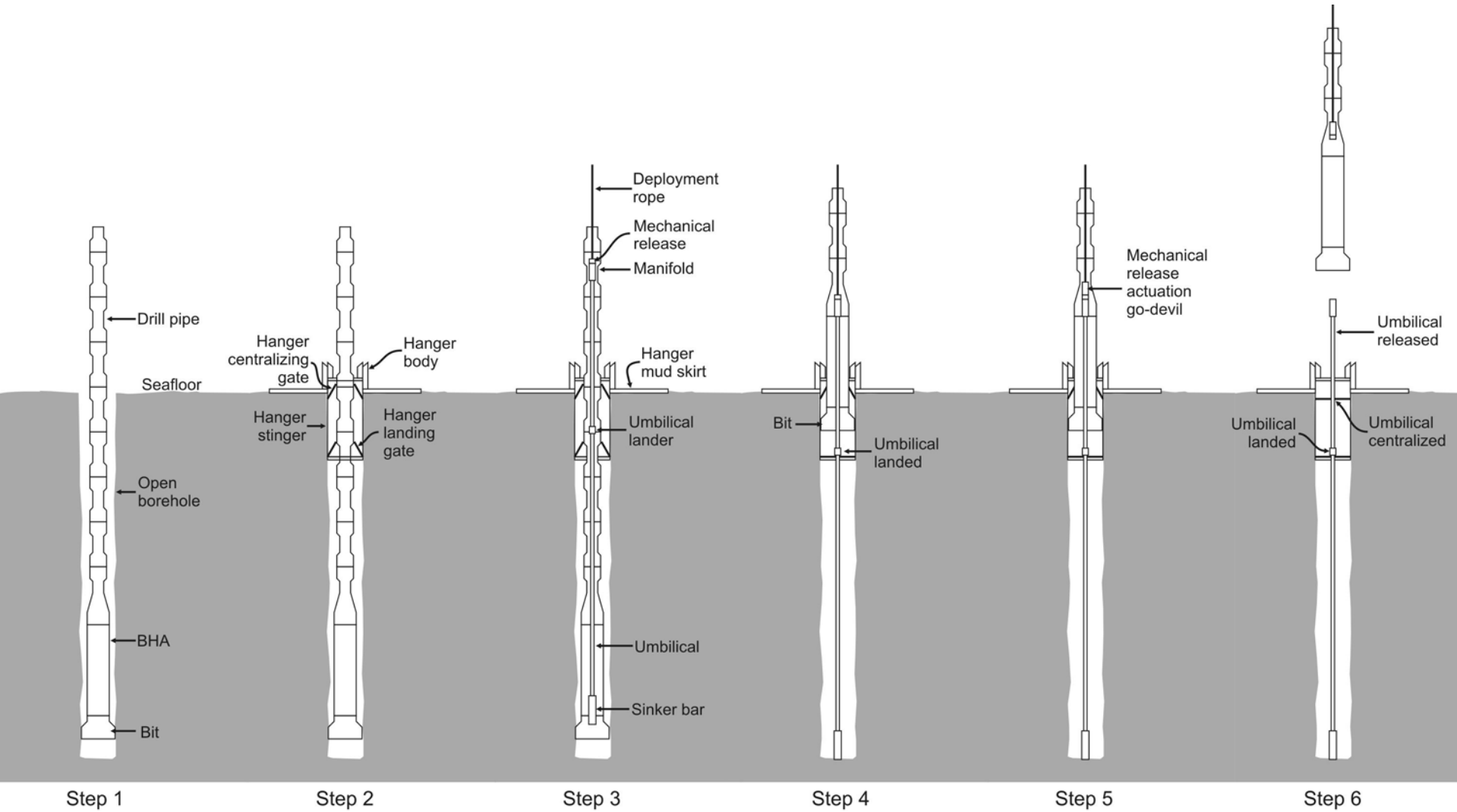
Simple Cabled Instrument for Measuring Parameters In-situ (SCIMPI)

- Variety of sensors can be deployed including sensors new to IODP
- Pre deployment sensor configuration required
- Quick deployment – saves rig time
- Could save up to 90% of traditional CORK costs
- Requires borehole collapse
- Can be deployed from multiple platforms


API Drillstring
BHA
Wireline Release Tool
Sensor Modules
Buoyancy
Connector
Command Module
Template

Sediment CORK (S-CORK)

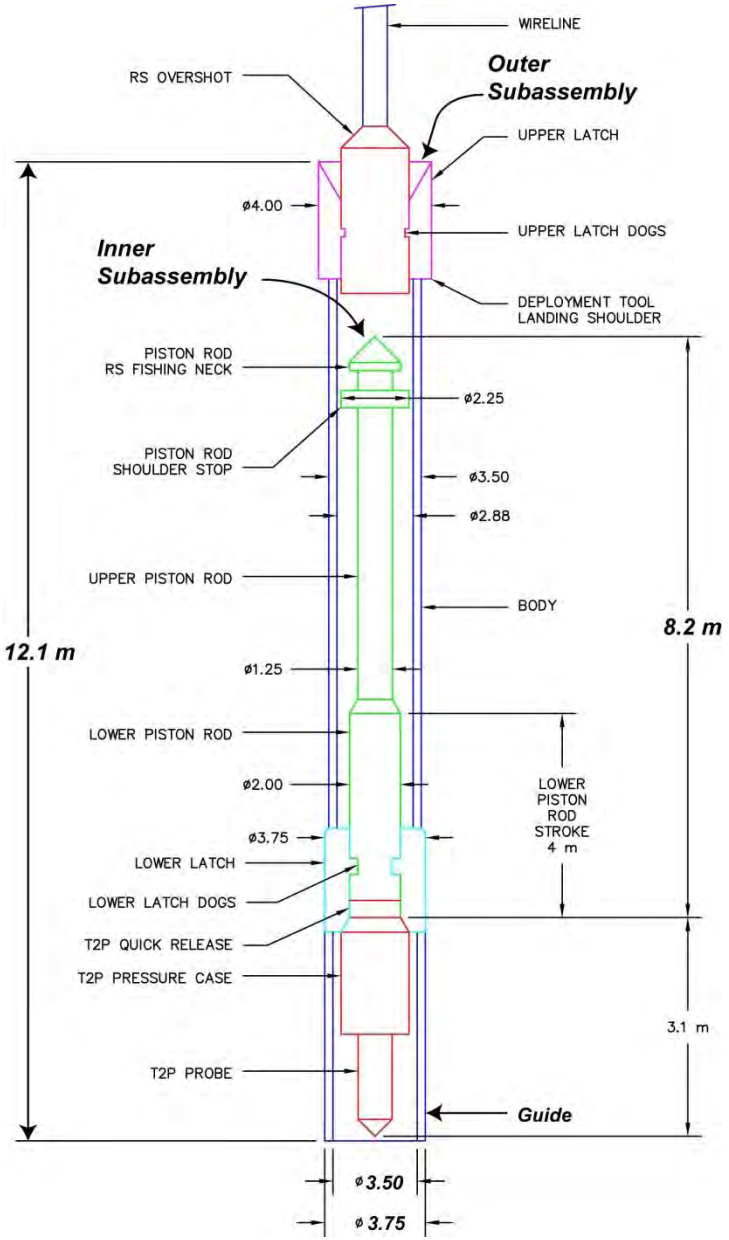
- Temperature and pressure measurement initially
- Typically will not be configured for each site.
  - One model approach
- Quick deployment – saves rig time
- Could save up to 90% of traditional CORK costs
- Can be deployed from multiple platforms
- Minimal ship time downhole hardware and
- Requires borehole collapse



Single-pipe-trip CORK with free-fall-deployed seafloor hanger

Motion Decoupled Hydraulic Delivery System

- Significant problems exist with making reliable in situ formation pressure measurements
- Remove tool dislodgement problem because the bottom hole assembly will not be driven into the base of the hole during penetration
- Improve control over the penetration process by using the drilling fluid to hydraulically insert the penetrometer
- More effectively decouple the penetrometer from drill string heave
- Allow real-time communication with the downhole tool through an armored logging cable that is available on IODP vessels



Outline

1. EDP# 5 Consensus Items
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    1. ~~Review of process~~
    2. ~~Proposals~~
    3. Recommended plan
4. Proposal Review Process
5. Other

FY2009 Plan – part 1

- Long Term Borehole Monitoring System

  CDEX will continue construction and testing of the LTBMS in FY2009, which builds on the planning, detailed specifications and prototyping completed in FY2007 and FY2008.

FY2009 Plan – part 2

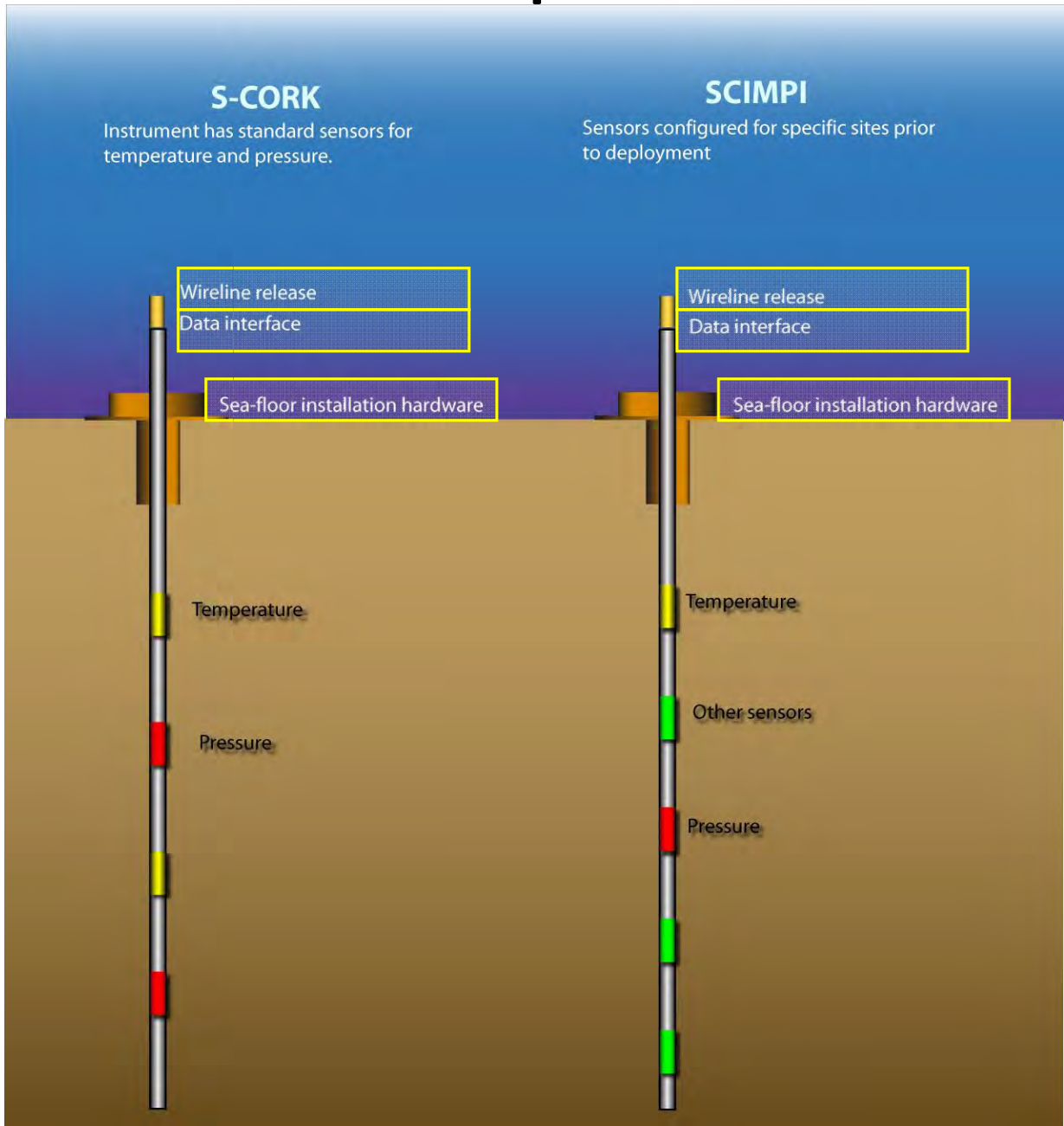
- Simple Cabled Instrument for Measuring Parameters In-situ (SCIMPI)
  - Re-structure proposal phases
  - Develop High Level Design Document first
  - Collaborate with S-CORK proponents on design of overlapping items
  - Begin construction in phase in subsequent year

- Sediment-CORK (S-CORK)
  - Re-structure proposal phases
  - Develop High Level Design Document first
  - Collaborate with SCIMPI proponents on design of overlapping items
  - Begin construction phase in subsequent year

- Solicit proposal for common deployment system
  - Design and build a common deployment system for both simple observatories. Proponents will work with each other, IO's, contractor and IODP-MI to create integrated system.

What will be developed?

- Two instruments will be developed by individual institutions
- Collaboration will occur on overlapping items such as:
  - deployment and installation systems
  - wireline releases
  - data interfaces
- An RFP will be issued for design and construction services of a common deployment system



FY2009 Plan - part 3

- Motion Decoupled Hydraulic Delivery System
  - In lieu of a seabed frame, this development will facilitate the acquisition of meaningful in-situ pressure measurements on Riser and Riserless platforms and provide a real-time link to the surface for use by pressure tools and core barrels.

Science Driver Statistics

38 Proposals at SPC, OTF or scheduled

- Observatories
  - Of the 38, 14 (or 37%) include an observatory
- Simple Observatories
  - Of those 14 observatories, 8 (57%) could be simple observatories
- In situ pressure measurements
  - Of the 38, 16 (42%) include in-situ pressure measurements

FY2009 Engineering Summary

1 existing project included:

- **Long Term Borehole Monitoring System –** build and testing phase

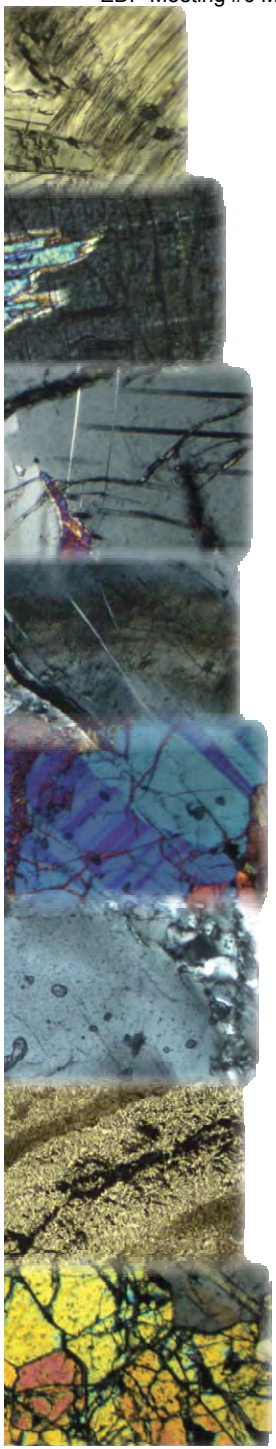
3 new projects included:

- Two similar 4-star proposals for simple observatories are included. IODP-MI proposes to address deployment issues and conduct high level designs for both simple observatories.
  - **SCIMPI and S-CORK**

- One 3-star proposal for building a new downhole hole delivery system for meaningful in-situ T&P
  - **MDHDS - Motion Decoupled Hydraulic Delivery System**

What are we asking for?

We ask that EDP endorse the FY2009 engineering plan in full.



IODP-USIO
Review of FY07 Activities

EDP Meeting

Nice, 9-11 January 2008

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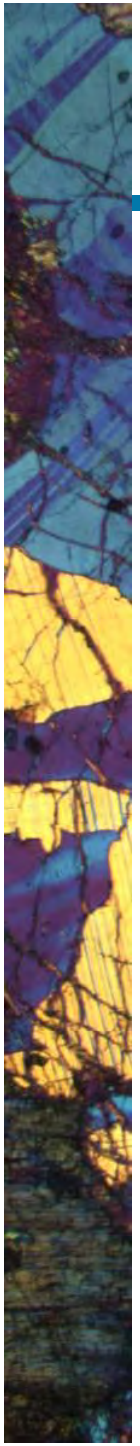

PTM Feasibility and Design Study

Background

- Development of a Pulse Telemetry Module (PTM) would add the ability to communicate with downhole tools, both receiving data and sending commands
- The DSS would provide an initial platform for evaluating data transmission in real time
- PTM Feasibility Study was initiated in January 2007 with the understanding that a develop project would not be initiated until the DSS was proven technology
- Five companies contacted to provide:
  - Written assessment of available off–the-shelf pulser technology.
  - An estimate of engineering and development time and costs to modify off-the-shelf technology.
  - An estimate of circulating fluid flow rates.
  - An estimate of pulse telemetry rates depths from 5,000 to 30,000 feet.
- One company responded positively

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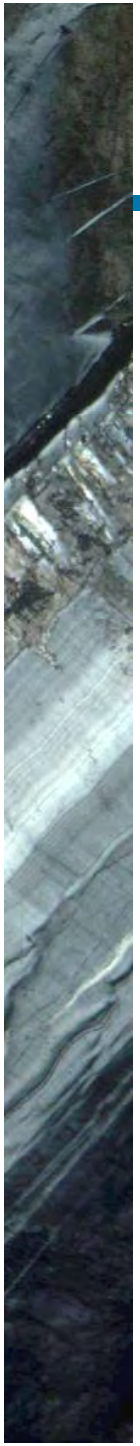

PTM Feasibility and Design Study

Study Results

- Request for Quotation issued to company interested in performing feasibility study
- Study received by IODP on 2 July 2007 with the following proposal:
  - Company standard pulser could be modified to fit IODP's purposes
  - ~1600 man hours to complete and test design work
  - Estimated hardware cost of $83,000 for 3 units
  - Estimated total price for 3 units is ~$250,000 (hardware and labor)
- Necessary flow rates from 100-400 gpm were in the range of IODP operation
- Net data transmission rate of one WOB/TOB data set every 30-40 sec
- Improvements in pulser operation and signal detection should lead to greater transmission rates in the future

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Drilling Sensor Sub Update

Description-DSS

- An instrumented drill collar sub which is installed just above the outer core barrel (~40 ft behind the bit)
- Records WOB, TOB, annulus/pipe pressure and annulus temperature at one second intervals stored in onboard memory
- Additional measurements can be added
- Data set not available until the DSS is recovered

Description-RMM

- Instrumented core barrel that receives information from the DSS during coring operations
- Collects data on WOB, TOB, annulus/pipe pressure and temperature in onboard memory
- Recovered after each coring run and data is downloaded

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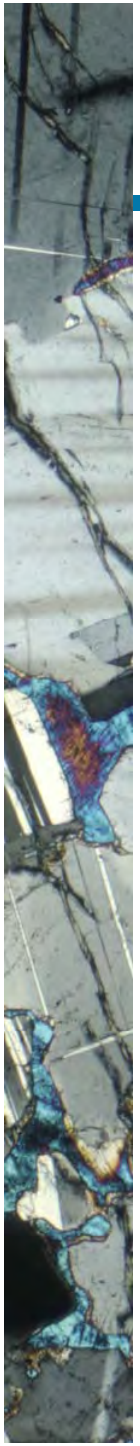

Drilling Sensor Sub Update

DSS/RMM Development History

- 2003
  - First deployments on ODP Legs 208 and 210 (with RMM on 210)
- 2005
  - DSS and RMM tested at Schlumberger Test Facility with data successfully transferred between DSS and RMM
- 2006
  - Tools sent to APS for analysis and repair and recalibration
  - New software installed to correct coefficient errors
  - Bench testing gave good readings on both WOB and TOB
- 2007
  - Both tools returned to TAMU with good readings on all sensor output
  - 31 March 2007 Drilling test
  - 17-18 May 2007 Pressure test
  - 21-22 June DSS/RMM Test
  - August 2007 DSS/RMM test cancelled due to communication failure
  - Communication problem attributed to software issue
  - Old software re-installed on DSS and bench tested
- 2008
  - Next step
    - Bench test DSS and RMM system
    - Schedule next drilling test

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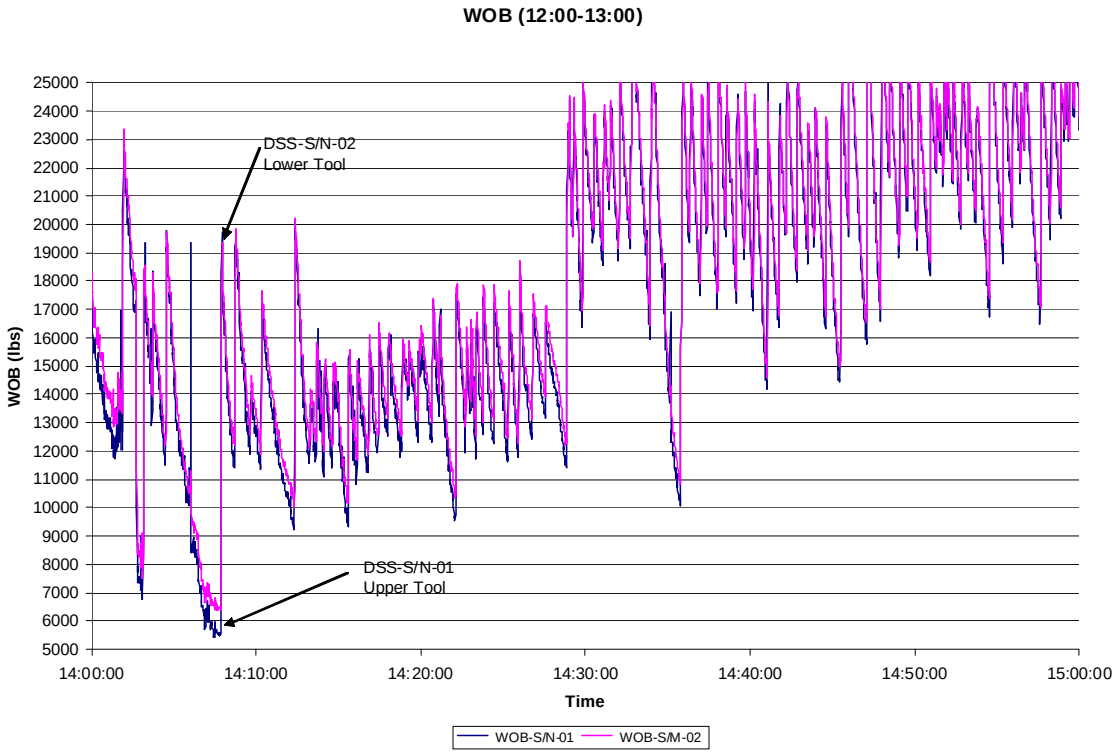
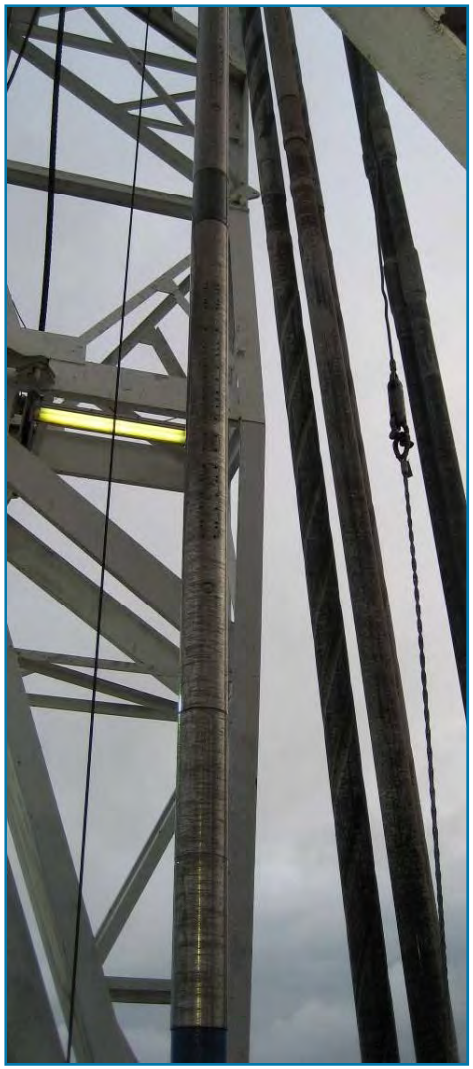
Drilling Sensor Sub Update

31 March 2007 Test

- Two tools run in tandem
- Test varied WOB, RPM and flow rates
- WOB and TOB for both tools tracked very well
- Rig Instrumentation data was not available after test (RIS data acquisition malfunction)





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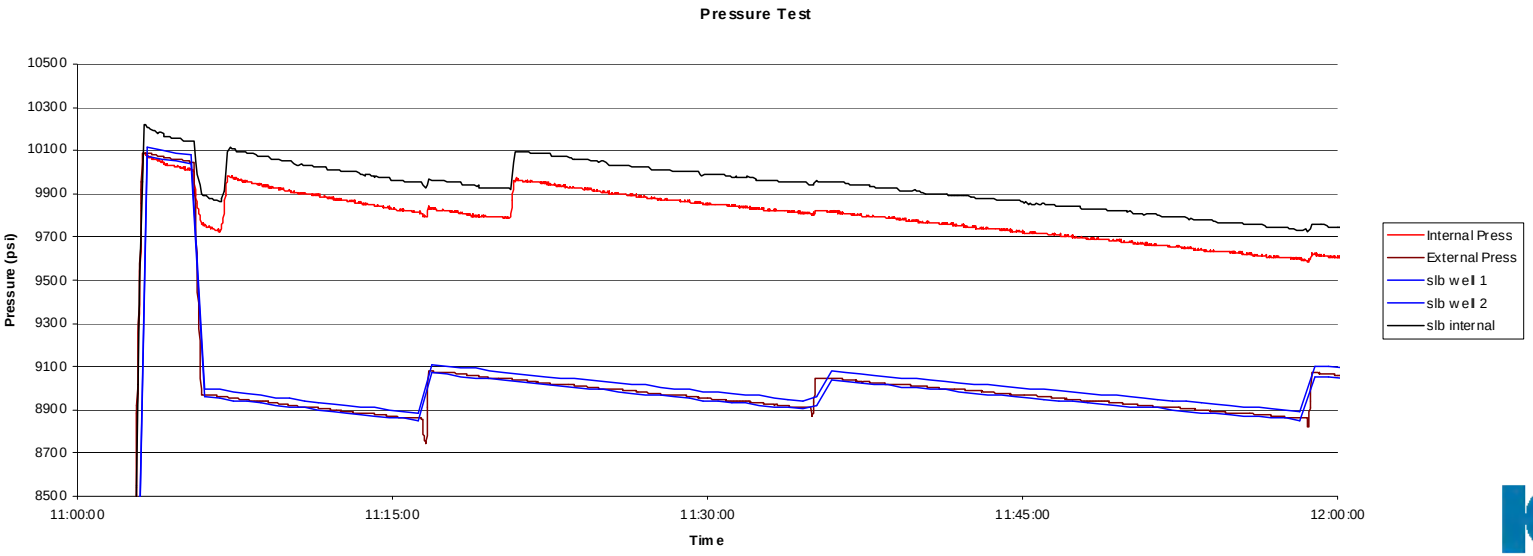
Drilling Sensor Sub Update

17-18 May Test

- Tools pressured to 10,000 psi
- Annulus pressure reduced by 1,000 psi
- Pressure equalized and temperature raised to 100C
- Internal pressure reduced by 1,000 psi

Results

- Pressure and temperature readings looked very good
- WOB and TOB were affected by pressure and temperature increase
- New coefficients have been developed to compensate for pressure and temperature effects



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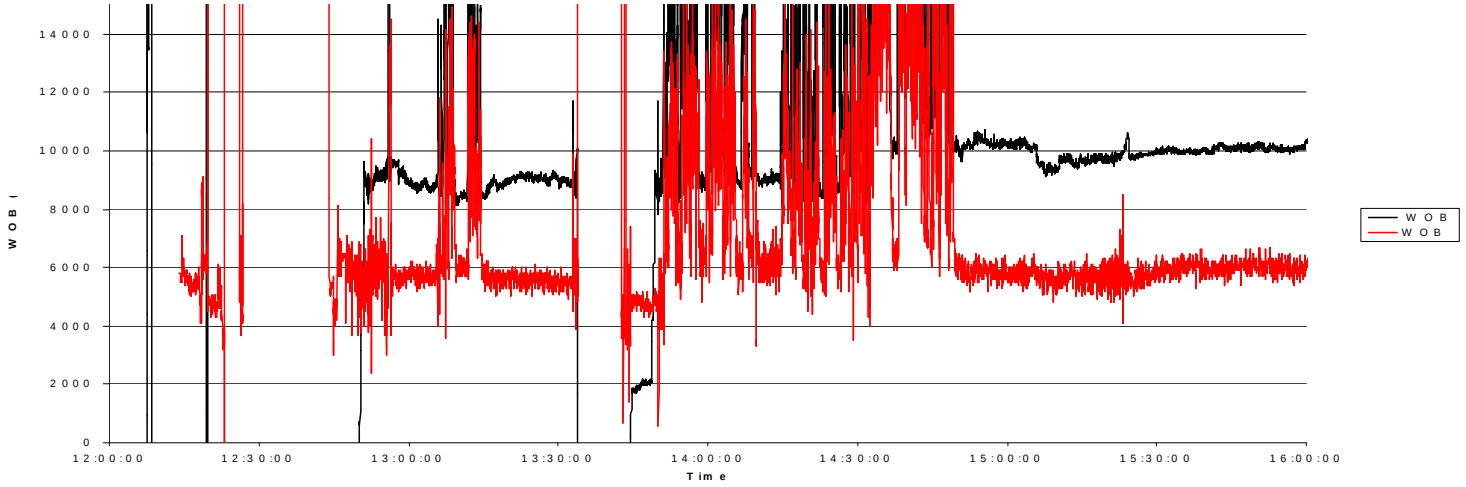
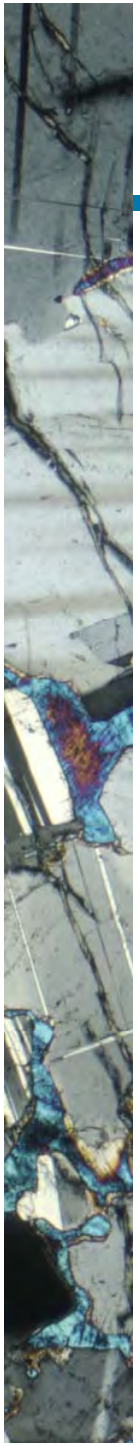
Drilling Sensor Sub Update

21-22 June 2007 Test

- DSS/RMM testing
- Communication problems on the first day caused a delay in the testing
- Test run with one DSS tool on 22 June
- Data transmission between RMM and DSS failed, reason for failure is under investigation
- Data collected from rig instrumentation compares favorably to data collected from DSS (~3000lbs hung below DSS)



Integrated Ocean Drilling Program
United States Implementing Organization



Drilling Sensor Sub Update

August 2007

- Communication problems between DSS and RMM caused test cancellation
- Determined that the communication problem was caused by new DSS software
- Old software loaded on DSS seemed to fix problem during bench test

FY08

- Bring RMM and simulators to College Station and test tools together to ensure communication link
- Drilling test at Schlumberger

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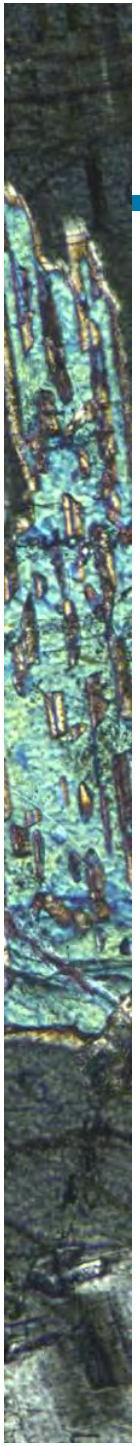
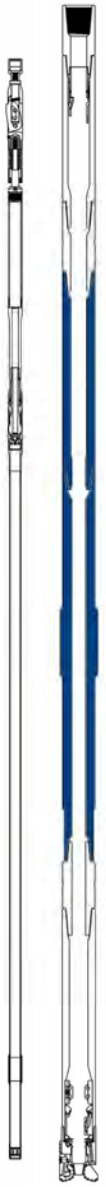


Logging-While-Coring Core Barrel

RAB-LWC Project Background

- Modified components
  - RCB BHA
  - MDCB barrels
  - RAB LWD tool
- Limited success
  - Up to 68% recovery on Leg 204
  - <1% on Leg 209
- Requested funds to
  - investigate the problem
  - manufacture core barrels, catchers



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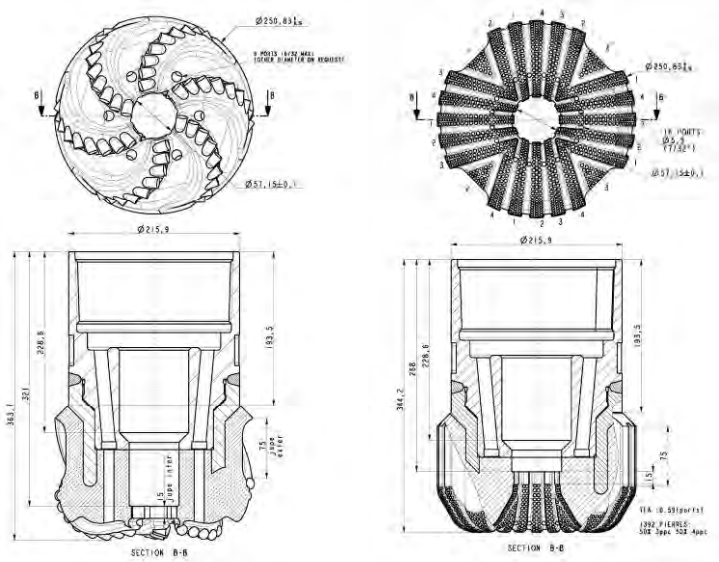
Logging-While-Coring Core Barrel

RAB-LWC Project Results

- ID mismatch
  - MDCB catcher 2.25 in.
  - RCB bit 2.312 in.
- Decided to keep MDCB barrels
- Coring/core bit survey
  - PDC standard
  - No off-the-shelf solution
- Commissioned two Varel PDC bits and tested at Genesis
- More work (4 months lead time) before deployment



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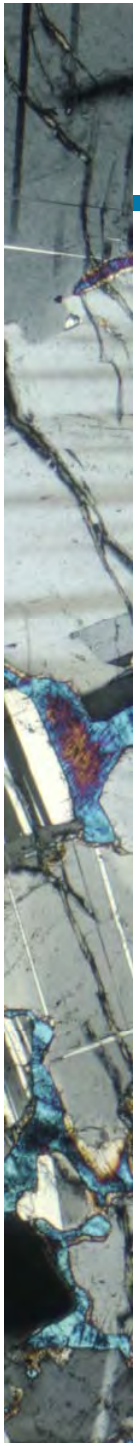

Common Data Acquisition System

Background

- Current Data Loggers
  - Support for current data loggers no longer available
    - Current data loggers have come to the end of technological lifespan
    - Technological advances have lead to breakthrough levels of accuracy and flexibility
  - CDAQ
    - Calibration, maintenance and repair done in-house
    - Software and hardware optimized for conditions pertaining to IODP operations
    - Spare stock quantities can be decreased
    - Owning rights to software and hardware allows expansion of eliminating proprietary issues

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Common Data Acquisition System

Description

- Data acquisition system to replace current data loggers on IODP downhole measurement tools (DVTP/DVTP-P, IWS, APCM and PCS)
- CDAQ features
  - 24 bit resolution potential
  - SPI and RS-232 serial interface
  - Persistor CF2 32-bit microcontroller MC68332 based single board computer system
  - Sample rate of 1 to 100 data points per second
  - 3 Axis digital output linear accelerometer
  - Common interface for IODP DHM tools

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Common Data Acquisition System

Schedule

- July 2007
  - Prototype boards fully populated for testing
  - Software developed
- August 2007
  - System integration firmware for DVTP replacement tool, Sediment Temperature Tool (SET)
- November 2007
  - Final Board Production and user interface complete
  - Hardware for mounting in DVTP received
- December 2007
  - Hardware and board assembled for use in SET
  - Parts shipped to *Chikyu* for initial deployment on Expedition 316
- 2008
  - SET tool with CDAQ electronics arrived at *Chikyu* 3 Jan
  - SET to be run at first opportunity

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APC Temperature Tool

Background

- Previous APCT:
  - After about 15 years APCT tools no longer operable due to damage, losses and obsolete electronics
  - Deficiencies in data storage, accessibility, retrieval
  - Inadequate processing of raw data
  - No dedicated calibration procedures and schedules exist
  - No continuous QA/QC for calibration and field data
- APCT (and DVTP) tools no longer fulfill basic requirements for operations
  - OTF Report recommendations - Expedition 311:
    - Replacement of APCT with new tools (APCT3), receiving adequate support
    - Develop proper calibration and service facilities for new (and past) tools is critical
    - Develop shipboard downhole tool calibration facility for T in FY08
- APCT3 Developed by H. Villinger (Univ. Bremen), A. Fisher (UCSC), built by ANTARES (Bremen)
  - USIO will operate three owned tools and three on loan from UCSC (A. Fisher)
  - CDEX will operate six owned tools
  - All tools scheduled for recurring calibration/overhaul returns to USIO through lifetime
  - All calibration and primary readout data will be documented, stored, and made accessible through IODP databases

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APC Temperature Tool

Schedule

- July-September 2007
  - Delivery of ANTARES tools (CDEX and USIO)
  - Calibrations of all APCT3 tools in USIO Metrology Lab
  - Complete APCT3 sets operational for CDEX
- November 2007
  - Initial deployments on *Chikyu* during expedition 315 with good initial temperature results
  - One APCT3 lost in hole during coring operations
  - Completion of 8 deployments during Expedition 315
- December2007
  - Additional APCT3 electronics calibrated and sent to *Chikyu* for deployment on Expedition 316
  - APCT3 deployed with good temperature results
- January 2008
  - Two tools operating on *Chikyu* on Expedition 316

FY07 results on Development of Telemetry System of Long Term Borehole Monitoring System

Nori KYO

CDEX, JAMSTEC

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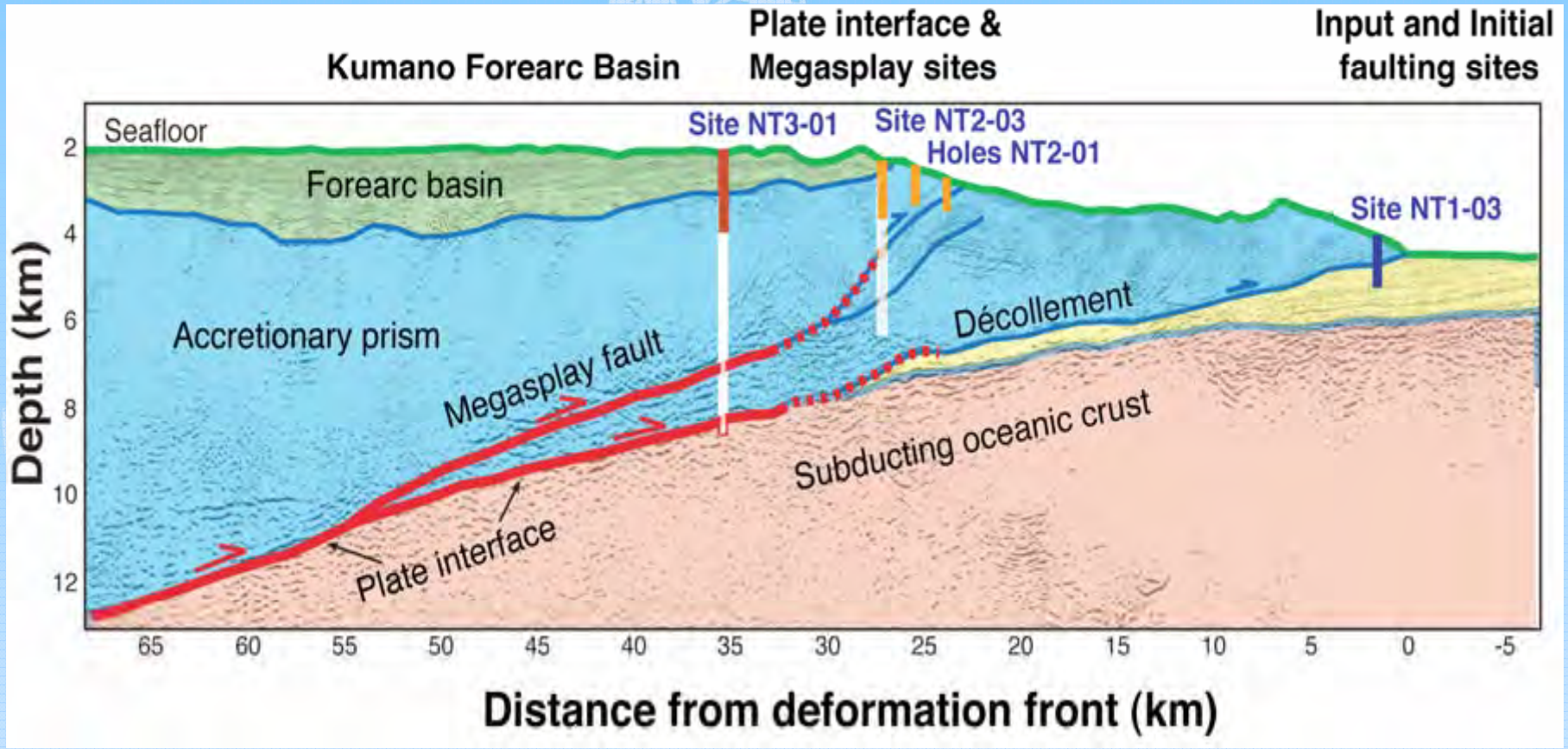
Proposed Observatory Site



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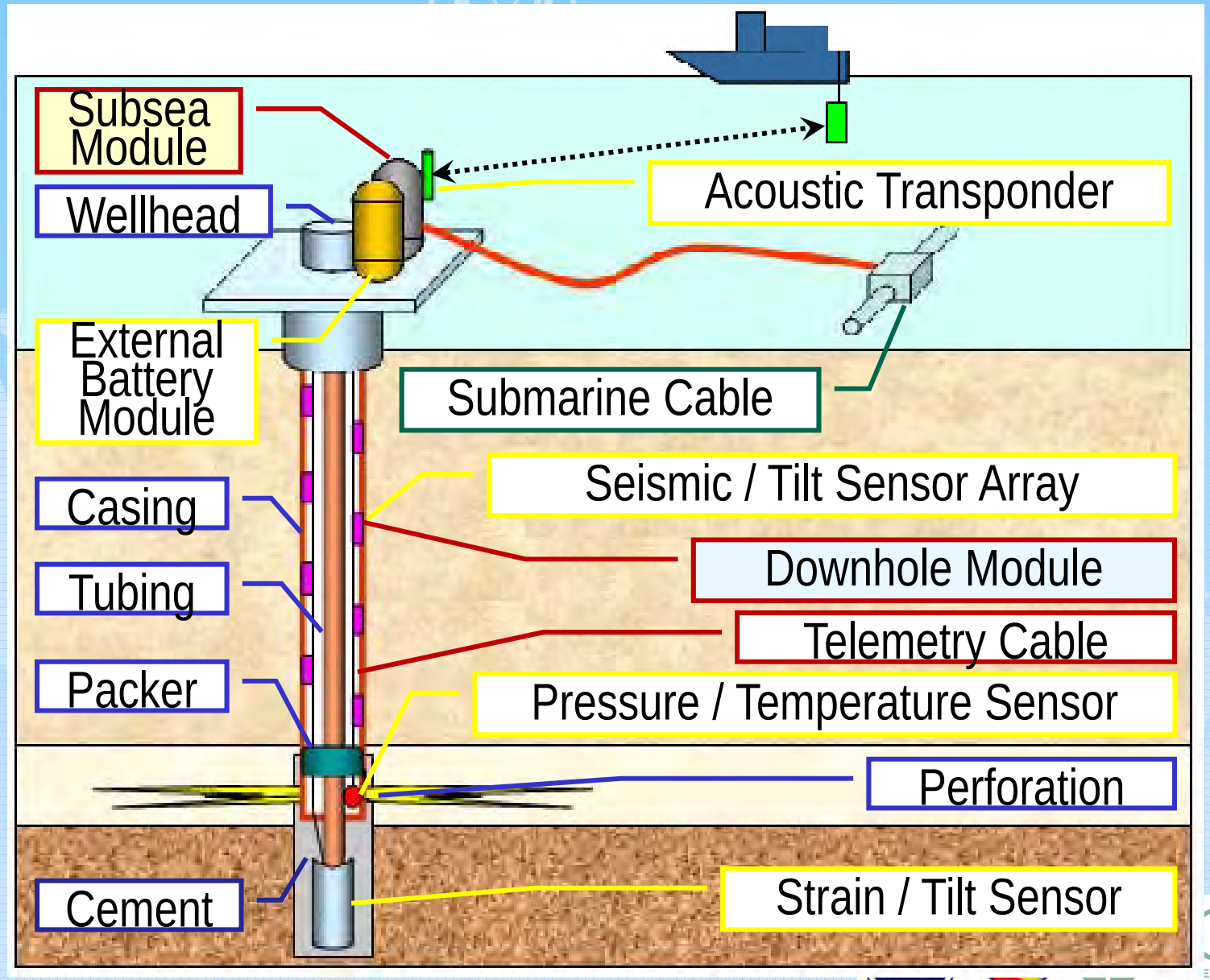
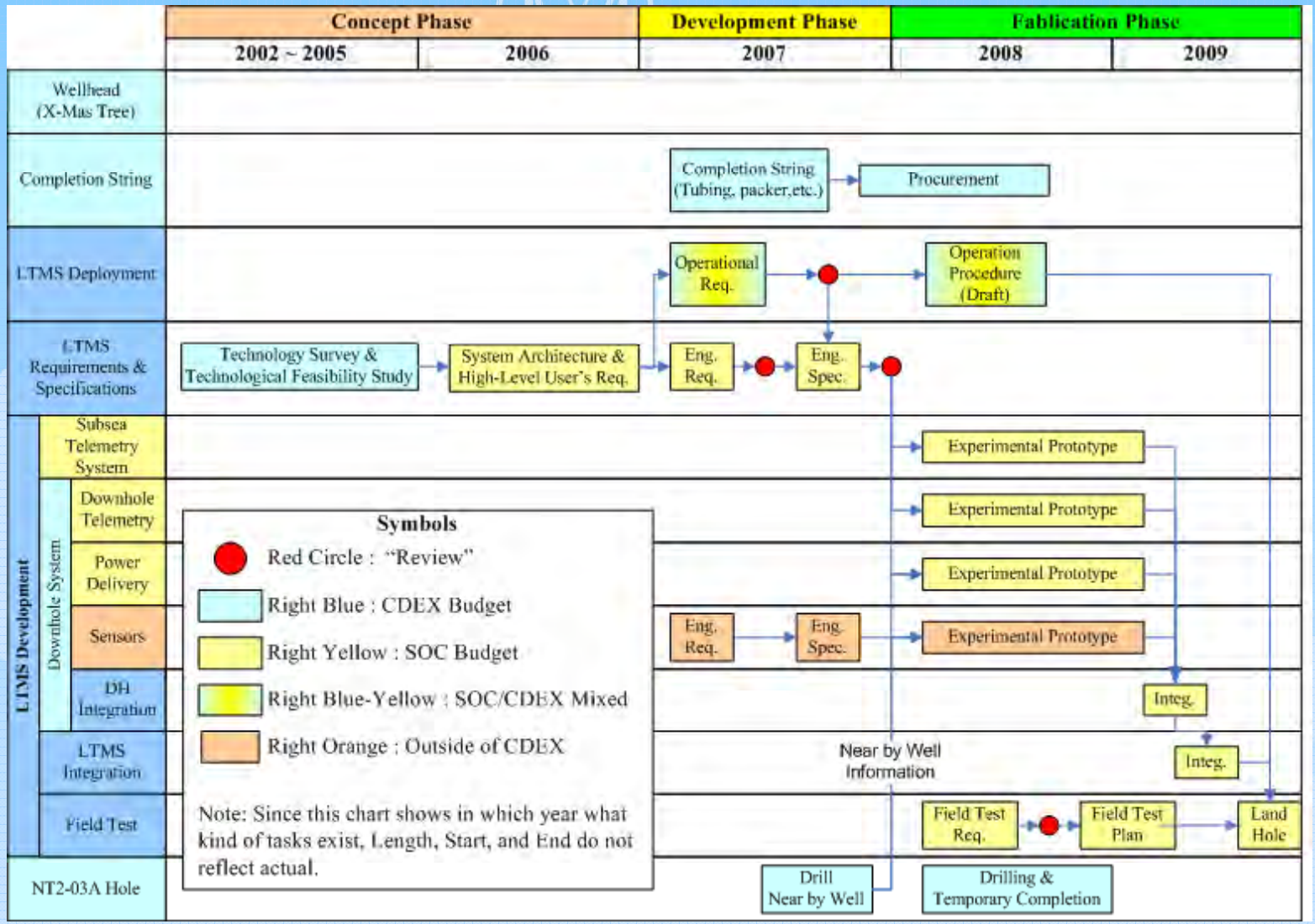
LTBMS Conceptual Image



Development Process and Plan (1/2)



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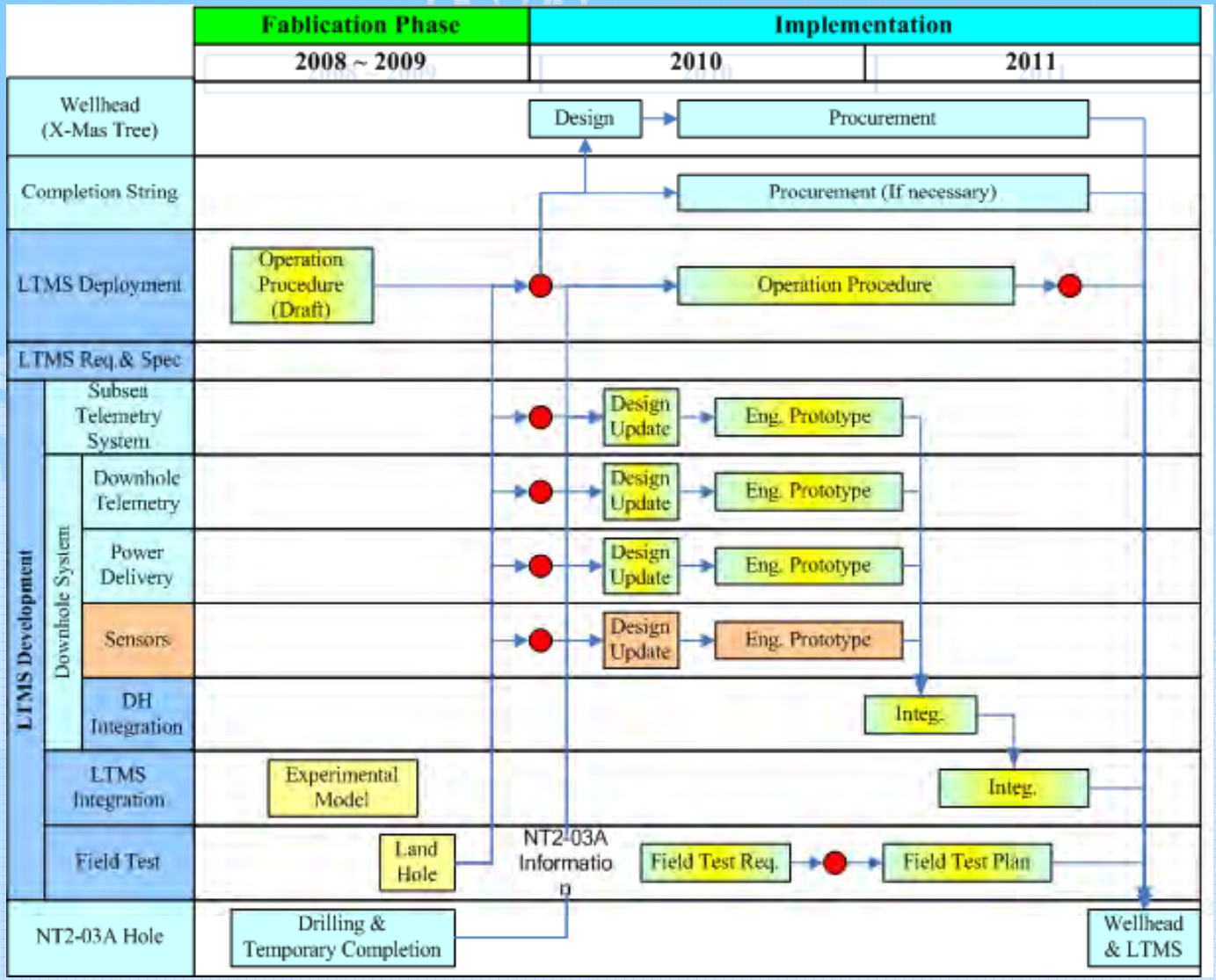
Development Process and Plan (2/2)



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Scope of Work

USFY2007

- **Define Engineering Requirements**
- Define Operational Requirements
- Specify Engineering Specifications

USFY2008

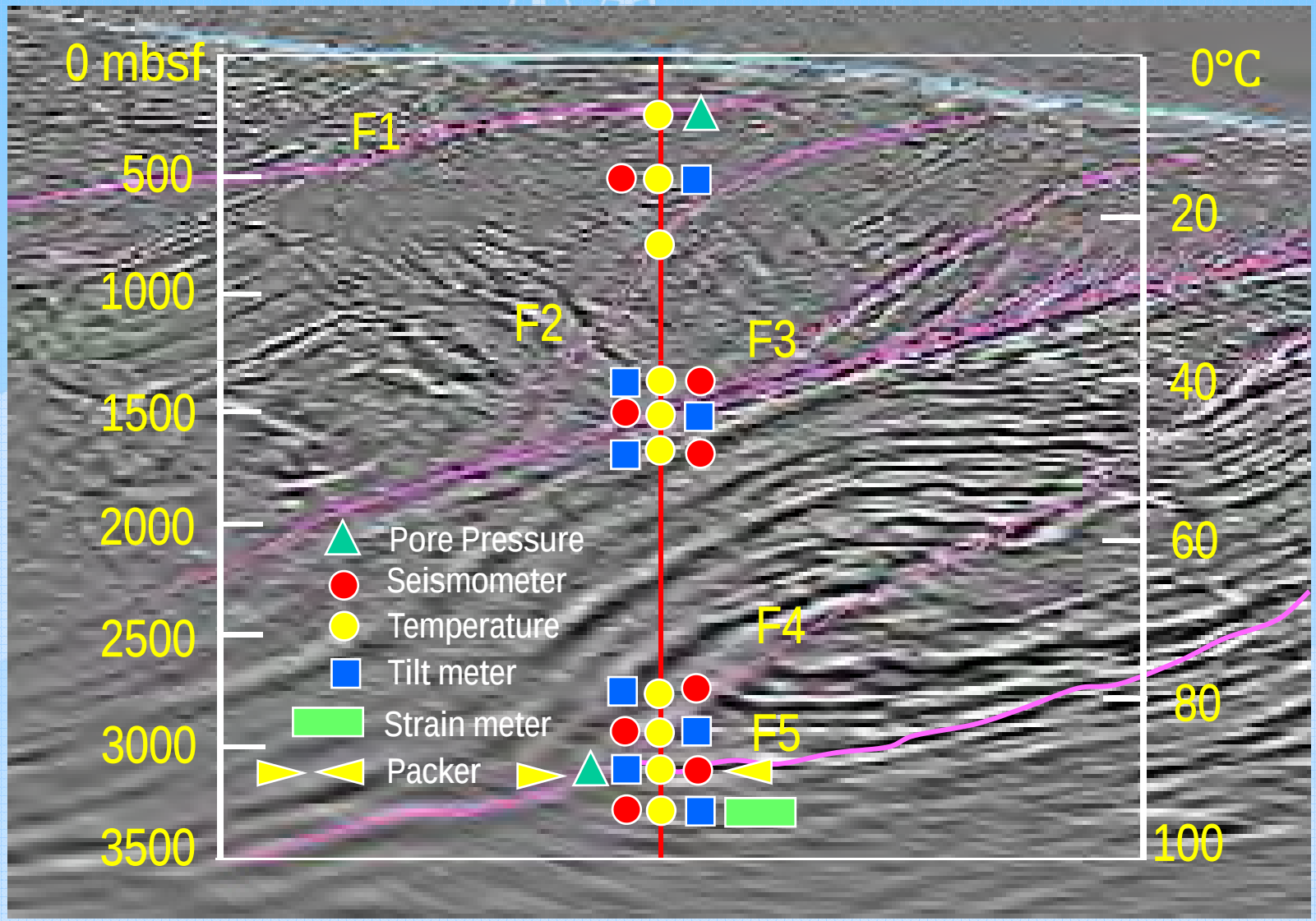
- Design and build EXP (Experimental Prototype)
- Define Field Test Requirements
- Prepare Field Test Plans

USFY2009

- Integration of EXP
- Field Test in the Land Hole

EDP#6 @ Nice, France

Proposed Borehole Observatory



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Required specifications<Seismic observations>

- The system has to cover the potential micro-, small earthquake to M8+ earthquake. Considering the expected noise floor in deep borehole and M8+ earthquake, the dynamic range required exceeds 200dB .
- The strongest motion would be over 2g and the weakest be 10^{-8} m/s^2 at 10Hz and 10^{-10} m/s^2 at 0.05Hz.
- The system frequency range needs to cover from low frequency to high frequency in the range of 0.01~1 kHz.

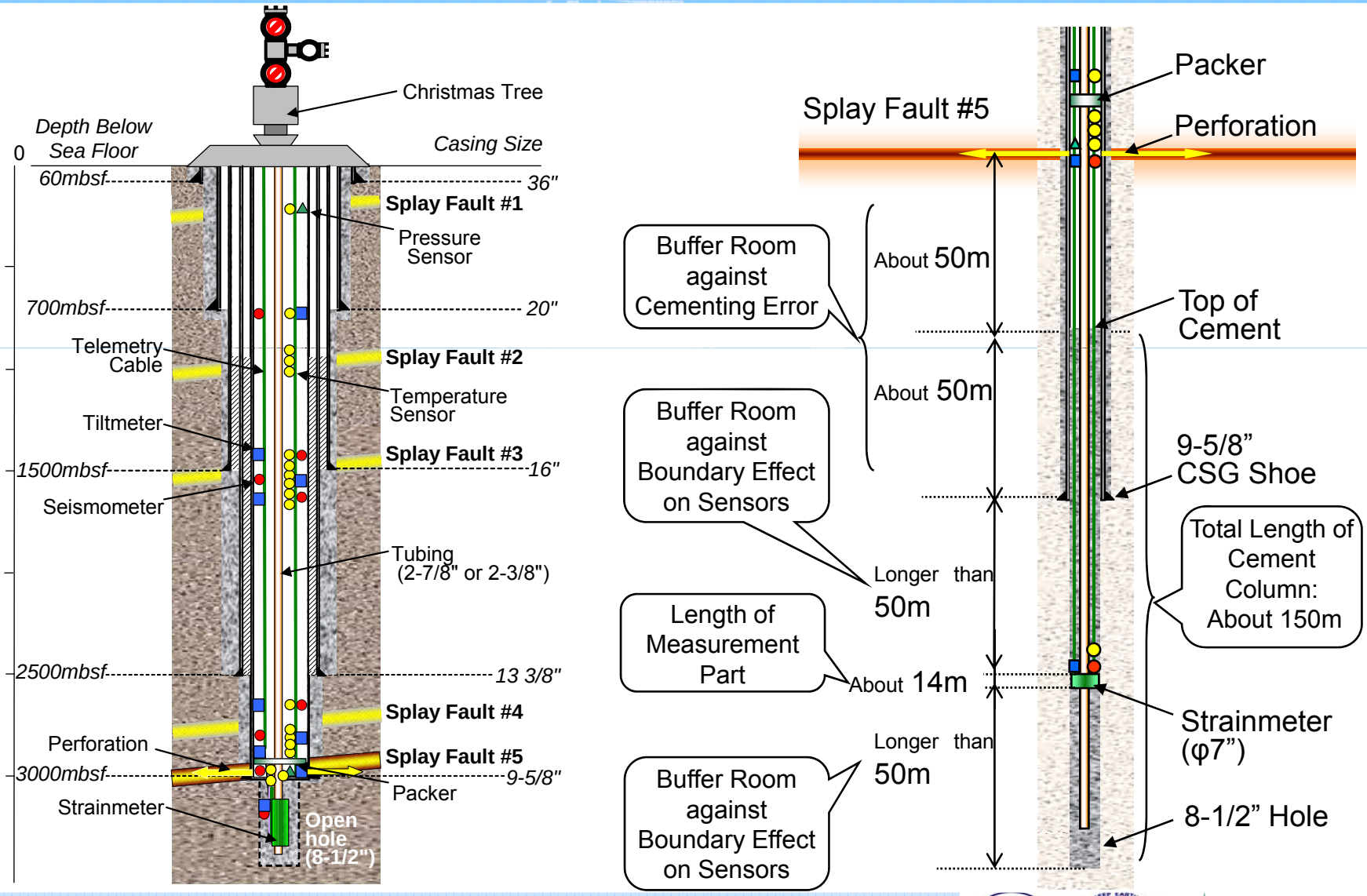
Required specifications<Geodetic observations >

- Understanding the mechanism of VLF events will be one of the important achievements of this observatory.
- We roughly calculated tilt changes along the drill NT3-01 site, which are caused by virtual VLF events for M~4. (Poisson ratio= 0.25)
- The result suggests an accuracy of 10 nrad is required. Similarly, we estimate a 10 nano-strain is required for strain sensor.

Required specifications<Pore fluid observations>

- Objectives of pore pressure measurements is to monitor formation strain change, and to monitor pore fluid flow within the fault.
- In order to separate these signals we need simultaneous monitoring of strain by strainmeter and of pore pressure at the same interval.
- We require the precision of pore pressure at 10 Pa (relative), based on the results by Davis et al. (2006) (100 kPa pore pressure transients caused by a VLF swarm activity were detected near the decollement beneath the frontal thrust of Nankai accretional prism off Muroto. They also showed other pressure variation such as tidal response, on the order of 0.1 kPa or larger).
- Objectives of downhole temperature profile monitoring are to know the formation temperature with the precision of 1 K (absolute), and to know its time variation due to pore fluid movement in the formation. Temperature change can be a good proxy for a very slow fluid movement. In this case we require a precision of 1mK(relative).

Observatory plan for NT2-03 (perforation)



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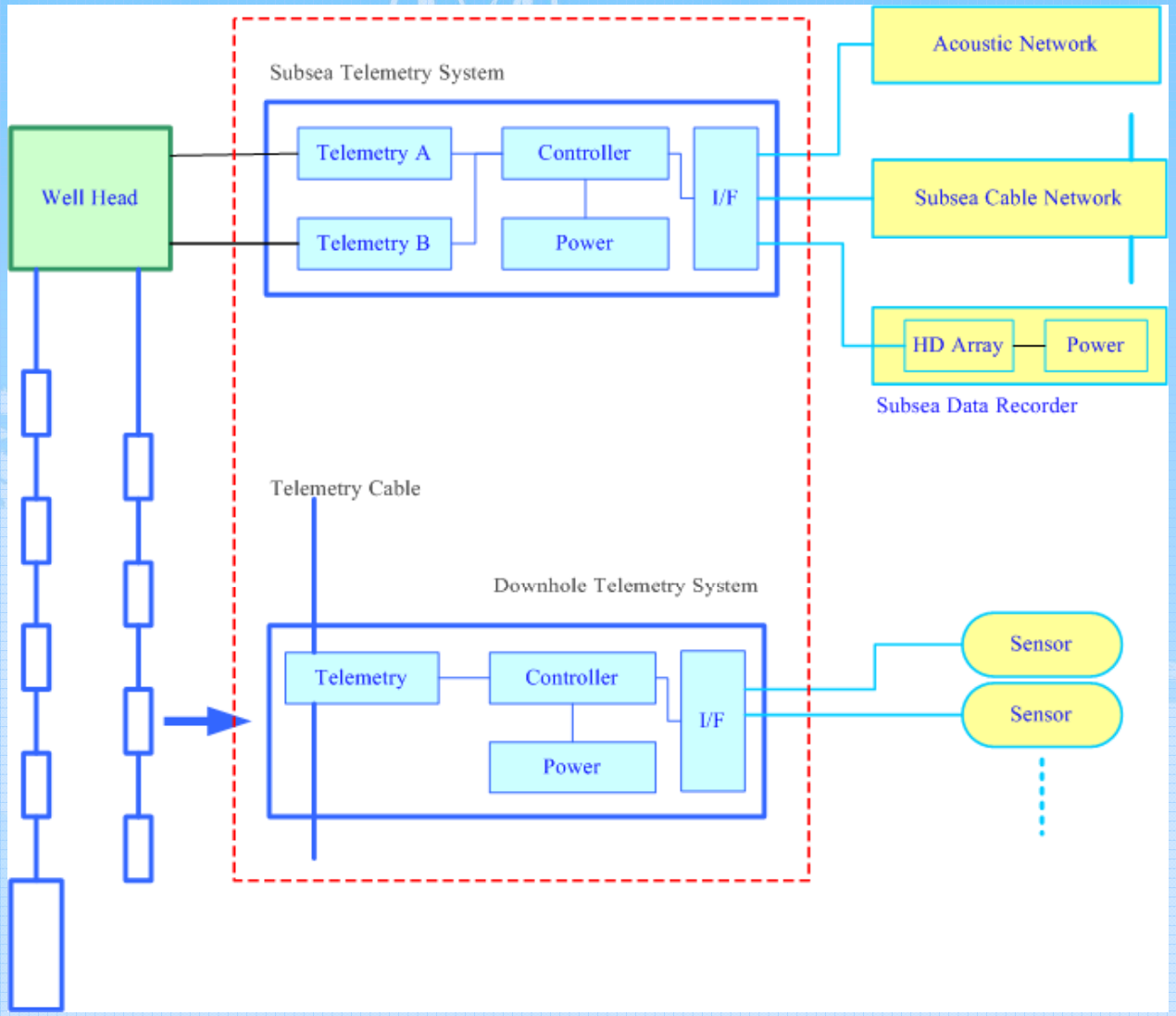
Schematic Diagram of Telemetry System



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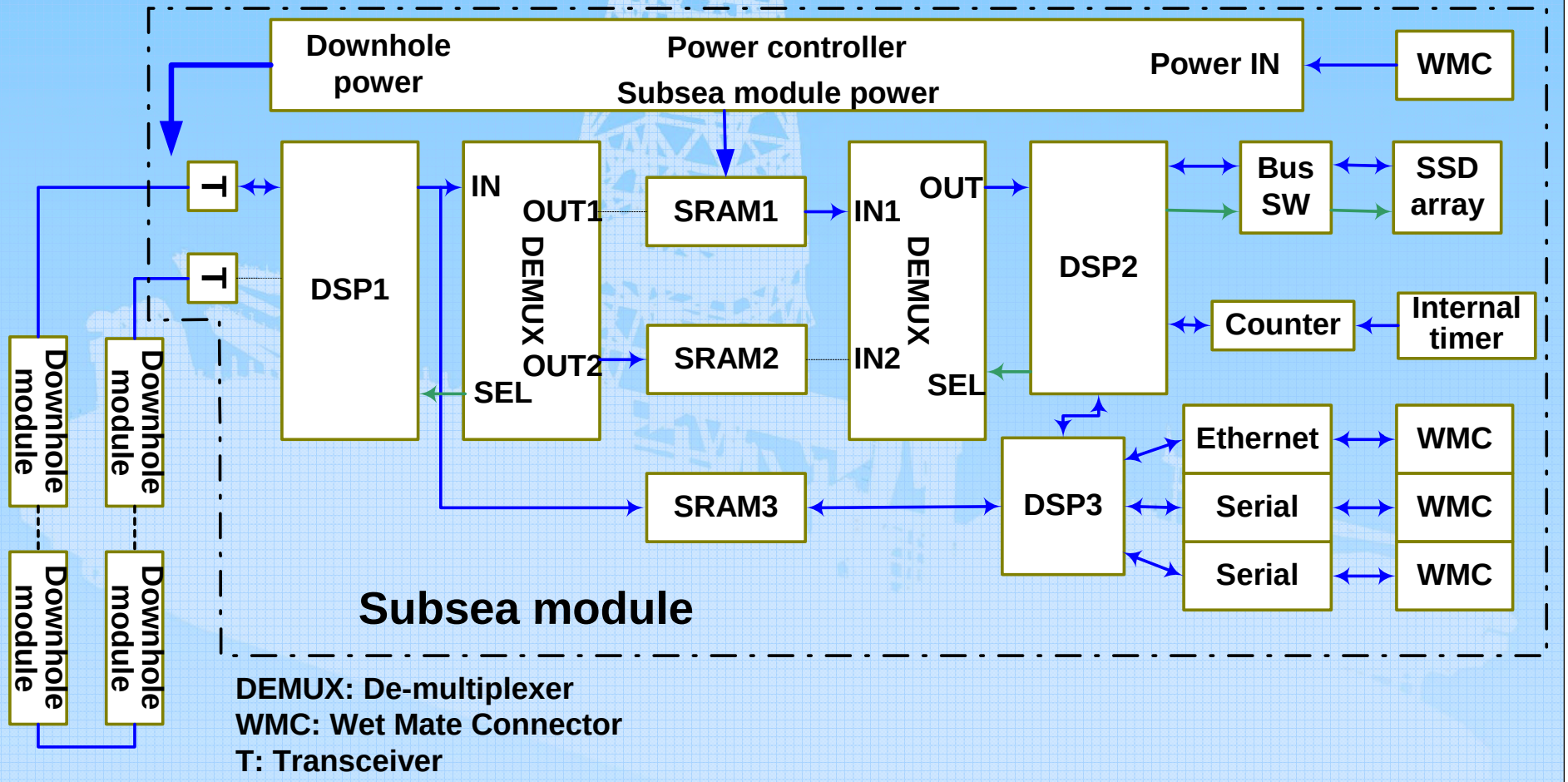
Block Diagram of Subsea Module



DEMUX: De-multiplexer
WMC: Wet Mate Connector
T: Transceiver

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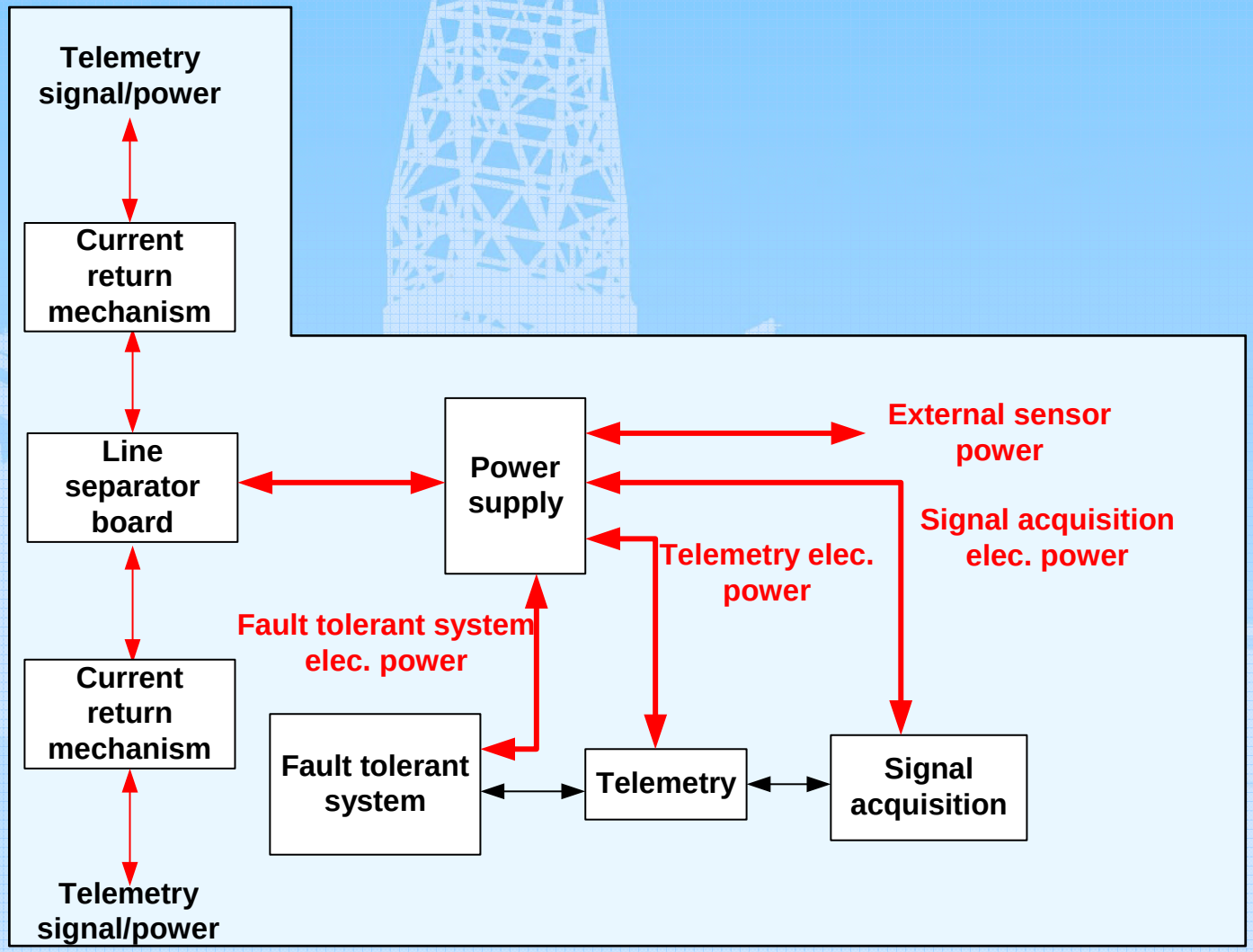
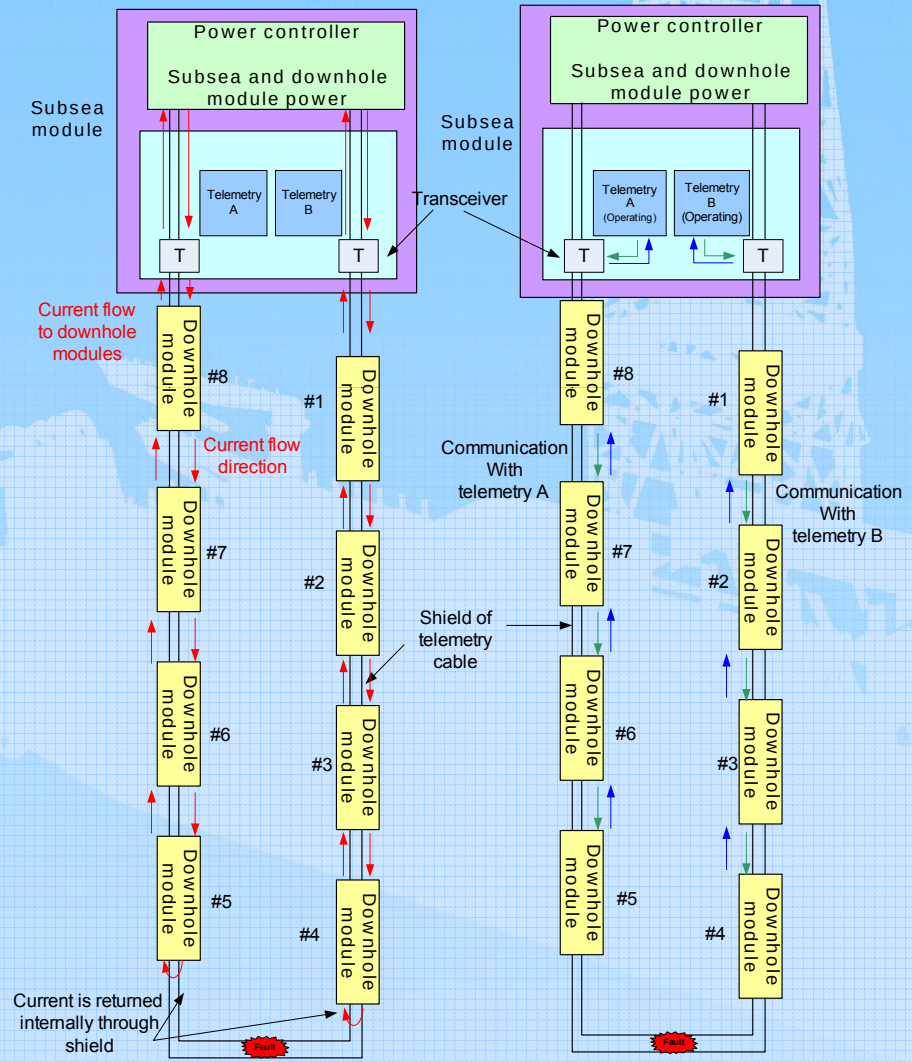
Block diagram of Downhole Module



Fault Tolerant System



Direction of the current to downhole modules when a fault occurred in the telemetry cable

Direction of telemetry at a fault occurred in the telemetry cable
Green : Command from subsea module
Blue: Data from downhole modules

In the fault tolerant concept, faults are taken as faults occurred in the telemetry cables, the connections and inside the downhole modules themselves.

If a fault is detected in the cable, the downhole module closest to the fault will short circuit the center power line with outer shield of the telemetry cable. This is achieved through a built-in relay mechanism inside the downhole module. The switching of the relays in the downhole module adjacent to the fault makes the system operate **two separate telemetry systems on both side of the fault.**

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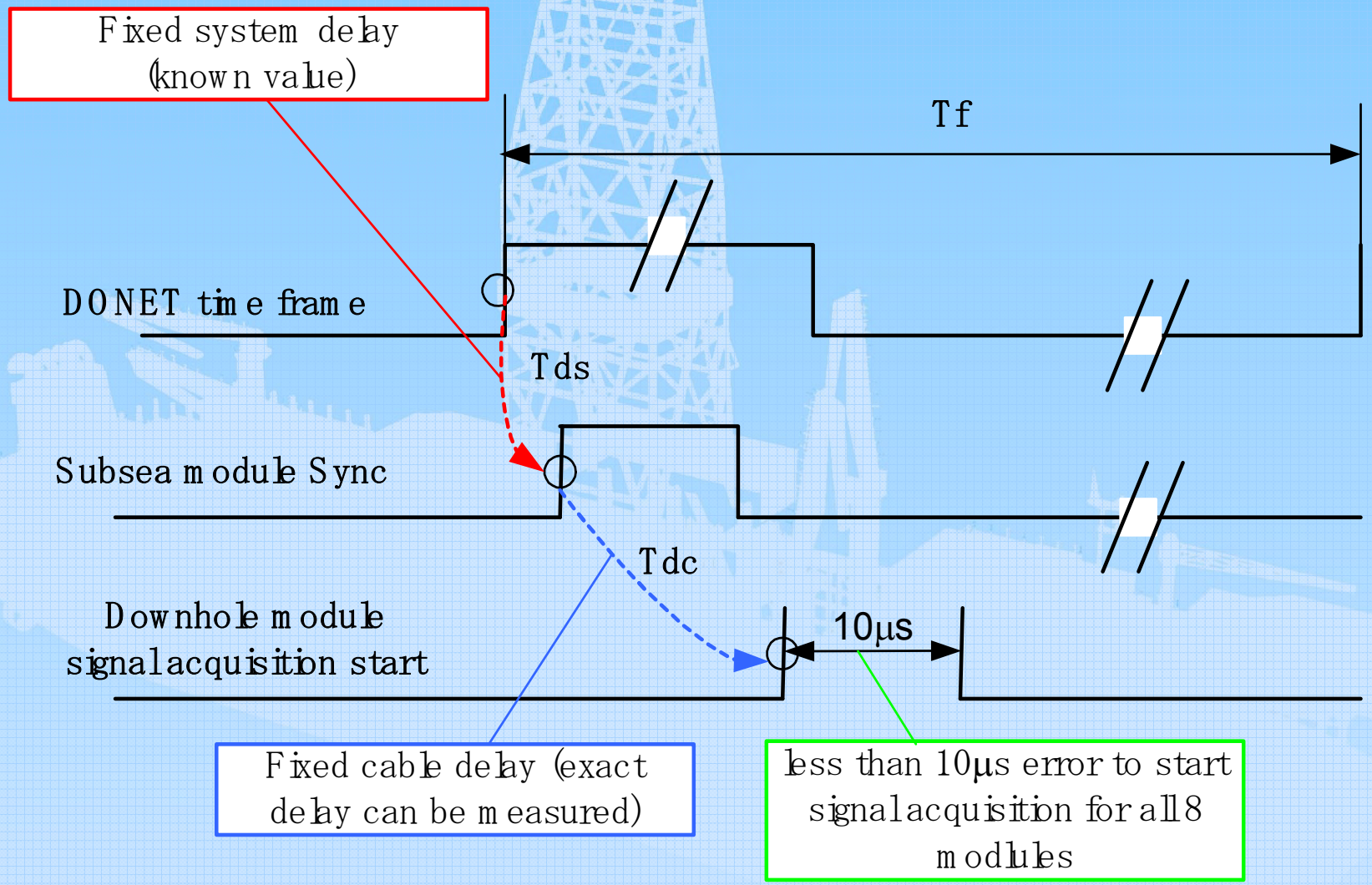
System Synchronization



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Power Consumption

Element	Current = 100 mA	Current = 200 mA
Subsea	4.32 W	4.32 W
Power for downhole electronics (Regulator efficiency=85%)	34.8 W = (27.0+2.59)/0.85	44.0 W = (27.0+10.36)/0.85
Downhole module	27.0 W (3.37 W x 8)	27.0 W (3.37 W x 8)
Cable	2.59 W	10.36 W
Total	39.1 W	48.3 W

Downhole Telemetry System

Synchronization accuracy ----------**< 10 µs** (PLL jitter) @1.024 Mbps with 8 modules
Accuracy depends on the uplink speed and number of downhole modules

Number of downhole modules ---------**8 modules** for NanTroSEIZE C0001

Uplink speed ---------- 2.048 Mbps, 1.024 Mbps, 512 kbps (Selectable)

Uplink bit error rate ---------- $< 10^{-9}$

Downlink command speed ----------500 bps

Downlink carrier frequency ---------- 2 kHz

Maximum module distance ---------- 1000 m @2.048 Mbps, 1500 m @1.024 Mbps

Subsea Module

Dimension ---------- Diameter (ID) : 266.7 mm, Length: 0.61 m
Temperature ---------- -20 to 70 °C (Storage), -5 to 50 °C (Operation)
Pressure ---------- 35 MPa *Able to work in water depth of 3000 m
Shock ---------- 98.0665 m/s^2 (10 G), 11 ms half-sine *IWIS compliant (ISO 13628-6)
Module weight ---------- 34 kg (in sea water with flotation)
Power consumption ---------- 5 W
Mass storage size ---------- 1 Tbyte
Subsea interfaces for electric power supply ------ 2 kinds of port (Submarine cable port & Additional battery port)
Subsea interfaces for data transmission ---------- 3 kinds of port (RS-232C, RS-422 , Ethernet)
High speed analog signal input (seismic channels) 4 channels / module (Voltage proportional to signal)

- Dynamic range: 120 dB (A/D 24 bit ΔΣ Minimum phase)
- Frequency range: 0 to 400 Hz
- Pre-amplifier: Input voltage range: 5 Vpp (differential), Input impedance, >10 Mohm

Low speed analog signal input ------ 8 channels / module (Voltage proportional to signal)

- Dynamic range: > 97 dB @ 10 Hz sampling
- Frequency range: 0 to 8 Hz (Upper frequency limit depends on sampling rate)
- Drift: 50 ppm (1000 hours)
- Pre-amplifier: Input voltage range: -2.5 V ~ +2.5 V, Input impedance: > 10 Mohm

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Downhole module (1/2)

Dimension ----------	Diameter (OD): 63.5 mm, (ID): 50 mm, Length depends on sensor design
Module weight ----------	Depends on sensor design
Temperature ----------	-25 to 125 °C (Storage), 4 to125 °C (Operation)
Pressure ----------	104 MPa *Able to work in 2200 m water depth + 3500 m well depth
Operational life ----------	MTTF (Mean Time To Failure) **5 years @125 °C**
Shock ----------	2451.55 m/s^2 (250 G) *Able to deploy through casing without damage
Material ----------	Inconel 718
Connection for sensors --	Welded connector
Seal ----------	Welded
Power consumption ------	3.5 W
Sensor power supply -----	+ 5 VDC+/-1% [+/- 12 VDC, under investigation]

IODP INTEGRATED OCEAN DRILLING PROGRAM

Downhole module

High speed analog signal input ---------- 4 channels / module
(Voltage proportional to signal)

Dynamic range	**120 dB** (A/D **24 bit** ΔΣ Minimum phase)
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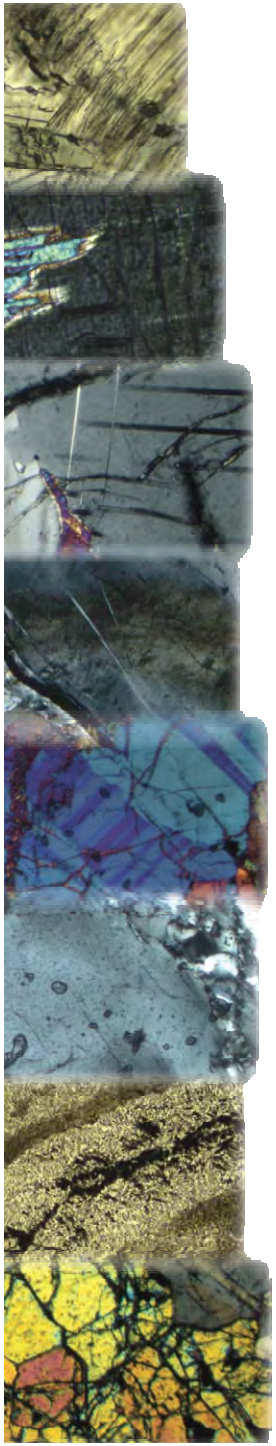
Frequency range	0 to 8 Hz (Upper frequency limit depends on sampling rate)
Drift	**50 ppm** (1000 hours)
Pre-amplifier	Input voltage range: -2.5 V ~ +2.5 V
	Input impedance: > 10 Mohm

Digital input ---------- **RS-232C**, **RS-485**, **SPI** (Optional)

Command out for sensor	4 bits (15 kinds of command)
Command in for status monitor	8 bits

Planned works in FY08 and FY09

- Hardware design iteration / Concept validation[FY08]
  Power management, Synchronization accuracy, Fault tolerant function, I/F@sea floor system
- Component evaluation[FY08]
  High temperature, Design optimization, Cable connection
- Unit Integration Test [FY08]
  System power consumption, Unit level anti-shock packaging design, Connectivity with down hole sensors, High temperature characteristics
- System Integration Test [FY09]
- System Life Test (Destructive Test) [FY09]
- EXP Field Test [FY09]



IODP-USIO
Status of FY08 Activities

EDP Meeting

Nice, 9-11 January 2008

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SODV Status

Ship delivery from Yard to ODL: 31 March 2008

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SODV Status

Heave compensation (passive)

- After meetings with industry experts, it was decided to removed the Active Heave Compensator (AHC) and resume operations with only the Passive Heave Compensator (PHC).
- AHC will be mothballed and stored in College Station. It can be returned to the ship if needed.
- PHC to be optimized for performance
  - Low friction seals to be incorporated once baseline functionality established
  - PHC rods & cylinders re-chromed and re-installed
  - APV refurbished
  - Pneumatic high pressure piping optimized
- Third part inspection of PHC cylinders completed
- Cylinders being refurbished by Maritime Hydraulic in Canada
  - Scheduled to be returned to Singapore by 1 March 2008

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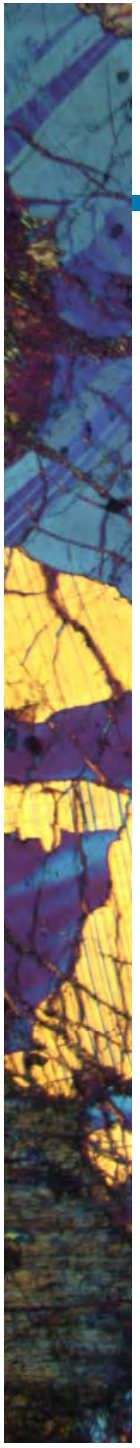

SODV Status

Rig instrumentation system (RIS)

- Epoch Well Services RIGWATCH system will be installed in Singapore
  - Ability to collect and monitor over 100 data inputs at 1 Hz
  - Rig instrumentation sensors
  - Two-way MWD and LWD transmissions
  - IODP measurement systems
  - Data from third party systems
- Ability to collect and monitor selected data at 10 Hz
- Depth Tracking system for heave compensation
- Optional drilling efficiency software available: Mechanical Specific Energy system
- Data stream will be transmitted over ODL and IODP networks and stored in IODP data base
- Data base will be accessible to science party
- Installation scheduled for March 2008

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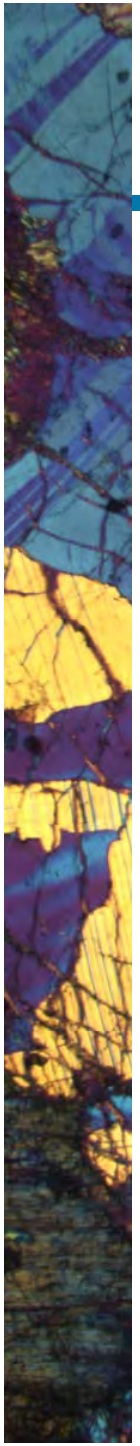

IODP Engineering Services Exchange

USIO provided the following services to the Chikyu FY08 operations:

- APCT3 procurement coordination
- APCT3 calibration on shore
- Formation measurement support (1 engineer each on Expeditions 315 and 316)
  - APCT3 and DVTP tools
- Coring engineer on Expedition 316

CDEX-USIO agreement on observatory implementation is in progress

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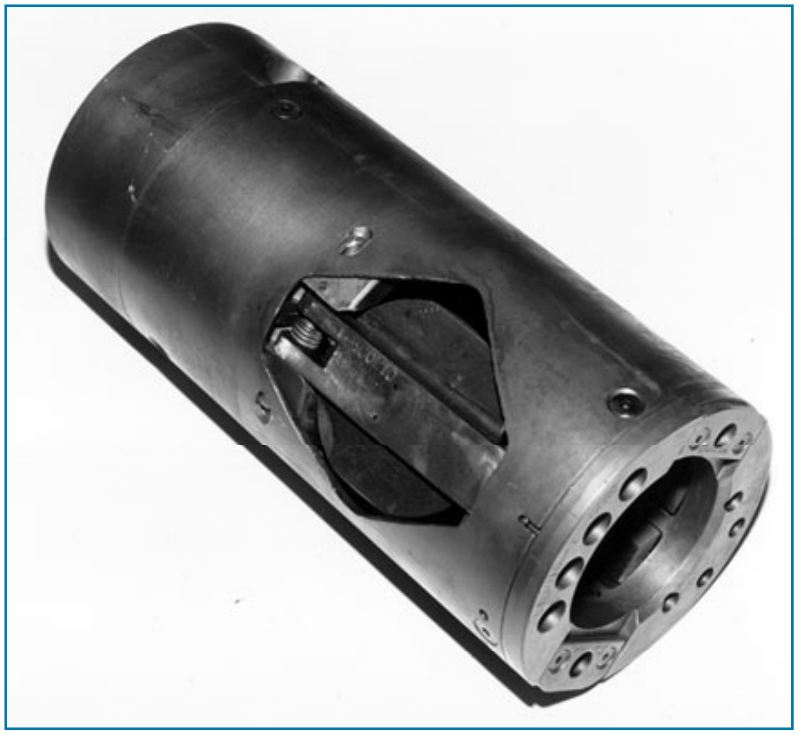
Lockable Flapper Valve (LFV)

LFV Redesign

- Flapper-type valve
- Used with APC, XCB and RCB
- Requires a LFVA (go-devil)
- 3.75 ID restriction



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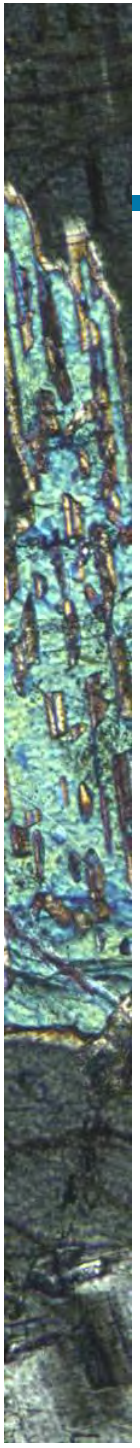
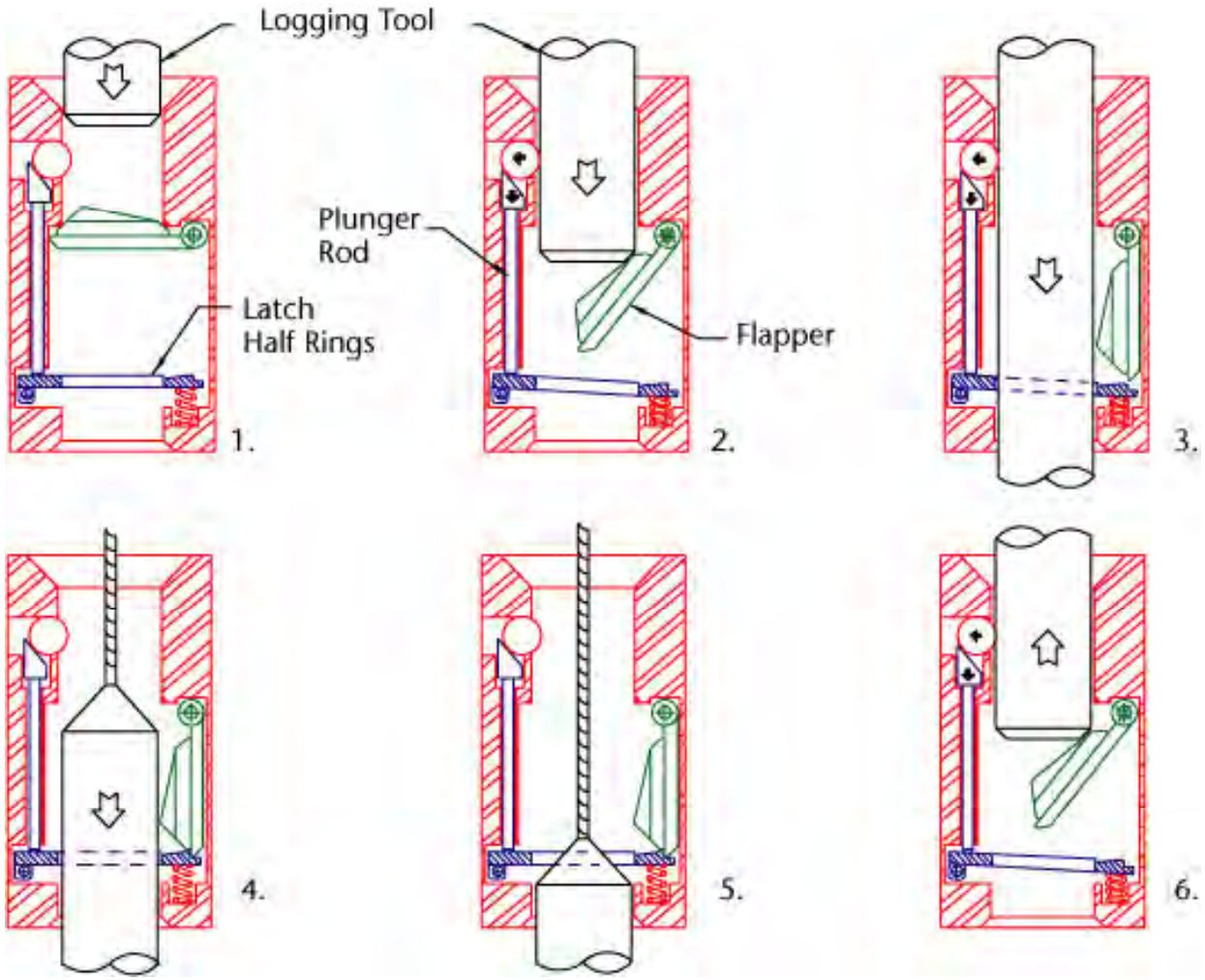


Lockable Flapper Valve (LFV)

LFV Operation Theory



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Lockable Flapper Valve (LFV)

LFV Operational Reality

MSS Magnetic Susceptibility Sonde

Application

- Paleoclimate, paleoceanography
- Correlation and integration

Two sensors

- Bartington high-res
- Göttingen low-res

Future

- Offshore qualification
- SLB telemetry
- 10kpsi

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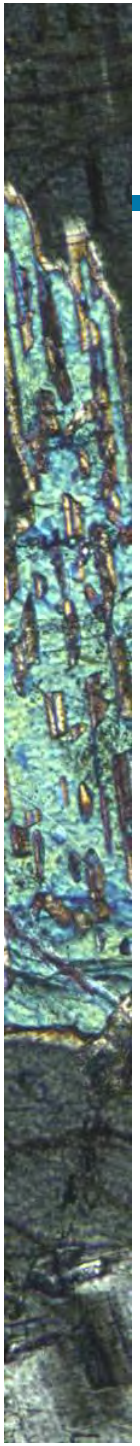

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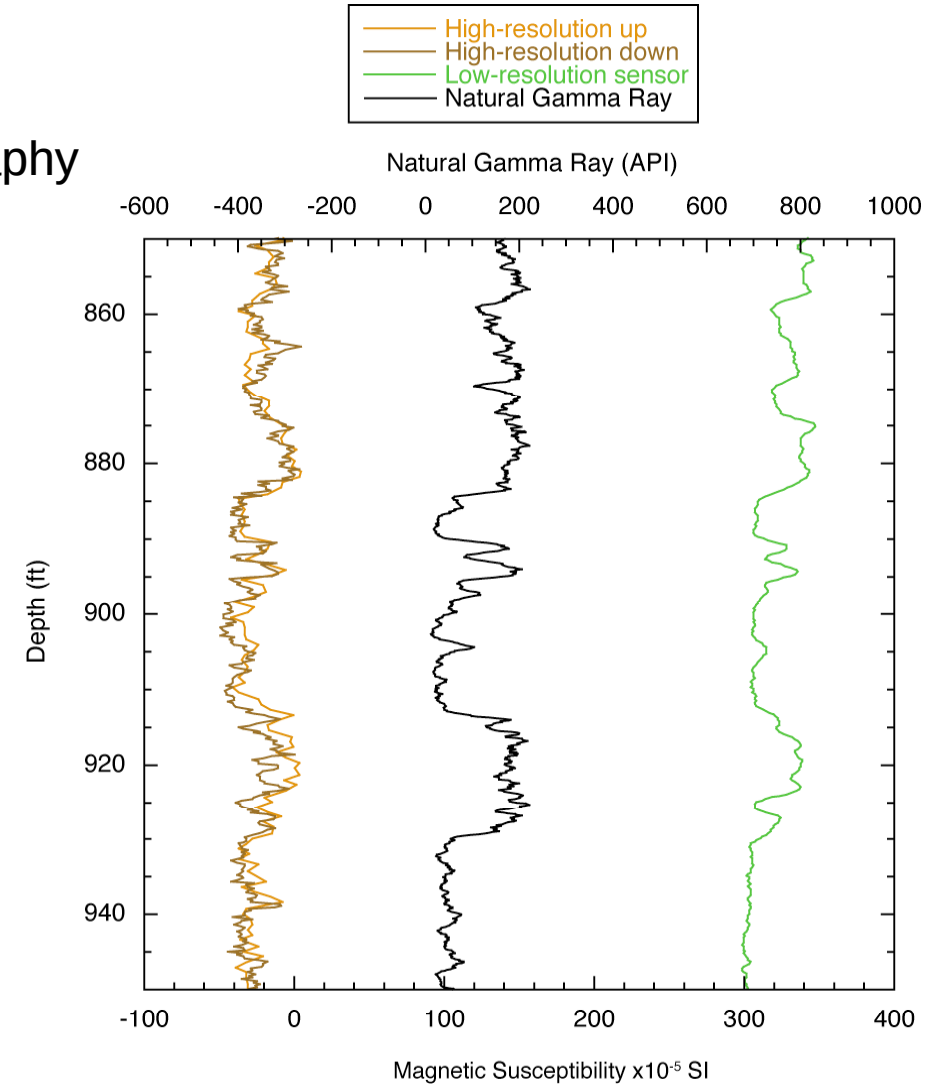

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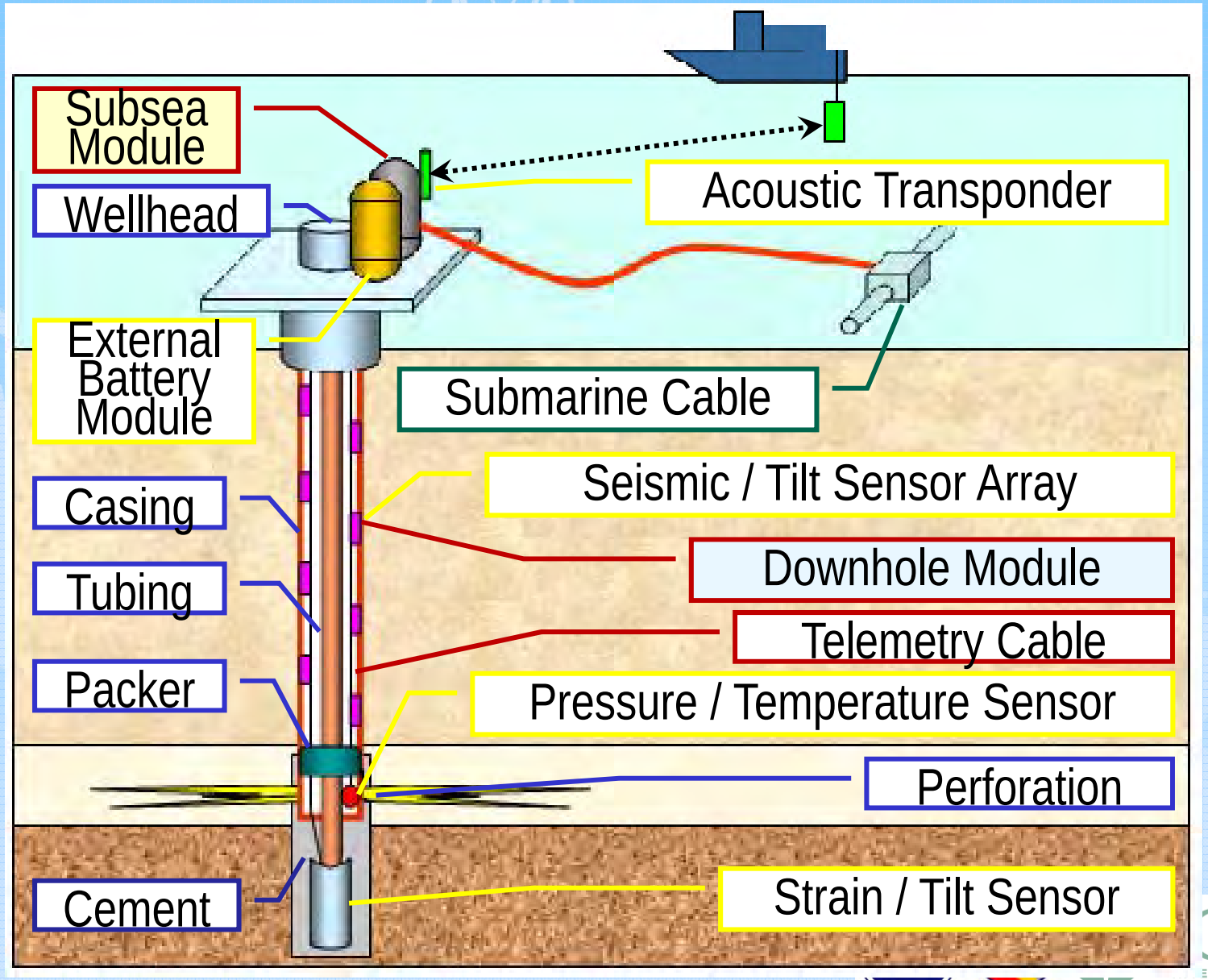
FY08 status on Development of Telemetry System of Long Term Borehole Monitoring System

Nori KYO

CDEX, JAMSTEC

LTBMS Conceptual Image



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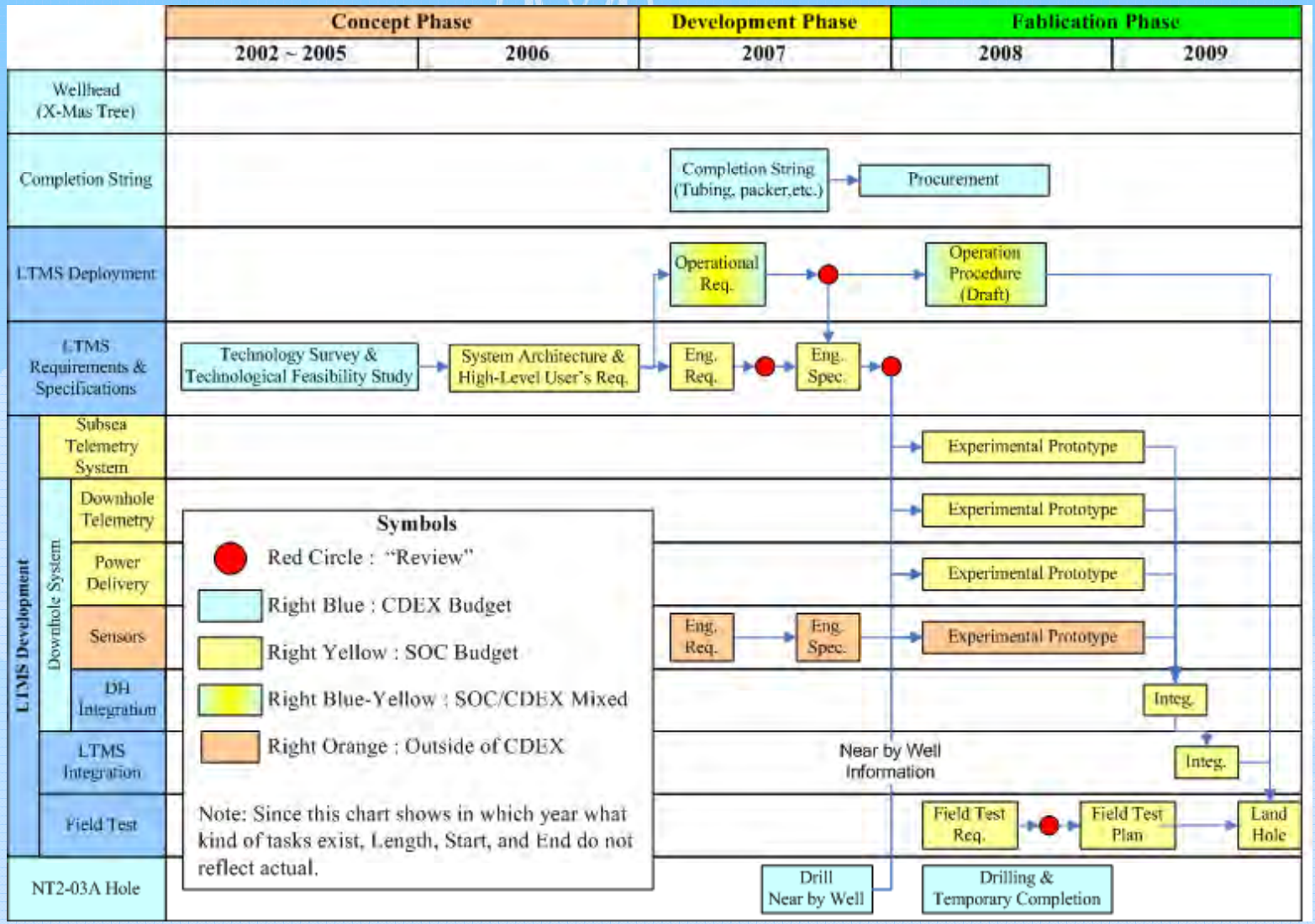

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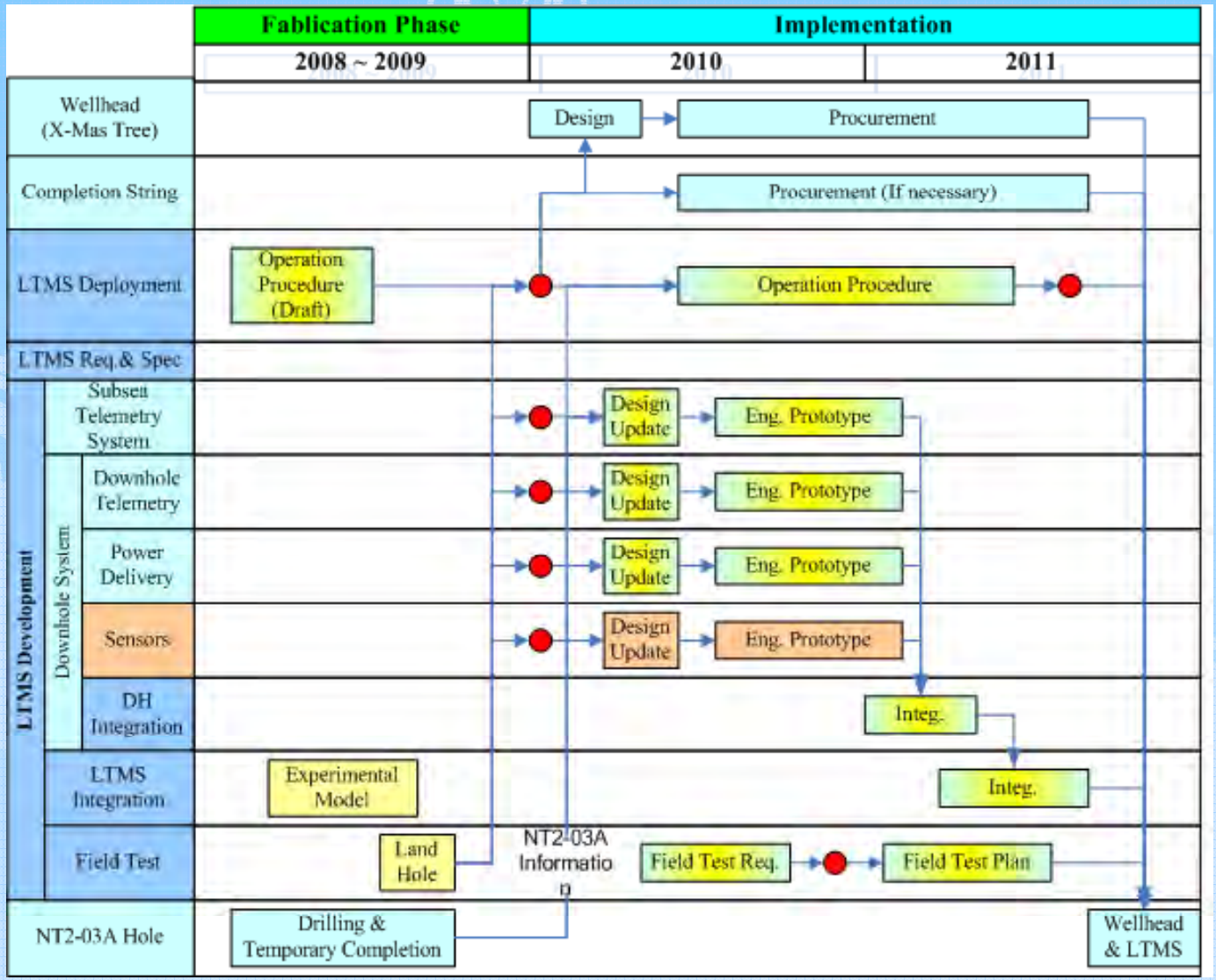
Development Process and Plan (2/2)



JAMSTEC CDEX JAMSTEC IODP INTEGRATED OCEAN DRILLING PROGRAM

Scope of Work

USFY2007

- **Define Engineering Requirements**
- Define Operational Requirements
- Specify Engineering Specifications

USFY2008

- Design and build EXP (Experimental Prototype)
- Define Field Test Requirements
- Prepare Field Test Plans

USFY2009

- Integration of EXP
- Field Test in the Land Hole

Planned works in FY08 and FY09

- Hardware design iteration / Concept validation[FY08]
  Power management, Synchronization accuracy, Fault tolerant function, I/F@sea floor system
- Component evaluation[FY08]
  High temperature, Design optimization, Cable connection
- Unit Integration Test [FY08]
  System power consumption, Unit level anti-shock packaging design, Connectivity with down hole sensors, High temperature characteristics
- System Integration Test [FY09]
- System Life Test (Destructive Test) [FY09]
- EXP Field Test [FY09]

Hardware Design Iteration/Concept validation [FY08]

Make functional section mockups for design iteration and experimentally verify hardware design concept. Select electric components from commercial market as many as possible to save development time and cost. Prepare printed circuit board, since using small mount components.

Major items;

- System power consumption
- System synchronization accuracy
- Fault tolerant function
- I/F with subsea cable and acoustic transponder.

Component Evaluation [FY08]

Perform component level design evaluation to confirm design function. With using electric components selected above, evaluate electric components under high temperature for long-term reliability. Prepare copies of the selected PCBs as many as necessary to carry out reliability test. Perform mechanical design evaluation also especially on a pressure tight housing and a seal design. Confirm cable connectivity and signal distortion through cable.

Major items;

- High temperature characteristics
- Long-term reliability

Unit Integration Test [FY08]

Integrate one by one component and perform functional test to confirm each functions of unit level. At this stage, develop actual size printed circuit board that is able to be mounted on the packaging chassis. Evaluate environmental performance of individual unit (for example, Downhole module). High temperature operational test will be carried out in this unit integration test. This is long term high temperature test to evaluate life of unit. Perform shock test for each unit to evaluate mounting design. Downhole module will be qualified with dummy housing and dummy sensors. If we have actual sensors before this unit integration test with enough time to develop sensor packaging design, this unit integration test can be done with actual sensors. Feed back test results for the hardware design and improve it.

Major test items;

- System power consumption
- Unit level anti-shock packaging design
- Connectivity with downhole sensor
- High temperature characteristics

System Integration Test [FY09]

Fully integrate the system with telemetry cables, Downhole modules and a Subsea module to evaluate full function of the telemetry system. Perform this system integration test in laboratory for EXP field test.

Major test items;

- System power consumption
- System synchronization accuracy
- Fault tolerant function
- Telemetry data transmit speed
- Data error rate versus cable length
- I/F design for submarine cables and acoustic transponders by using PC emulator with cable.

Destructive Test (System Life Test) [FY09]

Prepare EXP design mockup to apply shock and long-term operational test under high temperature. This is full life evaluation test.

Major test items;

- System reliability under high temperature
- System level anti-shock packaging design
- Pressure tight housing

EXP Field Test [FY09]

After confirm whole functions by the system integration test, deploy downhole equipments in land well to perform field test. Field test plan will describe test procedure, test item and criteria of test. We will finalize this test plan in FY09 before starting the field test. Hardware for this test are Downhole modules with dummy sensors, telemetry cables, a Subsea module without pressure tight housing and PC based emulator to control and monitor telemetry system at surface. Number of downhole modules is 8 or less that will be defined in the test plan. During this test, we will also evaluate deployment handling tools and operation procedure also.

Current candidate field site is JAMSTEC well nearby Tazawa Lake in Akita prefecture, Japan. Well condition is 7" cased hole down to 305 m and 6-1/4" open hole to 800 m.

Major test items;

- System reliability in the real well
- Downhole installation
- Deployment handling

Deliverables (FY08)

Provide the detailed system design document such as circuit drawings and the Bill of Materials by Q4 US FY08.

Provide manufacturing plans of the EXP and the system integrated mock-up for environmental life test by Q4 US FY08.

Provide the environmental life test plan by Q4 US FY08.

Provide the system control software specification document by Q4 US FY08.

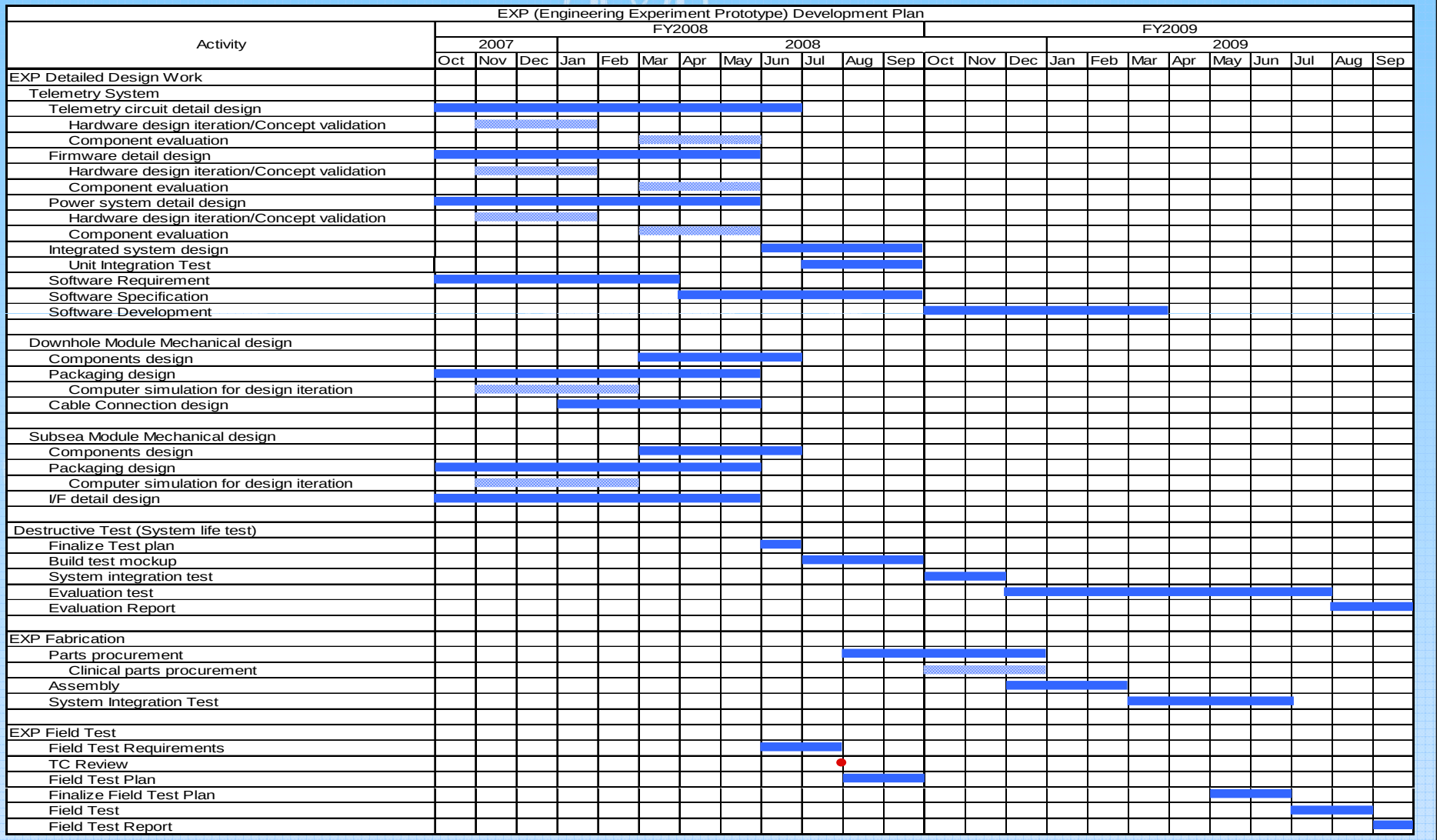
Provide a draft document of operation procedure for the EXP deployment by Q4 US FY 08.

Field Test Requirements by Q4 USFY08

Revised Project Plan by the end of USFY08

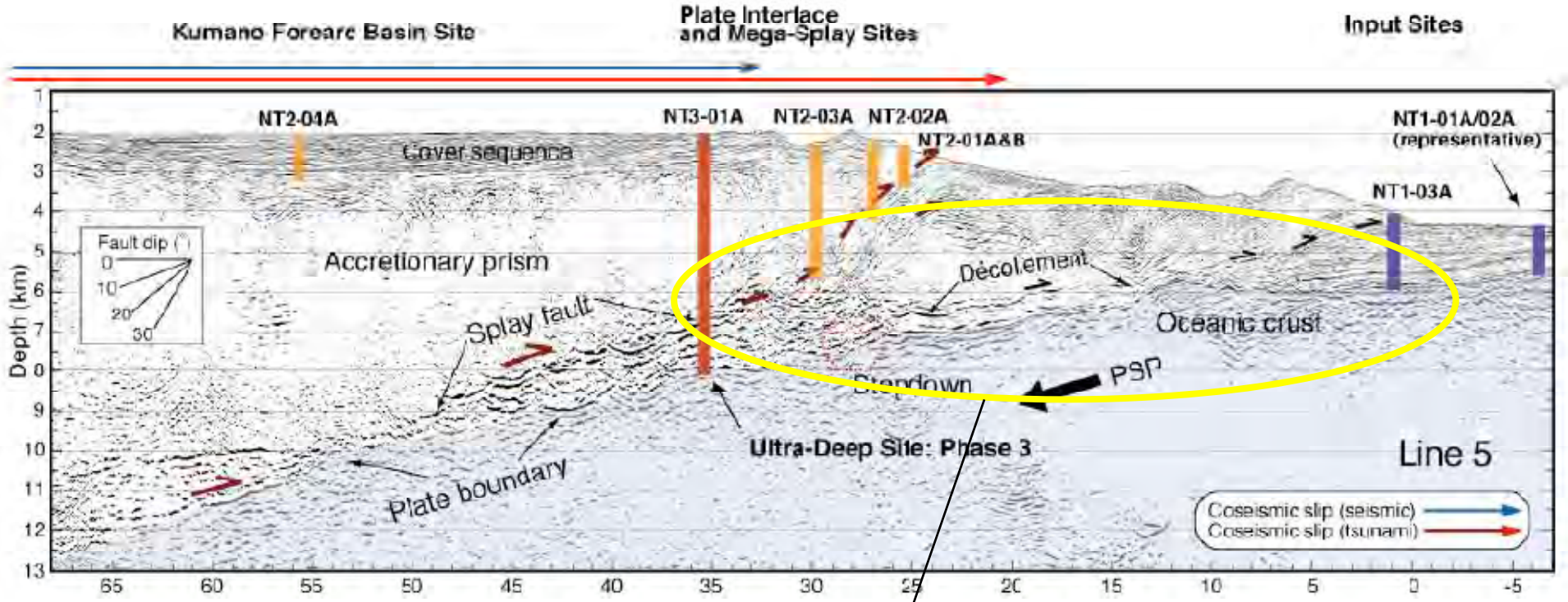
EDP#6 @ Nice, France

Schedule

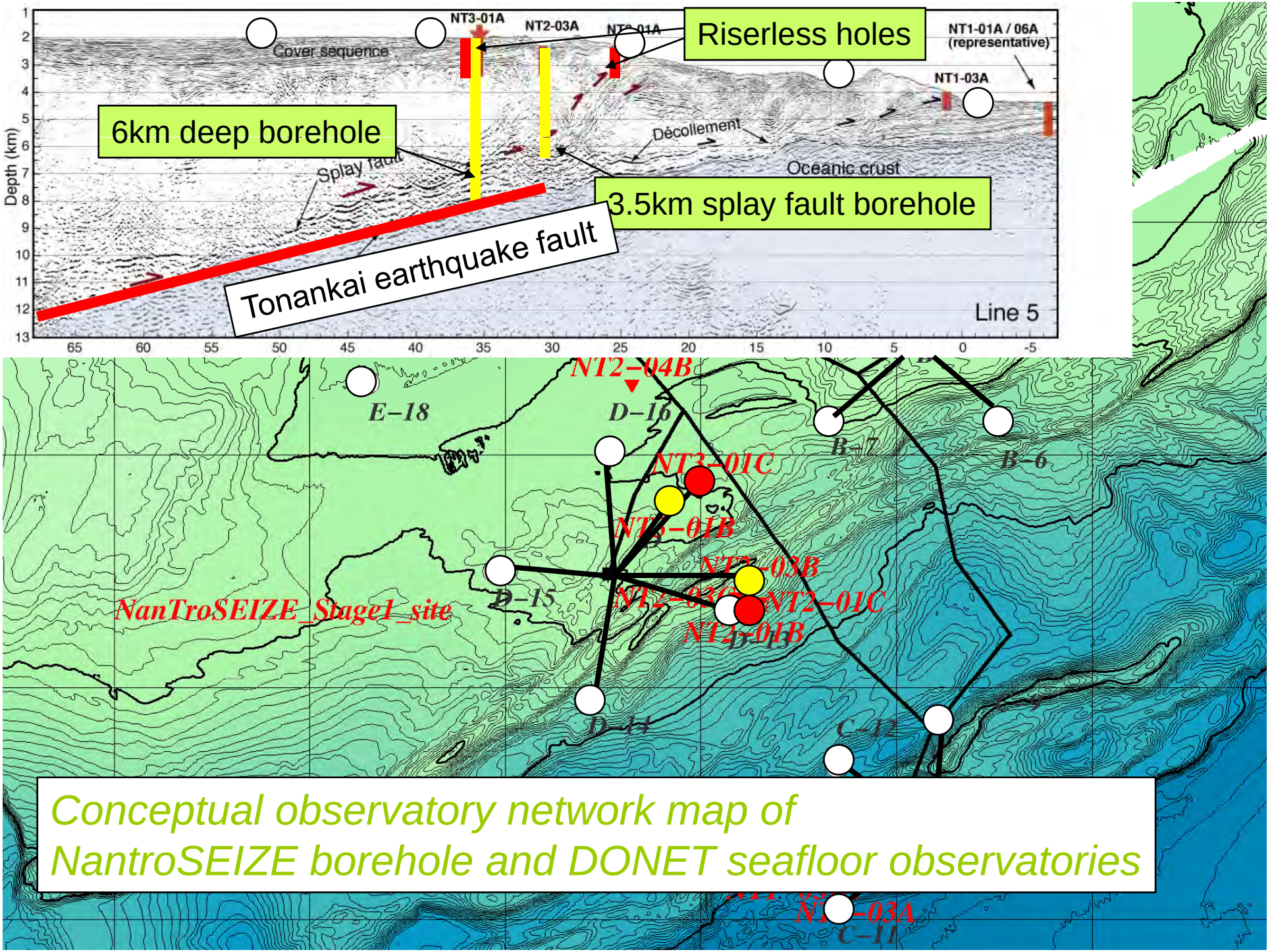


JAMSTEC CDEX JAMSTEC IODP INTEGRATED OCEAN DRILLING PROGRAM

Location of proposed boreholes for long-term monitoring

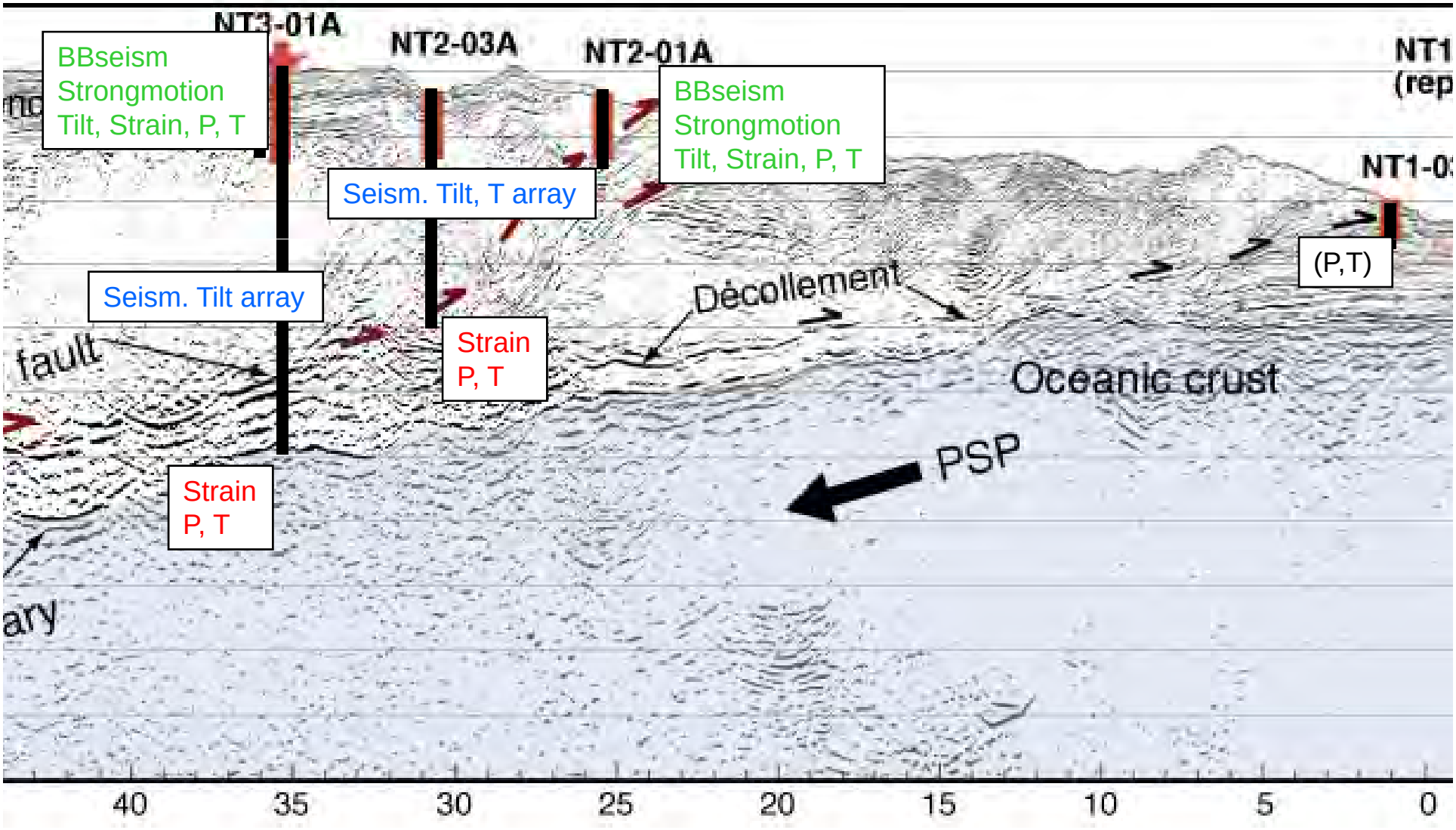


Area where VLF events are identified from land seismic observation.



Conceptual observatory network map of NantroSEIZE borehole and DONET seafloor observatories

Observed parameters (JAMSTEC plan as of Nov. 07)



Discussion Items (proposed)

1. Target phenomena/properties (in and around the fault)? What is the best corresponding observable, robust and sensitive.

What may happen?

What may/may not change in the fault zone during earthquake cycle?

High-freq seismic, Low-freq seismic, Strain, Tilt ,Pore-fluid pressure, Temperature, EM, seismic attenuation-velocity-and-anisotropy (Active source)

How accurate shall we model phenomena. (spatial and magnitude)

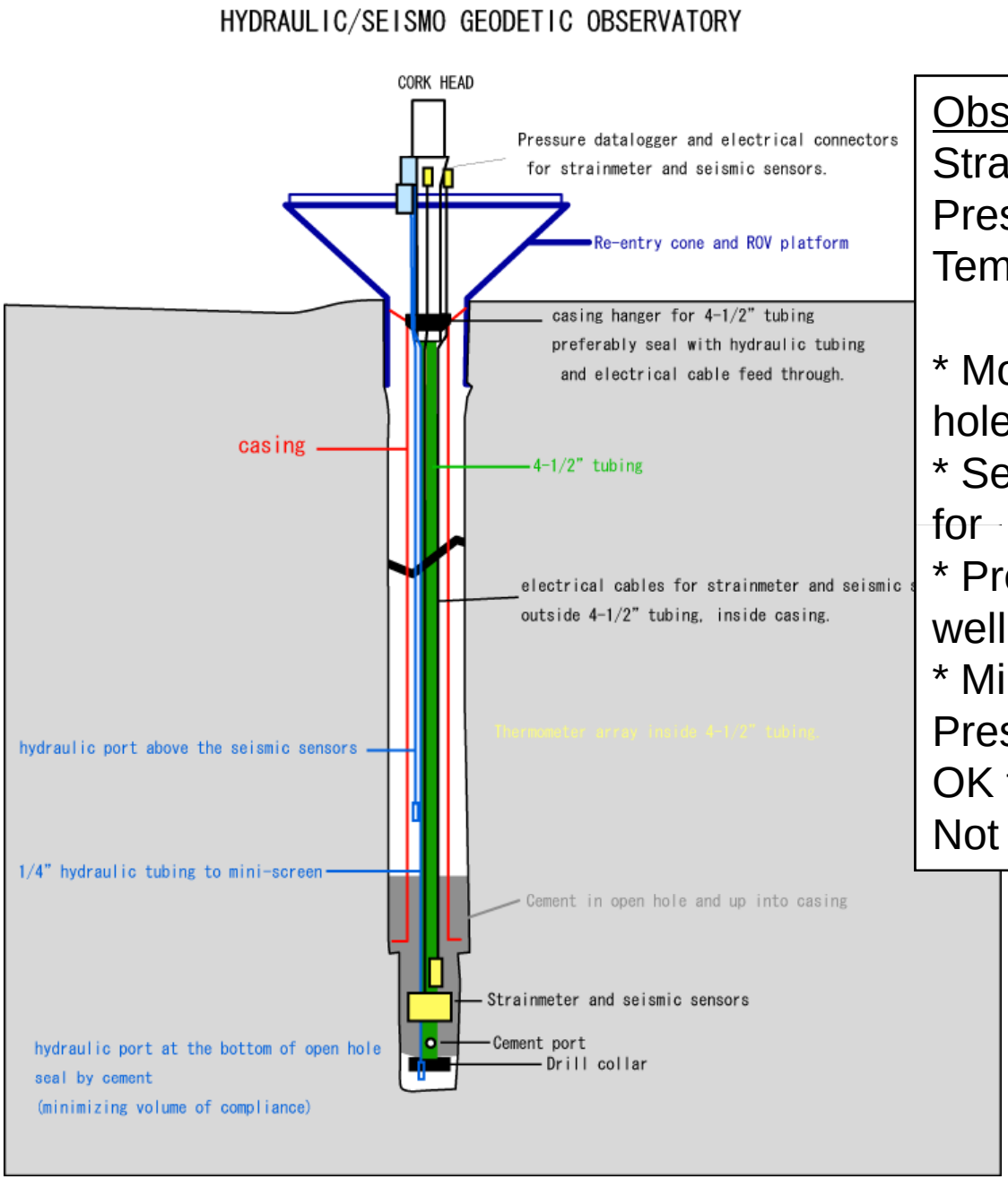
2. Requirements for stable observation environment? How different from the seafloor? (Thermal, Rock strength, Hydrological)
3. Array density and location corresponding to each observable, horizontally and vertically?
4. “Long-term” how long? The observation period may be different among observables.

5. Recoverable/non-recoverable choice
6. Monitoring fault property change in time? No need?

Active source experiment and cross hole experiment … its use and feasibility.

What was discussed (11/28)

- Target event: Aseismic slip event (VLF event and undiscovered type), associated earthquakes are expected. (Moment of VLF events does not account for slip rate).
- Slip partitioning during co-seismic slip is a target, but may require observation for 30+ years.
- Uniqueness of fault zone monitoring in the Nankai Trough has to be addressed.
- Property of fault zone and its change in time are to be monitored (which fault zone?) Seismic array density necessary for monitoring guided wave was suggested.
- Classification of instruments by technical feasibility is necessary.
- Outside casing installation of sensors is important for multi point observation. Which are the sensors installed outside casing? Techinical feasibility discussion is necessary.
- Consider complementary network with seafloor seismometer, geodetic observation, as well as array sensors in boreholes.
- Importance of submarine cable connection of borehole.



Observation parameters:
Strain, tilt, broadband seismic
Pressure (more than two depths)
Temperature

* Monitor strain, tilt, seismic near the hole bottom by cemented sensors.
* Separate cable for each sensors for redundancy
* Pressure seal by cement and wellhead
* Minimize volume associated with

Pressure monitoring is important
OK for hole bottom pressure
Not the best upper section pressure

Figure 1. Combined Hydraulic and Seismo-geodetic Observatory in single hole proposed in this document.

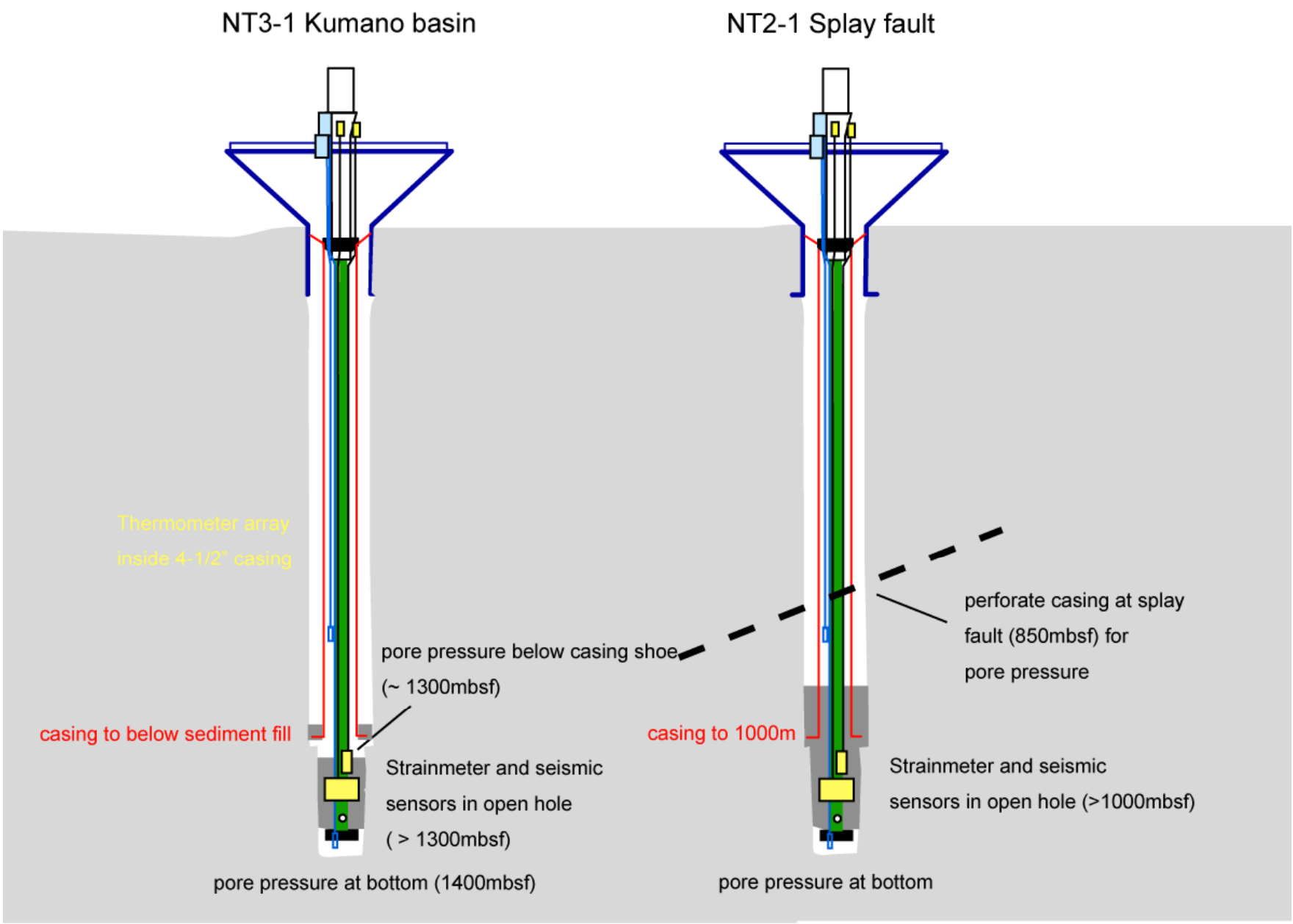
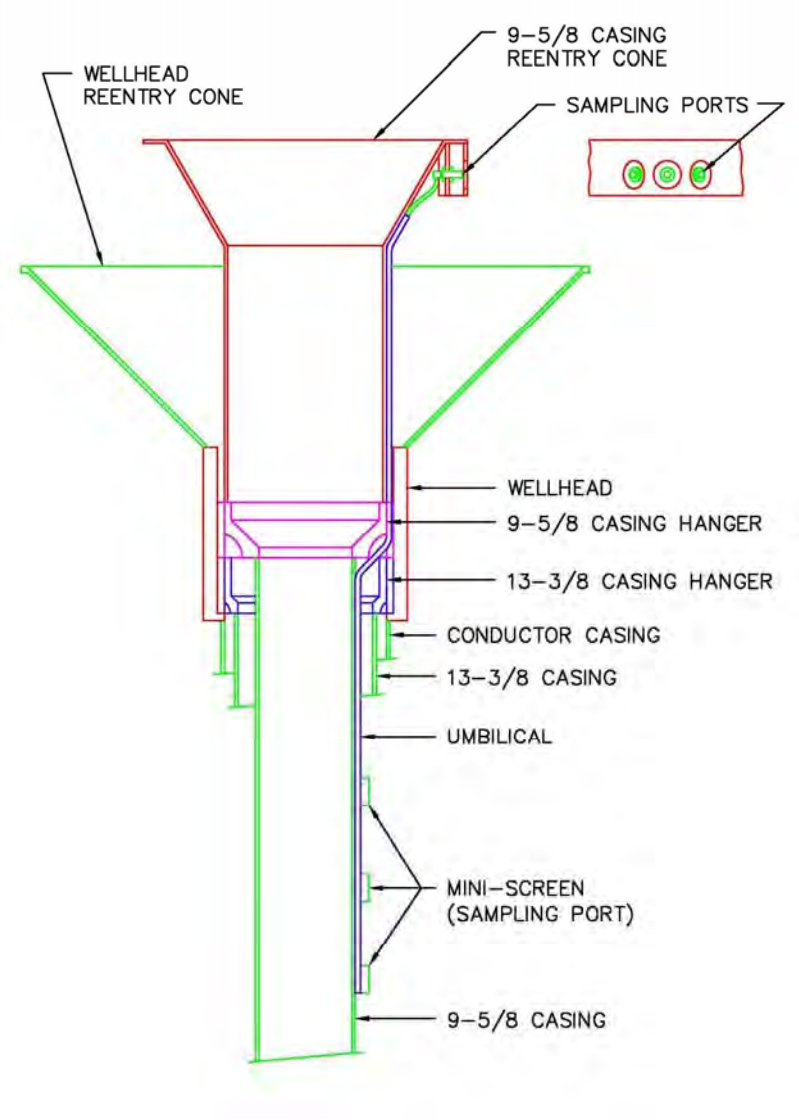
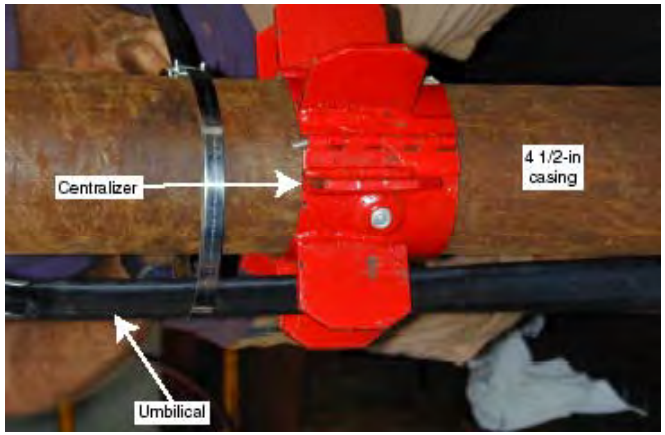


Figure 3. Proposal of deployment of two non-riser borehole observatories for pore pressure, temperature, strain, seismic monitoring in the Nankai Trough.

A solution to the opportunity: Strapped-on screens and hydraulic lines





Nonriser-development
What to do and who does by when?

- Engineering

1) Design of 9-5/9 csg hanger with hydraulic line through outside casing (VETCO)
2) Sensor carrier design (Tom, Araki with CDEX) related to #5
3) Equipment (sensor) design (araki)
4) Re-design of CORKhead (drawing) (Tom Dec 07)

Option1. use swellable packer

Option2. use seal disk a) cable is attached by swagelok seal b) cable is attached by split compressional seal

Need performance of swellable packer and information about split compression seal (c) from Tom-san.

Araki will hand information (c) to OCC for evaluation.

5) Consider tubing size 4-1/2" , 3-1/2", 2-3/8" ? (CDEX)

Installation simulation, strength ? Related to #2

6) # of cables #of equpment, pressure port interface specification ~ 24 Dec. Araki

Operation

7) Cementing operation scheme (CDEX)
8) On Rig handling (layout procedure etc) of cables , hydraulic tubing (end of Mar 08, VETCO)
9) Cutside casing hydraulic line work will be done on the moon pool. (TAMU will provide previous example to CDEX, and CDEX will plan the operation on D/V Chikyu)

Non-riser development Schedule

- Tell/Update our discussion on development plan to IODP (EDP) Jan 08.
- Initial Design (clear and cooperated) by the end of March → provide to scientific community.
- send IODP our initial design for review by EDP in July? 08.
- When we have initial design, we have review meeting of risk assessment (Sept. 08)
- VETCO test/fab/order by Dec. 08.
- At AGU08 meeting, scientist will agree on implementation plan of the riserless observatory.
- CORK head fablication start Dec. 08
- Equipment test to end of July, and fix design.

Sensor development by JAMSTEC requirements and plan

- Target environment: functional at 3.5km deep below 2.2km seafloor environment = *125℃~75MPa*
- Installable *both in non-riser and in riser* hole
- Sensors must withstand *severe shocks and vibrations during installation*
- Sensors are either *cemented or clamped* (for sensors in the middle hole).
- Data and control interface for telemetry system: *A/D converter or frequency counters, valve operation etc.*
- Hole diameter ~9-5/8” csg and 2-3/8” + tubing for cement delivery→ *small diameter or sensor has a hole for cement delivery*

- Strainmeter: *Sacks-Evertson type dilatometer and 3C volumetric type for very high pressure environment.*
- Tiltmeter: *mechanisms similar to broadband seismographs*
- Pressure gauge: *stability test needed*
- Thermometer: *stability test needed*
- Others:
- *Shock environment during installation has to be understood.*

Sensor test facility

- Laboratory for borehole sensor stability test (under detail planning, will be build in 2008).
- Use: Sensor element calibration/testing for stablility (strainmeter, thermometer, pressure gauge, and other sensors)
- 1回の実験で最低1ヶ月程度かけ安定度を見るような実験を中心とする。
- Specs: 0-180degC, 0-100MPa, constant T (~mK), constant P (~ a few PPM) maintained for weeks.
- Fullscaleのチャンバーは、温度一定、圧力一定の条件維持の困難から十分な検討を要する。
- まず、小さな(とはいってもセンサー要素を十分に収納可能）チャンバーでの環境維持装置を優先整備。運用して上記問題を検討する。

IODP
INTEGRATED OCEAN DRILLING PROGRAM

EDP Meeting

8-11th January 2008

ESO Down-pipe Camera Feasibility Study

Dan Evans

ECORD Science Operator

Assumed specifications

- Maximum diameter 95 mm
- Maximum Length 2000 mm
- Full Ocean Depth (6000 metres)
- Colour Camera with
  - Standard – High TV resolution (450-480 TV lines PAL/NTSC)
  - Low Light capability
- Pan and Tilt
- Built in Lighting
- Zoom Camera (optional)
- Laser diodes for 2D Measurement (optional)
- Direction indicator (optional)

Development to be addressed

- Communication
- Optical systems
  - Camera / Pan and tilt
  - Lights
  - 2D measurements
  - Directional indication
- Pressure housing
- Surface Unit

Communication

- Fibre optics provides both:
  - Data channels for control
  - Real-time video from a single multiplex card
    - Available off-the-shelf

Optical systems

- Camera/pan and tilt
  - No currently available zoom camera identified that is small enough – further investigation needed
- Lighting
  - LED and small halogen bulbs
  - Configuration will depend on space available

Pressure housing

- Needs to be titanium to allow sufficient internal bore

Surface unit

- Depending on camera and pan/tilt systems
  - Stand-alone system similar to that used for Tahitii

  Or
  - PC-based

Development avenues

- Direct upgrading of current system
- Purchase of a commercially available system
- Modification of a commercially available system
- Designed from scratch

Designed from scratch

- Would require most development and cost
- Main risk is developing the camera pan/tilt unit

- Not recommended

Direct upgrading of current system

- CCD camera with digital iris and 70 deg viewing
- Rated to 500 m
- Lighting is standard ROS unit with 120 V AC bulb

- Replace camera and light with 6000 m-rated units
- Use fibre optic communication
- Add 2 laser diodes to light unit for 2D measurement
- Would lack pan/tilt
- The redesign load would be equivalent to designing the system from scratch – not recommended

Purchase of a commercially available system

- None identified that meets required specification
  - May exist
  - Main limitation is depth rating
- VS3350 FARR to 3000 m
- DTR 71 MPX to max 2000 m
- Not recommended unless specifications can be met/changed

Modification of a commercially available system

- Option 1 Modify the Hytec VS3350 FARR
  - Hytec estimate that a modification for 6000metres and the inclusion of colour cameras could cost approximately $100000 (US). This system would provide a downwards facing camera and a separate sideward facing unlimited rotation camera but no true tilt function.

Modification of a commercially available system

- Option 2 Modify the Hytec DTR 71 MPX.
- Replaced steel with a custom-built titanium housing
- Replace optical polished glass dome. An off-the-shelf dome for approximately $1000, but could increase to $30000 if the dome is custom made
- Possible to add laser diodes for scaling
- Considered most-feasible option

Conclusion

- Pursue an off-the shelf system that meets specification
- Develop the Hytec DTR 71
  - Purchase winch and fibre-optic cable
  - Even so, costs would be approximately $250 000
- Down-grade the specification

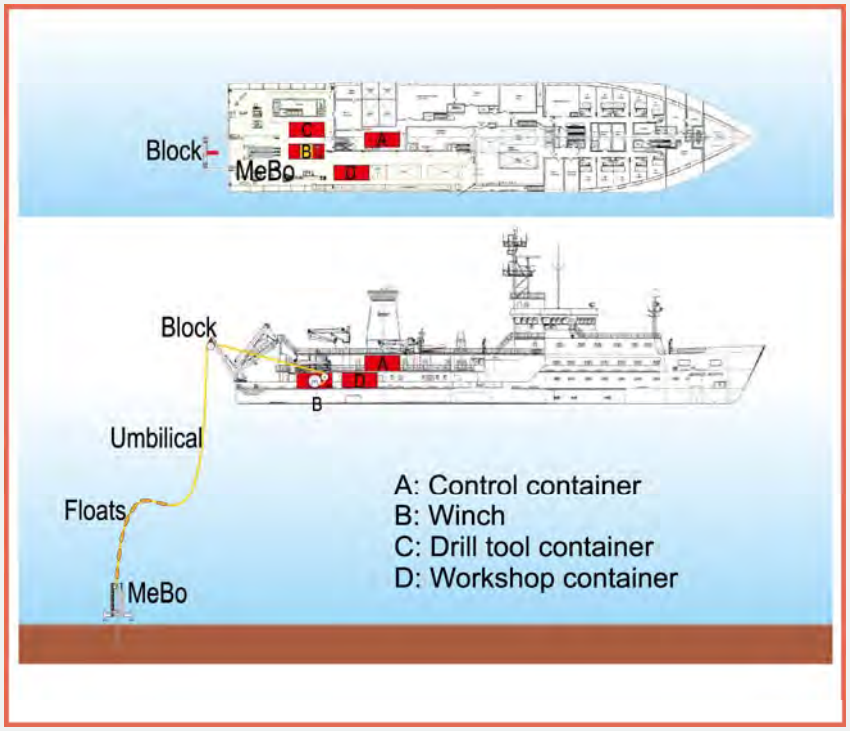
EDP Meeting

8-11th January 2008

ESO Rock drills

Sea floor drill rig MeBo

(short for “Meeresboden-Bohrgerät”, ‘sea floor drill rig’ in German)



From: Freudenthal & Wefer (2007), *Scientific Drilling* **5**

http://www.rcom.marum.de/English/Sea_floor_drill_rig_MeBo.html

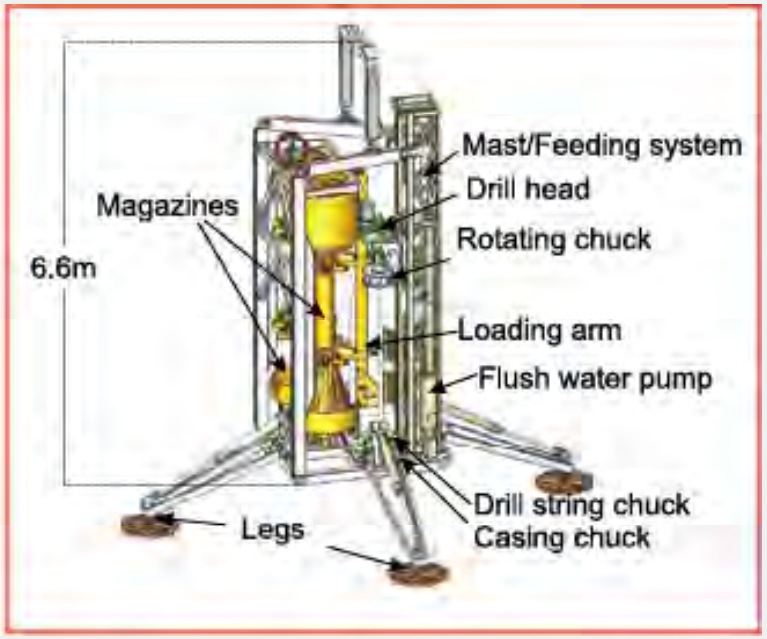
LEFT: Schematic deployment scheme of the sea floor drill rig MeBo exemplified for *RV Maria S. Merian*.
RIGHT: Launch of the sea floor drill rig MeBo from the *Maria S. Merian*.

MEBO

- 50 m penetration
  - Maximum achieved to date of 41.55 m
  - Maximum recovery of almost 40 m.
- 2000 m water depth; 32 mm diameter umbilical
- 17 x 3 m barrels in magazine
- 74-84 mm diameter core
- 6 x 20ft containers for mobilisation on research vessels

Sea floor drill rig MeBo

http://www.rcom.marum.de/English/Sea_floor_drill_rig_MeBo.html

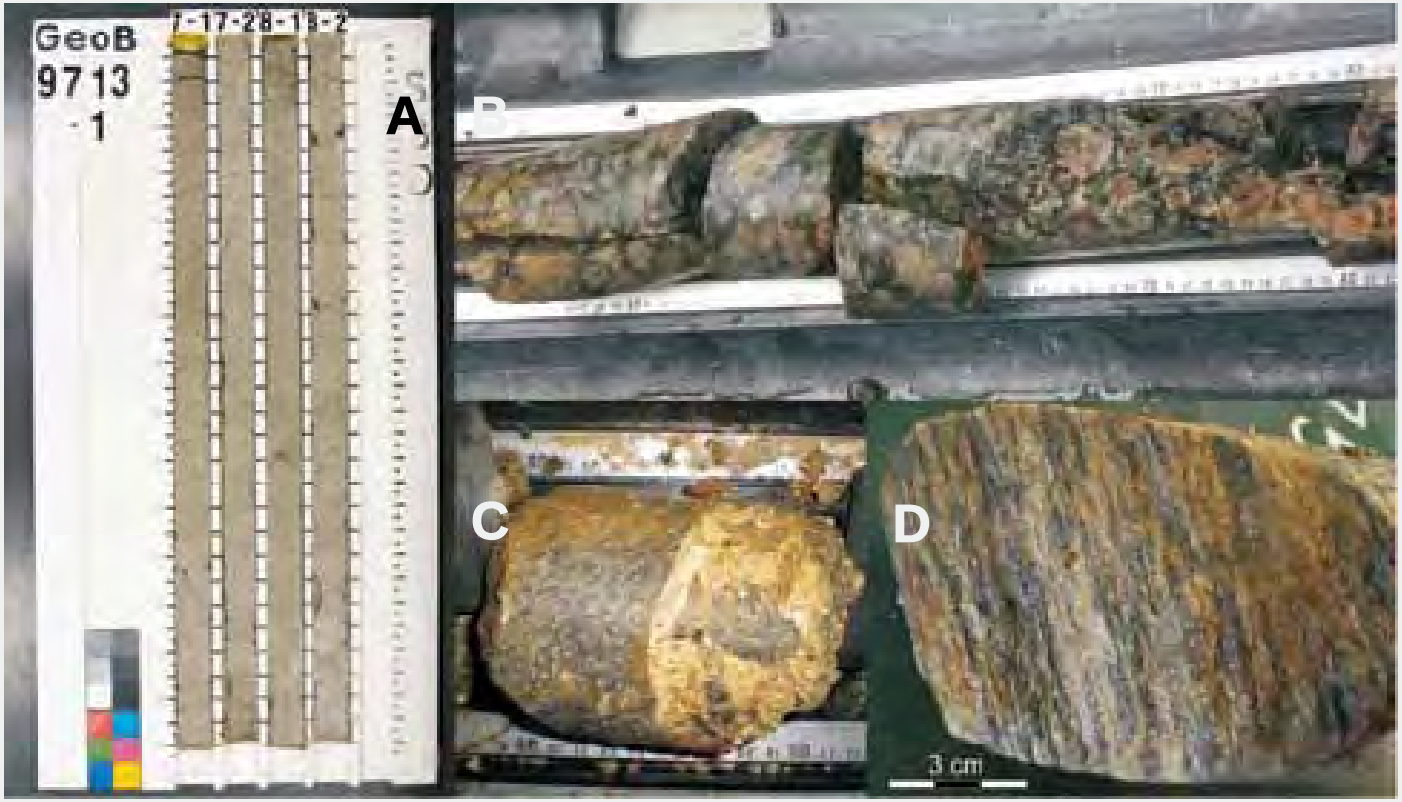


From: Freudenthal & Wefer (2007), *Scientific Drilling* **5**

LEFT: Overview of basic components of sea floor drill rig MeBo.
RIGHT: View of the work deck of *RV Meteor* during a deployment of the sea floor drill rig MeBo.

Sea floor drill rig MeBo

Examples of recovered samples



From: Freudenthal & Wefer (2007), *Scientific Drilling* **5**

[A] consolidated Pliocene marl, continental slope off Morocco;

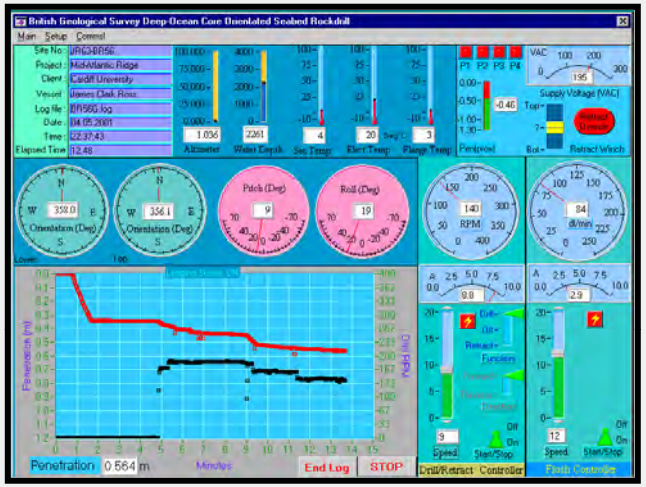
[B] Granite, Porcupine Bank;

[C] Conglomerate, Porcupine Bank;

[D] Gneiss, Porcupine Bank.

BRIDGE Oriented Seabed Rockdrill 1995 - Present

Specification
Core length 1m
Water depth 5500m
Oriented Cores



Surface
Control
Program

Pillow Lava
4000m
Mid Atlantic Ridge

Scribed core

BGS Oriented Seabed Rockdrill

RRS James Clark Ross
Cruise JR63

BGS 5m Seabed Rockdrill

August 2007

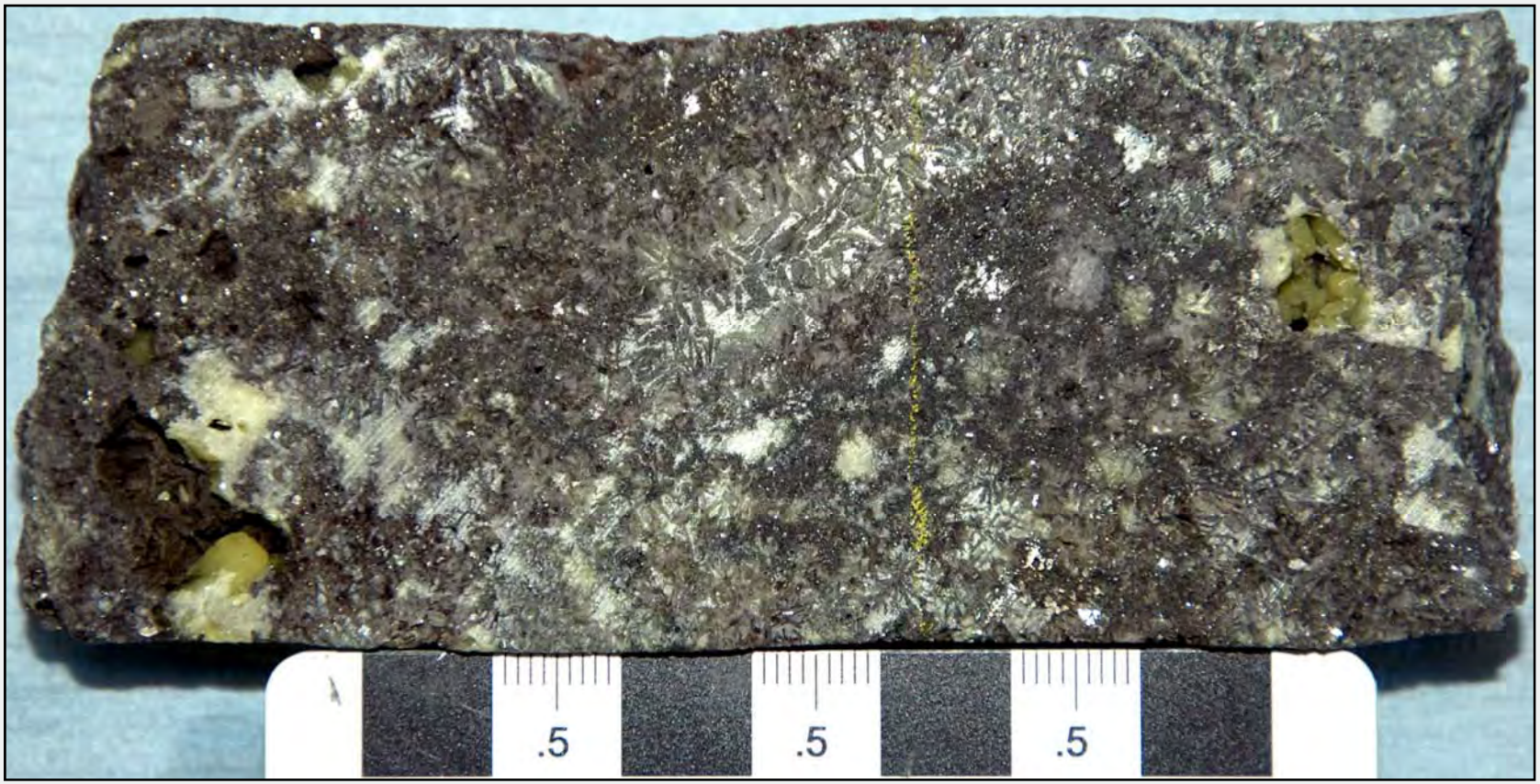
Drilling on active submarine volcanoes, Tyrrhenian Sea

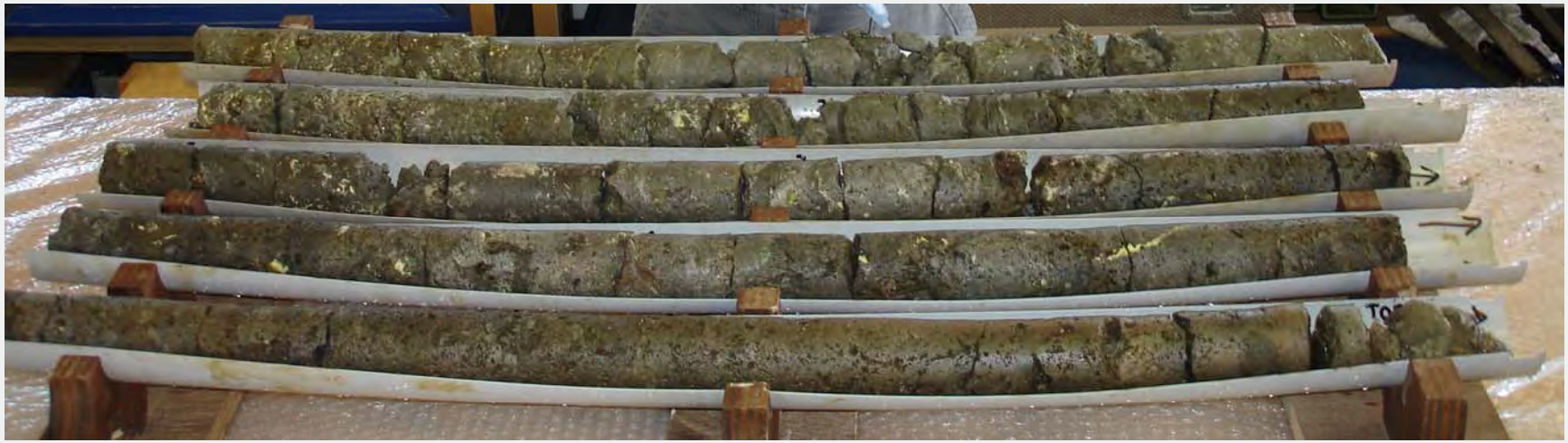
Stromboli in background

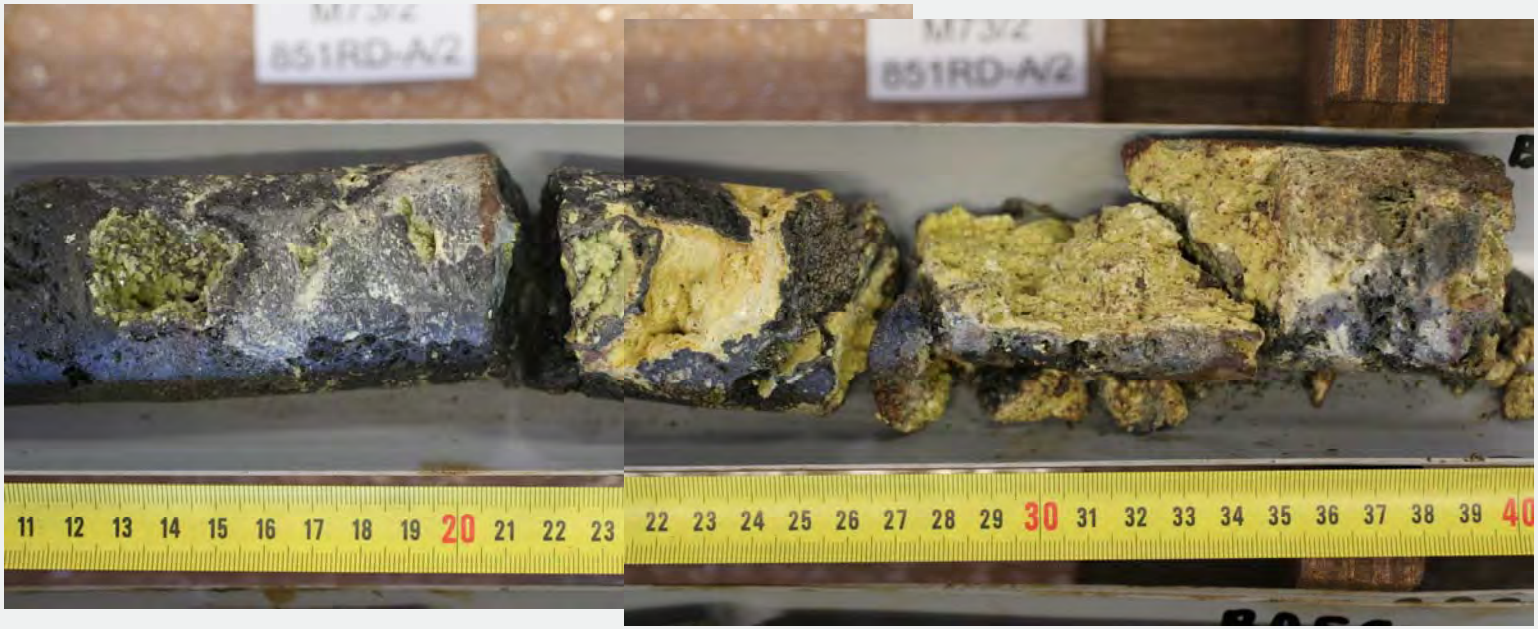

M73/2
865RD-A/6
M73/2
865RD-C/6
M73/2
865RD-D/6
M73/2
865RD-E/6

Palinuro Hydrothermal Facies

Sulfate > sulfide (anhydrite/gypsum/barite - clay, pyrite +/- sphalerite, galena, Ag-sulfosalts, late native S)






851RD-A2
11 12 13 14 15 16 17 18 19 20 21 22 23
851RD-A2
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

BGS 15m Seabed Rockdrill

Address limitation of 5m Rockdrill

Multi core barrels

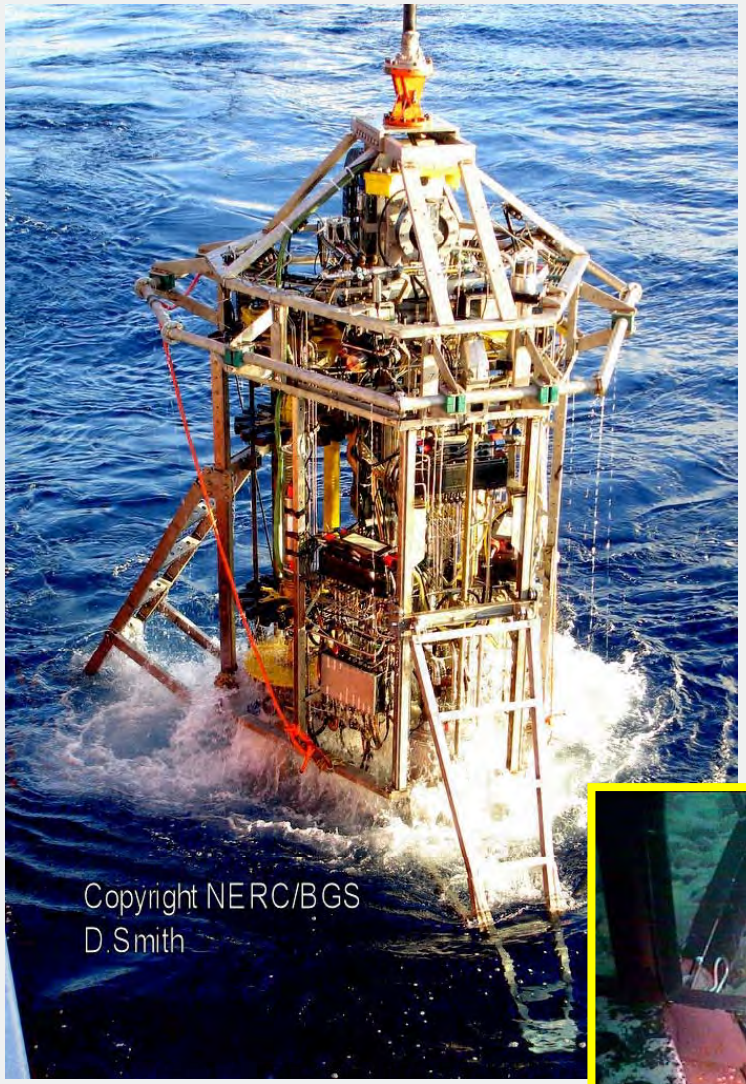
3000m depth rating

Deepest core site to date 3050m

Active area of Mid-Atlantic Ridge 15Deg N

West of Scotland

Same umbilical as 5m Rockdrill



FY2008 Engineering Developments

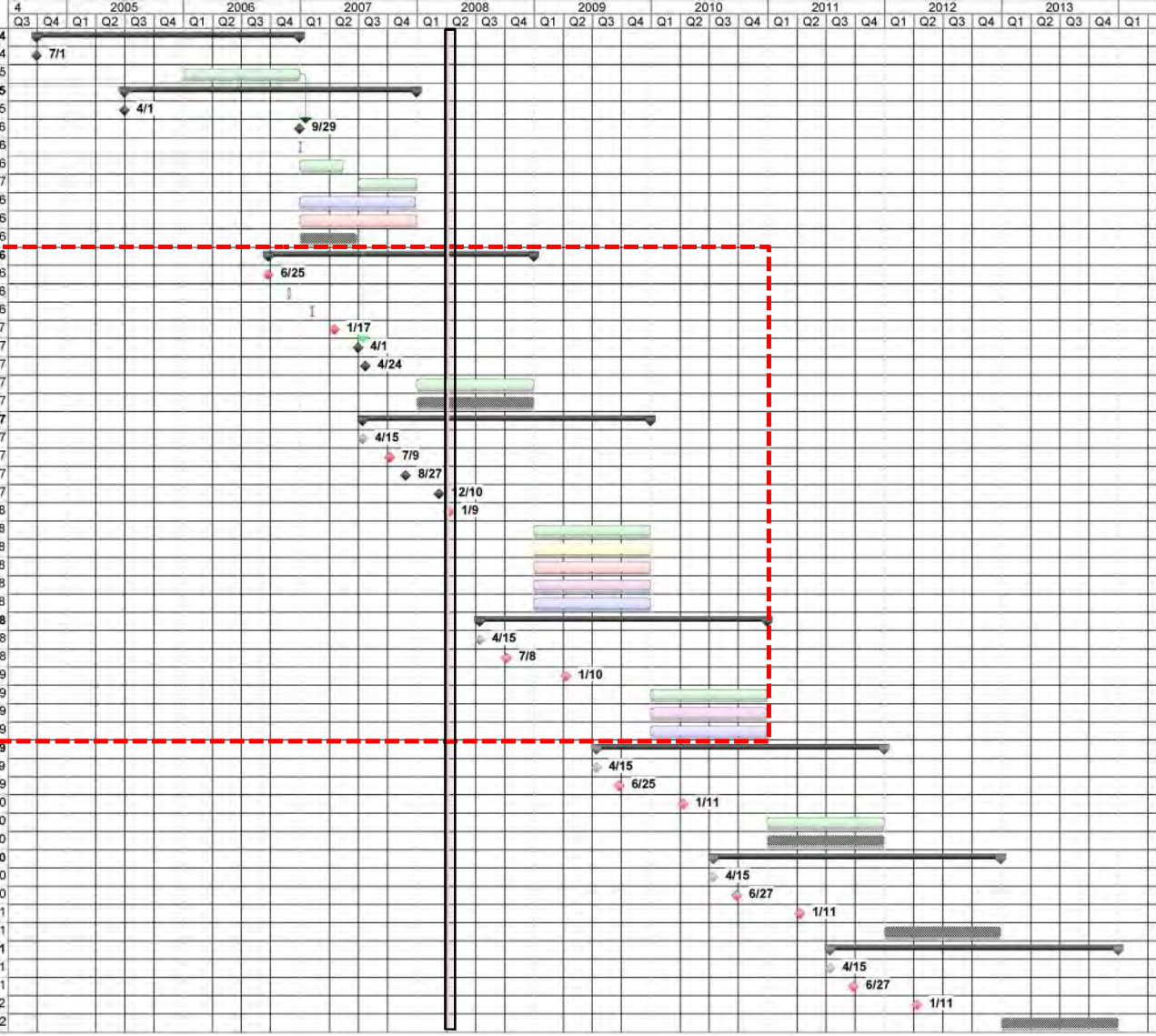
CDEX - Long Term Borehole Monitoring System

- Finalize design, generation of construction documents, Begin production of experimental prototype
- Class B project continuation

IODP-MI will conduct a coring study:

- Primary goals are to define the factors that control quantity/quality and establish the framework for quantifying core quality.
- Class A project supported by EDP (**EDP Consensus 0707-06)**

ID	Task Name	Duration	Start
1	**FY2006 APP**	**587 days**	**Thu 7/1/04**
2	FY 06 APP Planning	0 days	Thu 7/1/04
3	LTBMS Feasibility Study	260 days	Mon 10/3/05
4	**F2007 APP**	**656 days**	**Fri 4/1/05**
5	FY 07 APP Planning	0 days	Fri 4/1/05
6	Received LTBMS feasibility Study	0 days	Fri 9/29/06
7	Engineering Task Force 1st MTG	3 days	Sun 10/1/06
8	Develop proposal for FY2007 LTBMS work	100 days	Sun 10/1/06
9	LTBMS Implementation FY 07	132 days	Mon 4/2/07
10	Logging While Coring Core Barrels	262 days	Sun 10/1/06
11	PTM Feasibility Study	265 days	Sun 10/1/06
12	Thru Drill Pipe Camera Feasibility	131 days	Sun 10/1/06
13	**FY2008 APP**	**597 days?**	**Sun 6/25/06**
14	EDP-3 June Meeting - Germany	0 days	Sun 6/25/06
15	SPC Meeting - present FY2008 plan	5 days	Fri 8/25/06
16	APP Planning Meeting	4 days	Tue 11/7/06
17	EDP-4 - January Meeting - New York	0 days	Wed 1/17/07
18	First draft of FY 08 APP	0 days	Sun 4/1/07
19	Engineering Task Force MTG	0 days	Tue 4/24/07
20	LTBMS Implementation FY 08	262 days	Mon 10/1/07
21	IODP-MI - Proposed Coring Study	262 days?	Mon 10/1/07
22	**FY2009 APP**	**646 days**	**Sun 4/15/07**
23	FY +2 proposal final submission	0 days	Sun 4/15/07
24	EDP-5 June Meeting - Tokyo	0 days	Mon 7/9/07
25	SPC Meeting - present FY2009 plan	0 days	Mon 8/27/07
26	ETF Meeting - present FY2009 plan	0 days	Mon 12/10/07
27	EDP-6 January Meeting - Nice	0 days	Wed 1/9/08
28	LTBMS Implementation FY2009	262 days	Wed 10/1/08
29	SCIMPI High Level Design	262 days	Wed 10/1/08
30	S-CORK High Level Design	262 days	Wed 10/1/08
31	Simple Observatory - Common Deployment Syste	262 days	Wed 10/1/08
32	MDHDS design and build	262 days	Wed 10/1/08
33	**FY2010 APP**	**644 days**	**Tue 4/15/08**
34	FY +2 proposal final submission	0 days	Tue 4/15/08
35	EDP Summer Meeting	0 days	Tue 7/8/08
36	EDP Winter Meeting - US	0 days	Sat 1/10/09
37	LTBMS Implementation FY2010	261 days	Thu 10/1/09
38	Simple Observatories - Year 2	261 days	Thu 10/1/09
39	MDHDS - Year 2	261 days	Thu 10/1/09
40	**FY2011 APP**	**643 days?**	**Wed 4/15/09**
41	FY +2 proposal final submission	0 days	Wed 4/15/09
42	EDP Summer Meeting	0 days	Thu 6/25/09
43	EDP Winter Meeting	0 days	Mon 1/11/10
44	LTBMS Implementation FY2011	261 days?	Fri 10/1/10
45	Engineering Development Projects	261 days	Fri 10/1/10
46	**FY2012 APP**	**643 days**	**Thu 4/15/10**
47	FY +2 proposal final submission	0 days	Thu 4/15/10
48	EDP June Meeting	0 days	Sun 6/27/10
49	EDP January Meeting	0 days	Tue 1/11/11
50	Engineering Development Projects	261 days	Mon 10/3/11
51	**FY2013 APP**	**644 days**	**Fri 4/15/11**
52	FY +2 proposal final submission	0 days	Fri 4/15/11
53	EDP June Meeting	0 days	Mon 6/27/11
54	EDP January Meeting	0 days	Wed 1/11/12
55	Engineering Development Projects	262 days	Mon 10/1/12



Project: engineering development calendar-APP based-Jul
Date: Thu 1/3/08

Task | Progress | Summary | External Tasks | Split
Split | Milestone | Project Summary | External MileTask

13		**FY2008 APP**	**597 days?**	**Sun 6/25/06**
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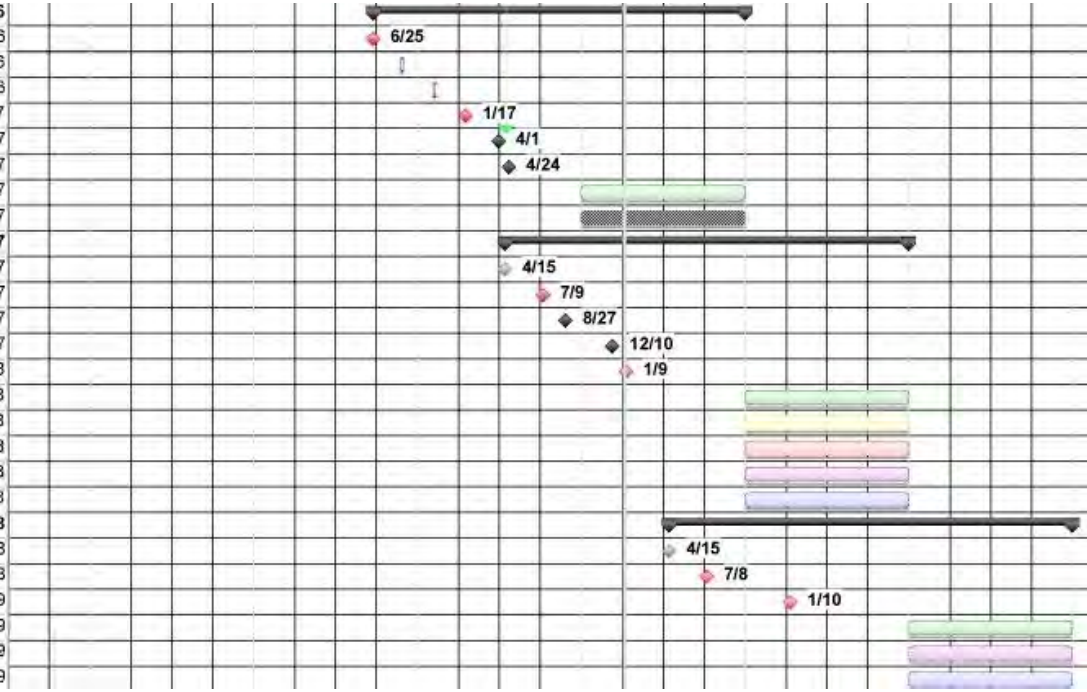
18		First draft of FY 08 APP	0 days	Sun 4/1/07
19		Engineering Task Force MTG	0 days	Tue 4/24/07
20		LTBMS Implementation FY 08	262 days	Mon 10/1/07
21		IODP-MI - Proposed Coring Study	262 days?	Mon 10/1/07
22		**FY2009 APP**	**646 days**	**Sun 4/15/07**
23		FY +2 proposal final submission	0 days	Sun 4/15/07
24		EDP-5 June Meeting - Tokyo	0 days	Mon 7/9/07
25		SPC Meeting - present FY2009 plan	0 days	Mon 8/27/07
26		ETF Meeting - present FY2009 plan	0 days	Mon 12/10/07
27		EDP-6 January Meeting - Nice	0 days	Wed 1/9/08
28		LTBMS Implementation FY2009	262 days	Wed 10/1/08
29		SCIMPI High Level Design	262 days	Wed 10/1/08
30		S-CORK High Level Design	262 days	Wed 10/1/08
31		Simple Observatory - Common Deployment Syste	262 days	Wed 10/1/08
32		MDHDS design and build	262 days	Wed 10/1/08
33		**FY2010 APP**	**644 days**	**Tue 4/15/08**
34		FY +2 proposal final submission	0 days	Tue 4/15/08
35		EDP Summer Meeting	0 days	Tue 7/8/08
36		EDP Winter Meeting - US	0 days	Sat 1/10/09
37		LTBMS Implementation FY2010	261 days	Thu 10/1/09
38		Simple Observatories - Year 2	261 days	Thu 10/1/09
39		MDHDS - Year 2	261 days	Thu 10/1/09



IODP-MI Core Quantity and Quality Study

- Project started in October
- IODP cannot move on technology developments related to improving core quality and quantity until metrics are created that will determine if progress in this area is being made.
- Goal of the study is to quantitatively define the factors that control core quality and quantity
- Deliverables will include:
  - Indentify framework for describing core quantity
  - Research techniques for quantitatively evaluating core quality
  - Locate industry core quality description systems and procedures. If they don't exist, a contractor will assist IODP in developing a model for scientific ocean drilling
  - Determine what are the key factors that affect core quality and quantity. Begin analyzing core photographs, drilling parameters, drilling dynamics data.
  - Gain access to proprietary industry data sets and industry techniques to assist IODP in developing recommendations for improvement

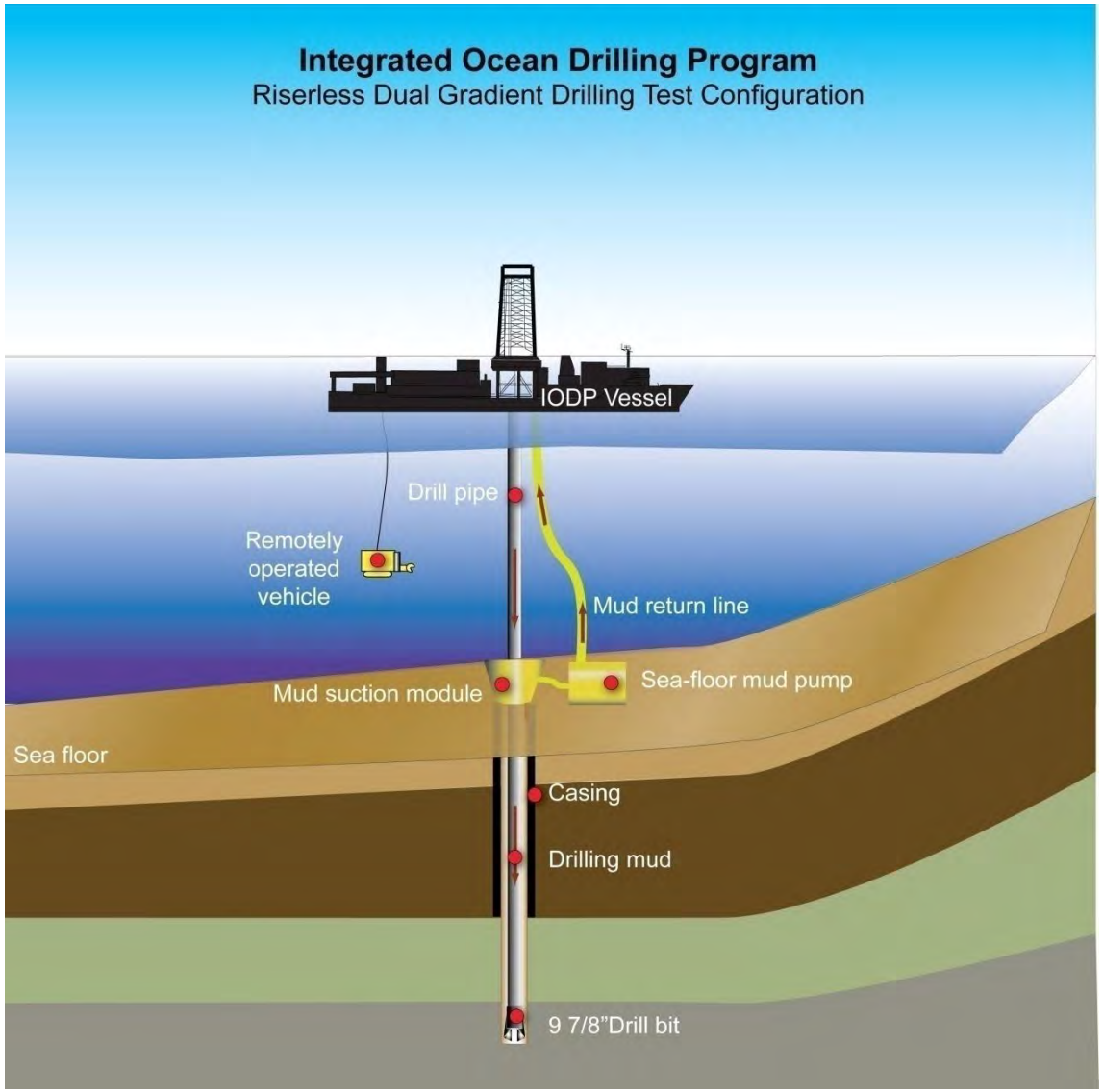
Planning for a JIP Engineering Field Trial with DeepStar

IODP-MI, the USIO, AGR and BP are submitting a $645,000 proposal to conduct feasibility studies and planning for a sea trial of emerging technology. (note: corporate funds, not IODP funds used to conduct work to date).

The JIP plan would consist of the steps required to deploy and test AGR's Riserless Mud Recovery system at ultra-deep (>1,500 m) sites in the Gulf of Mexico.

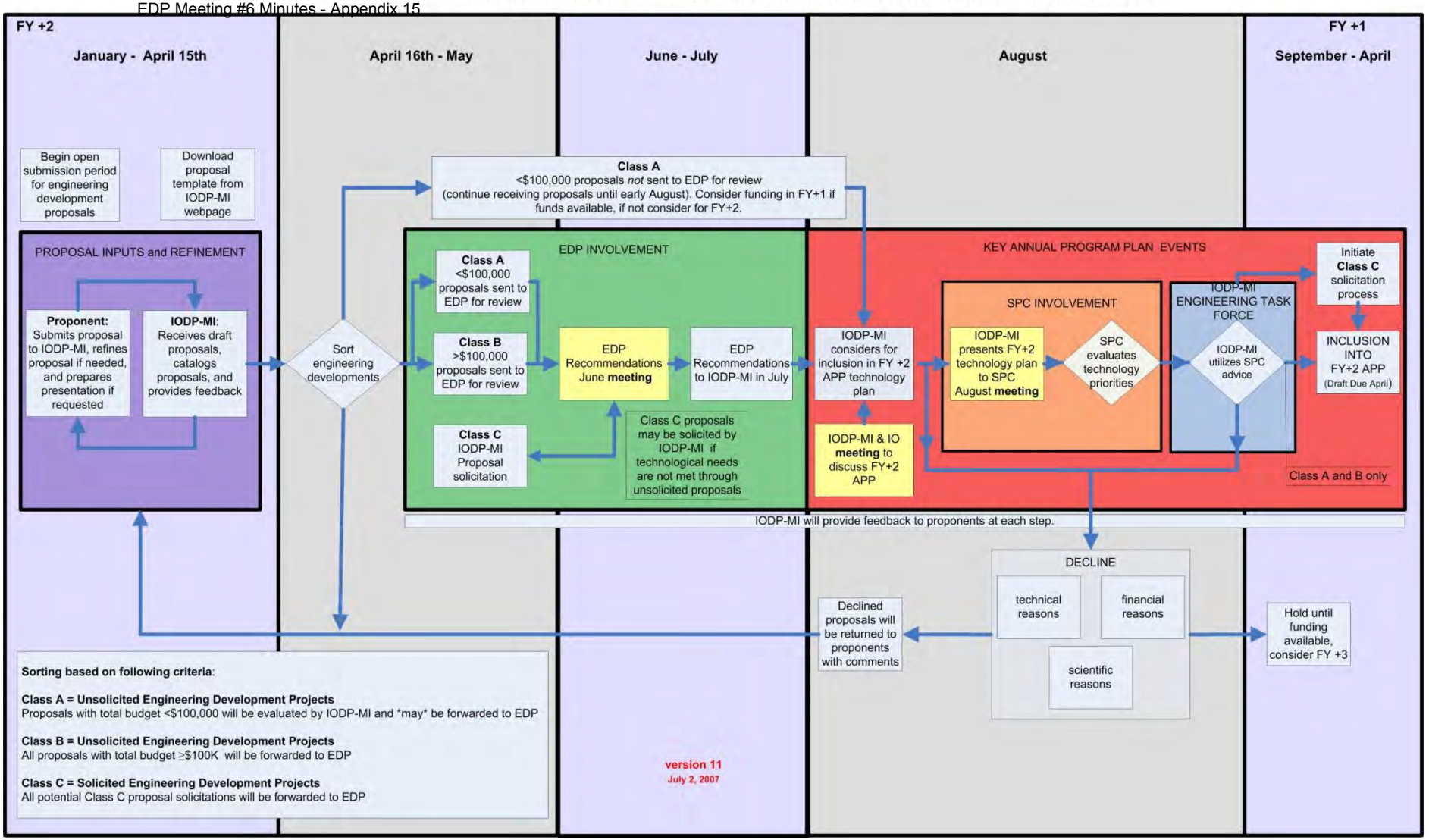
The JIP would be a demonstration project to test riserless drilling equipment for industry while coring at sites of interest to the IODP science community in the Gulf of Mexico

A successful test would provide the impetus for drilling and exploration in water depths greater than 4,000m



Proposal Review Process

ENGINEERING DEVELOPMENT PROPOSAL SUBMISSION PROCESS FOR INCLUSION INTO THE ANNUAL PROGRAM PLAN



Engineering Development Process Implementation (What to expect between now and next meeting)

- IODP-MI receives proposals no later than April 15
- ETF meeting at end of April to briefly review and route proposals
  - Proposals selected for routing to EDP
  - Reviews sent to all proponents
  - Responses received and attached to proposals for forwarding to EDP
- Watch dogs assigned in May for proposals to be reviewed by EDP
  - Dialog between proponents and watchdogs
  - Presentations provided to watchdogs
- July EDP meeting
  - Follow accepted confidentiality and proposal review procedures
  - Presentation given by watchdogs at summer meeting
  - Groupings assigned (preferably by consensus) by close of meeting.
  - Reviews written by watchdogs and completed by end of meeting
  - Results of meeting sent to proponents in including grouping number
  - Following meeting, proponents provide response letter (PRL) to IODP-MI who forwards this to lead watch dogs.

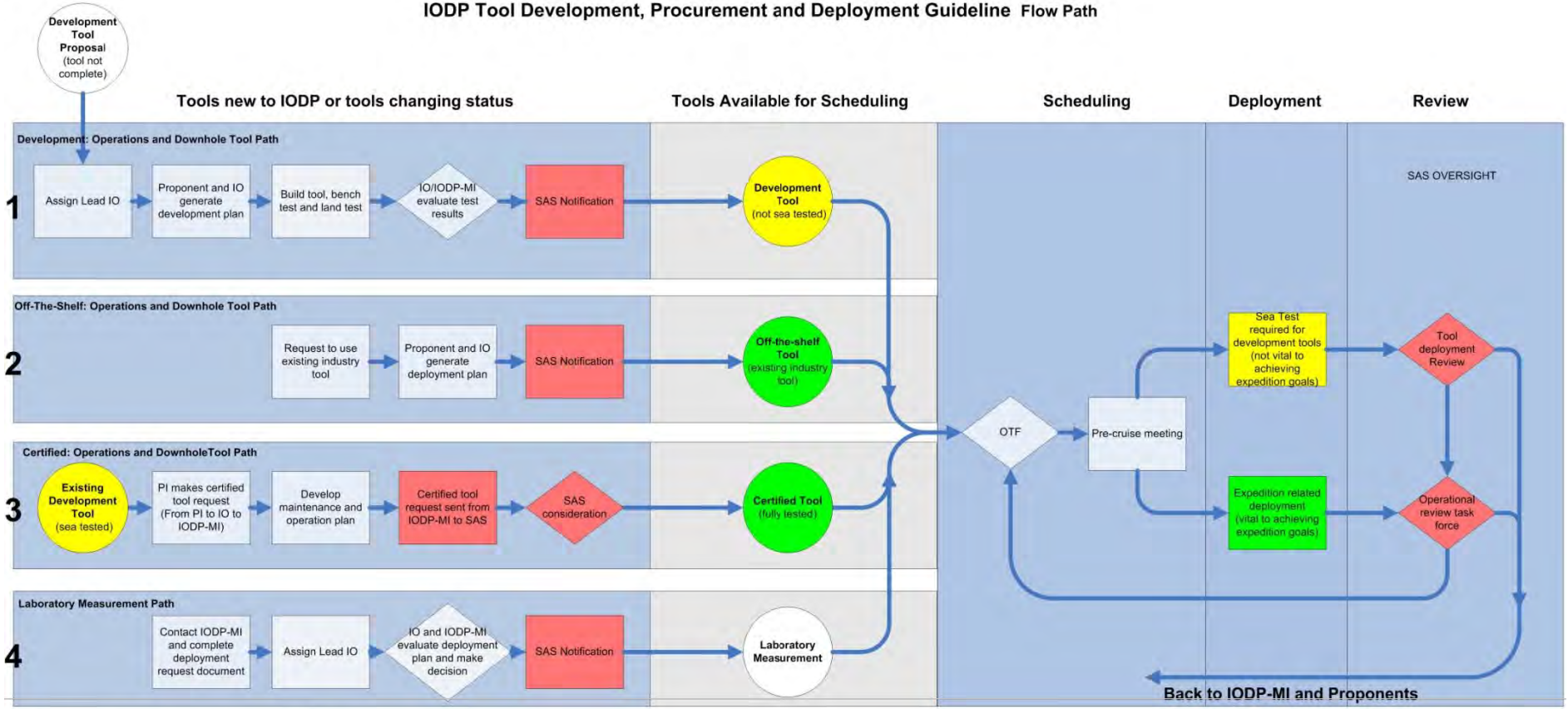
Process continued

- IODP-MI takes all review data, in conjunction with budget data and drafts engineering plan
- Engineering plan is presented to SPC and comments are generated
- Following SPC, engineering plan is edited if needed and presented to the Engineering Task Force for comment
- Engineering plan is presented to EDP at the winter meeting for final look
- Lead agencies provide budget guidance at end of January
- First draft of the Annual Program Plan (APP) is written in February
- Final draft of the APP in spring
- Projects commence on October 1st.

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

IODP Tool Development, Procurement and Deployment Guideline Flow Path



1. A development tool may be:
a. New technology that has been created
b. Modifications to existing technology that has been completed
c. Any existing prototype tool untested at sea

2. Off-the-shelf tool may be:
a. Technology new to IODP that has been utilized in other markets
b. Leased or purchased tools

3. A certified tool may be:
a. New technology that has been tested at sea
b. Modified, existing technology

4. A Laboratory Measurement may be:
a. Any equipment intended for use in the shipboard laboratory

Development

✪Assign Lead IO
✪Determine funding and operational requirements
✪Lead IO ensure development plan has been created
✪SAS is kept informed on all three tool categories

Tools available for scheduling

✪These are existing, functional tools that are available for OTF consideration.

Scheduling

✪Funding and operational issues have been identified and resolved
✪Lead IO have provided feedback on whether third party development can move forward to OTF

Deployment

✪Lead IO assists proponent in implementing testing plan

Or

✪Lead IO deploys tool as integral part of science plan

Review

✪Data must be archived with other shipboard data and releasable following moratorium
✪Results must be made available to engineering and technology panels and operations review task force.
✪Results of deployment ultimately are presented to OTF, who considers whether tool is run again.

DRAFT
October 25, 2007

ISP Technology Challenges

1 Expand temperature and pressure tolerance
2 Drill/Instrument unstable lithologies and over pressured zones
3 Improve core recovery and quality
4 Improve depth control and cross instrument depth correlations
5 Develop long-term borehole monitoring systems
6 Develop ability to perform in situ experiments
7 Improve well directional control
8 Make measurements under in-situ conditions
9 Sample at in situ conditions and transfer samples at in situ conditions shipboard
10 Improve hard-rock drilling capabilities
11 Improve remote and post-deployment capabilities of borehole infrastructure
12 Improve reliability of what drilling and borehole monitoring systems
13 Extend depth capabilities of IODP platforms
14 Improve Chikyu operability under strong currents and severe sea state

Problem:

- One challenge links to several items
- Some items overlap or conflict
- Proposals may make inappropriate assumptions about related systems
- Time-wasting and frustrating for protagonists
- Lack of overview of technology state of the art

Roadmap:

possible solutions, drilling systems only

A	3a	10	Motor driven core barrel	Shallow hard rock coring
A	3a	13	Seabed coring devices (PROD)	Shallow sampling (rubble, unconsolidate sand)
A	3a	14	Jumbo Piston corer	Long continuous sediment cores
A	3a	18	Common Bottom Hole Assembly (BHA)	Operate all coring systems in common BHA
B	3a	3	Heave Compensation	Improve Heave Compensation
B	3a	4	Heave Compensation during Advanced Piston Coring	Improve depth resolution
B	3a	5	Seabed Frame	Stabilize Drill String at sea floor
B	3a	6	Pressure Compensated Bumper/Thruster Sub	Improve core quality and quantity
B	3a	7	Rig Instrumentation System	Record/communcate/store rig instrumentation data
B	3a	8	Improved Automatic Driller	Better Weight On Bit Control
B	3a	9	Drilling Parameter Acquisition while coring	Record pressure, weight on bit
B	3a	10	Real Time Drilling Paramater Acquisition while coring	pressure, weight on bit
B	3a	30	Freestanding remotely operated deep water shallow hole coring system	Deep water shallow hole coring
B	3a	31	Drill pipe conveyed deep water, shallow hole coring tools	Deep water shallow hole coring
C	3a	18	Deployment procedures/soft-landing	need techniques to ensure that borehole instrumentation is not damaged during deployment, can be recovered in specific instances;

ISP Technology Challenges

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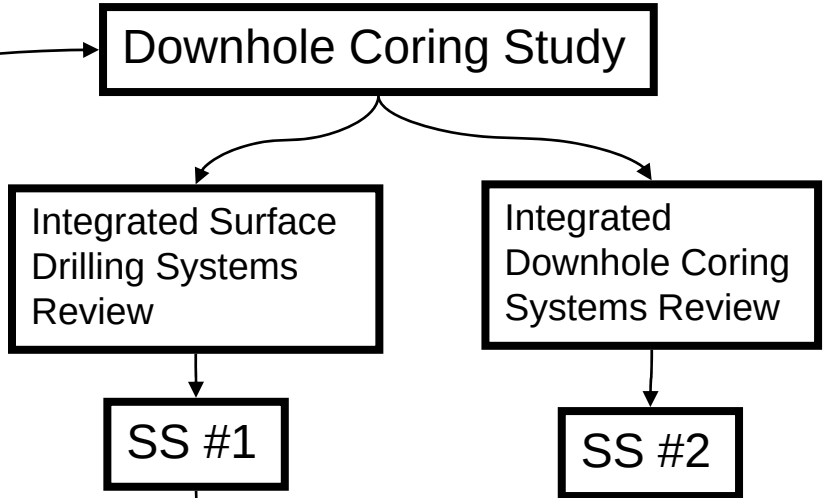

Simplified Roadmap

ED Cat	ED #	Engineering Development	Requirements	Old PMap	Science Goa	hnology Cha	Availability
B		Integrated Downhole Coring Systems Review	Build on coring performance study to develop a systematic 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.	A1, 3, 6, 7, 8, 9, 10, 11, 16, 19, 20, 21, 24, B11, 15, 16, 17, 18, 19		2, 3, 10	
B		21st Century Mohole	Review the technology options and possible evolutionary pathways to achieving the capability to deliver the ultra-deep water ultra deep scientific drilling capability. The limits to present riser technology, potential for mud-lift systems or remote seabed applications must be considered.	B1, 21, 22, 25, 27, 28, 29, 32, 20		13.00	
B		Integrated Surface Driling Systems Review	Build on coring performance study to develop a systematic platform-independent map of the drilling systems, from the mudline upwards to ensure most effective functioning of whichever downhole coring system is in use. Part of the output should include platform-specific performance requirements.	A13, 14, 18, B3, 4, 5, 6, 7, 8, 9, 10, 13, 20, 31, C18,		2, 3, 10	
B		Chikyu Operability	Upgrade Chikyu systems to reduce curent forces on the riser and operability of the DP system in severe sea states.	B23, 24			
B	2	ROV Guided Logging Tools	Run large diameter tools without large diameter drillpipe		all	8, 9	E
B	12	Radio Frequency ID Chip Implant in Drill Pipe	Reliable Depth Measurement		all	4,	I
B	14	Electric/Optical Wireline	Monitor and Control Observatories		1a, 1b, 3a,3b, 3c,3d,3e,3f	1, 5, 8, 9, 11, 12	E
B	26	Cementing protocol for deep drilling	Casing in deep penetration , high t emperature , high pressure , hostile e n v i r o n m e n t s		1b, 3a,3b, 3c,3d,3e,3f	1, 2, 5, 11, 12, 15	M

Proposals

- EDP strongly support the IODP-MI proposed coring study.
- IODP-MI plan for future “Analysis of Options” studies for guidance of protagonists.

IODP-MI scopes out three AOO Studies:

- “Integrated Downhole Coring Systems Review”
- “Integrated Surface Drilling Systems Review”
- 21st Century Mohole

ISP Technology Challenges

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Roadmap:

possible solutions, drilling systems only

Possible Solution - Analysis of Options

- State the ISP challenge being addressed
- Quantify the opportunity
- Define existing system limitations
- Review current developments in the area
- Identify possible evolutionary paths
- Show the relationship for roadmap items in each path

Outcome

- Integrated systems requirements
- Preferred direction in roadmap
- Platform systems performance standards

A	3a	10	Motor driven core barrel	Shallow hard rock coring
A	3a	13	Seabed coring devices (PROD)	Shallow sampling (rubble, unconsolidate sand)
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C	3a	18	Deployment procedures/soft-landing	need techniques to ensure that borehole instrumentation is not damaged during deployment, can be recovered in specific instances;

Proposal to host EDP #8 in China (Jan/2009)

IODP China and Zhejiang University support this proposal

Choice 1:

Meeting in SH & HZ

Weather: Like Atlanta

Arrive in SH by flight;

The 1st and last session in SH, the rest in HZ.

Local travel is convenient.

Choice 2

Meeting in Beijing

Weather: Like New York;

Arrive in BJ by flight.

Choice 3

Meeting in Guangzh

Weather: Like Florida;

Arrive: you may need transfer in BJ or SH.

Strong signals from the SSEPs proposals

1. Deep drilling
2. Long-term borehole monitoring and observatories
3. Improved core recovery
4. Drilling/coring hard rock

Where is the TR weak?

1. Does not identify high level technical needs at systems level
2. ‘High priority’ ED table has ED needs that do not match science/proposal pressure; connection not obvious to high level technical needs listed above

‘Top 10’ Unranked Engineering Developments Deemed ‘High Priority’ at EDP 5

Sampling/Logging/Coring	**Drilling/Vessel Infrastructure**	**Borehole Infrastructure**
A1) Thin Walled Geotechnical Sampler	B3) Heave Compensation	C1) High temperature electronics, sensors, and sensor systems
A2) Cone Penetrometer/Remote Vane	B5) Seabed Frame	C4) Hydrologic Isolation
A4) Hard rock re-entry system (HRRS)	B8) Improved Automatic Driller	C5) Realiable wellhead hanger seals
A11) Rotary sidewall coring	B9) Drilling Parameter Acquisition while coring	C6) Electric, optical fiber and fluid feed-throughs at wellheads and in subsurface casing completions
A12) Provide core orientation on standard coring tools - Structural Orientation of Hard Rock Cores	B10) Real Time Drilling Paramater Acquisition while coring	C9) Physical coupling of acoustic instruments to formations and decoupling from noise sources
A13) Seabed coring devices	B14) Electric/Optical Wireline	C14) Systems reliablity for LTMS

'Top 10' Unranked Engineering Developments Deemed 'High Priority' at EDP 5 - continued

Sampling/Logging/Coring	**Drilling/Vessel Infrastructure**	**Borehole Infrastructure**
A16) Pressure coring systems (PTCS, PCS, FPC, HRC, etc.)	B19) Protocol for Proper Mud Design	C15) ROV-serviceable wellheads and submarine cable connections
A17) Pressurized Sample Transfer (autoclave)	B21) 4000 m class riser system	C17) Design standards for electrical, communications, mechanical, and fluid systems
A21) Anti-contamination system (gell core barrel)	B22) 4000 m class BOP	C18) Deployment procedures/soft-landing for borehole infrastructure and instruments
A23) Fluid samplers, temperature, and pressure measurement tools	B27) Drill pipe for ultra deep ocean drilling	C19) Managing borehole experiments
A24) Transition corers		

Nakata-san

- **KIPPU NO II SHIN SHI**

Nakata-san

- KIPPU NO II SHIN SHI
  - –“gentlemen who has nice tone and spirits"
- A very positive-thinking character who never worried yesterday's bad things for today but positively think about it.
- Respects elder people and takes care of younger people
- it includes some spirits like "beat strong and help weak" which is a very good concept in Japan.
- A contradictory concept but Nakata-san

Peter Flemings
Chair, EDP 2005-2008

University of Texas
Austin, TX

- Jackson Chair in Geosystems
- Professor, Department of Geological Sciences
- Research Scientist, UT Institute for Geophysics

Sailed on ODP Legs 174A, 196; Co-chief IODP Leg 308

5 quick, perhaps little known, facts about Peter Flemings

“Peter started training early for the EDP chairmanship…

“Peter is a field geologist, and has boundless vision…”

“Flemings was initially attracted to the EDP because of…”

“His boundless energy comes from his dedication as a distance runner…”

“Peter has just finished 2+ years of dedicated work as as the founding chair of the EDP and hasn’t lost his mind.”


Chairman in Training ?

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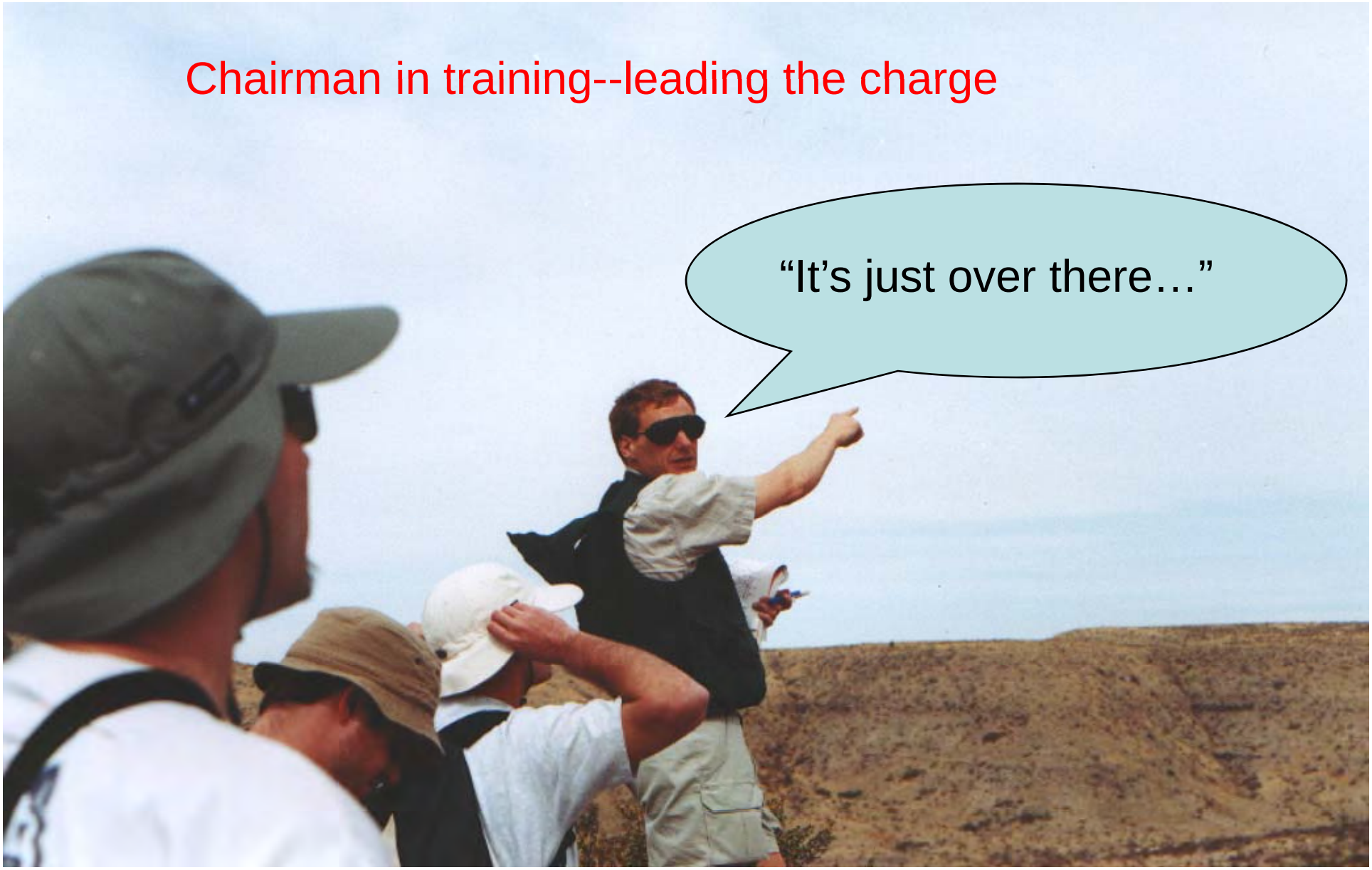
Chairman in training--leading the charge
“It’s just over there…”

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The great EDP receptions!

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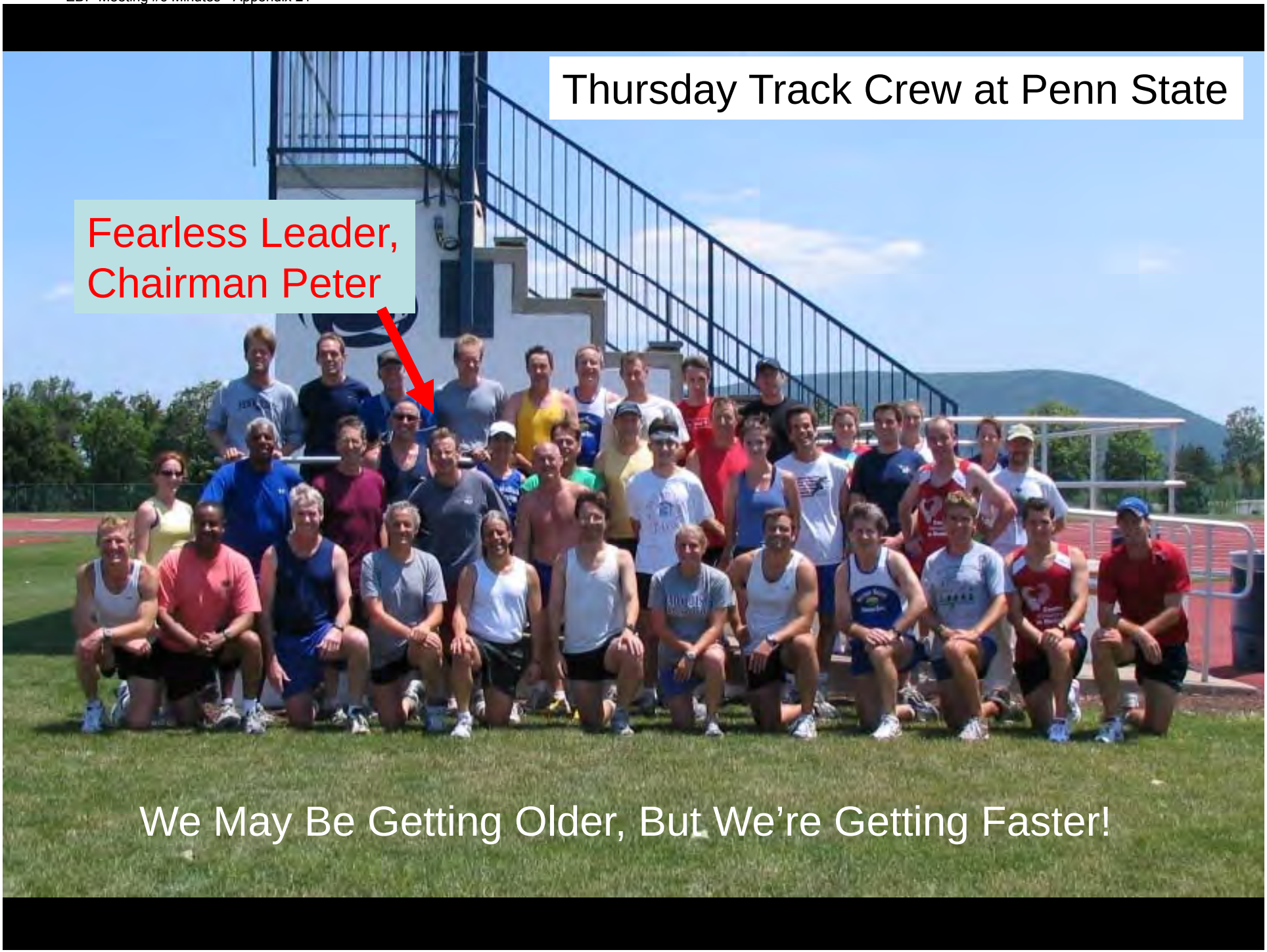
Thursday Track Crew at Penn State
Fearless Leader, Chairman Peter
We May Be Getting Older, But We're Getting Faster!

Steve Sears
Member, EDP 2005-2008

Louisiana State University
Baton Rouge, LA

- Chair, Craft & Hawkins Department of Petroleum Engineering
- Longwell-Leonard Family Distinguished Professorship


Chairman in Training ?
NO SMOKING
Little known fact about Steve Sears--he has sailed
on the Joides Resolution disguised as a staff scientist!

Inside The Head of Steven O. Sears
Part Two

Contributions of Steve to IODP EDP

Surveillance Program
Reliability Engineering
Phases of an Engineering Development Project
(Concept, Design, Fabrication, Implementation)
Insight
Patience
Thoughtfulness
Wealth of Experience