Minutes

2nd Meeting of the Scientific Technology Panel (STP) of the IODP

30 January – 1 February 2006

Center for Advanced Marine Core Research (CAMCR)
Kochi, Japan

Attendees

STP

Ahagon, Naokazu	Japan, Hokkaido Univ.
Basile, Christophe	ECORD, Univ. Fourier, France
Castillo, Paterno	US, SIO
Christensen, Elizabeth	US, Adelphi Univ.
Ge, Hongkui	China, China Earthquake Administration
Kasahara, Junzo	Japan, Tonou Geoscience Center
Lovell, Mike (vice-chair)	ECORD, Leicester Univ., UK
Lyons, Timothy	US, Univ. Missouri
Mandernack, Kevin	US, Colorado School of Mines
Nanba, Kenji	Japan, Fukushima Univ.
Okada, Makoto (chair)	Japan, Ibaraki Univ.
Sakamoto, Tatsuhiko	Japan, JAMSTEC
Screaton, Elizabeth	US, Univ. Florida
Suzuki, Noritoshi	Japan, Tohoku Univ.
Villinger, Heinrich	ECORD, Univ. Bremen, Germany
Wheat, Geoffrey	US, Univ. Alaska
Wilkens, Roy	US, Univ. Hawaii

Note: absent members Yamamoto (Japan) and Korja (ECORD)

Liaisons and Guests

Baldauf, Jack	USIO, TAMU
Ball, Bill	USIO, JOI
Becker, Keir	SPC Chair
Blum, Peter	USIO, TAMU
Delaney, Peggy	SODV, UCSC, US
Fujine, Kazuho	CDEX
Gulick, Sean	CLSI workshop, University of Texas, US
Higgins, Sean	USIO, JOI Alliance, TAMU
Houpt, David	USIO, TAMU
Inwood, Jenifer	ESSAC, Leicester Univ. UK.
Janecek, Thomas	IODP-MI Vice-President
Kuroki, Kazushi	CDEX
Masuda, Koji	AIST, Japan, VpVs measurements
Miville, Bernard	IODP-MI, Data management
Neal, Clive	SODV, Univ. Notre Dome, US
Nomura, Ritsuo	SPC, Shimane Univ., Japan
Röhl, Ursula	ESO, Bremen Core-repository
Schuffert, Jeff	IODP-MI Science Coordinator
Sugihara, Takamitsu	CDEX

IODP Scientific Technology Panel (STP)

2nd Meeting, 30 January-1 February 2006
Center for Advanced Marine Core Research (CAMCR)
Kochi, Japan

FINAL EXECUTIVE SUMMARY

The STP forwards the following recommendations, consensus statements, and action items to the SPC or the IODP-MI as appropriate, and for distribution to the IOs as required. STP suggestions for whether items should be forwarded to SPC and/or IODP-MI are indicated, as are priorities for action items, Brief overviews/background are provided where appropriate in italics.

Recommendations

STP Recommendation 0601-01: Common Framework for Depth Scales
The STP recommends the IODP-MI Data Management Group together with the IOs develop guidelines for a common framework for depth scales and investigate software implementation across all platforms. STP requests IODP-MI report back to STP at their next meeting.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-01: A critical issue in core-log integration is the question of standardizing depth positioning and depth accuracy of collected data sets. STP recognizes the need for standard definitions and processing procedures across all platforms for generating depth scales for the geological and geophysical aspects of drilling, coring and logging.

Geological measurements, including cores, cuttings, and gas/mud logging operations, must be calibrated accurately and efficiently. Specifically, conversion of incident time (for mud logging, cuttings, and gas logging data) and conversion of curation depth (for cores and samples) must be undertaken to derive accurate and internally consistent depth values.

STP Recommendation 0601-02: SODV Magnetometer
The STP recommends that the USIO not include an underway magnetometer in the SODV suite of instrumentation.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to SPC

Background to STP Recommendation 0601-02: The SODV is first and foremost a drill ship and therefore technical support and upkeep of underway systems should be minimized.

STP Recommendation 0601-03: Vp & Vs at elevated pressures for the riser vessel
The STP recommends that an elevated pressure velocity measurement system be established for the riser drilling ship program.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-03: Refer to STP Action Item 0507-05: Vp & Vs measurements. STP recognizes the importance of velocity measurements on core samples under high pressure. Drilling, core recovery, and sub-sampling open microcracks and/or pores in core samples that significantly decrease Vp and Vs. To better match in situ velocity measurements with lithology for improved core-log-seismic integration,

STP Recommendation 0601-04: Seismic sources for IODP platforms
The STP recommends that seismic sources acquired for IODP platforms be of sufficient power to reach an appropriate total depth (not hole depth) at all operational water depths and that operators be appropriately trained in their operation.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-04: VSP seismic sources used during ODP have proven to be incapable of producing adequate energy to provide a signal at an appropriate total depth.

STP Recommendation 0601-05: QA/QC
The STP recommends that IODP-MI coordinate the QA/QC efforts across all platforms in cooperation with the IOs and where necessary STP. STP requests a QA/QC plan for the IODP minimum measurements to be presented by the IOs/IODP-MI at the next STP meeting.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-05: QA/QC is an important issue, especially given multiple platforms and the desire of scientists to integrate data acquired by different platforms across the IODP. This recommendation follows on from previous discussions at SciMP and STP, and provides a route towards addressing this in a timely manner for phase 2 of IODP.

STP Recommendation 0601-06: IODP Measurements
The STP recommends the document IODP Measurements, which was updated at the STP Kochi meeting and corrected post-meeting, is adopted by all IOs and implemented in the program.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-06: see STP Action Item 0507-04: Minimum measurements proposed a set of IODP measurements across platforms subdivided into different categories, and SPC Consensus 0510-7 on quality assurance and quality control (QA/QC). This recommendation derives from that action item and form efforts by IODP-MI and the IOs to progress the QA/QC issue. The rig floor information section is in draft stage *and subject to an action item by STP, but this should not delay acceptance in principal, since the remaining measurements impact the design of the SODV. All comments regarding IODP Measurements should be forwarded to STP via IODP-MI.*

STP Recommendation 0601-07: Temperature Measurements for EDP Operations
The STP recommends that ESO investigate various downhole temperature tools for use on a range of platforms that are being considered for future charters. If no such tools exist, EDP should be consulted with a view to having suitable tools fabricated in consultation with appropriate specialists. ESO should report back to STP at the January 2007 meeting.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-07: Formation temperature was identified by STP as an IODP Minimum Measurement, which is defined as a measurement that shall be conducted in all boreholes and on all cores in IODP. It is not in the initial measurements plan for the "New Jersey Transect" and was not included in the recent Arctic drilling program. These deficiencies result from an apparent lack of suitable tools for the various drilling technologies. If tools do not exist with potential lease options, ESO must notify EDP, who in consultation with STP should have suitable tools fabricated. Because the "New Jersey Transect" may be drilled in the summer of 2006, this process should be expedited to meet the scheduled cruise date.

STP Recommendation 0601-08:Temperature and Pressure Tools report
The STP recommends to SPC acceptance of the Temperature and Pressure Tools report and the report be forwarded to IODP-MI for implementation (see report and extract below*).

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-08: STP Action Item 0507-06: Downhole temperature and pressure tools requested the SciMP petrophysics working group and IOs complete their report on downhole temperature and pressure tools. STP reports the state of T & P measurements within IODP and submits a detailed report (see appendices). As outlined in this report (included in the appendices) STP recommends:

- *Minimum of once a year calibration of temperature and pressure sensors.*
- *IOs develop standard deployment protocols, including quality checks such as mudline temperature checks and comparison of pressure at stops with drillpipe with line depth.*
- *Technicians should be trained in operation and maintenance of tools, downloading of data, and processing of the data, and should have specific though not necessarily exclusive responsibility for downhole T and P tools.*
- *One scientist / shift should have specific responsibility though not necessarily exclusive responsibility for downhole T and P tools (on all expeditions where they will be run), and one scientist/expedition should be experienced / trained in thermal data collection.*
- *Initial Reports should include calibration information, include plots of temperature (or pressure) versus time for all deployments and describe reasons for any failed deployments and any QA/QC issues for each run.*

- *Information that should be archived and accessible online includes: current version of software plus sample data for each instrument, deployment information, instrument calibration history and sensor specification, time versus measured temperature and pressure, and estimated equilibrium value.*

STP Recommendation 0601-09: Digital taxonomic dictionaries
The STP recommends that IODP-MI coordinate the development of a paleontologic taxonomic/stratigraphic reference standard, with MRC involvement, to ensure continued effective use of DSDP-ODP legacy sites, as well as to improve IODP's own paleo data resolution and reproducibility.

These dictionaries are required across all platforms and should be developed with appropriate funds provided by IODP-MI to the MRCs. The MRCs, while outside the IODP structure, can provide significant input to this process, including digital taxonomic dictionaries (DTDs) for microfossil taxa, linking DSDP-ODP and current taxonomic concepts. This is an important part of the QA/QC process and the STP is seriously concerned that further delay will adversely impact IODP science.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
This is a response to SPC Consensus 0510-9; STP suggests it be forwarded to SPC & IODP-MI.

Background to STP Recommendation 0601-09: STP, and earlier, SciMP, have repeatedly recommended to SPC (in Recommendations 0507-08) that micropaleontologic data quality needs to be secured by appropriate calibration and updating of taxonomic and biostratigraphic concepts, and further, that the MRCs should continue to provide support to IODP as a source of micropaleontologic expertise and materials. The MRCs, in their July 2005 report – attached as an appendix to the STP Bremen meeting 0507 - have explicitly offered to provide IODP with input to this development, and have suggested a reasonable budget (estimated at $60,000 over an initial period of 2 years). As the MRCs collections will be used in the development of DTDs, and have as well other potential uses (see MRC report) we agree that the MRC collections should be completed as proposed in the MRC report and integrated into the DTD effort. Other proposed uses for MRC collections, e.g. for education, will however need to be proposed and approved separately.

STP Recommendation 0601-010: Improved seafloor visualization for SODV
The STP recommends the USIO acquire an improved seafloor visualization system for routine deployment on the SODV.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack, Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI (and be copied to PAC SODV).

Background to STP Recommendation 0601-10: STP have considered the potential benefits of an ROV for the SODV and in discussions identified a clear need to improved seafloor visualizations for scientific observations. STP believes improved seafloor visualization (Better camera system (better lights, pan and tilt, orientation)) would impact many areas such as:

- *locating all sites and geologic context (e.g., in vent/hydrate/fault area)*
- *addressing issues connected with CORKs:*
    - *are valves open or closed?*

- *inspection during and post-installation*
- *better fishing (dropped equipment, blocked hole, dropped drill string)*

Consensus Statements

STP Consensus 0601-01: Larger Drill Pipe Diameter
The STP strongly supports larger drillpipe diameter on the SODV to allow new downhole logging tools.

Priority: High
STP suggests this be forwarded to SPC

Background to STP Consensus 0601-01: The STP received a short presentation from the USIO concerning the implications for downhole logging of remaining with the ODP drill pipe dimensions. At the start of the ODP the increase in effort and resources available for downhole logging represented a significant development beyond the measurements routinely carried out in the DSDP. The constraint provided by the narrow diameter of the drill pipe during ODP has in recent years, however, restricted the range of downhole logging tools that can be deployed in open-hole conditions. To take advantage of the state of the art commercial tools available a larger diameter pipe is recommended. This would ensure the program is able to make use of the latest technology, to the benefit of the scientific community at large. New capabilities that are scientifically exciting include:

- *High-resolution, improved coverage, borehole imaging*
- *Use of NMR logging in open hole conditions*
- *Formation testing to obtain stress state and hydrologic properties*
- *Sidewall coring and in-situ fluid sampling.*

STP believes that ultimately if the USIO stays with the current diameter, the SODV will eventually lose current state of the art logging capabilities because tools will no longer be fully supported.

STP Consensus 0601-02: LA-ICP-MS
The STP wishes to thank Clive Neal and Taka Sugihara for their presentations on the prospect of LA-ICP-MS usage in the SODV and the current status of a similar instrument on the *Chikyu*, respectively. STP recognizes that LA-ICP-MS analytical capability is important for IODP science, but most especially in providing critical (real time) analyses needed to direct drilling operations.

Priority: High
STP suggests this be forwarded to SPC

Background to STP Consensus 0601-02: see STP Action Item 0507-01

STP Consensus 0601-03: Open hole VSP – request for EDP advice
The STP recognizes that improvements in open hole VSP operations need to be made in IODP. Specifically, advancements in either receiver technology and/or implementation of downhole sources should be investigated. STP requests advice from EDP in exploring the state of the art in these areas and their applicability to IODP requirements. STP nominates Kasahara as a liaison to EDP for this issue.

Priority: High
STP suggests this be forwarded to SPC

Background to STP Consensus 0601-03: VSPs have been implemented infrequently in ODP and IODP phase 1 and have met with limited success. At the international Core-Log-Seismic workshop on October 3-4, 2005, the participants widely agreed that VSPs are vital to proper core-log-seismic integration and that the problems encountered by ODP were largely due to the open hole conditions that exist in non-riser operations. Industry has a long history of successful VSP operations but also generally has must greater well control. 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 0601-04: STP Panel Expertise
The STP recognizes the importance of IODP-MI providing appropriate advice to program member offices in allocating panel members, and in maintaining panel expertise concordant with the mandate of STP. STP provides a list of appropriate expertise categories to IODP-MI.

Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Consensus 0601-04: In response to a request from IODP-MI, concurrent with a change in STP's mandate, STP is working to provide detailed information on the nature of panel expertise required to meet the terms of STP mandate. This will be set against existing panel expertise, with the aim of improving dialogue with lead agencies to ensure STP can deal with a majority of issues arising under the new mandate.

STP Consensus 0601-05: New Jersey Transect Measurements Plan
The STP received and reviewed the initial measurements plan for the New Jersey Transect. STP thanks the ESO for a thorough plan. Temperature measurements were not included in the initial plan, but need to be considered as it is an IODP minimum measurement (note action item and recommendation above). STP accepts the measurement plan subject to IODP minimum measurements being met.

Priority: High
STP suggests this be forwarded to SPC

Consensus Statement 0601-06:
The STP gratefully thanks Kenji Nanba for his work and dedication to the IODP over the years he has served on this panel. His presence on STP will be missed but we anticipate that he will continue to contribute to IODP through new roles, and we wish him well.

Consensus Statement 0601-07:
The STP expresses its gratitude to Prof. Iwao Watanabe for his superb efforts in hosting this meeting, and Dr. Masafumi Murayama and other staff of the Center for Advanced Marine Core Research and AESTO for their warm hospitality and logistic support. Everything went very smoothly. We enjoyed fruitful discussion at the state-of-art CAMCR facility operated by both Kochi University and JAMSTEC. Participants truly appreciated the excellent seafood (e.g., lightly-roasted bonito, young fish of conger eel, and so on), citrus fruit, and good sake at

the official banquet held on Monday evening at the Palace Hotel, while the fieldtrip participants appreciated visiting interesting field locations and of course the *Chikyu*.

Action Items

STP Action Item 0601-01:
Priority: High
Date: Next meeting
ESO will immediately conduct a survey of possible temperature tools for use with a variety of platforms that may be leased for IODP operations. ESO will immediately notify EDP and STP about availability for the New Jersey Transect. If no suitable tools exist, specifications for use during the New Jersey Transect will be forwarded to EDP and STP. Date: asap and before next meeting.
Lead Roehl (ESO).

STP Action Item 0601-02:
Priority: Low
Date: Next meeting
In order to better interpret in situ measurements, it is recognized that laboratory measurements under in situ temperature and pressure are important. STP should investigate temperature and pressure controlled physical properties measurements for IODP. For example, velocity anisotropy, density, porosity, permeability, electrical resistivity, as well as other measurements.
Lead: Sakamoto, & Screaton, Kasahara, Wilkens, Ge

STP Action Item 0601-03:
Priority: High
Date: Next meeting
STP asks Wilkens and Villinger to incorporate suggestions made by the IOs to the draft third party tool policy at the Kochi meeting. The edited document will be circulated amongst CDEX, the IODP-MI, and the SPC chair for further review before final approval by STP via email. A final and accepted version shall be submitted to SPC before March 6, 2006.
Leads: Wilkens and Villinger

STP Action Item 0601-04:
Priority: Medium
Date: Next meeting
Post-cruise Data.
The STP will explore the potential inclusion of post-cruise data by the IO to enhance the value of the database. A significant impact of database development is efficient data delivery but STP recognizes that the shipboard data are preliminary and need to be updated through shore-based studies. The data, such as refined age models, would be treated not as a replacement, but as a supplement with good metadata and quality control. The emphasis would be on voluntary acquisition of datasets rather than developing a policy that emphasizes enforcement.
Leads: Christensen and Suzuki and Ahagon

STP Action Item 0601-05:
Priority: High
Date: Next meeting
STP will specify guidelines for necessary accuracy and precision for temperature and pressure measurements through consultation with scientific specialists.
Leads: Kasahara, Villinger, Screaton

STP Action Item 0601-06:
Priority: Low
Date: Next meeting
STP should continue to track developments and tool status on all platforms. As software is developed for newly developed tools, the IOs should develop standard protocols for deployment and processing in consultation with tool developers and STP.
Leads: Screaton, Villinger, Wheat

STP Action Item 0601-07:
Priority: Low
Date: Next meeting
STP will closely monitor the progress of *Chikyu* evaluations of Laser Ablation ICP-MS capability during sea trials during 2006 as a continuation of Action Item (Kona/Bremen).
Leads: Kuroki (CDEX), Castillo (STP).
Background: see SciMP Action Item 0502-12 and STP Action Item 0507-01 Laser Ablation ICP-MS

Minutes

The second meeting of the Scientific Technology Panel (STP) of the IODP was held from 30th January-1st February 2006 at the Center for Advanced Marine Core Research (CAMCR) Kochi, Japan with Prof. Iwao Watanabe and Dr. Masafumi Murayama as hosts. The meeting included a field excursion on 28-29 January to tour the Chikyu at the port of Sukumo and to visit other field sites.

The STP meeting resulted in ten recommendations, seven consensus statements, and seven action items, all of which are forwarded to SPC and/or IODP-MI.

Appendices to these minutes are as follows:

Appendix 1	Agenda
Appendix 2	Presentation by Kasahara on 2nd EDP meeting (Tokyo).
Appendix 3	Presentation by Okada on SPC (Kyoto) meeting and STP items
Appendix 4	CDEX Report presented by Sugihara
Appendix 5	USIO Report presented by Blum
Appendix 6	ESO Report presented by Röhl and Inwood
Appendix 7	SODV Report presented by Delaney
Appendix 8	SODV Report presented by Baldauf
Appendix 9	SODV Report presented by Blum
Appendix 10	SODV LIMS Report presented by Houpt
Appendix 11	STP Downhole T & P Report
Appendix 12	Laser Ablation ICP-MS Report
Appendix 13	CLSI Workshop Report
Appendix 14	Measuring Vp & Vs at high pressures Report
Appendix 15	Draft New Jersey measurement Plan
Appendix 16	STP response on SODV proposals
Appendix 17	SODV Drill Pipe implications
Appendix 18	IODP Measurements document
Appendix 19	IODP 3rd Party Tools Policy to SPC March 06
Appendix 20	Palaeontology Working Group Report

Monday 30th January 2006

1. Welcome and logistics

Okada opened the meeting and introduced Director Prof. Iwao Watanabe, Center for Advanced Marine Core Research, Kochi University who welcomed the panel to Kochi.

2. Introductions of continuing and new members, guests, liaisons

Lovell introduced panel members and guests (see participant list). Yamamoto (Japan) and Korja (ECORD) were unable to attend and had sent their apologies. Several panel members and guests were attending their first meeting.

3. Review and Approval of Agenda

Lovell asked for review of the agenda. The agenda was approved unanimously with no further modifications (appendix 1).

4. Review and Approval of Minutes from July meeting (Okada/Lovell)

A unanimous consensus approved the minutes form the previous meeting.

5. Conflict of Interest Policy

The Conflict of Interest Policy was explained by Lovell. Schuffert noted that should any conflict be determined during the meeting it should be reported in the minutes. No direct conflict arose during the meeting though Villinger note during discussions of the Temperature and Pressure report that it may be construed his involvement with the USIO could lead to COI.

6. STP mandate

Lovell reviewed the STP mandate. Schuffert reported that IDOP-MI had accepted STP's request to include review of proposals as part of the STP mandate.

7. Report from Engineering Development Panel meetings

Boston. Lovell reported on the first EDP meeting held in Boston in September 2005. The EDP panel discussed financial details of the engineering mandate. There seems to be little overlap with STP business, nevertheless, liaisons will be set up between two panels. SSEP proposals were discussed in detail in Boston, specifically protocols for involvement in the review process. Third party tools (an item discussed widely by STP) was not discussed at the EDP meeting.

Tokyo. Kasahara reported on the second EDP meeting held in Tokyo in January 2006. ROV capabilities were discussed, particularly with respect to the SODV. Discussion then followed with inout form Becker and Delaney of the need for to define the scientific needs for an ROV, emphasizing seafloor visualization capabilities. If deemed necessary by panel, STP must make a case for inclusion of ROV. Kasahara gave a short presentation on the EDP meeting in Tokyo (appendix 2).

8. Report from most recent SPC meeting

Okada reported on the SPC meeting held in Kyoto 25th – 28th October 2005.
The previous Bremen STP meeting yielded nine recommendations, seven consensus statements, and ten action items. Details of the SPC review of these items is contained in appendix 3.

Becker gave an outline from SPC for the scheduling for 07 and 08.
Provided Agency Timeline for FY07 Scheduling and Program Plan (APP) Development. Late FY07 will mark initiation of Chikyu and Phase II SODV operations, but with only modest actual time in FY07. OTF and SPC will use this opportunity to advance the scheduling lead time beyond the timeline required by Lead Agencies. Discussed scheduling for Chikyu, MSP, and SODV Phase II, including two models for SODV start. Large early commitment to NanTroSEIZE for Chikyu. Many other details provided in ppt presentation. Twenty one drilling proposals will be reviewed and ranked at March meeting. SPC responses to STP recommendations and consensus statements discussed in detail. SPC recommends including two STP members to the Observatory Task Force. Janecek commented that the Observatory Task Force will hopefully meet in early Spring

Lovell noted that STP needed to identify a new Vice Chair to rotate on in summer 2006; this four year position would become Chair after 2 years. This would be revisited later in the meeting.

STP is charged with making initial calls on the best pathway for processing recommendations, with proposals for whether IODP-MI or SPC should be the preferred destination. But all recommendations should go through IODP-MI via Han Christian Larsen to streamline processing. A brief update on Mission Concept was provided.

9. Discussion of status of STP's previous recommendations and action items

Lovell introduced a brief discussion on the current status of previous recommendations. Many of these were scheduled for detailed discussion in the following days proceedings.

10. Report from MEXT/NSF

No report.

11. Report from CDEX

Sugihara gave an update on the CHIKYU (appendix 4). Many panel members and guests had been fortunate to visit the CHIKYU the previous day. International operations are scheduled to begin in Sept. 07 (Nankai Trough). July-Sept 2006 downhole tools may be tested. There was discussion on aspects of Core flow and core processing deck, and especially the time and data problems associated with the x-ray CT scanner. Screaton asked when downhole T and P tools would be acquired, with a provisional schedule for summer 2006.

12. Report from USIO

Blum reported on behalf of the USIO concerning operations, schedule, USIO activity, and senior staff changes (appendix 5). Update on recent drilling successes as final efforts of SODV Phase I. Expedition 309-312.
1507 m depth, 1256 – first time penetrated lavas, dikes, and gabbro
Exp 311 Cascadia Margin – Gas Hydrates – before they drilled they did some testing during the transit to Astoria. Exp 311 – all 5 sites occurred. PCS worked only 22 out of 42 - problem with seals.
Completed demobilization on January 20, 2006. Contract signed in December for use of the JOIDES Resolution as the SODV. Delivery of the converted riserless vessel targeted for July 2007. Discussed transitions for seagoing technicians. Every effort is being made to maintain a legacy of shipboard experience.

13. Report from ESO

Röhl and Inwood reported (appendix 6) on the Expedition 310 Tahiti drilling (DP Hunter) and New Jersey plans. Good core recovery in Tahiti (632 m recovered from 1099.8 m). Use of split steel corer without liner dramatically improved recovery. Water depths ranged from 41 to 117 m. 37 holes at 26 sites 150 m from the reef. Labs set up in containers. Some pore waters collected in suitable lithologies. Wirlene logging successful; onshore party starts in 2 weeks time. Additional details available in presentation (appendix 6).

New Jersey Sea Level Transect planned for this fiscal year. Greg Mountain appointed as co-chief. SPC have ruled that three holes are necessary to achieve scientific objectives. Call for applications for science party is out. There could be a delay in drilling until FY07. Measurement plan will be reviewed by STP this panel meeting.

14. Report from IO's for QA/QC issues

Blum noted that there has not been a coordinated effort within IODP to address these issues. While QA/QC was an issue across IODP and some discussions across IOs had taken place there was little progress. STP had put forward two related recommendations during last meeting: (1) establish task force to coordinate effort (represented expertise should span sample curation, analytical chemistry, petrophysics, and geology [core description, paleontology, stratigraphy]) and (2) development of protocols for use of reference standards. Neither of these had been acted on, partly due to a lack of communication between IODP-MI and the IOs. The second recommendation is viewed as too generic and STP is asked to provide more specific suggestions in light of multiple platform compatibility issues. Miville noted that some efforts are already underway by data managers. USIO requested that an IODP-MI Task force is necessary to fully design, coordinate, and implement plan for QA/QC. This would enable meetings of experts and.

Recommendation 2 – Measure all existing standard references and store for later QA/QC – Not done because time was too short and the request was too generic. Blum requested more detail and specifically asked STP to identify want they wished to be done differently?

Considerable discussion ensued as to how best to proceed with his important issue. Given the delays experienced with the Observatory Task force the STP were reluctant to request IODP establish a Task Force for this purpose. There was also considerable reluctance by individual panel members to take on what could be a very large and time consuming task.

STP Recommendation 0601-05: QA/QC
The STP recommends that IODP-MI coordinate the QA/QC efforts across all platforms in cooperation with the IOs and where necessary STP. STP requests a QA/QC plan for the IODP minimum measurements to be presented by the IOs/IODP-MI at the next STP meeting.

17. Third Party Tools Policy
(item taken early to allow for SPC chair participation; see also Wednesday morning when this item is revisited)

Wilkens introduced a revised document outlining the general principles governing third party tools and instruments (building from efforts in Kona and Bremen). Wilkens briefly ran through this document, including important appended information outlining certification, and safety considerations. The document was evolving iteratively but needed finalizing for discussion at the forthcoming SPC meeting in early March in Florida. IO input was seen to be critical, with the effective chain of command for approval being an important issue to be resolved. Discussion took place as to whether the process could be streamlined, making requirements as encouraging as possible for third party tool use and enhancing likelihood of funding? Villinger was concerned it is a complicated process – could dissuade scientists While the final responsibility rests with IODP, many considered that funding agencies should include enough money to test beforehand. Primary responsibility rests with the PI (not the IO). Becker asked what is the role of OTF and IODP IMI. Janecek queried when this goes back to SPC for discussion, what is the level of SPC approval for engineering time? Becker responded that approval was on a case-by-case basis. Janecek – SPC meeting – OTF may schedule between meetings. What will SPC response be to this? Becker –noted we should develop policy not procedure. Baldauf noted that EDP started this discussion last week.

IOs will comment quickly (including liability issues) in anticipation of next SPC meeting.
(IO approval is necessary before going to SPC.)

15. SODV Update & SODV Discussions

STP received four separate presentations from Delaney (PAC Chair) and 3 USIO guests/liaisons. These presentations provided the background and status of SODV developments and formed the basis for specialist STP breakout groups the following day when STP panel members attempted to provide a rapid response to the current proposals.

SODV Presentation 1: Delaney provided an overview of developments concerning the SODV (appendix 7). This presentation included the following:

Update on U.S. plans (in collaboration with international community) for Phase II of non-riser drilling ship (JOI Alliance SODV Conversion Project) (Peggy Delaney).
Some highlights:
$115 M total U.S. NSF commitment to conversion and implementation of non-riser drilling ship.
Contract signed on December 15.
Engineering design phase through April 2006 (based on extensive community input of past 5+ years).
International operations planned to initiate by late summer 2007. Key issues: (1) lengthening JR hull (ca. 30 ft. gain in length primarily meant to add lab and berth space), (2) seafloor visualization (including ROV capabilities), (3) drill pipe diameter/logging issues. Heave compensation and electric wire to be talked about later
STP should provide Delaney with feedback by Feb. 10 (for Feb. 16-17 PAC meeting).
www.joialliance.org/MREFC/

SODV Presentation 2: Baldauf described the SODV Planning Stage (appendix 8):

Some highlights:
Design validation (lab. concept arrangement, SODV science deliverables).
Project scoping capabilities (microbiology, earth sciences [e.g., water samples to complement coring], visual core description, seafloor visualization, QA/QC, micropaleontology taxa dictionary).
SODV scope of work (goals, timelines, organization, project risks).
Goals: provide an affordable riserless research platform, incorporate community input, deliver vessel by summer 2007.

Review of design teams provided: goals, members, etc.
Mandatory platform requirements; lowest acceptable level defined by previous JR capabilities. Targeting at least a decade of operation for the Phase II ship.
Engineering design phase (EDP) commenced 15 Dec 2005; will submit RFP to shipyards by spring 2006: planned 30 ft. extension, capability for larger diameter pipes, >50% increase in lab stack space, improved vessel stability, increased accommodations from 114 to ~137 (will enhance outreach capabilities, etc.), new galley, gym, 1 and 2 person staterooms, environmentally controlled splitting room to support microbiology and hydrate studies, enhanced lab flexibility, each lab redesigned and scientific equipment updated or replaced with latest technology, special project demands—e.g., microbiology labs. Accommodation of laboratory containers, potential for van addition on lab level, soliciting specific input from this (STP) panel.

SODV Presentation 3: Blum provided a description of the proposals for delivery of analytical items (appendix 9):
Science database and sample applications.
Operations database and applications.
Geological descriptions and analysis.
Microscopy and imaging.
Modular core loggers.
Petrophysics and geophysical systems
Analytical chemistry and microbiology

Discussion followed—the need to address microbiology needs were discussed, also relative merits of XRF and ICP— is one redundant? Castillo asked why both XRF vs ICP AES were included? Neal stated there is no consensus in the community as to which is better XRF or ICP AES. Adding XRF we have a redundant instrument. XRF is not as diverse as the ICP AES. There will be microwaves for digestion. If only one then we need the ICP. RockEval has been demanded for safety purposes, coulometry requested by community as preferred inorganic carbon method, radiotracers will be handled in van only (scintillation counter?). Downhole temperature measurements seemed lacking. Blum stated downhole T & P analysis is cumbersome at best. Villinger expressed interest for the inclusion of resistivity capabilities. Lovell expressed surprise that resistivity measurements are not part of laboratory proposals. Villinger asked why no resistivity? - this is a basic measurement and the community needs a new resistivity instrument. There was discussion of how many microcopes would be available? Core loggers are currently multiple and of different ages and software, but there was significant concern at proposals to build core loggers from scratch given the widespread acceptance in the community of off-the-shelf solutions. Wilkens asked about the length of the track, while Lyons queried where radiotracters are going to be in the lab? Radiotracers are only going to be in a van (not the lab). Kasahara asked about the seismic data base but this is not part of the scope of this work. Screaton asked about discrete analyzer for physical properties; freeze drying versus convection oven. Wilkins raised the issue of data visualization and specifically about the wall image system? Blum indicated the list is more of criteria, the (Geo)wall system is would be one way to address the criteria. Villinger asked about downhole tools, where are they? Blum indicated they are in another section, but the view was that hey fall under QA/QC so they should be there. Chistensen asked how the databases are going to deal with micropaleontology?

There would be further more detailed discussions of many of these issues in the breakout groups scheduled for the following day.

Continued stakeholder engagement required: data models and architecture, sample planning and requests, access. Geological description and analysis

SODV Presentation 4: Houpt provided an overview of LIMS: Laboratory Information Management System (appendix 10).
What is LIMS?

Broad scope of products. Web based possibilities.
Driving force for LIMS is QA/QC.
Statistical analysis flags issues with data.

Data from third party tools can be captured at sea.
Can use LIMS to manage workflow
Chemical consumable inventory control
Audit trail

Villinger asked about cost? $200 to $500K, and a question about lab view was raised? The proposal was to retain labview. Christensen asked if the web goes down, does the system crash? Houpt answered that no, the system will depend on on-line network.

LIMS Deployment will enable sample tracking, input to QA/QC. It requires Instrument Interfaces, but will provide document access and control, workflow management, as well as data analysis and reporting tools, costing and accounting functions. There are obviously challenges and risks, but this is part of the USIO Implementation Strategy.

16. <u>Executive session: strategic review of STP aims, workflow, and actions</u>

STP moved to executive session with invitees Neal and Gulick, and with Schuffert present. In executive session the following items were discussed:
SODV breakout/working groups
Panel expertise
IODP Minimum measurements
Vice Chair
Rotations

SODV working groups
I. Chemistry (Castillo/Lyons lead; geomicro, hard rock, and sediment/pore water);
II. Description (Christensen lead; sed, tectonics, micropaleo, paleoceanography);
III. Physical Properties Lab (Wilkens lead);
IV. Hydrogeology/hydrogeology/observatories/seafloor visualizations/downhole measurements (Screaton lead).

STP (panel members and guests/liaisons) will break into working groups tomorrow afternoon and provide written suggestions on the SODV designs by Wednesday morning.

Panel expertise
Essential to cover full range of expertise, as per dictates of panel mandate (data /information handling, methods/techniques of measurement, lab design including portable labs, downhole measurements/experiments, observatories).

Minimum measurements and QA/QC; relation to SODV
Review document provided by Schuffert.

Vice chair nominations
Clive Neal discussed as possible nominee. Issue to be discussed further on Wednesday.

Rotations

Rotated/rotating off in 2005/2006: Gulick, Lyons, Mandernack, Nanba, Neal, Nanba, Okada, Sakamoto, Wilkens.

This was followed by a tour of the Kochi Core Store at the end of the first day.

Tuesday 31st January

Note: Mandernack absent in AM due to illness, present for afternoon

Action Items from previous meetings

17. Third Party Tools Policy
Item discussed early on Monday (see above)

18. Downhole Temperature and Pressure Tools

Screaton introduced the Downhole T & P Report circulated prior to the meeting (appendix 11).

Downhole T & P measurements are very important for deep processes, fluid flow, hydrates, microbiology, and geochemical reactions
The types of tools were outlined, together with temperature QA/QC
Screaton indicated that standard protocols should be developed for all of these tools
Packer tests- require experienced person
Screaton introduced the APC3 tool to determine the in-situ temperature; this was expanded on by Villinger:

Villinger described the testing and deployment of the new APC3 tool to determine in-situ temperatures while piston coring. This was a response to an out-of-date existing system. Only useful in unconsolidated sediments. Test results discussed. All nine deployments were successful. Andy Fisher is moving forward with purchase of additional electronics for JR. (Note Villinger raised with the panel a possible conflict of interest given his involvement with this work).

Discussion followed resulting in a recommendation and action item.

STP Recommendation 0601-08:Temperature and Pressure Tools report
The STP recommends to SPC acceptance of the Temperature and Pressure Tools report and the report be forwarded to IODP-MI for implementation (see report and extract below*).

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-08:

STP Action Item 0507-06: Downhole temperature and pressure tools requested the SciMP petrophysics working group and IOs complete their report on downhole temperature and pressure tools. STP reports the state of T & P measurements within IODP and submits a detailed report (see appendices). As outlined in this report (included in the appendices) STP recommends:

- *Minimum of once a year calibration of temperature and pressure sensors.*
- *IOs develop standard deployment protocols, including quality checks such as mudline temperature checks and comparison of pressure at stops with drillpipe with line depth.*
- *Technicians should be trained in operation and maintenance of tools, downloading of data, and processing of the data, and should have specific though not necessarily exclusive responsibility for downhole T and P tools.*
- *One scientist / shift should have specific responsibility though not necessarily exclusive responsibility for downhole T and P tools (on all expeditions where they will be run), and one scientist/expedition should be experienced / trained in thermal data collection.*
- *Initial Reports should include calibration information, include plots of temperature (or pressure) versus time for all deployments and describe reasons for any failed deployments and any QA/QC issues for each run.*
- *Information that should be archived and accessible online includes: current version of software plus sample data for each instrument, deployment information, instrument calibration history and sensor specification, time versus measured temperature and pressure, and estimated equilibrium value.*

STP Action Item 0601-05:
Priority: High
Date: Next meeting
STP will specify guidelines for necessary accuracy and precision for temperature and pressure measurements through consultation with scientific specialists.
Leads: Kasahara, Villinger, Screaton

STP Action Item 0601-06:
Priority: Low
Date: Next meeting
STP should continue to track developments and tool status on all platforms. As software is developed for newly developed tools, the IOs should develop standard protocols for deployment and processing in consultation with tool developers and STP.
Leads: Screaton, Villinger, Wheat

19. IODP Minimum Measurements

At the Bremen meeting STP was asked to produce a document defining a measurements plan. Generally, this is a set of minimum measurements for safety purposes and operational choices. Specifically they fall into four categories: safety, minimum, standard, supplemental.
Standard procedures are those that are hoped for if practical.
It was agreed that it was best not to duplicate the listing of individual procedures under both minimum and standard categories. Also, certain standard procedures may become minimum as defined by specific project (Expedition) objectives.

A lengthy discussion ensued about the distinction between minimum and standard procedures. One approach is to define minimum as an absolute as dictated by (say) ephemeral nature of properties. Standard is subject to pragmatism. This definition is, however, open to debate. It was agreed that it is critical to minimize overlap between standard and minimum procedures.
There was discussion of the difference between measurement and interpretation; synthetic seismogram construction (for example) was seen as a post-measurement processing/interpretation and should not be included in minimum measurements. Gulick noted that the check shot was, however, seen as the measurement enabling this to be done.

Standard versus minimum distinction must also consider relative platform capabilities. An STP subgroup (Villinger, Basile, and Kasahara, led by Villinger) agreed to revisit document for reconsideration at this meeting. See item 27.

20. Laser Ablation ICP-MS / Oscillating Plasma

Neal and Sugihara gave presentations (appendix 12) on the Laser Ablation ICP-MS/Oscilating Plasma.

Tests were planned at sea on Chikyu as follow-up to existing lab work. The relationship to spot size was explored, including avoidance of inclusions, but the stability on a moving platform was uncertain. The ICP-MS status on Chikyu is that it is set up for aqueous samples; the installation of laser system is planned for summer 2006, with a feasibility test planned to be conducted winter 2006. Neal noted that absolute values require microprobing on shore to calibrate against Ca.

STP action: Consensus statement expressing STP interest in LA approaches and highlighting that we look forward to further reports—based on Chikyu tests, etc.

STP Consensus 0601-02: LA-ICP-MS
The STP wishes to thank Clive Neal and Taka Sugihara for their presentations on the prospect of LA-ICP-MS usage in the SODV and the current status of a similar instrument on the Chikyu, respectively. STP recognizes that LA-ICP-MS analytical capability is important for IODP science, but most especially in providing critical (real time) analyses needed to direct drilling operations.
Priority: High
STP suggests this be forwarded to SPC

Background to STP Consensus 0601-02
See STP Action Item 0507-01

STP Action Item 0601-07:
Priority: Low
Date: Next meeting
STP will closely monitor the progress of Chikyu evaluations of Laser Ablation ICP-MS capability during sea trials during 2006 as a continuation of Action Item (Kona/Bremen).
Leads: Kuroki (CEDEX), Castillo (STP).

Background: SciMP Action Item 0502-12 and STP Action Item 0507-01 Laser Ablation ICP-MS

21. Proposal Review

No proposals for review by STP were received from IODP-MI form SSEP.

22. Report of CLSI workshop

Gulick had attended the CLSI workshop at the request of STP, together with Sakamoto and their report and presentation is attached as appendix 13.

The objectives and challenges were outlined in detail.

STP issues:

a. Panel should maintain contact with industry working group (Sakurai volunteered to be contact).
b. IODP taskforce or data management group should develop guidelines for composite depth scales and investigate software implementation.
c. Depth relationships become complicated in multi-platform environment.
d. VSP problems in ODP could be improved through help of industry/EDP
e. QA/QC oversight, aiding in communication on CLSI between industry and academia.
f. Measurements under pressure.
g. Involvement of EDP

STP Recommendation 0601-01: Common Framework for Depth Scales
The STP recommends the IODP-MI Data Management Group together with the IOs develop guidelines for a common framework for depth scales and investigate software implementation across all platforms. STP requests IODP-MI report back to STP at their next meeting.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-01:
A critical issue in core-log integration is the question of standardizing depth positioning and depth accuracy of collected data sets. STP recognizes the need for standard definitions and processing procedures across all platforms for generating depth scales for the geological and geophysical aspects of drilling, coring and logging.

Geological measurements, including cores, cuttings, and gas/mud logging operations, must be calibrated accurately and efficiently. Specifically, conversion of incident time (for mud logging, cuttings, and gas logging data) and conversion of curation depth (for cores and samples) must be undertaken to derive accurate and internally consistent depth values.

STP Consensus 0601-03: Open hole VSP – request for EDP advice
STP recognizes that improvements in open hole VSP operations need to be made in IODP. Specifically, advancements in either receiver technology and/or implementation of downhole sources should be investigated. STP requests advice from EDP in exploring the state of the art

in these areas and their applicability to IODP requirements. STP nominates Kasahara-san as a liaison to EDP for this issue.

Priority: High
STP suggests this be forwarded to SPC

Background to STP Consensus 0601-03
VSPs have been implemented infrequently in ODP and IODP phase 1 and have met with limited success. At the international Core-Log-Seismic workshop on October 3-4, 2005, the participants widely agreed that VSPs are vital to proper core-log-seismic integration and that the problems encountered by ODP were largely due to the open hole conditions that exist in non-riser operations. Industry has a long history of successful VSP operations but also generally has must greater well control. 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 Recommendation 0601-04: Seismic sources for IODP Platforms
The STP recommends that seismic sources acquired for IODP platforms be of sufficient power to reach an appropriate total depth (not hole depth) at all operational water depths and that operators be appropriately trained in their operation.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-04:
VSP seismic sources used during ODP have proven to be incapable of producing adequate energy to provide a signal at an appropriate total depth.

23. VpVs measurements

Kasahara and Masuda introduced the issue of measuring Vp and Vs under insitu pressures (appendix 14). This was considerd to be increasingly important if IODP were likely to drill deeper holes, specifically through long term use of the CHIKYU platform. Measuring physical properties under pressure provides more geologically meaningful perspective and procedures for measuring velocity under pressure were discussed.

In conclusion Vp Vs measurements under pressure are important and measurements can be done routinely on-shore. Concerns were expressed in discussion regarding feasibility of doing measurements at sea. Could it be done well, given staffing/expertise issues, were there health and safety issues, and is it necessary to do at sea? Consensus was that measurements should be made on shore.

STP Recommendation 0601-03: Vp & Vs at elevated pressures for the Riser Vessel
The STP recommends that an elevated pressure velocity measurement system be established for the riser drilling ship program.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)

Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-03:
Refer to STP Action Item 0507-05: Vp & Vs measurements. STP recognizes the importance of velocity measurements on core samples under high pressure. Drilling, core recovery, and sub-sampling open microcracks and/or pores in core samples that significantly decrease Vp and Vs. To better match in situ velocity measurements with lithology for improved core-log-seismic integration,

STP Action Item 0601-02:
Priority: Low
Date: Next meeting
In order to better interpret in situ measurements, it is recognized that laboratory measurements under in situ temperature and pressure are important. STP should investigate temperature and pressure controlled physical properties measurements for IODP. For example, Velocity anisotropy, density, porosity, permeability, electrical resistivity, as well as other measurements .
Lead: Sakamoto, & Screaton, Kasahara, Wilkens, Ge

24. New Jersey Measurements Plan

Roehl presented the plan (appendix 15) outlining the offshore core flow and with a detailed discussion of extensive planned analyses. It was noted that temperature measurements (in the sediments) should be added as minimum requirement.

STP Consensus 0601-05: New Jersey Transect Measurements Plan
STP received and reviewed the initial measurements plan for the New Jersey Transect. STP thanks the ESO for a thorough plan. Temperature measurements were not included in the initial plan, but need to be considered as it is an IODP minimum measurement (note action item and recommendation above). STP accepts the measurement plan subject to IODP minimum measurements being met.
Priority: High
STP suggests this be forwarded to SPC

STP Action Item 0601-01:
Priority: High
Date: Next meeting
ESO will immediately conduct a survey of possible temperature tools for use with a variety of platforms that may be leased for IODP operations. ESO will immediately notify EDP and STP about availability for the New Jersey Transect. If no suitable tools exist, specifications for use during the New Jersey Transect will be forwarded to EDP and STP. Date: asap and before next meeting.
Lead Roehl (ESO).

STP Recommendation 0601-07: Temperature Measurements for ESO Operations

The STP recommends that ESO investigates various downhole temperature tools for use on a range of platforms that are being considered for future charters. If no such tools exist, EDP should be consulted with a view to having suitable tools fabricated in consultation with appropriate specialists. ESO should report back to STP at the January 2007 meeting.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-07:
Formation temperature was identified by STP as an IODP Minimum Measurement, which is defined as a measurement that shall be conducted in all boreholes and on all cores in IODP. It is not in the initial measurements plan for the "New Jersey Transect" and was not included in the recent Arctic drilling program. These deficiencies result from an apparent lack of suitable tools for the various drilling technologies. If tools do not exist with potential lease options, ESO must notify EDP, who in consultation with STP, should have suitable tools fabricated. Because the "New Jersey Transect" may be drilled in the summer of 2006, this process should be expedited to meet the scheduled cruise date.

25. <u>Panel Expertise</u>

STP panel membership needs to cover the IODP minimum and standard measurements, observatory studies, and data management.

Lovell and Okada undertook to develop a simple spreadsheet to identify gaps and to liaise with IODP-MI on how rotation of panelists might address these.

STP Consensus 0601-04: STP Panel Expertise
STP recognises the importance of IODP-MI providing appropriate advice to program member offices in allocating panel members, and in maintaining panel expertise concordant with the mandate of STP. STP provides a list of appropriate expertise categories to IODP-MI.

Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Consensus 0601-04:
In response to a request from IODP-MI, concurrent with a change in STP's mandate, STP is working to provide detailed information on the nature of panel expertise required to meet the terms of STP mandate. This will be set against existing panel expertise, with the aim of improving dialogue with lead agencies to ensure STP can deal with a majority of issues arising under the new mandate.

26. <u>SODV Revisited</u>

Four breakout groups were formed, based on panel members' expertise. Guests and liaisons were free to join a specific group or to float between groups.

The goals for the breakout groups were

(1) Comments on proposed lab layout based on designs provided by the USIO/PAC.

(2) Focused comments on specialized areas represented by group.
(3) Are we integrating disciplines well—workflows, maximizing/optimizing opportunities?
(4) Are the proposals/expectations realistic?
(5) Are there any additional non-scientific issues?

Panel members were asked to think about their own experiences.
To consider how this compare to shorebased experiences?

Questions to be asked included:
What do you want to achieve at sea?
What are you willing to sacrifice?
What can be achieved in time available?
What are the downstream costs?
What can you do without?

The results of the breakout sessions are provided in a largely unedited presentation (appendix 16). There was not sufficient time to prioritise the views of the different breakout groups, hence there may appear to be some conflicting statements.

<u>Drill pipe diameter</u>
Higgins gave a presentation explaining a desire to increase the drill pipe diameter to enable improved and state of the art downhole measurements (logging) (appendix 17).

STP was charged by PAC/SODV with providing feedback on scientific motivation for selection of larger diameter pipe. The basic argument is that we eventually run the risk of tools becoming obsolete if industry is not developing or supporting tools for current diameter pipe. Note that the core size will remain the same. Screaton agreed to prepare a list of the science drivers behind STP support for larger diameter drill pipe.

STP Recommendation 0601-02: SODV Magnetometer
The STP recommends that the USIO not include an underway magnetometer in the SODV suite of instrumentation

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to SPC

Background to STP Recommendation 0601-02:
The SODV is first and foremost a drill ship and therefore technical support and upkeep of underway systems should be minimized.

STP Consensus 0601-01: Larger Drill Pipe Diameter
Consensus Statement: STP strongly supports larger drillpipe diameter on the SODV to allow new downhole logging tools.

Priority: High
STP suggests this be forwarded to SPC

Background to STP Consensus 0601-01:
STP received a short presentation from the USIO concerning the implications for downhole logging of remaining with the ODP drill pipe dimensions. At the start of the ODP the increase in effort and resources available for downhole logging represented a significant development beyond the measurements routinely carried out in the DSDP. The constraint provided by the narrow diameter of the drill pipe during OPD has in recent years, however, restricted the range of downhole logging tools that can be deployed in open-hole conditions. To take advantage of the state of the art commercial tools available a larger diameter pipe is recommended. This would ensure the program is able to make use of the latest technology, to the benefit of the scientific community at large. New capabilities that are scientifically exciting include:

- *High-resolution, improved coverage, borehole imaging*
- *Use of NMR logging in open hole conditions*
- *Formation testing to obtain stress state and hydrologic properties*
- *Sidewall coring and in-situ fluid sampling.*

STP believes that ultimately if the USIO stays with the current diameter, the SODV will eventually lose current state of the art logging capabilities because tools will no longer be fully supported.

STP Recommendation 0601-010: Improved seafloor visualization for SODV
The STP recommends the USIO acquires an improved seafloor visualization system for routine deployment on the SODV.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI (and be copied to PAC SODV).

Background to STP Recommendation 0601-10:
STP have considered the potential benefits of an ROV for the SODV and in discussions identified a clear need to improved seafloor visualizations for scientific observations. STP believes improved seafloor visualization (Better camera system (better lights, pan and tilt, orientation)) would impact many areas such as:

- *locating all sites and geologic context (e.g., in vent/hydrate/fault area)*
- *addressing issues connected with CORKs:*
    - *are valves open or closed?*
    - *inspection during and post-installation*
    - *better fishing (dropped equipment, blocked hole, dropped drill string)*

Wednesday 1st February

Other Business
27. IODP Measurements – review of status

Villinger introduced a revised document taking account of the need to separate out measurements to avoid duplication. STP agreed that there should be liaison with EDP concerning the rig floor instrument measurements. Rig floor information is currently only in draft form. Villinger agreed to look into rig instruments and to seek help from EDP. Minimum requirements apply to all platforms. All standard measurements should be possible for Chikyu and SODV expeditions.

This list will evolve as the program proceeds and STP will need to review and maintain this document.

The final post-Kochi IODP Measurements document is attached as appendix 18.

STP Recommendation 0601-06: IODP Measurements
The STP recommends the document IODP Measurements, which was updated at the STP Kochi meeting and corrected post-meeting, is adopted by all IOs and implemented in the program.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-06:
STP Action Item 0507-04: Minimum measurements proposed a set of IODP measurements across platforms subdivided into different categories, and SPC Consensus 0510-7 on quality assurance and quality control (QA/QC).. This recommendation derives from that action item and form efforts by IODP-MI and the IOs to progress the QA/QC issue. The rig floor information section is in draft stage and subject to an action item by STP, but this should not delay acceptance in principal, since the remaining measurements impact the design of the SODV. All comments regarding IODP Measurements should be forwarded to STP via IODP-MI.

As part of the IODP Minimum Measurents document STP revisited the issues of QA/QC. There was a clear need for continuity in QA/QC methods across platform. Where possible IODP could use the same methods and same instruments, but this will not always be possible. The importance of rigorous documentation of metadata was emphasized in discussion. The IOs noted that they are completely sensitive to issues.

One option is a Task Force to provide structure and make funds available for any meetings. Should consist of IODP-MI, IOs, and STP members. Contrary arguments were presented. While a Task Force would assist with cross-platform continuity, there was significant reluctance to embrace this concept..

Three options were proposed:
(1) OA/QC must move forward, and we suggest that IODP-MI deals with it.
(2) QA/QC must move forward, and we let IOs deal with it with community involvement.
(3) QA/QC must move forward, and we recommendation formation of a Task Force to facilitate this.

If the IOs take lead, the challenge will be to facilitate exchange among the IOs to avoid redundancy.

STP Recommendation 0601-05: QA/QC
The STP recommends that IODP-MI coordinate the QA/QC efforts across all platforms in cooperation with the IOs and where necessary STP. STP requests a QA/QC plan for the IODP minimum measurements to be presented by the IOs/IODP-MI at the next STP meeting.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
STP suggests this be forwarded to IODP-MI

Background to STP Recommendation 0601-05:
QA/QC is an important issue, especially given multiple platforms and the desire of scientists to integrate data acquired by different platforms across the IODP. This recommendation follows on from previous discussions at SciMP and STP, and provides a route towards addressing this in a timely manner for phase 2 of IODP.

Revisit item 17. 3rd Party Tools

Peter Blum solicited input from IOs (TAMU, Lamont, ESO responded, nothing yet from CDEX). Many specific (tracked changes) and general comments were provided.
STP could not approve or reject without CDEX feedback. It was agreed the panel must continue to process this document away from meeting to get iterative input from CDEX, IOs, and IODP-MI in time for SPC meeting in March. Wilkens and Villinger agreed to lead this. "Final" version will be agreed electronically by STP within two weeks and forwarded to IODP-MI for consideration by SPC.

Blum provided a summary of comments and changes to text from the IOs.

Amplification of responsibilities (money and resource is a big issue)
Tool integration (IO responsibility because they have to make sure of safety)
Data issues (observatories)
Planning requirements (funds must be identified in the planning phase).
IODP MI needs to be in the chain of responsibility and certification approved by IMI
ESO who will arbitrate a deployment?

The final post-Kochi approved 3rd Party Tools document submitted to SPC is attached as appendix 19.

STP Action Item 0601-03:
Priority: High
Date: Next meeting
STP asks Wilkens and Villinger to incorporate suggestions made by the IO's to the draft third party tool policy at the Kochi meeting. The edited document will be circulated amongst CEDEX, IODP-MI, and the SPC chair for further review before final approval by STP via email. A final and accepted version shall be submitted to SPC before March 6, 2006.

Leads: Wilkens and Villinger

28. Micropaleontology WG report

Suzuki presented this report (appendix 20) and the recommendations were discussed in detail.

Much discussion about MRCs (micropaleo reference collection) and interfacing with existing programs such as Chronos. Questions arose concerning funding and the need for MRCs to remain outside IODP but with strong collaborative links. It was agreed that MRCs are important for next generation of paleontologists and that legacy issues exist.

STP Recommendation 0601-09: Digital taxonomic dictionaries
The STP recommends that IODP-MI coordinate the development of a paleontologic taxonomic/stratigraphic reference standard, with MRC involvement, to ensure continued effective use of DSDP-ODP legacy sites, as well as to improve IODP's own paleo data resolution and reproducibility.

These dictionaries are required across all platforms and should be developed with appropriate funds provided by IODP-MI to the MRCs. The MRCs, while outside the IODP structure, can provide significant input to this process, including digital taxonomic dictionaries (DTDs) for microfossil taxa, linking DSDP-ODP and current taxonomic concepts. This is an important part of the QA/QC process and the STP is seriously concerned that further delay will adversely impact IODP science.

Vote: 15 Yes, 0 No, 0 Abstentions, 4 absent (Castillo, Korja, Mandernack &Yamamoto)
Priority: High
This is a response to SPC Consensus 0510-9; STP suggests it be forwarded to SPC & IODP-MI.

Background to STP Recommendation 0601-09:
STP, and earlier, SciMP, have repeatedly recommended to SPC (in Recommendations 0507-08) that micropaleontologic data quality needs to be secured by appropriate calibration and updating of taxonomic and biostratigraphic concepts, and further, that the MRCs should continue to provide support to IODP as a source of micropaleontologic expertise and materials. The MRCs, in their July 2005 report – attached as an appendix to the STP Bremen meeting 0507 - have explicitly offered to provide IODP with input to this development, and have suggested a reasonable budget (estimated at $60,000 over an initial period of 2 years). As the MRCs Collections will be used in the development of DTDs, and have as well other potential uses (see MRC report) we agree that the MRC collections should be completed as proposed in the MRC report and integrated into the DTD effort. Other proposed uses for MRC Collections, e.g. for education, will however need to be proposed and approved separately.

29. Next meeting location and date

Korja offered to host the next meeting in Helsinki, Finland. Possible dates included 26 June 2006 as first choice with other options: 12 June 2006 or 17 July 2006. The first choice overlapped with proposed dates for the EDP meeting in Germany.

Ge offered to host STP in Beijing in summer 2007 while Wheat offered to host in Monterey in January 2007.

30. Executive session: revisit strategic review of STP aims, workflow, and actions

STP Action Item 0601-04:
Priority: Medium
Date: Next meeting
Postcruise Data.
The STP will explore the potential inclusion of postcruise data by the IO to enhance the value of the database. A significant impact of database development is efficient data delivery but STP recognizes that the shipboard data are preliminary and need to be updated through shorebased studies. The data, such as refined age models, would be treated not as a replacement, but as a supplement with good metadata and quality control. The emphasis would be on voluntary acquisition of datasets rather than developing a policy that emphasizes enforcement.
Leads: Christensen and Suzuki and Ahagon

In considering the discussions on the SODV STP were impressed by the enthusiasm and energy of the USIO and PAC teams. There were, however, some concerns that the short time window for implementing changes to the vessel may not allow sufficient time for the proposed changes to be implemented to enable the first expedition to take place successfully.

STP recognizes the time constraints on the USIO but encourages innovation from the USIO for establishing the basic (minimum and standard) measurement capability in time for the first SODV Expedition in 2007.

STP urges the USIO to look to the community for off the shelf solutions where possible to provide pragmatic and evidence-based solutions that are acceptable to the majority.

There being no further business Okada closed the meeting at 15.30.

IODP Scientific Technology Panel
2nd Meeting, 30 January - 1 February 2006
Kochi, Japan

FINAL AGENDA

Monday 30th January
08.30

1. Welcome and logistics (Okada)
2. Introductions of continuing and new members, guests, liaisons (Lovell)
3. Review and Approval of Agenda (Lovell)
4. Review and Approval of Minutes from July meeting (Okada)
5. Conflict of Interest Policy (Lovell)
6. STP mandate (Lovell)
7. Brief report from EDP meetings (Lovell and Kasahara)
8. Brief report from most recent SPC meeting (Okada)
9. Discussion of status of STP's previous recommendations and action items, etc. (Okada/Lovell)
10. MEXT/NSF (no report): IODP-MI (no report)
11. CDEX (TBN)
12. USIO (TBN)
13. ESO (Roehl/Inwood)
14. Report from IO's for QA/QC issues (Blum/CDEX-TBN)

12.30 Lunch
13.30

15. SODV Update:

Delaney: SODV: overview. The PAC perspective

Baldauf: Update of SODV capabilities and status, including the design teams and projects

Blum:
a. ODP measurements requirements and the current results from the science conversion design team deliberations to SODV systems implementation projects

b. Stakeholder and communications management plans; community expert input throughout the project cycles.

c. Preliminary scope statements for systems implementation projects

Houpt: LIMS (Laboratory Information Management System)

SODV Discussions

16. (16.30) Executive session: strategic review of STP aims, workflow, and actions

17.00 Tour of Kochi Core Store

Tuesday
08.30

Action Items from previous meetings

17. Third Party Tools Policy (Wilkens)
18. Downhole Temperature and Pressure Tools (Screaton/Villinger)
19. IODP Minimum Measurements (Miville)
20. Laser Ablation ICP-MS / Oscillating Plasma (CDEX-TBN)
21. Proposal Review (non expected for Kochi meeting)
22. Report of CLSI workshop (Sakamoto & Gulick)
23. VpVs measurements (Kasahara/Wilkens/Masuda)
24. New Jersey Measurements Plan (Roehl)
25. Panel Expertise (Lovell/Okada)

12.30 Lunch

13.30

26. SODV Revisited

Wednesday 08.30

Other Business

27. IODP Measurements – review of status
28. Micropaleontology WG report (Suzuki)
29. Next meeting location and date (Lovell)
30. Executive session(?): revisit strategic review of STP aims, workflow, and actions

31. Review of Recommendations, Consensus Statements, and Action Items (Okada/Lovell)

Lunch:

32. Continue Review of Recommendations, Consensus Statements, and Action Items (Okada/Lovell)

33. Rotation of panelists (Lovell/Okada)

34. (15.30) Closure (Okada)

EDP report

Jan. 25-27

Fuchinobe, Japan

Technology roadmap

- The initial science plan(ISP)
- ITAP: July2003 minutes
- Downhole tool workshop May '04
  - Top 5 bottom-up, investigator-driven, development needs
  - Top five down, program development needs
- USIO
  - Deep biosphere and the Subsearfloor Ocean
  - Environmental change processes and effect
  - Solid earth cycles and geodynamics

EDP recommendation for roadmap

- EDP list
  - Technology
  - Urgencies
  - Difficulty
  - Requirement
  - Priority
  - Science goal
- ->make a list of roadmap

SODV conversion project

- 10m stretching of the former JR
- Subsea camera/seafloor visualization
- Rig Instrumentation System
- Drill string Heave Compensation
- Drill pipe design
- Electric Wireline for coring
- Drill Pipe Guide Horn

Long term observation

- NanTroSEIZE
- Necessary to long term test
- Necessary to develop new technologies

Next meeting

- KTB, Germany

Reports from the last SPC meeting
Kyoto
24-28 October 2005

Makoto

Okada

2th STP meeting

Kochi, Japan

30 Jan – 1 Feb 2006

Results from the Bremen STP meeting

Recommendations

0507-01: STP mandate

0507-02: Core description WG

0507-03: QA/QC

0507-04: Standard reference on JR

0507-05: Observatory Task Force

0507-06: Proposal review

0507-07: Microbiology

0507-08: Micropaleontology

0507-09: CLSI

Consensus Statements

0507-01: SODV logging REP

0507-02: Modular labs

0507-03: IODP Imaging report

0507-04: Management Forum

0507-05: Prioritization for recs.

0507-06: Magnetometer tool

0507-07: Chair and Vice Chair

Results from the Bremen STP meeting

Action Items

0507-01: Laser Ablation ICP-MS

0507-02: Proposal Review

0507-03: Panel Expertise

0507-04: Minimum measurements

0507-05: VpVs measurements

0507-06: Downhole T & P tools

0507-07: CLSI workshop

0507-08: Third Party Tools policy

0507-09: Oscillating Plasma

0507-10: US SODV Briefing Book

Recommendations reviewed by SPC

Recommendations

Recommendation	SPC	
0507-01: STP mandate	→	Approved
0507-02: Core description WG		
0507-03: QA/QC	→	Received
0507-04: Standard reference on JR		
0507-05: Observatory Task Force	→	Received
0507-06: Proposal review	→	Approved
0507-07: Microbiology		
0507-08: Micropaleontology	→	Received
0507-09: CLSI		

Consensus reviewed by SPC

Consensus Statements

0507-01: SODV logging REP

0507-02: Modular labs

0507-03: IODP Imaging report

0507-04: Management Forum → SPC → Received

0507-05: Prioritization for recs. → SPC → Approved

0507-06: Magnetometer tool → SPC → Received

0507-07: Chair and Vice Chair → SPC → Approved

Current Status of Action Items

0507-01: Laser Ablation ICP-MS	ongoing
0507-02: Proposal Review	done
0507-03: Panel Expertise	ongoing
0507-04: Minimum measurements	done
0507-05: VpVs measurements	ongoing
0507-06: Downhole T & P tools	ongoing
0507-07: CLSI workshop	done
0507-08: Third Party Tools policy	done
0507-09: Oscillating Plasma	ongoing
0507-10: US SODV Briefing Book	ongoing

CDEX status report

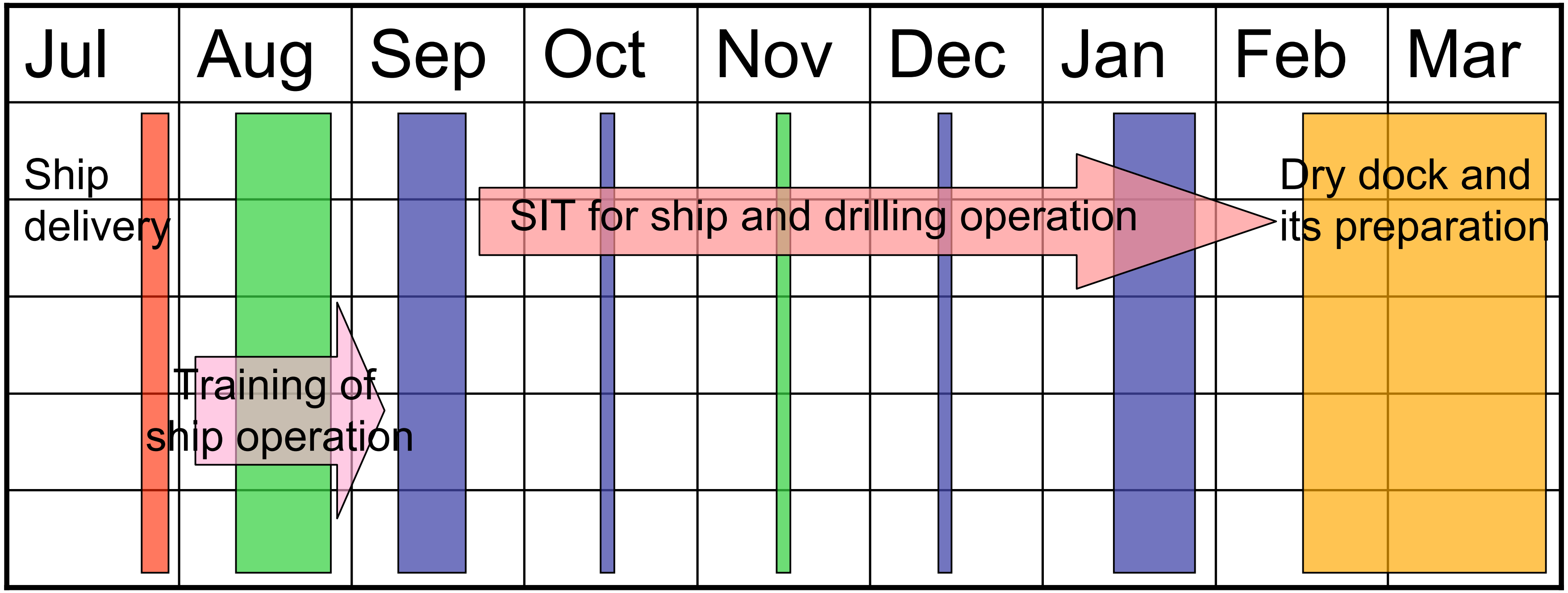
CDEX/JAMSTEC
Takamitsu SUGIHARA

Contents

- CHIKYU update – Schedule in this JFY
- Status of Laboratory set up
- Lab activity during Coring test operation

Operation Schedule of CHIKYU in JFY2005

- 29th July: Delivery from ship-yard

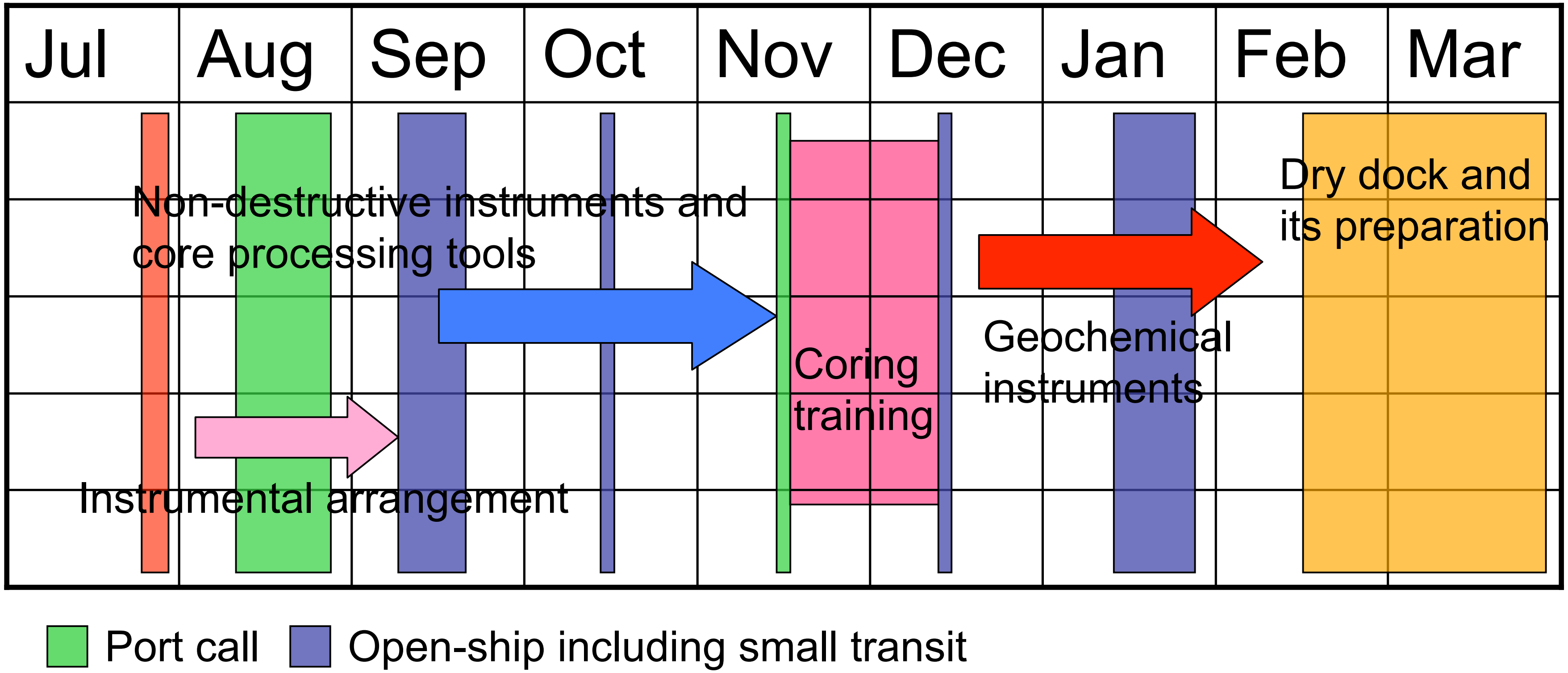


Port call Open-ship including small transit

From middle of Sep., System Integration Test (SIT) for ship and drilling operation have been carried out.

Delivery from ship yard

Laboratory setup schedule



Before coring SIT and training, non-destructive measurement instruments were set up. Set up of geochemical instruments have been carried out after the coring. In the coring training, we tested actual performance of our laboratory.

Before coring operation

- ✓ Set up of Non-destructive measurement instruments and core processing tool.
- Multi Sensor Core Logger (MSCL) for whole-round core (MSCL-W)
- MSCL for split core (MSCL-S)
- MSCL image scanner (MSCL-I)
- MSCL color spectrometer (MSCL-C)
- SQUID magnetometer
- XRFCL
- Moisture and Density (pycnometer and balance)
- Vane share
- GC-Natural Gas Analyzer (GC-NGA)
- CHNS elemental analyzer
- Core Splitter

Laboratory activity in the coring operation （middle of Nov. to middle of Dec.)

✓ Objectives

- To identify problems in work flow of the CHIKYU laboratory area processing the actual core .

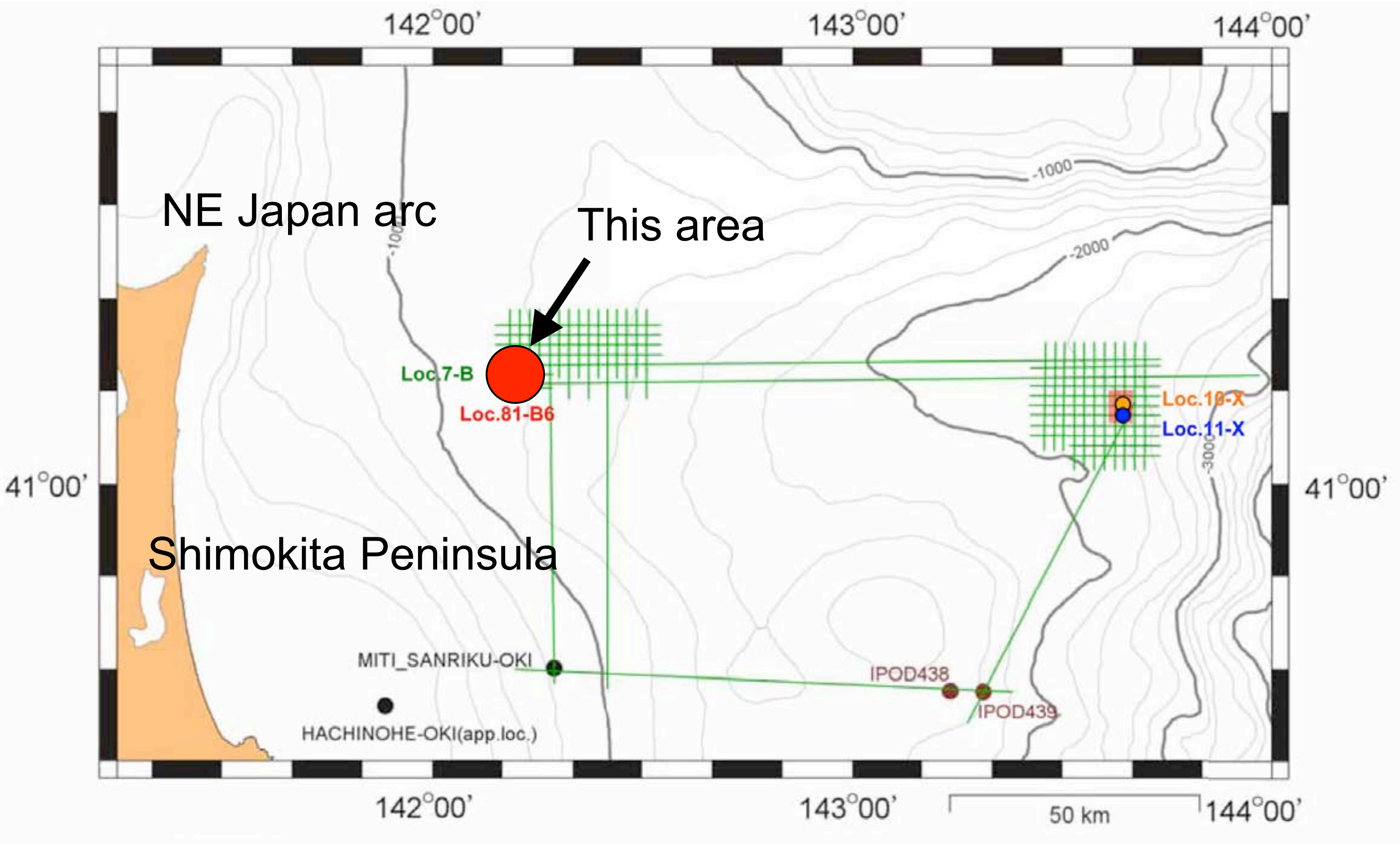
- In order to achieve the above objective, the most standard measurement settings were used for each instrument based on the previous experiments and our experiences.

→To obtain a basic information to design a core flow for various science objectives.

- To evaluate data handling procedure using new database tool (J-CORES).

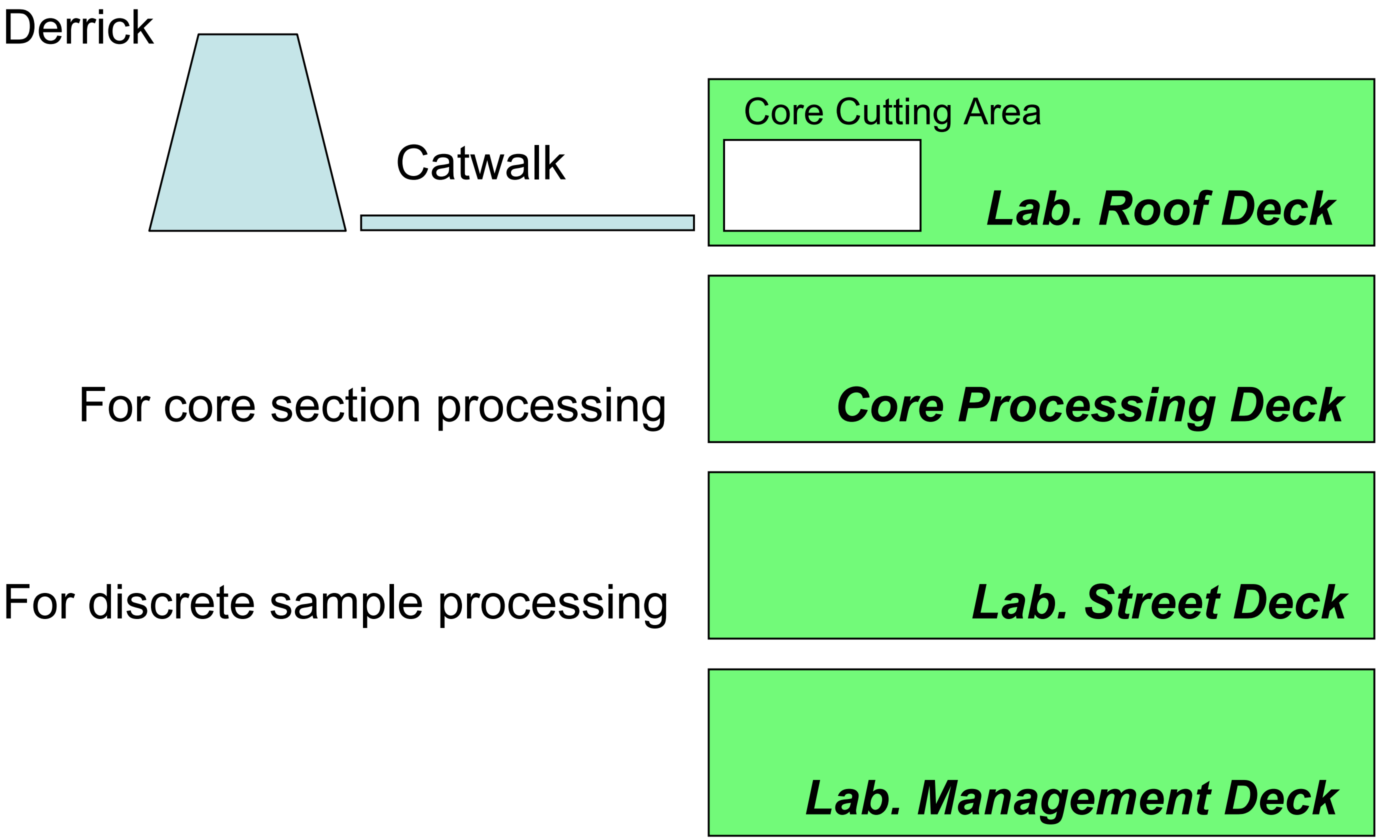
- To supply sample to science party if it’s possible.

Coring site



Ocean depth: ~ 1200m

Core flow: Lab. structure

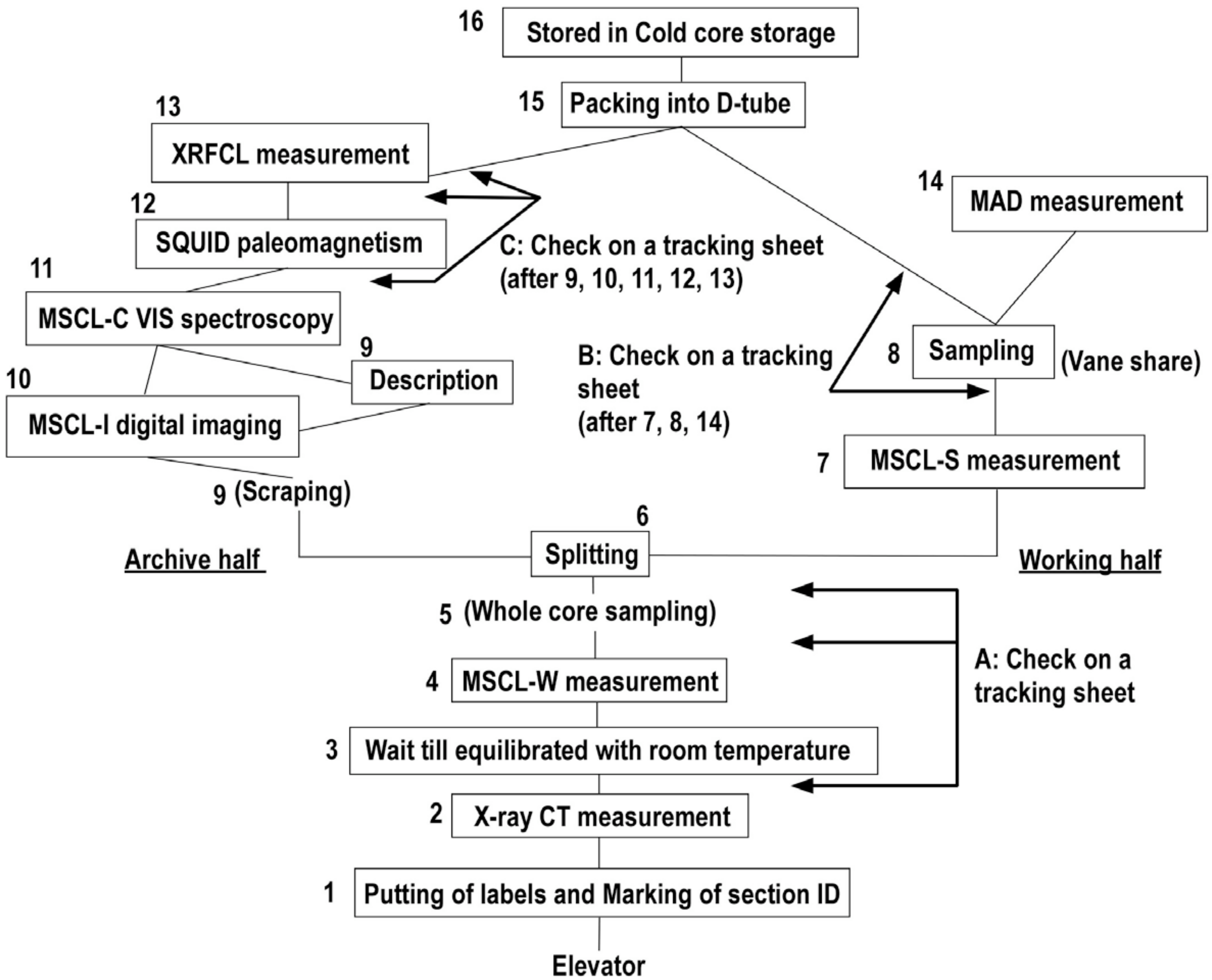


Core flow: Instruments

Instruments
1 X-CT
2 MSCL-Whole（GRA, Mag-sus Loop, PWV, NCR, NGR）
3 MSCL-Split（GRA, Mag-sus Point, PWV, NCR）
4 MSCL-Image (Digital imaging)
5 MSCL-Color（VIS-color spectrometer, Mag-sus Point）
6 P-MAG（SQUID magnetometer）
7 XRFCL
8 MAD（Pycnometer, balance）
9 Vane Share
10 GC-NGA (Head space sample analysis)
→Geochemistry Lab. on Lab. Street Deck.

Except for XRD, most of the instruments on Core Processing Deck were used.

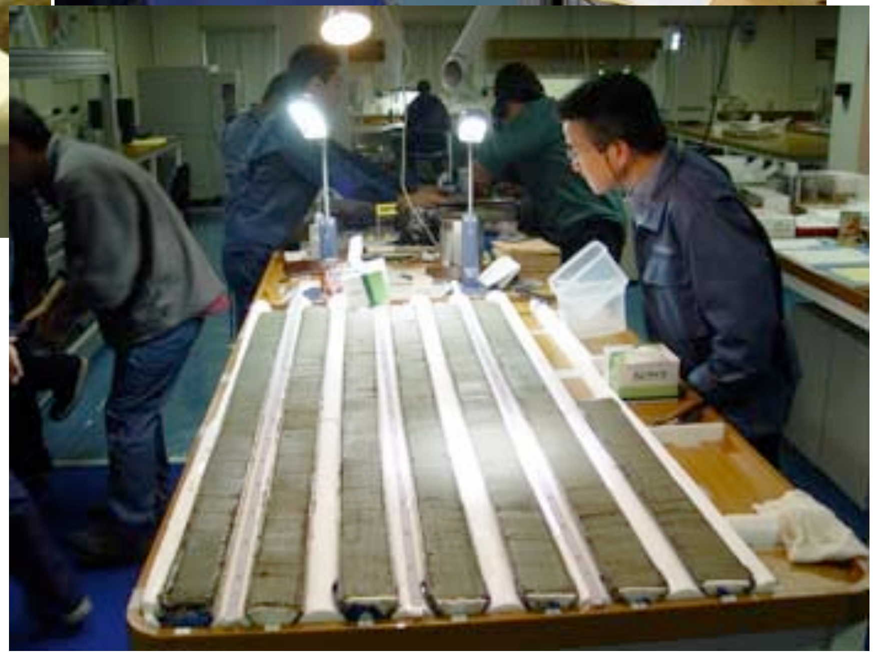
Core flow on Core Processing Deck



Coring operation

Catwalk to Core Cutting Area

Coring operation

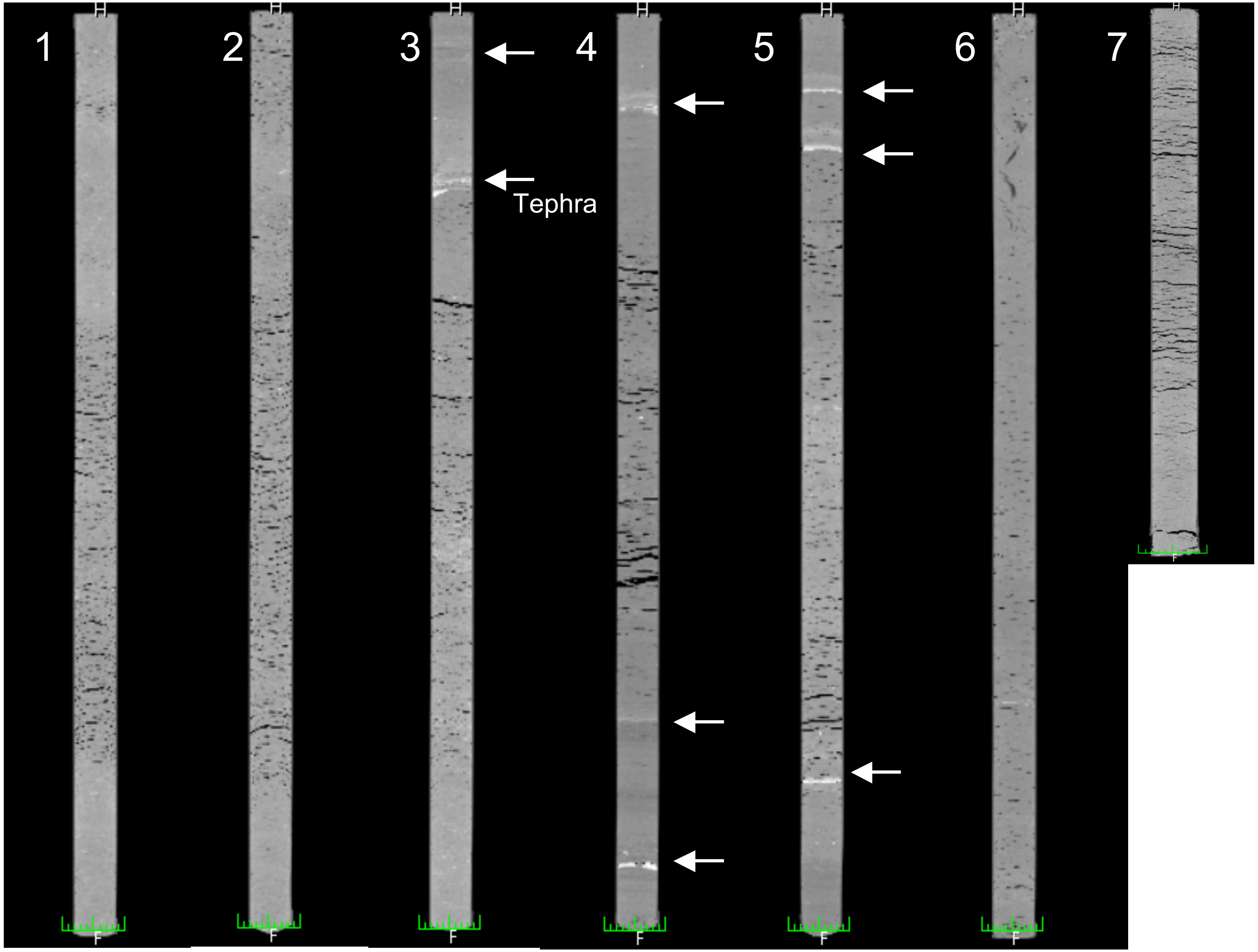


Results of coring operation

- We successfully obtained cores of 50 m and 70 m in total length from 2 sites.
- All of core sections were processed mainly using non-destructive measurement instruments on Core Processing Deck, and visual core description and sampling for on-shore studies of science party were also conducted.
- All of measurement data were successfully uploaded into J-CORES, and we can browse all of data using Composite Log Viewer of J-CORES.

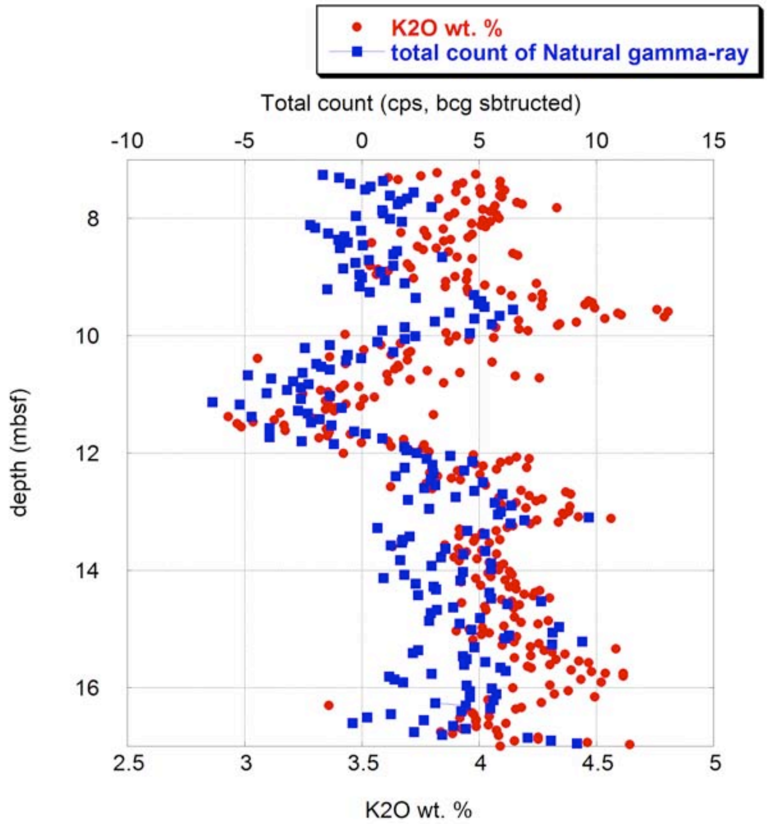
X-ray CT image

C9002A-H2



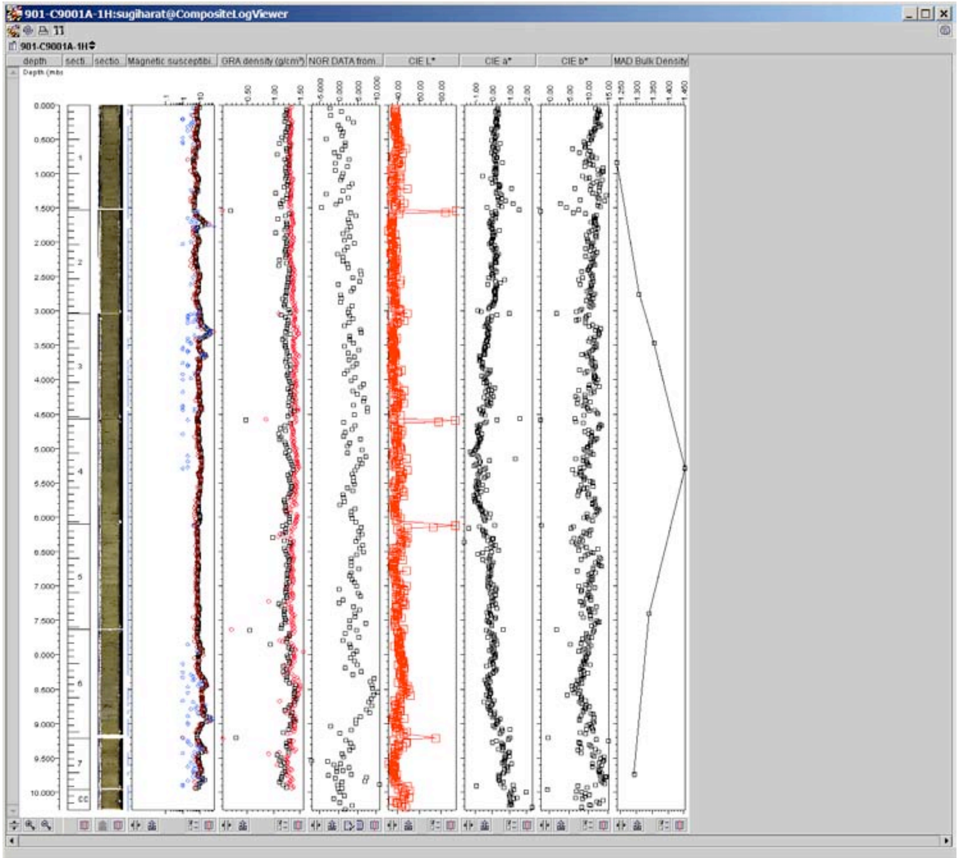
This core is cut into 1.4 m each section.

XRFCL vs. Natural Gamma Ray Sensor



Logging pattern of K2O content measured by XRFCL is well correlated with that of count rate measured by NGR sensor. Therefore, relative logging pattern of XRFCL measurements would be useful even if for wetted samples.

J-CORES
Composite Log Viewer (CLV)



Composite Log Viewer is an interface to browse the stored data in J-CORES.

Problem

- X-ray CT image data has quite large data volume (~1.3 GB/1 section) with an unique data format (DICOM).

→data migration using special software (e.g., OSILIX and E-FILM) for DICOM format and Large volume database server are needed in future operation.

After the coring operation

✓ Start set up of geochemical instruments

- Coulometer
- Ion Chromatograph
- HPLC
- ICP-MS
- ICP-AES
- Rock Eval
- Etc

Experiments using these instruments are ongoing on the ship now.

Schedule from JFY2006

- Mar, 06 ~ May, 06: Dry dock
- June, 06: Training operation of the ship
- July, 06 ~ Sep. 06: Riser drilling training
- Oct, 06 ~ Feb, 07: Training operation of the ship (including non-Riser drilling training ?)
- Spring, 07: Dry dock
- Summer, 07: Training operation
- Sep, 07 ~: International operation (Nankai Trough)

14
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C
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A
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2
16

Laboratory SIT: Core processing operation

- To identify problems in work flow of the CHIKYU laboratory area processing the actual core .

- In order to achieve the above objective, the most standard measurement settings were used for each instrument based on the previous experiments and our experiences.

→To obtain a basic information to design a core flow for various science objectives.

- Therefore, it was not so important that the adopted work flow became more smooth and efficient one for science party during this core processing training.

Depth profile for all measurements

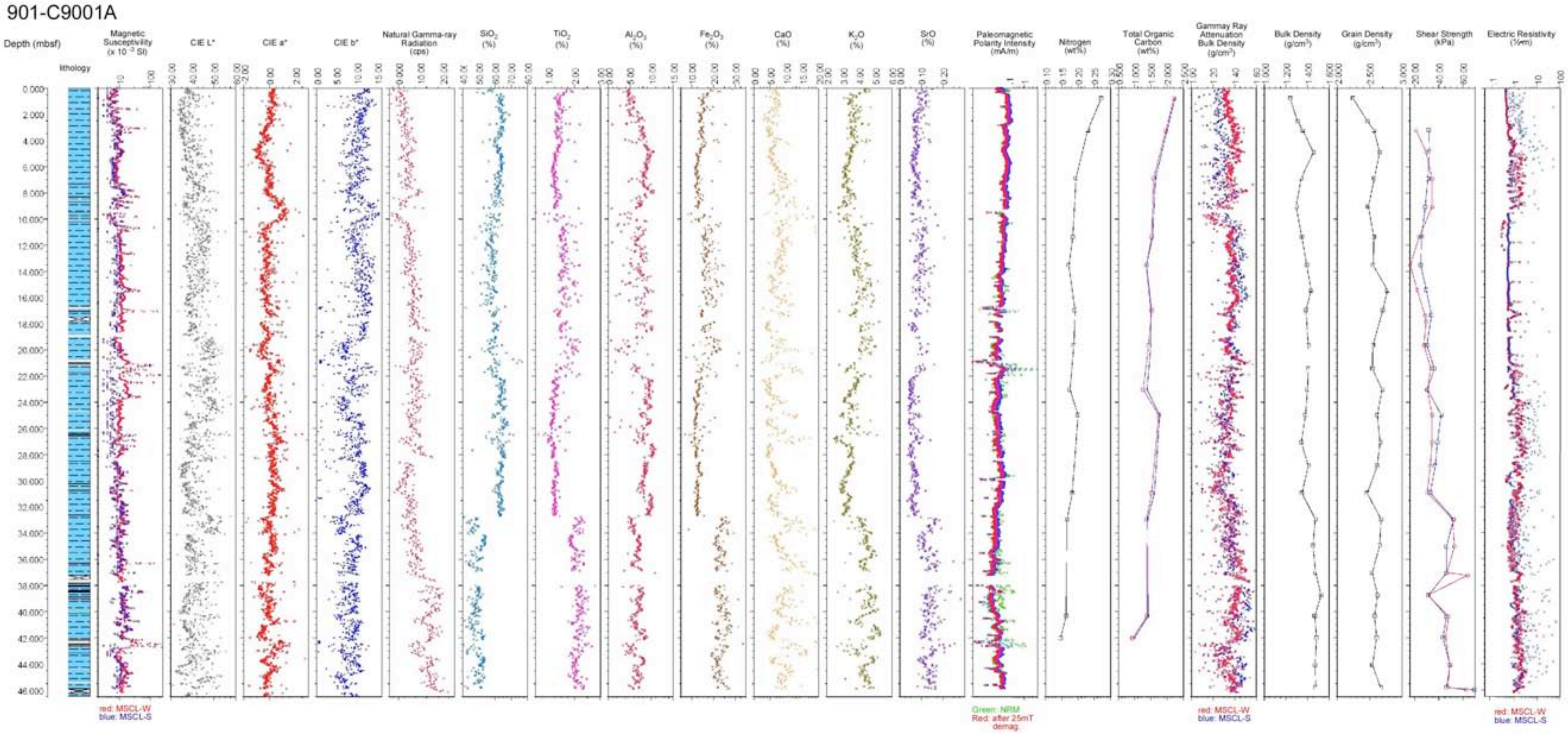


Fig. XXXX Synthesized columnar profiles of physical, chemical and magnetic properties and lithology for Site C9001 Hole A

IODP-USIO Report for the Scientific Technology Panel

Kochi, 30 January - 1 February, 2006

Overview

- Operations Review: Expeditions 309/312, 311
- Operations Preview: Phase 2 Schedule
- Selected USIO Activities
- USIO Senior Staff Changes

IODP USIO RISERLESS VESSEL SCHEDULE

Cruise		Port (Origin)	Dates[1,2]	Total Days (Port/Sea)	Days at Sea (Transit[3]/Ops[4])	Co-Chief Scientists	Alliance Contact(s)
Porcupine Carbonate Mounds	307	Dublin	26 April – 31 May	35 (6/29)	19/10	T. Ferdelman A. Kano	TAMU: M. Malone LDEO: T. Williams
Gulf of Mexico Hydrogeology	308	Mobile	31 May – 10 July	40 (5/35)	11/24	J. Behrmann P. Flemings	TAMU: C. John LDEO: G. Iturrino
Superfast - Spreading Crust 2	309	Balboa	10 July – 28 August	49 (5/44)	6/38	D. Teagle S. Umino	TAMU: N. Banerjee LDEO: F. Einaudi
Cascadia Margin Gas Hydrates	311	Balboa	28 August – 28 October[5]	61 (5/56)	19/37	T. Collett M. Riedel	TAMU: M. Malone LDEO: G. Guerin
Superfast - Spreading Crust 3	312	Victoria	28 October – 28 December[6]	61(5/56)	21/35	J. Alt S. Miyashita	TAMU: TBN LDEO: TBN
Demobilization		Balboa[7]	28 December – 31 January	34 (23/11)	11/0	N/A	TAMU: M. Storms LDEO: G. Myers

Notes:
[1] Ship is scheduled to arrive 0600 hr on first day of port call.
[2] Initial cruise date reflects first day of port call; ship sails when ready.
[3] Transit = Estimated time to/from port to the operating area.
[4] Ops = Operations (includes both on-site and between-site time).
[5] Scientists scheduled to embark vessel in Astoria on 16 September.
[6] Scientists scheduled to embark vessel in Balboa on 14 November.
[7] Demobilization will occur in Galveston, Texas

25 May 2005

Riserless Vessel
INTEGRATED OCEAN DRILLING PROGRAM

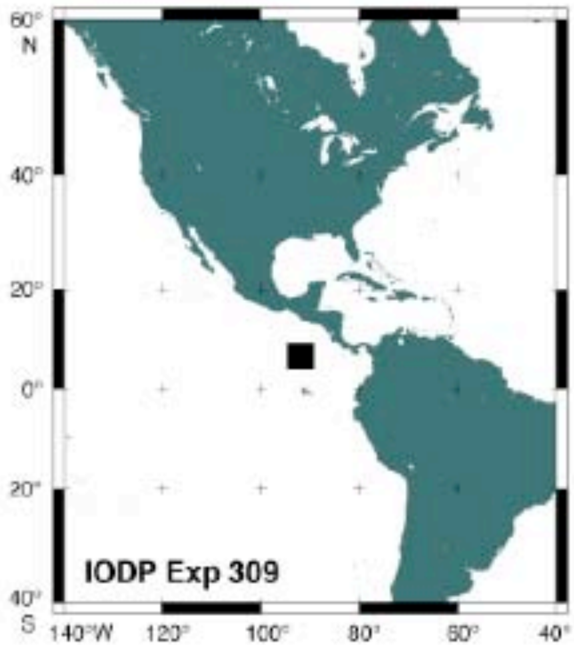
Expedition 309

Joint science program with Expedition 312

GENERAL INFORMATION

Title: Superfast Spreading Rate Crust 2
Sites: 1256
Dates: 8 July–28 August 2005
Ports: Cristobal, Panama, to Balboa, Panama
Co-chief Scientists: Damon Teagle & Susumu Umino
Staff Scientist: Neil Banerjee
Logging Staff Scientist: Florence Einaudi
Shipboard Scientific Participants: see list

LOCATION



Information by expedition | Expedition info | Home

Riserless Vessel
INTEGRATED OCEAN DRILLING PROGRAM

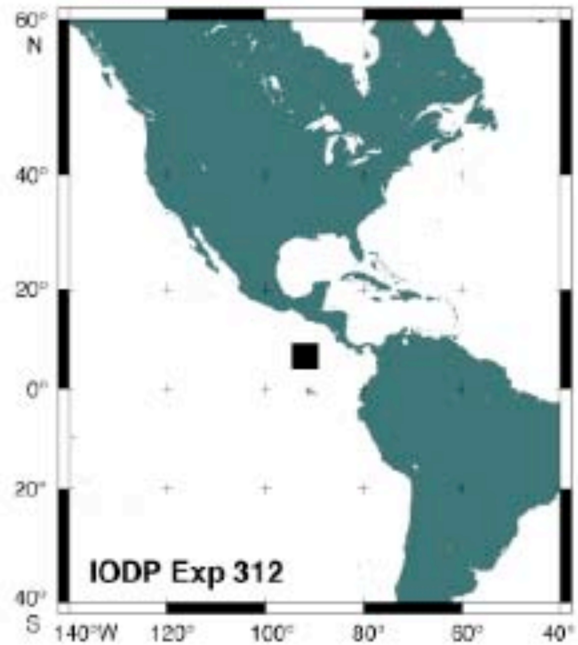
Expedition 312

Joint science program with Expedition 309

GENERAL INFORMATION

Title: Superfast Spreading Rate Crust 3
Sites: 1256
Dates: 28 October–28 December 2005
Ports: Victoria, B.C., Canada, to Cristobal, Panama (scientists embarked in Acapulco, Mexico, on 12 Nov.)
Co-chief Scientists: Jeffrey C. Alt & Sumio Miyashita
Staff Scientist: Neil Banerjee
Logging Staff Scientist: Marc Reichow
Shipboard Scientific Participants: see list

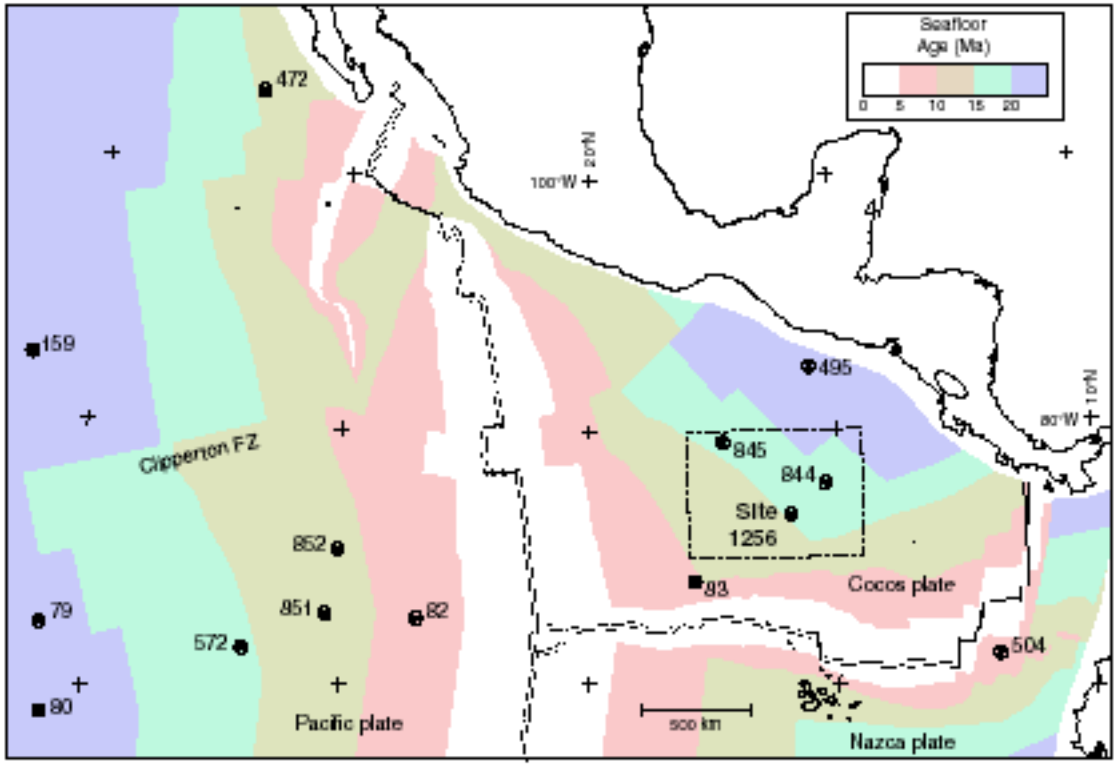
LOCATION



X309/312: Superfast Crust 2 & 3

- Continuous coring through the volcanic basement and sheeted dyke complex into the uppermost plutonic rocks in Hole 1256D
  - Deepened Hole 1256D by 252 m to TD of 1507
  - Recovery averaged 18%
  - Recovery of 3.3 m of gabbro to pegmatitic gabbro from 1411 - 1415 mbsf
  - Subsequent cores recovered 13 m of gabbro with 35% recovery
  - Basaltic dykes were recovered above and below gabbroic unit
  - Hole 1256 marks the first time in the history of ocean drilling that an in-situ section of upper oceanic crust has been penetrated through lavas, dykes, and into gabbros

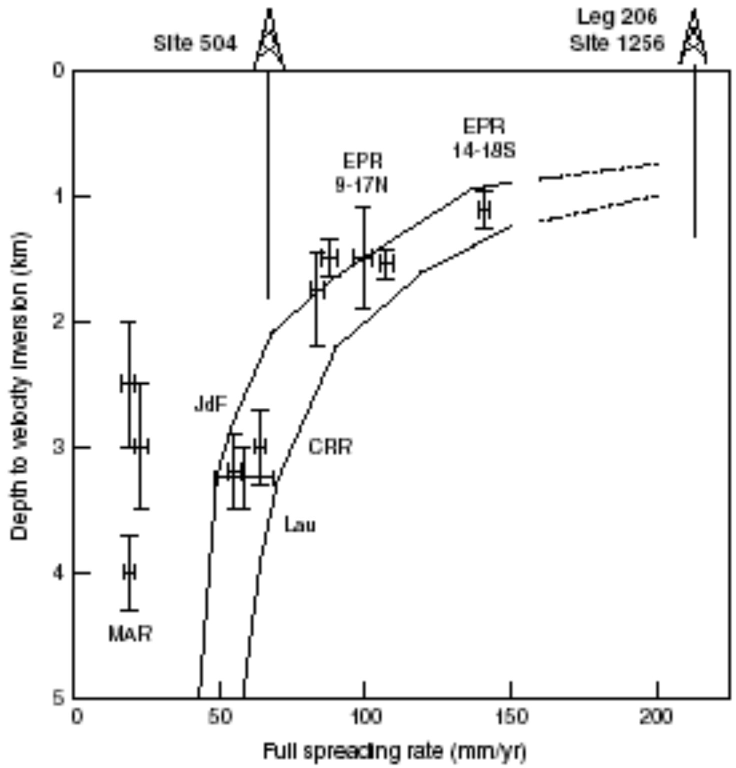
X309/312: Superfast Crust 2 & 3



- Age map of the Cocos plate and corresponding regions of the Pacific plate.
- Isochrons at 5 m.y. intervals from magnetic anomaly dating by Cande and Kent (1995).
- Selected DSDP and ODP sites that reached basement are indicated.
- The wide spacing of 10–20 m.y. isochrons to the south reflects the extremely fast (200–220 mm/y) full spreading rate (modified from Wilson, Teagle, Acton, et al., 2003). FZ = fracture zone.

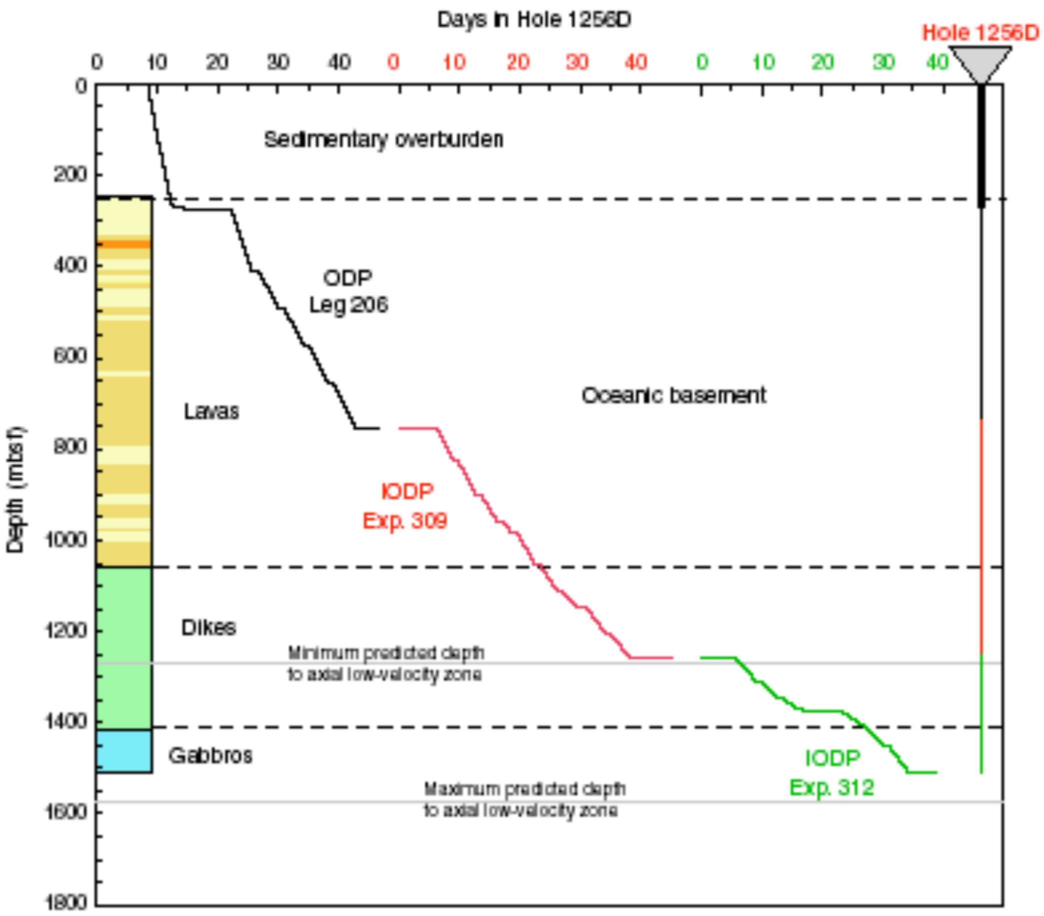
X309/312: Superfast Crust 2 & 3…

- Depth to axial low-velocity zone plotted against spreading rate (modified from Purdy et al., 1992; Carbotte et al., 1997b).
- Depth versus rate predictions from two models of Phipps Morgan and Chen (1993) are shown, extrapolated subjectively to 200 mm/y (dashed lines).
- Penetration to date in Holes 504B and 1256D is shown by solid vertical lines.
- MAR = Mid-Atlantic Ridge
- EPR = East Pacific Rise
- JdF = Juan de Fuca Ridge
- Lau = Valu Fa Ridge in Lau Basin
- CRR = Costa Rica Rift.



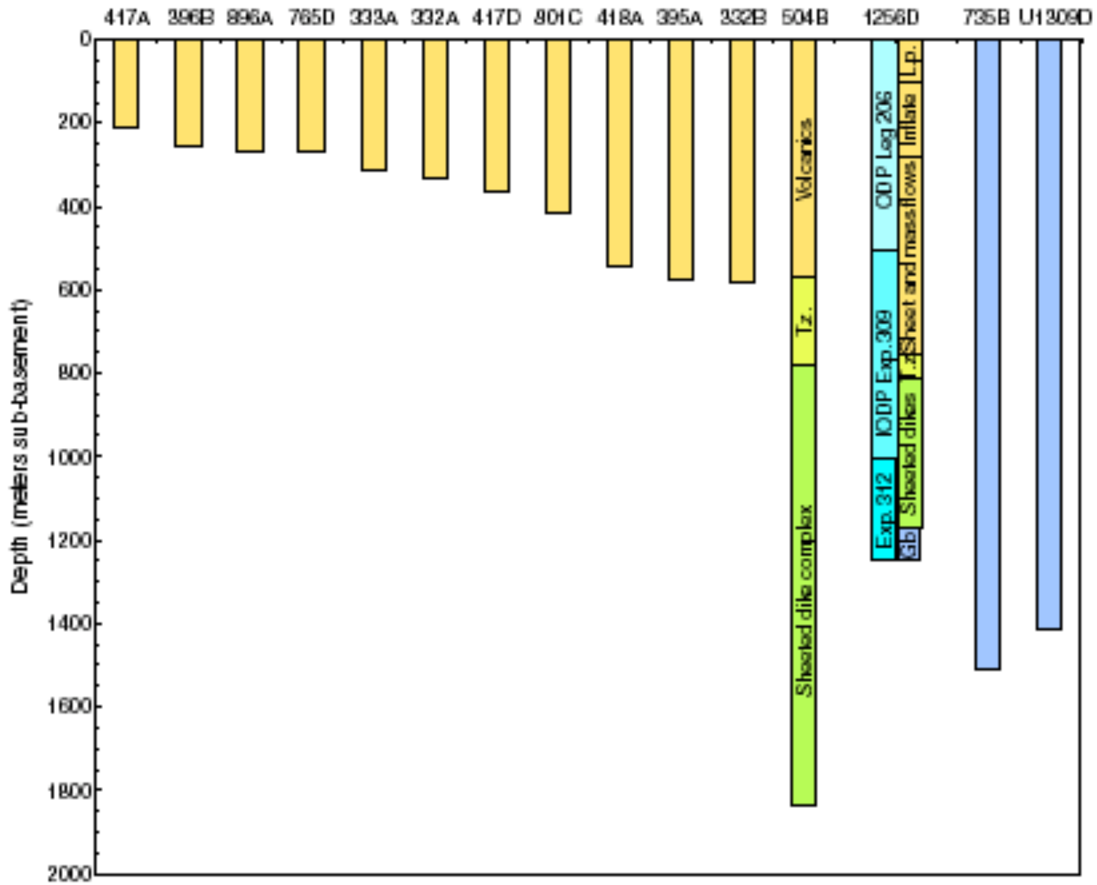
X309/312: Superfast Crust 2 & 3…

- Summary of drilling progress in Hole 1256D during
  - Leg 206 (black)
  - Expedition 309 (red)
  - Expedition 312 (green).
- Generalized lithostratigraphy is shown on the left.
- The minimum and maximum predicted target depths to gabbros are also shown.



X309/312: Superfast Crust 2 & 3…

- Boreholes >200 m deep drilled into in situ ocean crust by DSDP, ODP, and IODP compared to Hole 1256D.
- Hole 504B is the only other basement hole to sample a complete extrusive sequence and penetrate into the sheeted dikes.
- ODP Hole 735B and IODP Hole U1309D drilled deeply into gabbros tectonically exposed near ridge-transform intersections on the Southwest Indian Ridge and Mid-Atlantic Ridge,
- L.p. = lava pond
- Inflate = inflated flows
- Sheet and mass flows = sheet and massive flows
- T.z. = transition zone,
- S. intru. = sheeted intrusives
- msb = meters subbasement



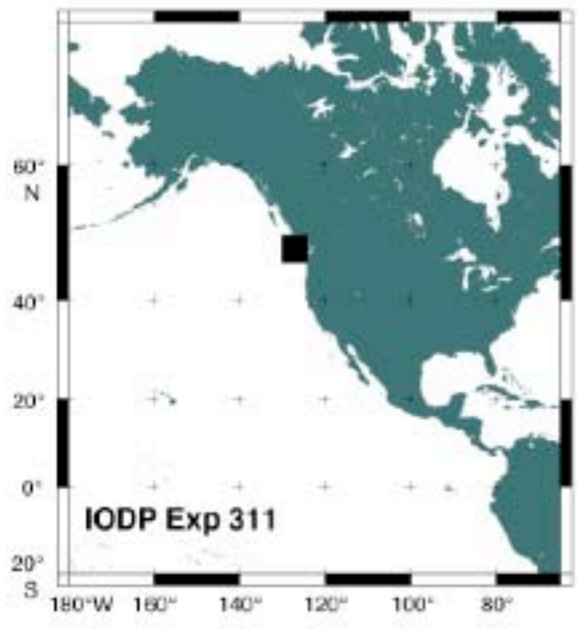
Riserless Vessel
INTEGRATED OCEAN DRILLING PROGRAM

Expedition 311

GENERAL INFORMATION

Title: Cascadia Margin Gas Hydrates
Sites: 1325–1329
Dates: 28 August–28 October 2005
Ports: Balboa, Panama, to Victoria, B.C., Canada (scientists embarked in Astoria, Oregon, on 16 Sep.)
Co-chief Scientists: Michael Riedel & Tim Collett
Staff Scientist: Mitch Malone
Logging Staff Scientist: Gilles Guerin
Shipboard Scientific Participants: see list

LOCATION

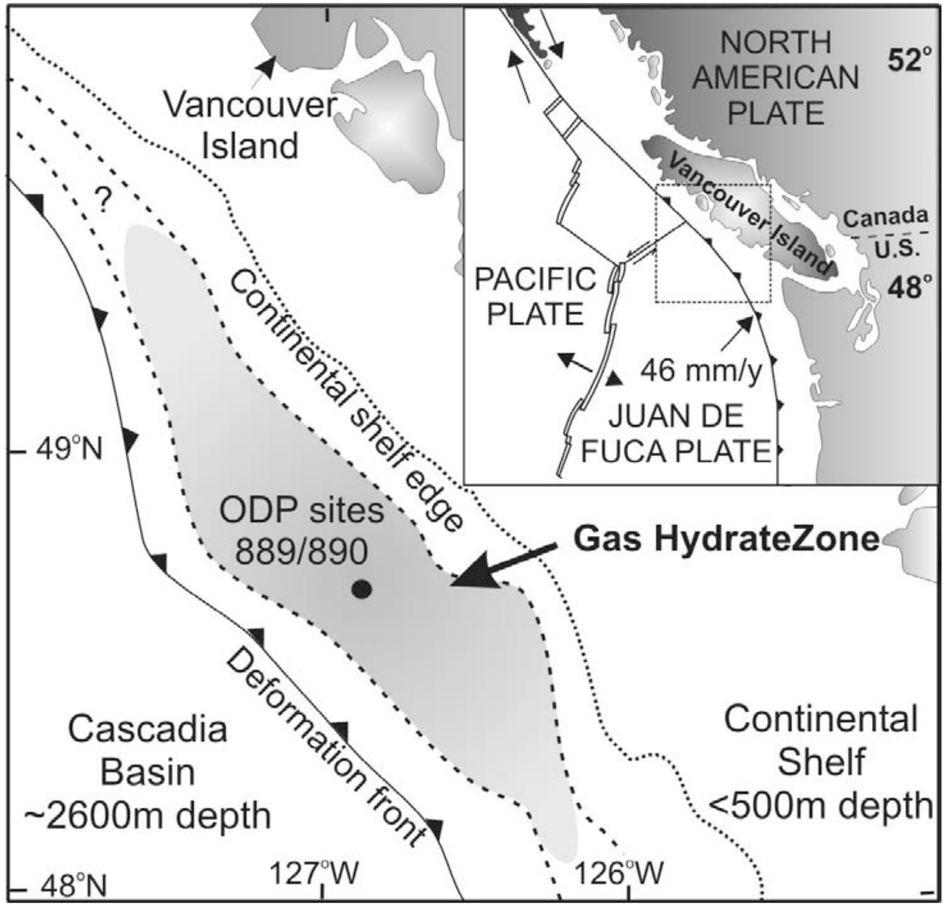


J-CORES Testing on X311Transit

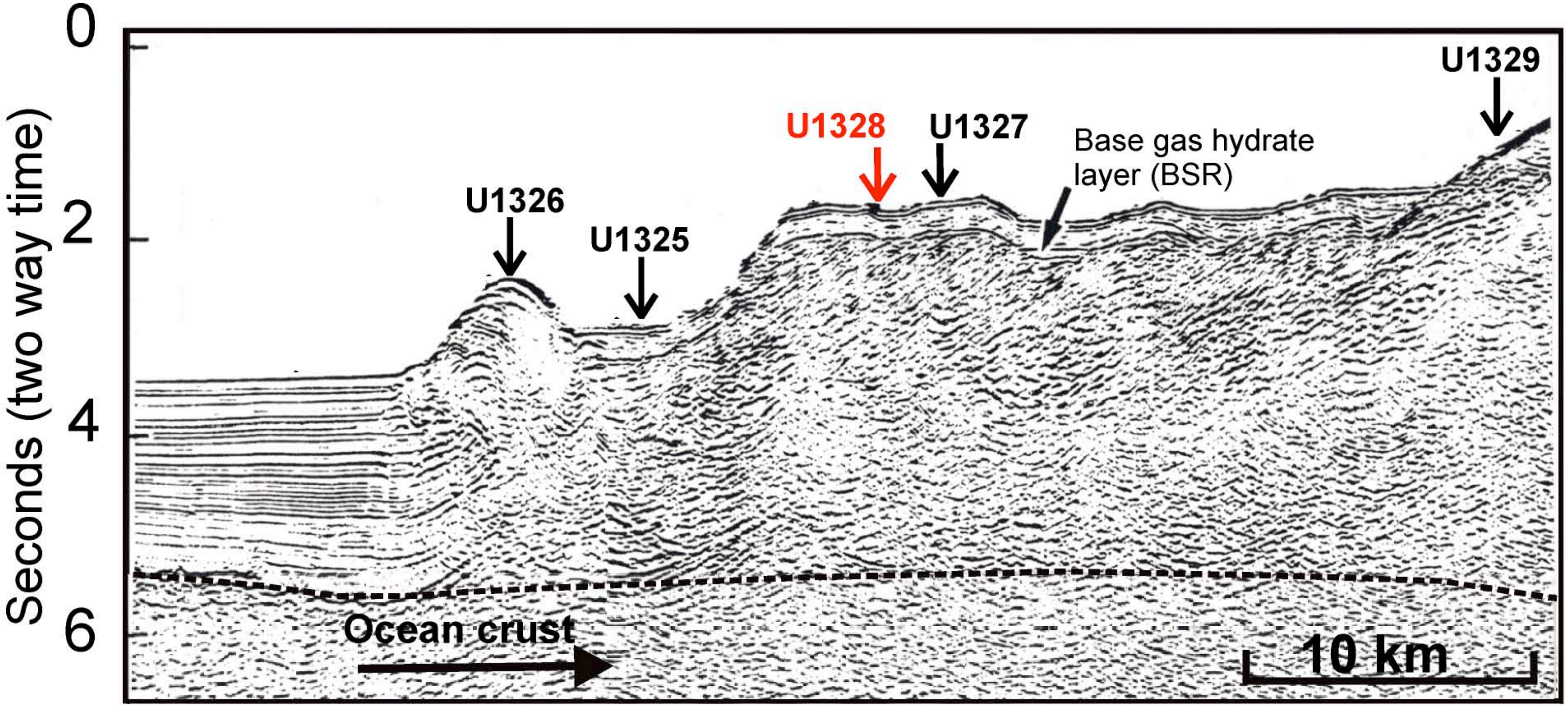
- August 28 - September 14
- USIO offered and hosted tests on the JR to evaluate the readiness of CDEX's J-CORES database and software application tools
- The event was coordinated by IODP-MI as part of the IODP Data Management Coordination Group (DMCG) activities
- Participants:
  - USIO testers: Peter Blum, John Firth, David Fackler, Paul Foster, Jay Miller, Rakesh Mithal, and technical staff sailing on X311.
  - CDEX staff: Shigemi Matsuda, Kyoma Takahashi
  - IODP-MI coordinator: Bernard Miville
- Results: IODP-MI summary report and the detailed test reports prepared by participants are available from the IODP-MI web site:
  - http://www.iodp.org/data-management-coordination-task-force/

X311: Cascadia Margin Gas Hydrates

Constrain models for gas hydrate formation in subduction zone accretionary prisms



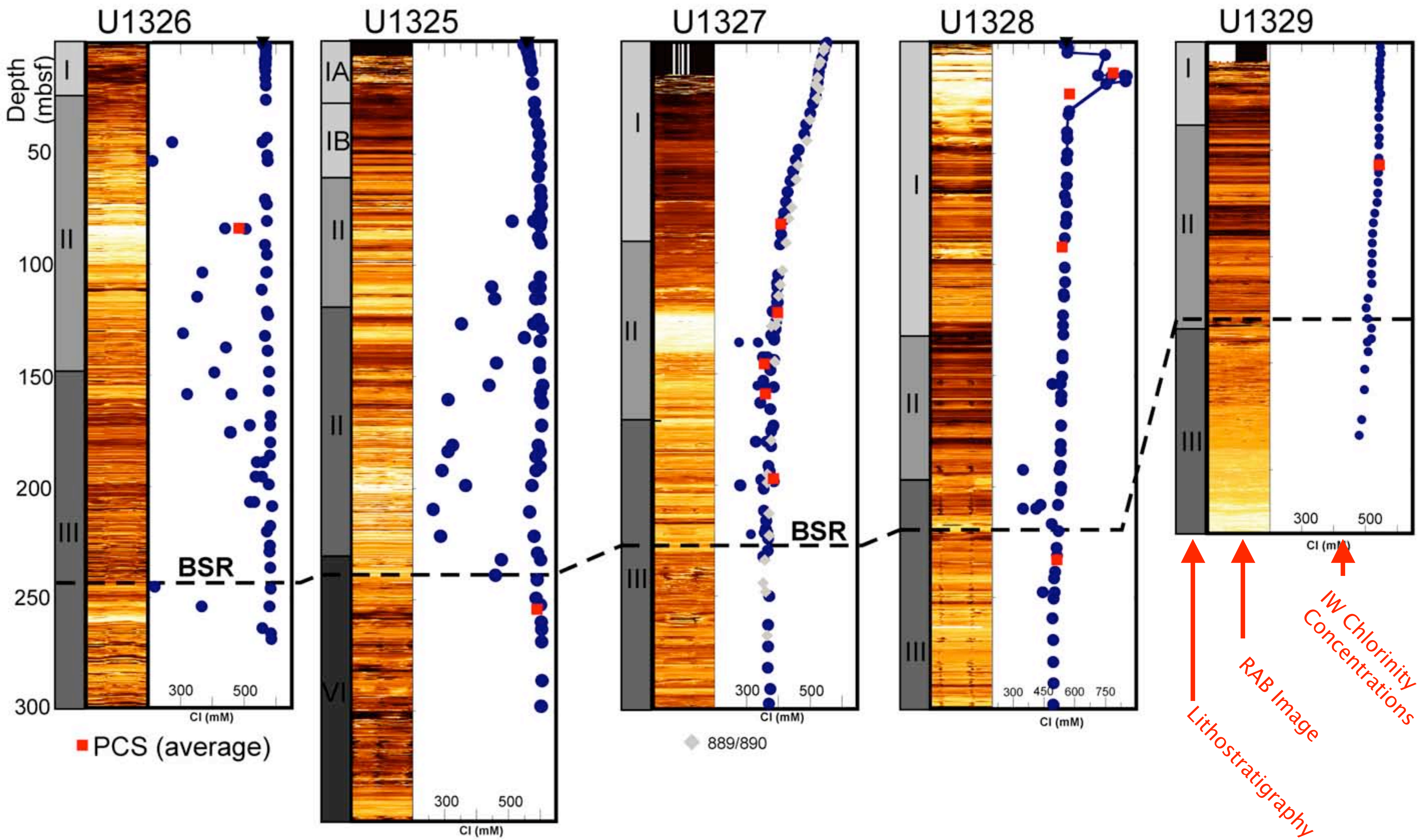
X311: Cascadia Margin Gas Hydrates



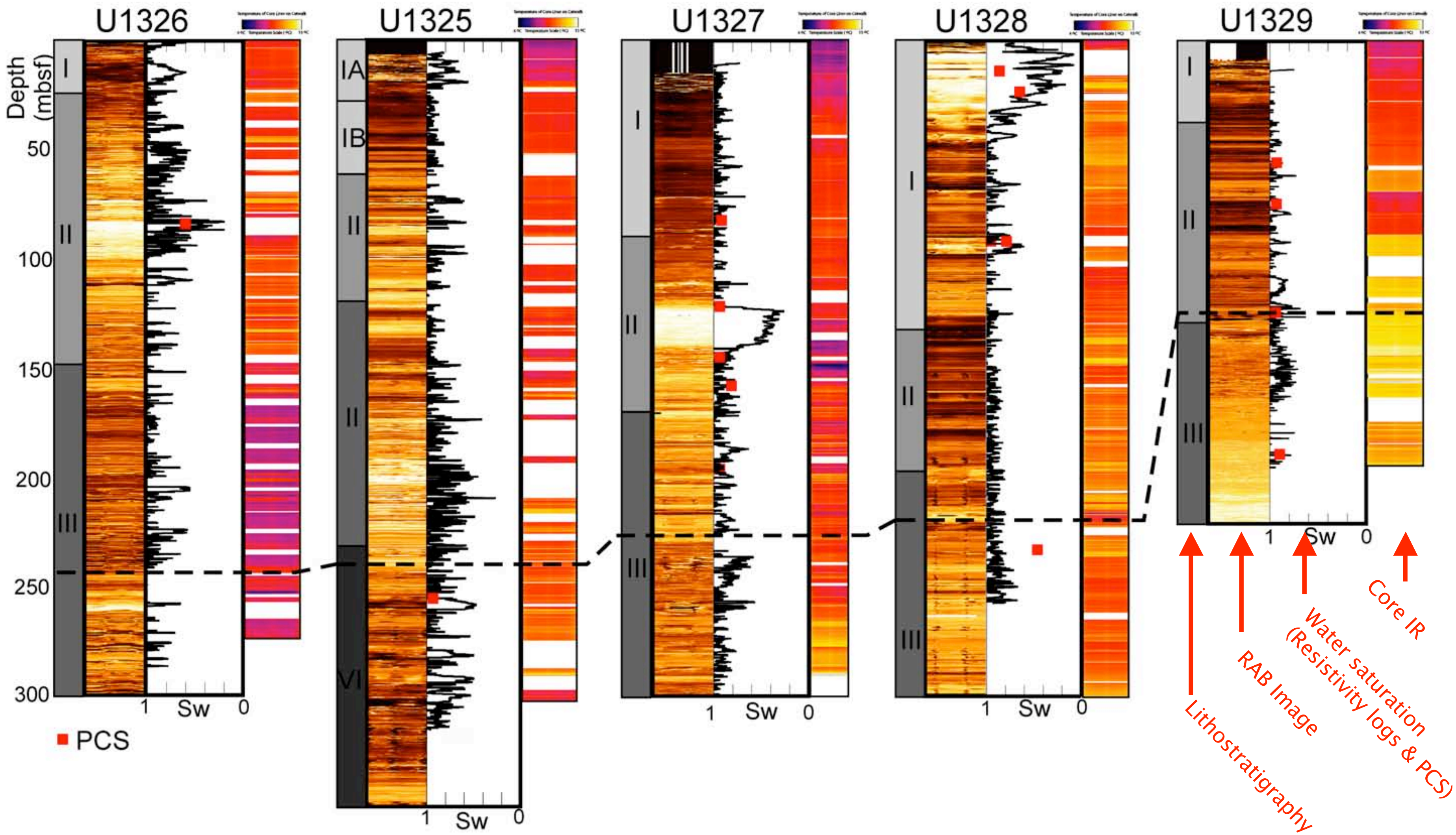
X311: Cascadia Margin Gas Hydrates

- 23 holes completed w/ 1218 m core recovered with the APC and XCB (75% recovery) and 2810 m drilled.
- Measure While Drilling /Logging While Drilling was successfully completed in 5 holes prior to coring.
- Zero offset VSPs completed in 2 holes.
- 22 out of 43 successful pressure core deployments (16 PCS, 4 HRC, 2 FPC)
- 33 temperature tool deployments (APC, APC3, DVTP, DVTPP), 17 good or better quality; heave affected many deployments. Tested and used prototype APC3 tool.
- 1.66 days of waiting on weather resulting in ~4 days of lost time; heave affected tool deployments and wireline logging at some sites.
- Funding (~$500,000) from United States Department of Energy for 3rd party tools

X311: Cascadia Margin Gas Hydrates



X311: Cascadia Margin Gas Hydrates



JR Demobilization

- Completed Demobilization on January 20
- Conversion contract began on January 21
- Projected date to complete IODP wrap-up: 26 January.
- Contracted a storing facility (Woodstone facilities) for equipment coming off the JR
  - This facility will also be used to set up and test the equipment for the SODV

Phase 2 Operations Schedule

Expedition Name (see map)	Exp #	Port of Origin	Dates[1,2]	Total Days (Port/ Sea)	Days at Sea (Trans[3]/ Ops[4])	Co-Chief Scientists	USIO Staff Scientists
Demobilization for SODV activities	N/A	Cristobal[5]	29 Dec–31 Jan'06	33 (26/7)	7/0	N/A	TAMU: M. Storms LDEO: G. Myers
This operations schedule is ONLY a draft issued for planning purposes. An initial schedule will be issued once the Scientific Ocean Drilling Vessel shipyard is determined.							
Equatorial Pacific	314?	Honolulu[9]	1 Aug[10]–1 Oct'07	61 (5/56)	16/40	TBN	TAMU: TBN LDEO: TBN
NanTroSEIZE	315?	Honolulu	1 Oct–1 Dec'07	61 (5/56)	15/41[11]	TBN	TAMU: TBN LDEO: TBN
NanTroSEIZE	TBN	Yokohama	1 Dec–31 Jan'08	61 (5/56)	2/54[11]	TBN	TAMU: TBN LDEO: TBN
TBN[6]	TBN	TBN	31 Jan–TBN	TBN	TBN	TBN	TAMU: TBN LDEO: TBN
Juan de Fuca	TBN	TBN	TBN	TBN	TBN	TBN	TAMU: TBN LDEO: TBN
TBN[7,8]	TBN	TBN	TBN	TBN	TBN	TBN	TAMU: TBN LDEO: TBN
Canterbury[7]	TBN	TBN	TBN	TBN	TBN	TBN	TAMU: TBN LDEO: TBN
Wilkes Land[7]	TBN	TBN	TBN	TBN	TBN	TBN	TAMU: TBN LDEO: TBN

Notes:

1 Ship is scheduled to arrive 0600 hr on first day of port call.
2 Initial cruise date reflects first day of port call; ship sails when ready.
3 Trans = estimated transit time to/from port to the operating area.
4 Ops = Operations (includes both on-site and between-site time).
5 Demobilization is scheduled to occur in Galveston, Texas.
6 The fourth expedition will be determined in early 2006. A transit may be required to move the vessel to the operating area for the fourth expedition.
7 The sixth through eighth expeditions are place holders to be finalized in 2006.
8 The sixth expedition most likely will include operations (to be determined) and a transit to position the vessel for the Wilkes Land expedition during the limited weather window (late Jan to early Mar).
9 The initial port call for Equatorial Pacific will be finalized once the Scientific Ocean Drilling Vessel shipyard is finalized.
10 The start date is tentative and will be finalized once the Scientific Ocean Drilling Vessel shipyard is finalized.
11 The operational plan for NanTroSEIZE will be determined during December 2005. The final plan could alter the operational dates.

U.S. SODV Project

- Contract signed with ODL in December 2005 for use of the JOIDES Resolution as the SODV
- Selection of downhole logging contractor currently underway
- MREFC funds allocated ($15m in 2005; $58m in 2006; $42 in 2007); FY06 and FY07 funds pending authorization
- Delivery of the converted riserless vessel on ~July 14, 2007.
- Project status to be presented in separate presentations:
  - Project Advisory Committee report (Peggy Delaney)
  - Conversion Management/Implementation Team report (Jack Baldauf)
    - Includes summary of Science Conversion Design Team (SCDT) activities
      - SCDT members present at this meeting: Clive Neal and Sean Higgins
  - Analytical systems implementation plans (Peter Blum, David Houpt)

Senior Staff Changes

- JOI
  - Stu Williams accepted a position as Director of Ocean Observatories with the ORION Project Office and will phase-out his role as SODV Project Director
  - Bill Ball joined in the position of SODV Project Director
  - Kelly Kryc, Assistant Director and USIO co-liaison to STP, accepted a job with the Washington DC IODP-MI office
  - David Divins joined in the position of Associate Director, Ocean Drilling Programs
- LDEO
- TAMU
  - Angie Miller, Interim Manager for Publications, accepted the position of Manager of Publications
  - Jay Miller was appointed interim Manager of the Tools and Analytical Services Department

IODP
INTEGRATED OCEAN DRILLING PROGRAM

2nd STP Meeting

30th January -1th February 2006, Kochi

ECORD Science Operator (ESO) Report

Ursula Röhl (Bremen)
Jenny Inwood (Leicester)

ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

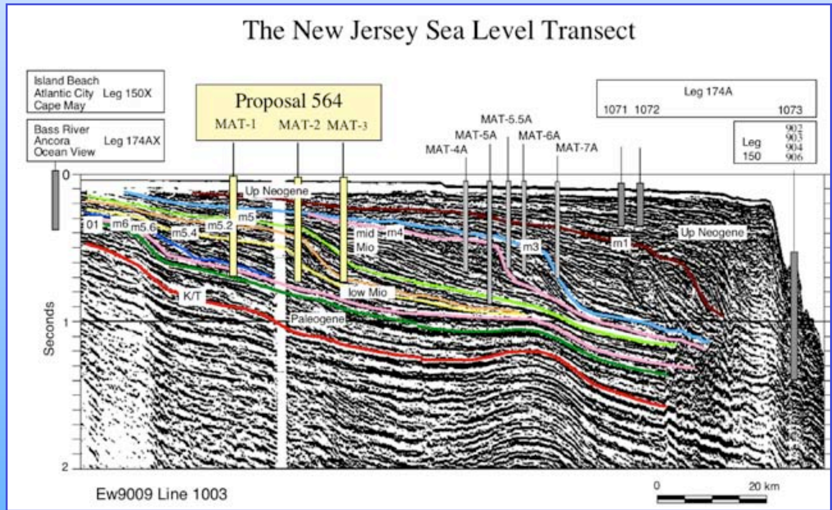
Universität Bremen rcom marum

EPC European Petrophysics Consortium

BGS British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

ESO Report

1. Tahiti Sea Level Expedition



2. FY06 – New Jersey

Expedition 310, Tahiti Sea Level

- 28th August - 6th September: *DP Hunter* mobilisation in Tampa, Florida.
- 6th September – 4th October: transit to Tahiti
- 4th- 6th October: Port call at Papeete
- 6th October: sail for first site at Maraa
- 16th November: complete drilling and return to Papeete for demobilisation
- Duration 42 days

- Onshore Science Party (Bremen) will begin 13th March,
- maximum duration of 30 days to 15th March

Mobilisation of *DP Hunter* in Tampa, Florida

28th August – 6th September

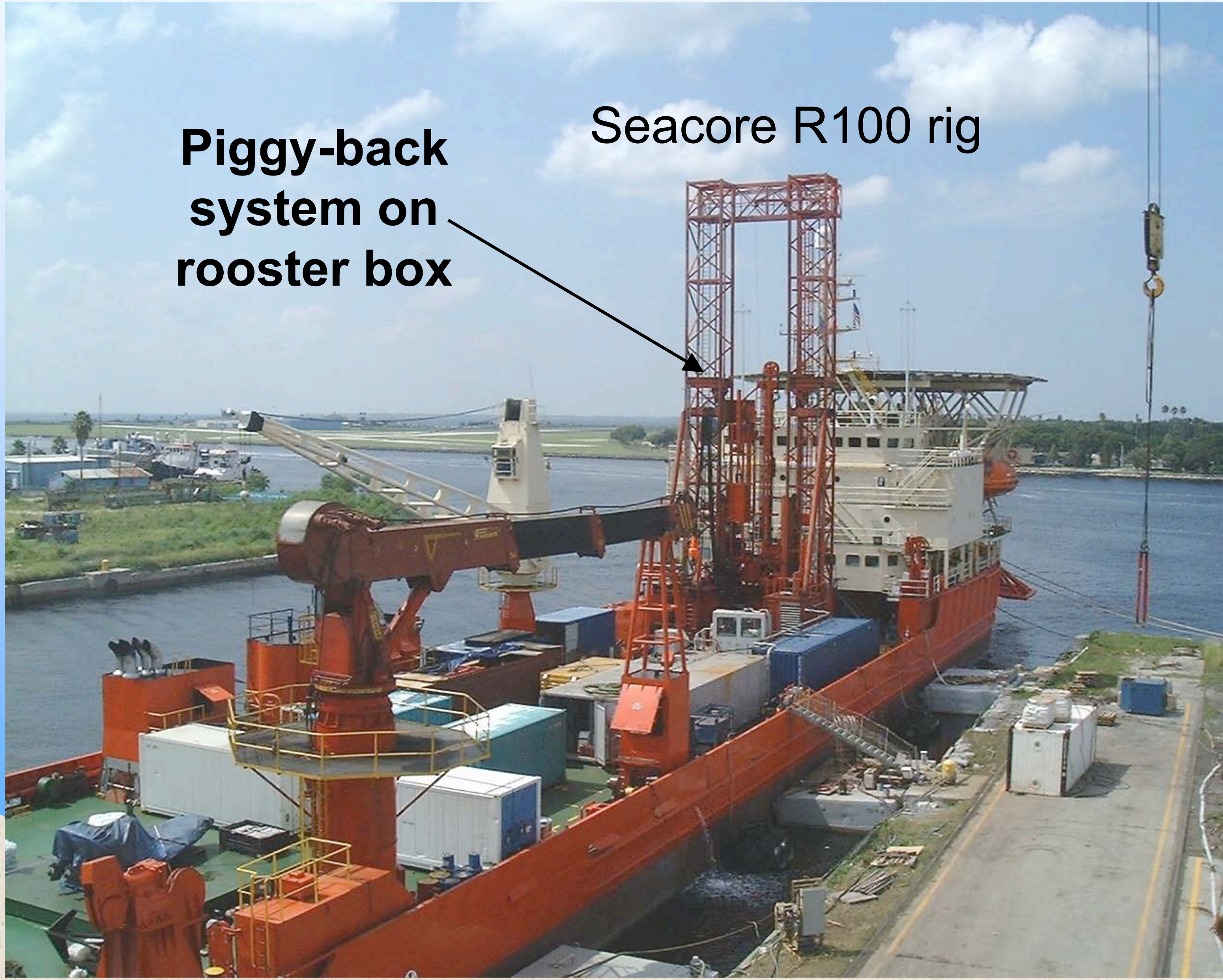
DP Hunter following mobilization

IODP
INTEGRATED OCEAN DRILLING PROGRAM

ECORD
European Consortium for Ocean Research Drilling

ESO
ECORD Science Operator

28th August – 6th September



ECORD European Consortium for Ocean Research Drilling

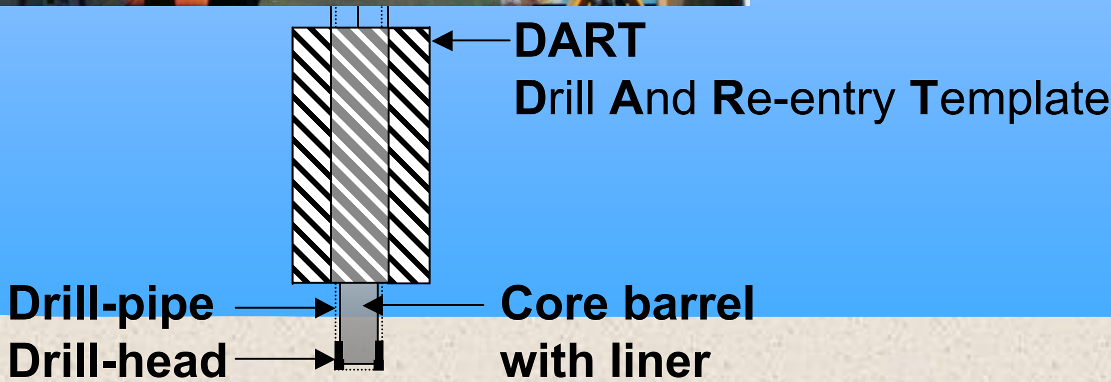
ESO ECORD Science Operator

Expedition # 310 Tahiti Sea-Level

View from the *DP Hunter* on site at Maraa

Site is c.150 metres from the reef

Drilling


DART
Drill And Re-entry Template
Drill-pipe
Drill-head
Core barrel
with liner

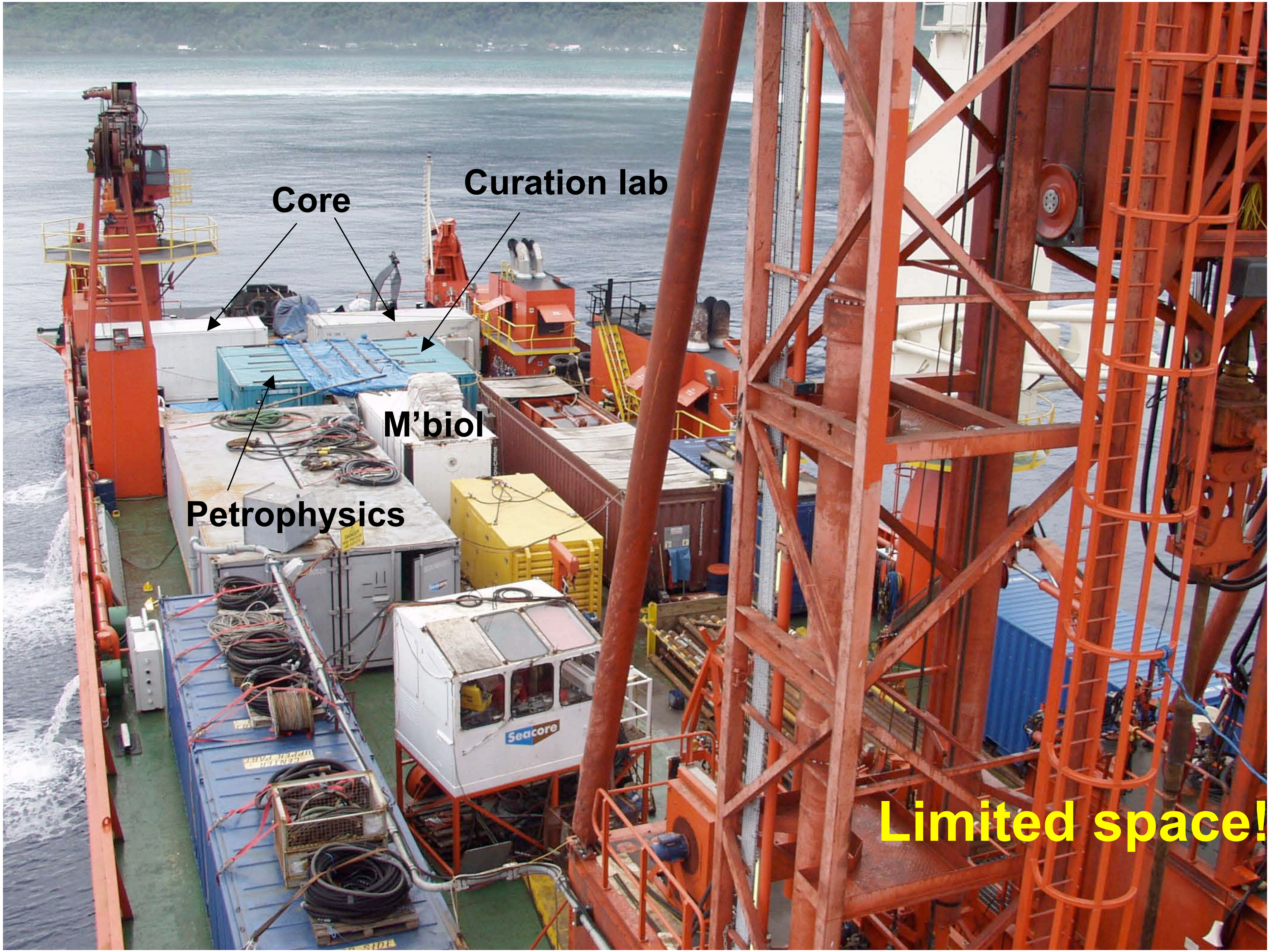

Mitutoyo

Recovery

Total drilled length	1099.83 m
Total recovered	632.12 m
Average recovery	57.47 % (+ ca. 20% porosity)
Duration	42 days
Water depth	41 – 117 m
Max. drilled length	79.17 m
Max. core depth	102.17 m

ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

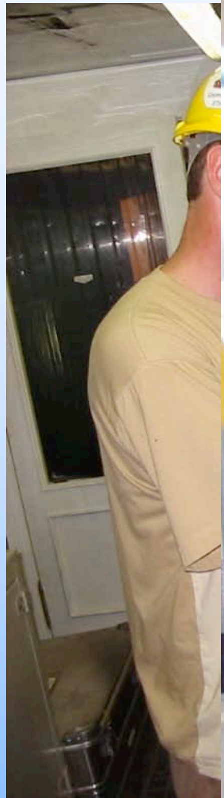

Core
Curation lab
M'biol
Petrophysics
Seacore
Limited space!

Split spoon

ECORD
European Consortium for Ocean Research Drilling

ESO
ECORD Science Operator

Microbiology and interstitial water chemistry



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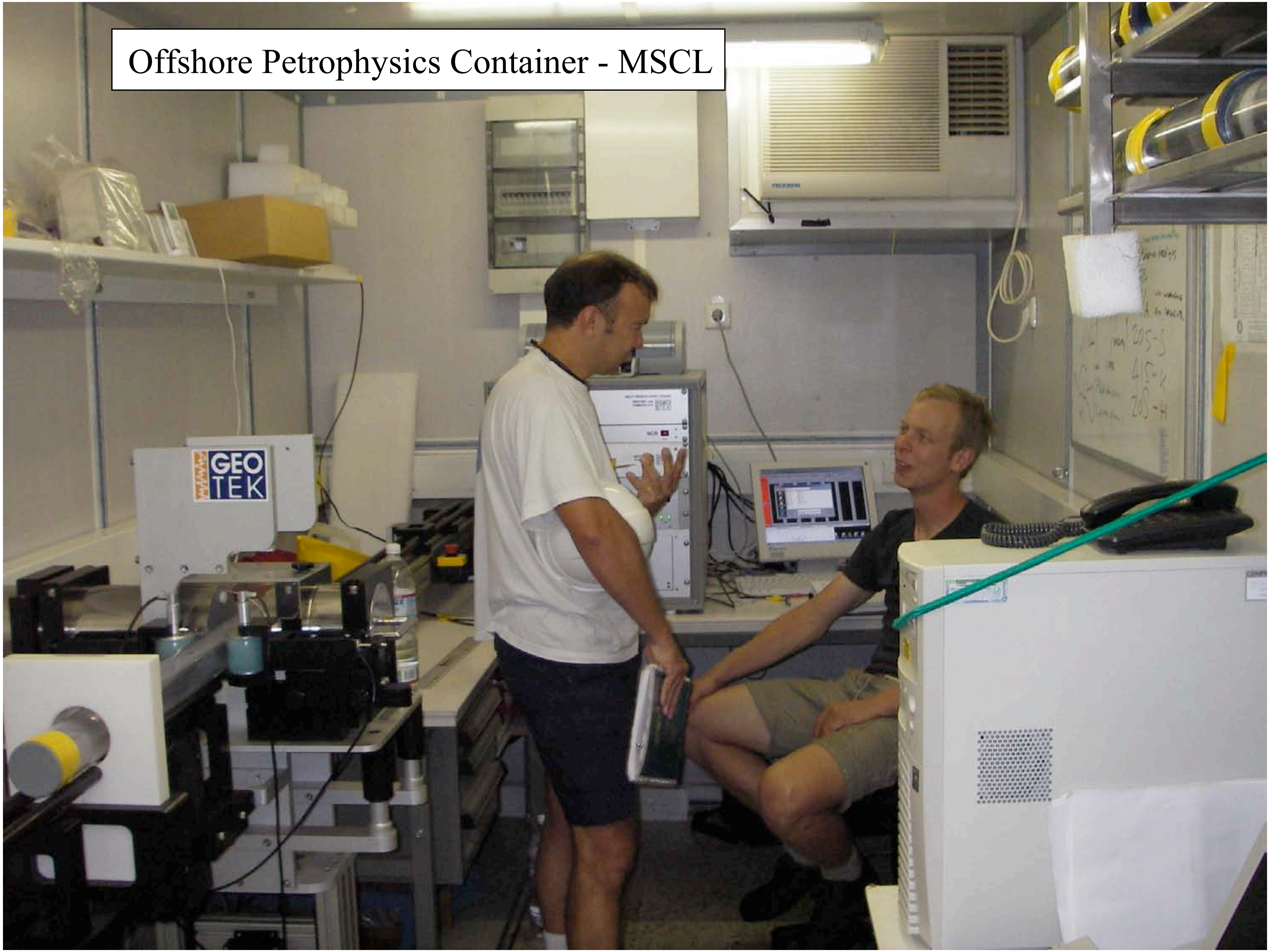
Offshore Petrophysics Container - MSCL




Offshore Core Curation Container

Tahiti Sea Level

- Total length of hole drilled – 1100 m from 37 holes at 26 sites
- Total length of core recovered – 632 m
- Recovery 57% (70% for last 10 sites)
  - Use of split steel corer without liner has improved quality and quantity of recovery
  - Excellent image logs suggest recovery is commonly in 90-95% region
- Interesting microbiology

ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

Tahiti Sea Level Expedition (310)
Borehole Geophysical Logging

10 boreholes logged; 66 runs in total

- **Optical images** (for mm-scale geological description)
- **Acoustic images** (for cm-scale impedance and mesoscale porosity)

- **Spectral gamma logging** (for U, Th, K and red algaes)
- **Acoustic velocity logging** (for Vp and Vs at 10 to 20 kHz)
- **Induction resistivity logging** (for pore fluid salinity and porosity)
- **Hydrochemical borehole fluid logging** (with p, T, pH, Eh, SP and fluid electrical conductivity to identify fluid circulations)

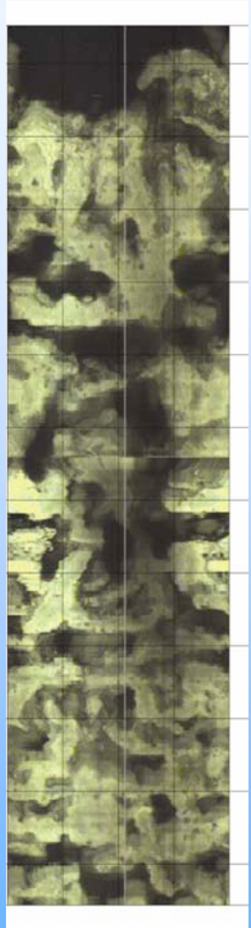
- **Hole size (caliper)** (for more precise data analyses)

ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

Tahiti Sea Level Expedition (310)
Borehole Geophysical Logging

IODP
INTEGRATED OCEAN DRILLING PROGRAM



Maraa transect

5D

7A
7B

Papenoo-Tiarei transect

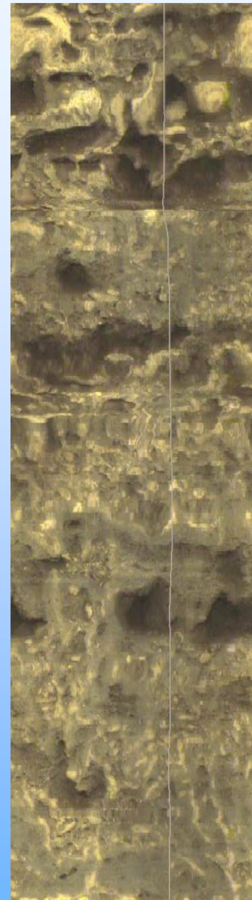
9B
9D
9E

15A

17A

21B

23B



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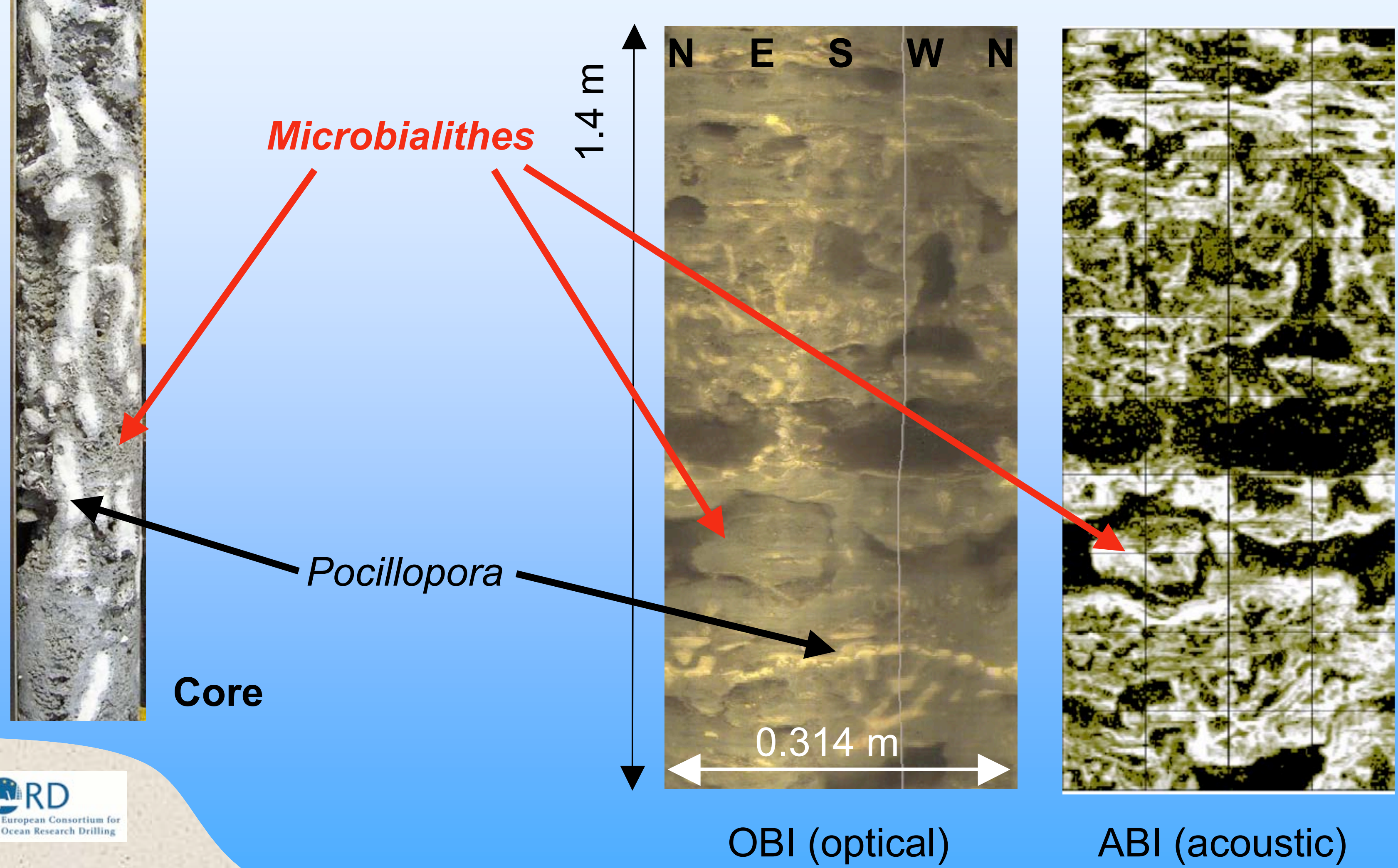
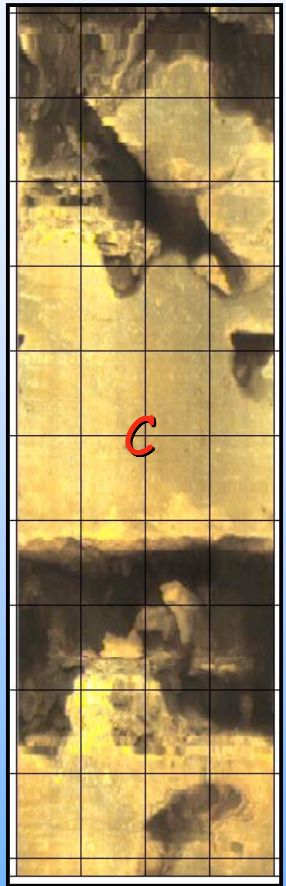
Tahiti Sea Level Expedition (310)
Borehole Geophysical Logging

High resolution (mm-scale) borehole imaging (M023B)

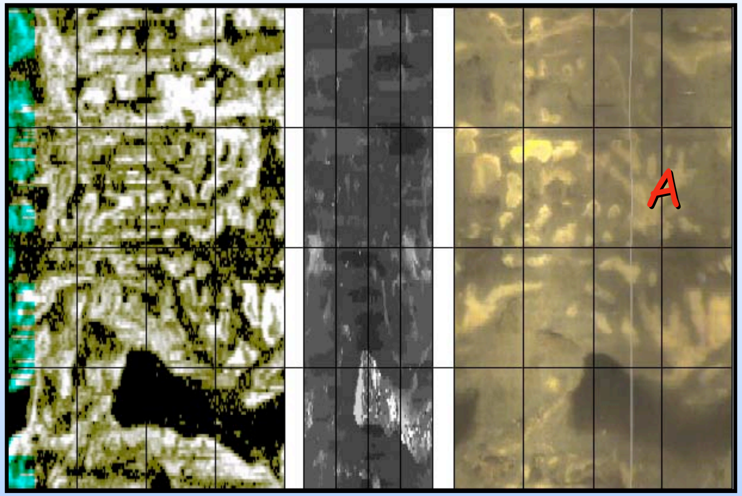


ECORD
European Consortium for Ocean Research Drilling
ESO
ECORD Science Operator
IODP
INTEGRATED OCEAN DRILLING PROGRAM

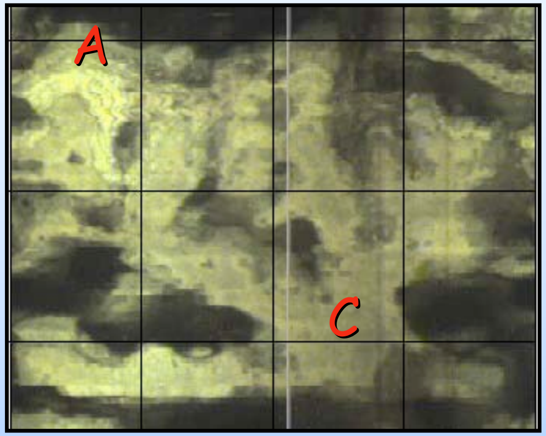
Tahiti Sea Level Expedition (310)
Borehole Geophysical Logging



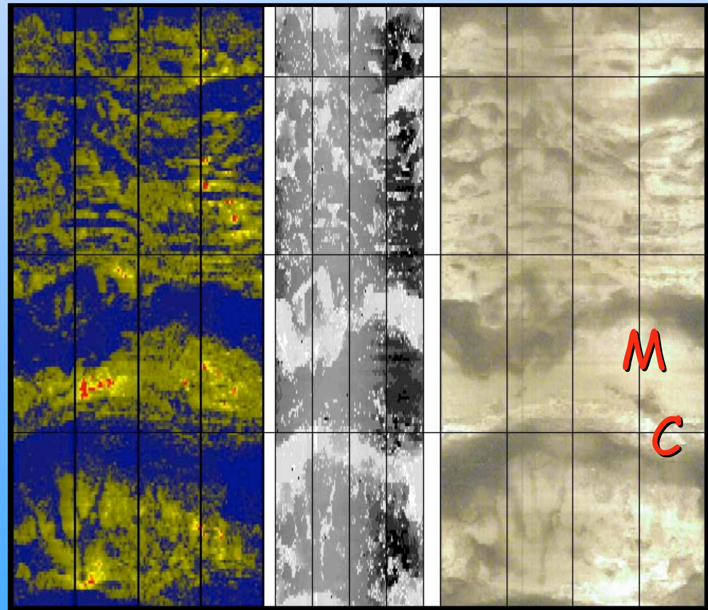
Massive corals (C)



Branching red algaes (A)

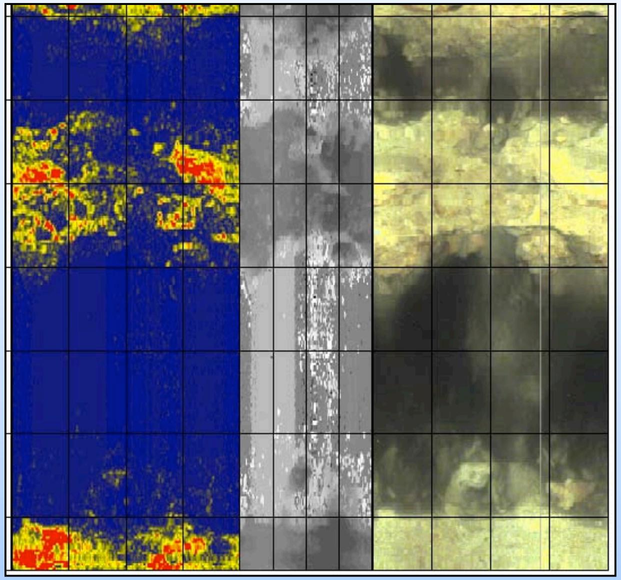
Branching corals (C) and crusty algaes (A)


Borehole geophysical images : Geological Interpretation (G. Camoin)

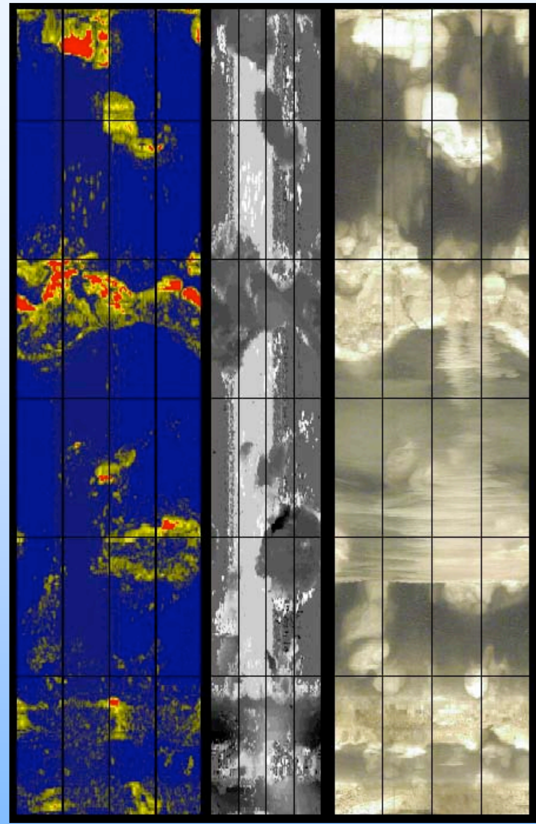


Laminar corals (C) and microbialithes (M)

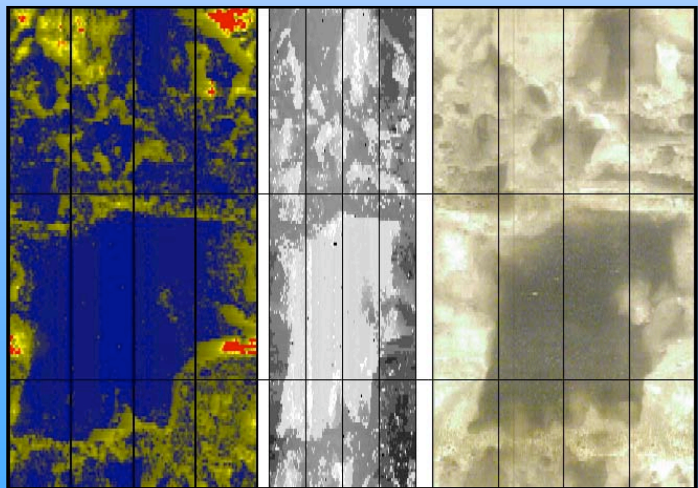
Tahiti Sea Level Expedition (310)
Borehole Geophysical Logging



Megaporosity (primary and secondary)



Mesoporosity (structural)



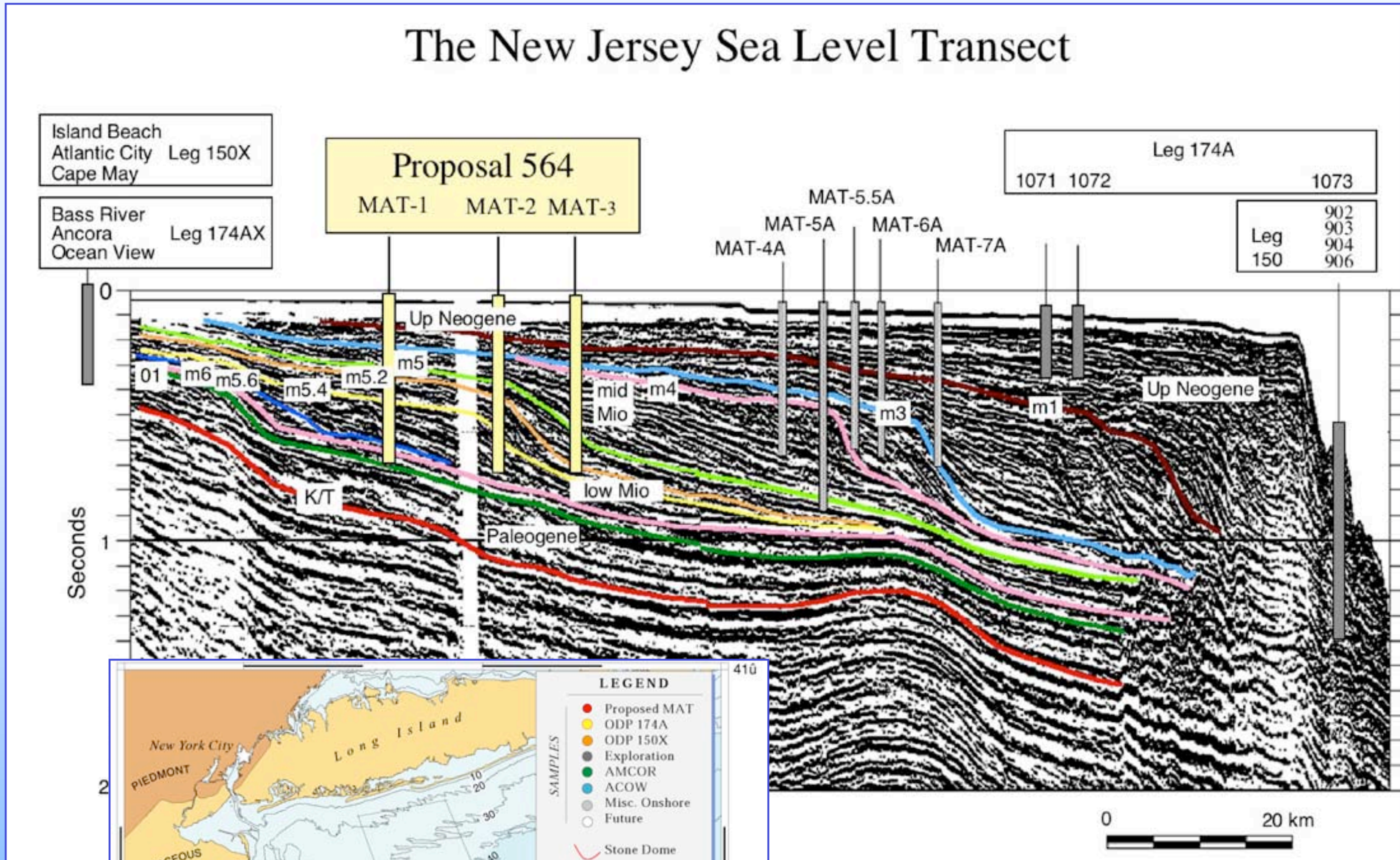
Porosity at different scales (G. Camoin & H.Braaksma)

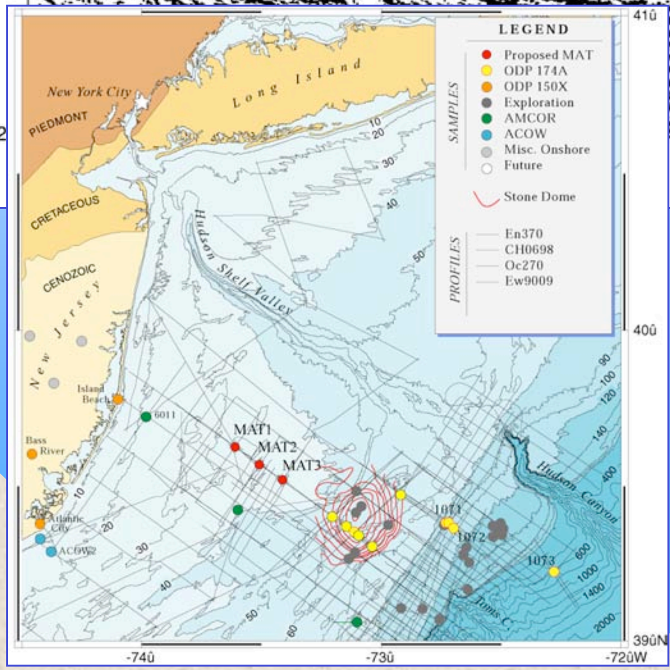
ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

Minimum measurements will be completed during the Onshore Science Party

NB - Now at new BCR





New Jersey Margin

New Jersey Margin

- SPC have ruled that 3 holes are necessary to achieve the scientific goals.
- Safety survey conducted by an independent contractor was presented to EPSP in December. Sites approved subject to reassessment of one site that has been moved
- Tenders sent out to 5 contractors that submitted expressions of interest via OJEU.
- One co-chief appointed (Greg Mountain, USA), who attended planning meeting in December.

New Jersey Margin

- Call for Applications for Science Party is out.
- SOC funding approved, and contract signed; sufficient for 3 holes as budgeted by ESO.
- Uncertainty remains regarding POC funds.
- Planning is continuing.

New Jersey Margin

- Every effort will be made to implement the expedition in FY06, but this may not be possible for one or more reasons, including:
  - Insufficient funds from EMA
  - No funding from ICDP
  - Tender costs too high for our budget
  - Contractual problems or platform availability
  - LWD availability
  - Delays of clearances and permits
  - US Visa delays
- These could result in delay until FY07.

Non-Riser Drilling Vessel
U.S. IODP Platform

Peggy Delaney
University of California
Santa Cruz

January 2006

Scientific Ocean Drilling Vessel

JOI Alliance *SODV* Conversion Project

- Major NSF funding
  - Major Research Equipment and Facilities Construction (MREFC)
- Scientific community participation
  - USAC nominations
  - Expertise balance
    - *Earth, Oceans, and Life*
    - Technical and engineering needs

SODV Funding
NSF MREFC

FY 2005	$14.88M
FY 2006	$57.92M
FY 2007	$42.20M
SODV TOTAL	$115.00M

SODV Budget

Scientific Ocean Drilling Vessel (SODV)

$109 M

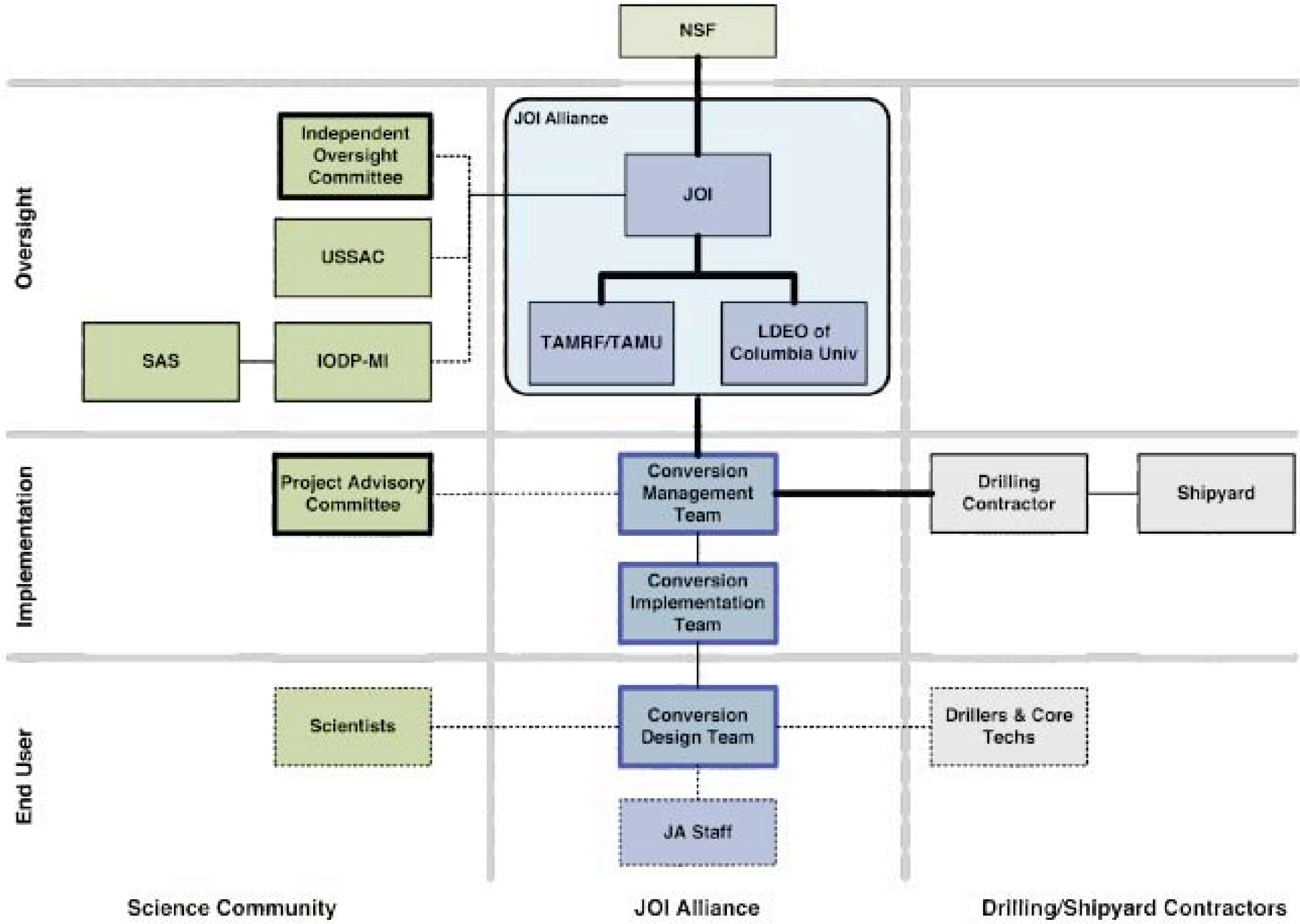
- SODV Management
  WBS 1.1
  $8.4 M
- Science System
  WBS 1.2
  $16.9 M
- SODV Conversion
  WBS 1.3
  $78.5 M
- Health, Safety, & Environment
  WBS 1.4
  $0.2 M
- Shakedown Cruise
  WBS 1.5
  $0 M
- Contingency
  WBS 1.6
  $5.0 M

January 2006

SODV Scientific Participation Three Levels

- Oversight
  - Independent Oversight Committee
- Implementation
  - Project Advisory Committee
- Science end user
  - Conversion Design Teams

IODP – SODV Organizational Chart Overview



January 2006

Oversight and Implementation Committees

PAC

Peggy Delaney

Page Chamberlain

Dave Christie

Juan Garcia

Chris House

Tom Janecek (non-voting)

IOC

Rannie Boyd

Susan Humphris

Ken Miller

Harold Tobin

Stan Christman

January 2006

What Is Happening Now?

- Contract signed December 15
- "Engineering design phase" through April 2006
  - Based on extensive community input of past 5+ years
  - Real-time input
    - USAC, key SAS panels January 2006
    - Scientific oversight/review structure

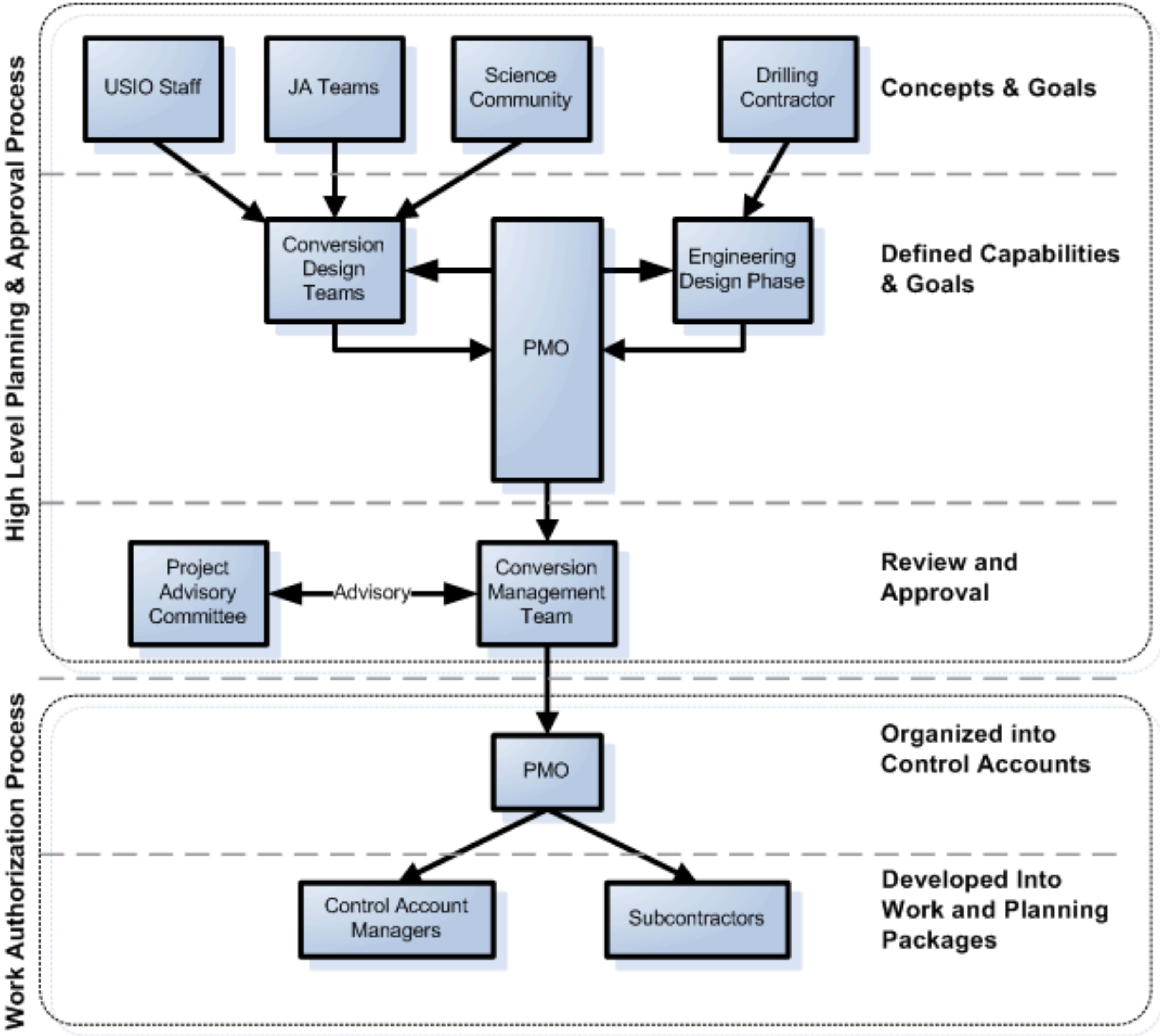
SODV Conversion Schedule

Engineering Design Phase	Dec 05 – Apr 06
Shipyard Solicitation	Apr 06 – May 06
Review Shipyard Proposals	Jun 06 – Jul 06
Prefab Ship Section	Jul 06 – Oct 06
Ship Arrives, Tanks Cleaned	Nov 06 – Nov 06
Ship in Drydock	Nov 06 – Jan 07
Ship Work Alongside	Jan 07 – Jun 07
Dock Trials, Inclining, Completion	Jul 07 – Jul 07
Acceptance Verification Cruise	Jul 07 – Aug 07
Post Delivery Availability	Oct 07 – Oct 07

Engineering Design Phase Goals

- Ensure structural integrity of vessel (hull, DP system, and stability)
- Major <u>increase</u> in scientific lab space and flexibility
- <u>Improved</u> drilling, coring, sampling operations
- <u>Increased</u> shipboard party size
  - (114 to 137)
- Major <u>improvements</u> in habitability
- <u>Modern</u> health, safety, and environmental protection

The Evolution of Concepts Into Approved Work



Oversight and Implementation Committees

PAC	IOC
Peggy Delaney	Rannie Boyd
Page Chamberlain	Susan Humphris
Dave Christie	Ken Miller
Juan Garcia	Harold Tobin
Chris House	Stan Christman
Tom Janecek (non-voting)	

January 2006

PAC Mandate

- Validate process for SODV conversion
- Provide "scientific community voice" during SODV conversion
  - Prioritization, decisions, trade-offs
- Engage and inform scientific community

PAC Outreach

- IODP Town Hall
  - December 2005, San Francisco AGU
- E-mail from PAC Chair
  - SPPOC, SPC, and USAC Chairs, December 2005
- PAC Chair to USAC, EDP, STP
  - January 2006

PAC Outreach—What's Coming Up?

- Chris House to present at ASM meeting
- JOI Town Hall at Ocean Sciences Meeting
  - February 2006
- SPC in March 2006?

PAC Activities

Meeting #1

- Oct. 31-Nov. 1, 2005, Victoria, CA
- Background documents
- Extensive ship tour
- How to carry out mandate
- Mapping of PAC members to CDTs

PAC Activities (continued)

Meeting #2

- January 5-6, 2006, College Station
- Preceding EDP Kick-off Meeting
- Updates from CDTs
- Overview of timeline, budget, change control process
- More documents
- Key issue discussion

Key Issues

- Ship Stretch
- Seafloor visualization
- Drill pipe diameter/logging issues

Future PAC Meetings

- Meeting #3
  - February 16-17, 2006
- Meeting #4
  - April, 2006

Note: IOC role...

What To Expect for U.S. SODV?

- New name for converted vessel
  - December 2006
- Ship operations in late 2007!

To Stay Informed…

http://www.joialliance.org/MREFC/

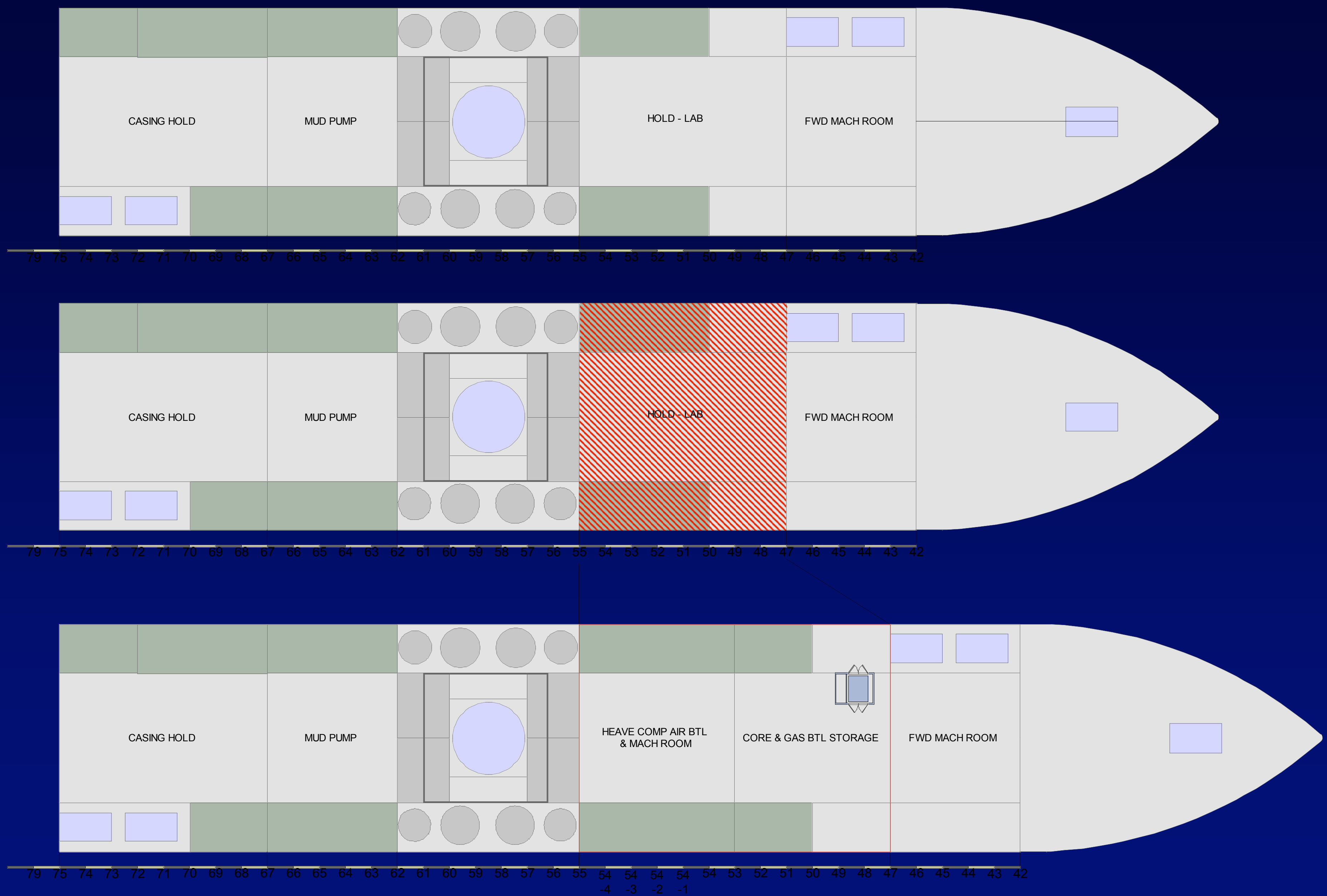
My contact info—

delaney@ucsc.edu

(831) 459 4736

Proposed Stretch

- Remove existing 60 foot hull section containing lab stack and in-hull laboratory components and storage.
- Construct new section <u>including</u> a 30 foot extension.
- Insert the new construction making the vessel 30 feet longer.



January 2006

AREA COMPARISON

JR-STRETCH	JR-AS IS
Bridge/Top – 6,073	4,090
Fo'c'sle – 4,830	1,915
Main – 2,160	1,915
Upper 'Tween -1,920	500
Lower 'Tween – 1,920	1000
Hold -1,920	2,500
TOTAL-18,823	**11,520**

Est: ~60% Increase

Proposed Vessel Extension

- More space w/ improved access and increased flexibility
- Improved efficiency with improved in core flow through lab
- Integration of living quarters, office space, laboratory work areas and free time areas
- Drill floor and core receiving platform on same level
- Loading / Unloading (efficiency/safe zones)
- Flexibility in stability improvements
- Time Savings in conversion shipyard
- Safer storage and handling
- Accommodate laboratory containers

SCIENTIFIC OCEAN DRILLING VESSEL (SODV) UPDATE to STP

January 2006

Issues for STP

- **Design validation**
  - Laboratory "concept" arrangement
  - SODV science deliverables

- **Project Scoping "capabilities"**
  - Microbiology
  - Earth Sciences
  - Visual core description (VCD)
  - Seafloor visualization
  - QA/QC
  - Micropaleontology taxa dictionary
  - Other

SODV UPDATE

1. **SODV Scope of Work**
   - Goals
   - Timelines
   - Organization (project, design and expert teams)
   - Project risks

2. **Science System Development/Acquisition**
   - System requirements
   - Source selection (vessel / logging)
   - Engineering design phase
   - Platform capabilities

3. **Science Projects**

4. **Laboratory Information Management System (LIMS)**

SODV Project Goals

- Provide an affordable riserless research platform that meets the needs of the scientific community for the duration of IODP
- Incorporate community input into the design process
- Delivery of the vessel in the summer of 2007

SODV Conversion Schedule

• Engineering Design Phase	Dec 05 – Apr 06
• Shipyard Solicitation	Apr 06 – May 06
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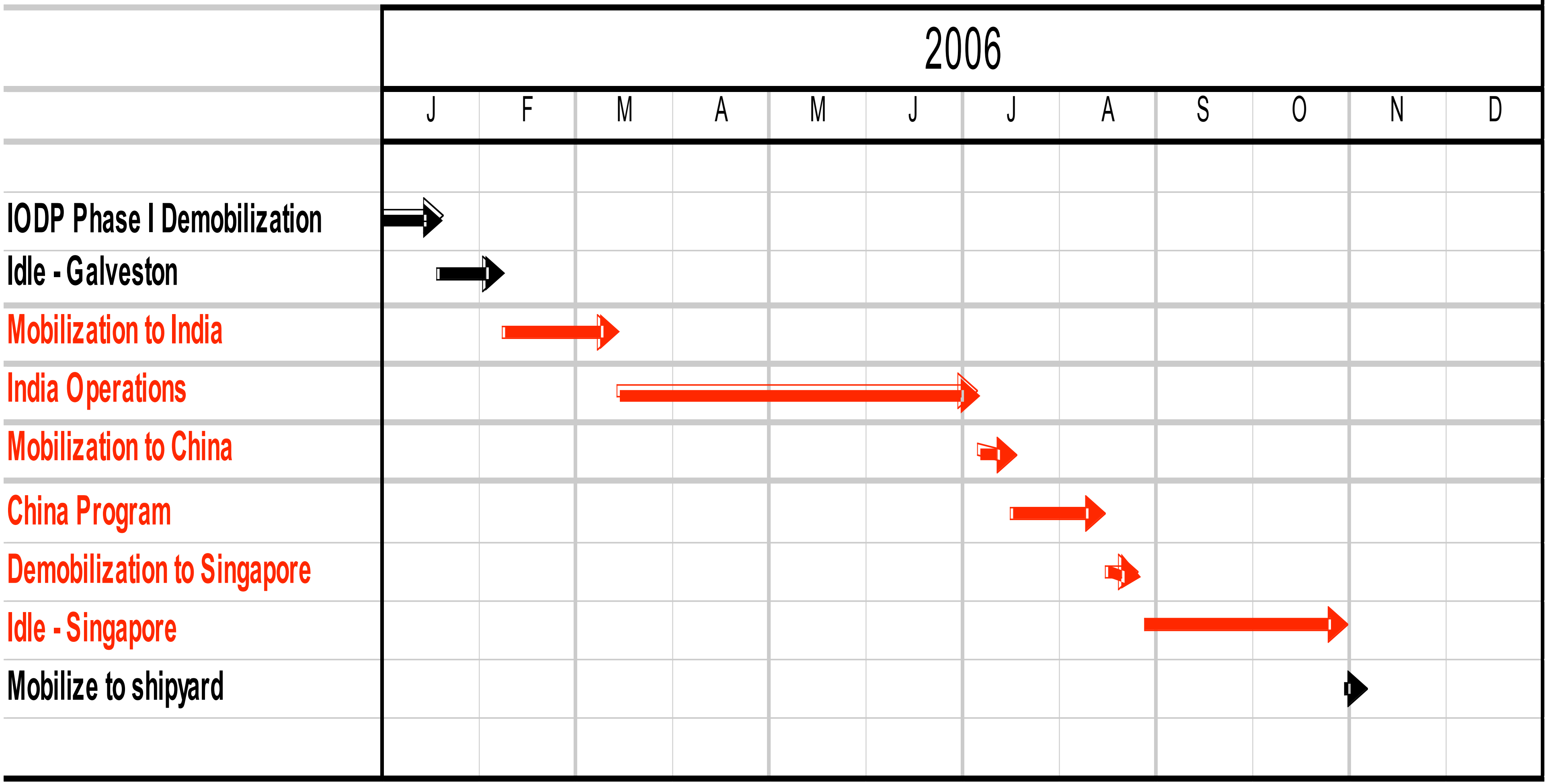
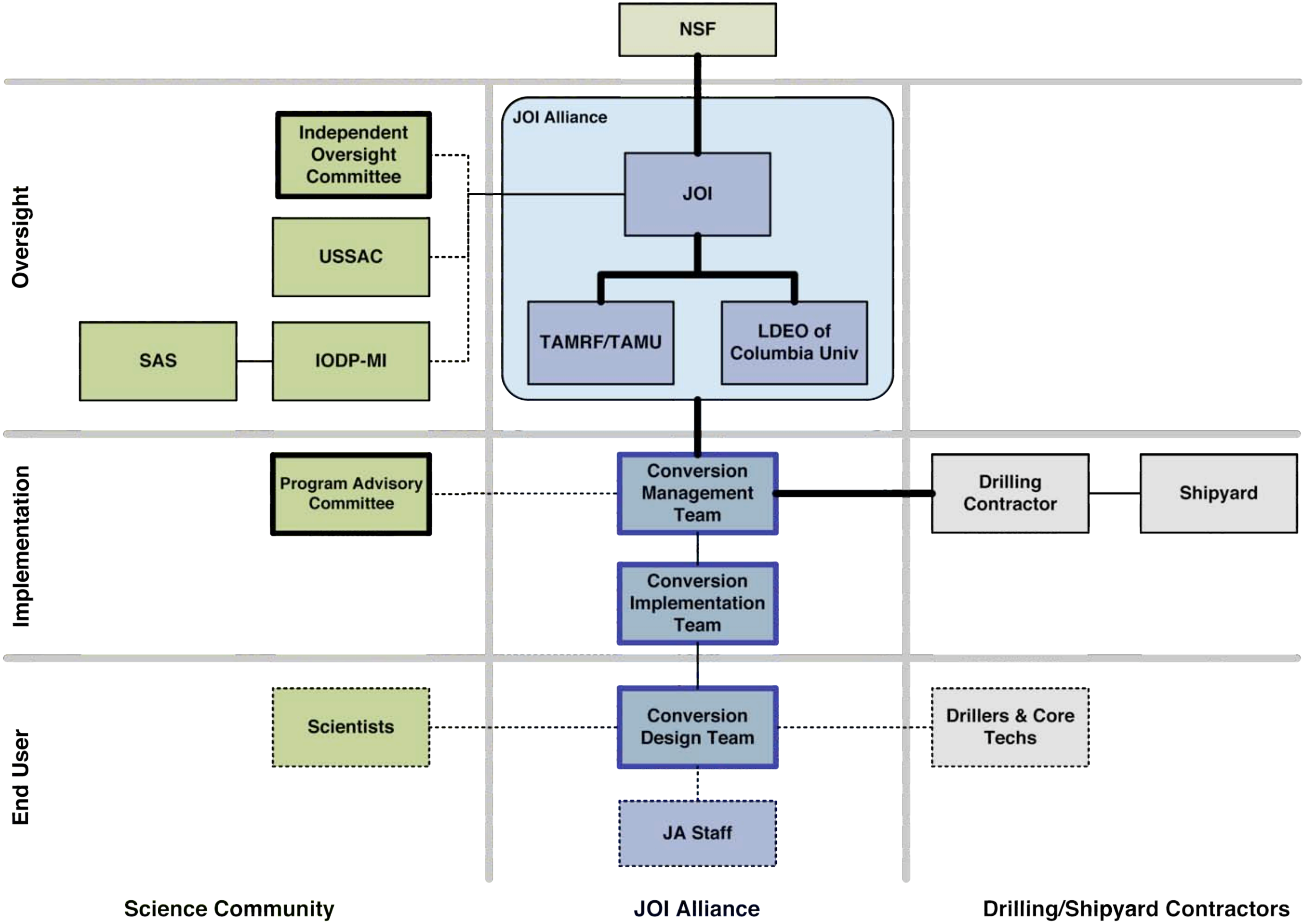
• Ship Arrives, Tanks Cleaned	Nov 06 – Nov 06
• Ship in Drydock	Nov 06 – Jan 07
• Ship Work Alongside	Jan 07 – Jun 07
• Dock Trials, Inclining, Completion	Jul 07 – Jul 07
• Acceptance Verification Cruise	Jul 07 – Aug 07
• Expeditions	Aug 07 – Oct 07

JOIDES Resolution During Hiatus

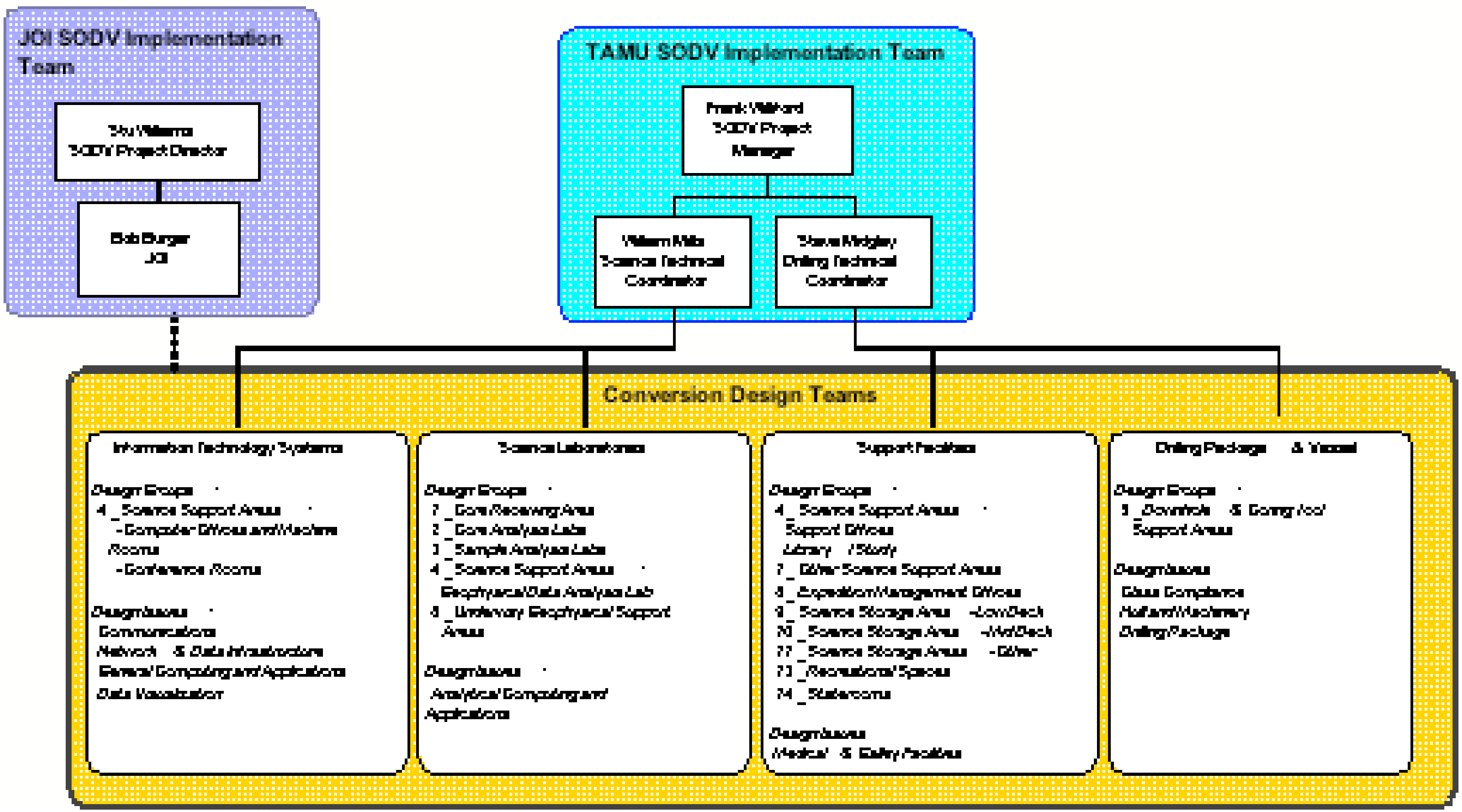
(If Indian and Chinese Gas Hydrate Programs Materialize)



IODP – SODV Organizational Chart Overview



SODV Conversion Design Team



Design Teams

- **Science Chair**: Mitch Malone
- **Science Community members:** Clive Neal, David Smith, Mark Leckie
- **Science USIO members:** Chris Bennight, John Firth, Sean Higgins, Chieh Peng, Tom Davies

- **IT Chair**: David Becker
- **IT Community members**: Peter Knoop, Richard Oliver-Goodwin
- **IT USIO members**: Margaret Hastedt, Cesar Flores, Adam Klaus

- **Vessel Chair**: Derryl Schroeder
- **Vessel Community members**: Frank Chuh
- **Vessel USIO members**: Mike Storms, Jay Miller, Gerry Iturrino

- **Facilities Chair**: Lisa Crowder
- **Facilities USIO members**: Debbie Partain, Tim Bronk, Carlos Zarikian, Leslie Peart

Design Teams

- Briefing Book is basis of design
- Science, Drilling, and Vessel Equipment Lists
  - Designate current equipment as reuse, replacement, upgrade
  - Identify new SODV equipment requirements
- Update SODV design requirements
- Validate SODV preliminary design

SODV Vessel Design Team

Critical Systems – impact vessel design

- Rig Instrumentation
- Iron Roughneck
- Mud Pump System
- Guide Horn
- Drawworks Motors
- Top Drive
- Dual Drum Coring Winch
- Sonar Dome
- Vessel Noise – Marine Life
- Vessel Noise – In Port
- Ship Extension
- Fuel Economy
- Helideck
- Heave Compensator
- Drill Pipe Design/Drill String
- Subsea Camera/Sea Floor Visualization
- Electric Wire Line for Coring

SODV Vessel Design Team

Non critical systems

- Magnetic Overprint – BHA
- Drill Pipe Radio Frequency Identification (RFID)
- CDEX Changes to ODP Coring Tools
- Slick OD Drill Pipe
- Smart Pipe (Telemetry)
- Pressure Compensated Bumper Sub
- Thru-pipe Camera
- Core Orientation & Sonic Core Monitor
- ADCB
- HRRS
- Motorized XCB
- Drill-in Casing

SODV IT Design Teams

Critical systems requiring investigation:

- Secure physical infrastructure for the machine and networking rooms
- Secure, flexible and expandable networks (including wireless)
- Servers, applications, and operating systems
- Database requirements
- Visualization environment
- Digital media management systems

Support Facilities Design Team

- **Space Usage**
  – Library, Offices, Conference/Break Rooms, Lounges, Accommodations, Storage areas, Repair shop, Theater, Recreational deck, Out door dining, Gym, toilet facilities, Mess room, Public phones, TV system/satellite TV
- **Design Issues**
  – location, arrangements, space requirements and use, support requirements (break rooms), sound abatement, storage requirements, etc.
- **Services**
  – lighting, outlets, A/C, exhausts, drinking fountains, safety, etc.
- **Equipment**
  – desks, computers stations, carpet, coffee machines, gas bottles, reading lamps, towel racks, mirrors

Science Design Team

- Reviewed CDC, and community response to Briefing Book
- Reviewed STP IODP measurement categories and current capabilities
- Prioritized >100 proposed SODV projects / correlated to STP categories and current capabilities.
- Projects released to CMT
- Identified issues requiring additional input (i.e.VCD, Microbiology, and Visualization)

Science

- **SODV project prioritization**
  - T = Top (deliver by sea trials)
  - H = High (important for delivery by sea trials, if resources are available)
  - L = Low (infrastructure by sea trials for future addition
- **Actions**
  - Release to SODV management team
  - Hold for additional study
  - Remove from list

PROJECT	PRIORITY	OCTOBER	NOVEMBER	DECEMBER	*Two-Tier Prioritization
Science Applications (excludes instrument control and uploaders)					
General					
Janus Database Update / Lab Information Management System	T	HELD	RELEASED		1
Migrate or Replace Corelog Application	T	HELD	RELEASED		1
Sampling Applications	T	HELD	RELEASED		1
Drilling Operations					
Migrate Operations Application	T	HELD	RELEASED		1
Drilling Data Database	T	HELD	RELEASED		1
Visual Core Description					
Visual Core Description Summary Application	T	HELD	VIS-WORK	RELEASED	1
Core Image Viewer	T	HELD	VIS-WORK	RELEASED	1
Core Description Data Visualization	T	HELD	VIS-WORK	RELEASED	1
Smear Slide & Polish TS: Ref Collections	T	HELD	RELEASED		2
Visual Core Description Station & Data Entry Application	T	HELD	VIS-WORK	RELEASED	1
Paleontology					
Biostratigraphy / Paleontology Application	T	HELD	EXPERT	RELEASED	1
Access To Digital Archives (Images and Ref from global databases)	T	HELD	RELEASED		1
Stratigraphy Core-Log Integration					
Age-depth Modeling	T	RELEASED			1
Stratigraphic Correlation Application Enhancement	T				Outside SODV
Syn Seismogram	T	RELEASED			2
Core Logging					
MST-Core Receiving (Whole Round-Unsectioned)					

SODV Expert Teams/Leaders

- Chemistry & Microbiology
  – Christopher Bennight
- Core Description
  – John Firth (interim)
- Curation & Core Handling
  – John Firth
- Downhole & Coring
  – Kevin Grigar
- Information Technology
  – Paula Clark
- Petrophysics & Imaging
  – John Beck (*pro tem*)
- Stratigraphy
  – Carlos Alvarez-Zarikian
- Underway Science
  – Adam Klaus (*pro tem*)

SODV Project Risks

- Availability SODV MREFC funds in FY06/FY07
- Availability of conversion funds at commencement of yard work
- Availability of shipyards
- Availability of long lead items
- Cost increases due to market forces
- Length of Engineering Design Phase (4 mo)
- Length of Shipyard conversion period
- Reduction of scope due to schedule

Systems Requirements

- CDC report (Baseline)
- Platform Team / Discussion (USIO)
- ODP Statistics
- Market Surveys
  - Engineering equipment
- Market assessment
  - Identification of potential vessel
- Briefing Book (Community Response)
- Development of RFP
- Basis of Design Document

Mandatory Platform Requirements

- Dynamically positioned drillship
- Unrestricted riserless drilling in any of the worlds oceans and seas
- Certified in accordance with Finnish-Swedish Baltic general ice class of 1B or equivalent
- Minimum transit speed of 10 kts.
- Capable of continuous wireline coring
- Accommodation of an Silkorsky S61-N helicopter or equivalent
- Navigation of the Panama Canal
- Passage under the Bridge of Americas

Platform Source Selection

15 Oct 04	**RFP issued**
10 Dec.	Pre-award conference
22 Dec.	RFP amended
3 Feb. 05	Initial offer received
10 Feb	Commenced proposal
1 April 05	Initial proposal due date amended
25 May 05	Letter to Drilling Contractor requesting additional information
21 June	D.C. response
11 July	Initiate discussions w/ D.C.
19 Aug	Concluded initial discussions w/ D.C.
6 Sept	NSF & TAMRF briefing
10 Sept	Commence final contract
15 Oct	Letter of intent signed with ODL
15 Dec	**Contract signed with ODL**
6 Jan 06	**Initial Engineering Design Meeting**

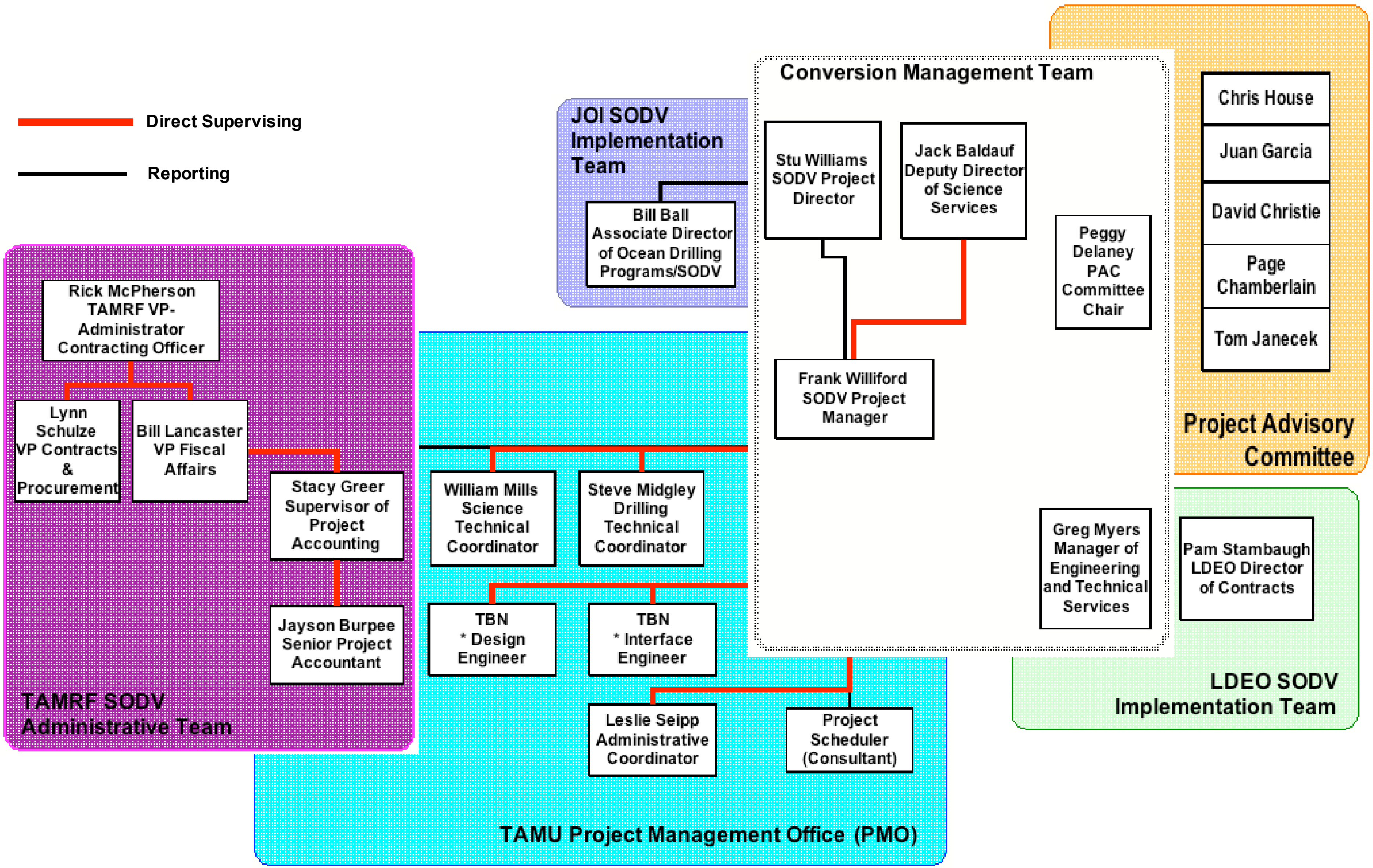
Logging Contractor Selection Schedule

30 Aug 2005	NSF Approval of RFP
2 Sept	RFP Issued
15 Oct	Responses received
15 Nov	Selection process initiated
11 Dec	Technical Committee
12 Dec	Business Committee
14 Dec	Advisory Council
22 Dec	Questions to bidder
10 Jan 06	JOI/NSF briefing
~11 Jan	Notification to Selectee
~31 Jan	Negotiations complete
~15 Feb	**Award of contract**

Engineering Design Phase

Goals

- Ensured structural integrity of vessel (hull, DP system, and stability)
- Major increase in scientific lab space and flexibility
- Improved drilling, coring, sampling operations
- Increased shipboard party size
- Major improvements in habitability
- Modern health, safety, and environmental protection



Direct Supervising
Reporting
JOI SODV Implementation Team
Bill Ball Associate Director of Ocean Drilling Programs/SODV
Conversion Management Team
Stu Williams SODV Project Director
Jack Baldauf Deputy Director of Science Services
Peggy Delaney PAC Committee Chair
Frank Williford SODV Project Manager
Greg Myers Manager of Engineering and Technical Services
Chris House
Juan Garcia
David Christie
Page Chamberlain
Tom Janecek
Project Advisory Committee
Pam Stambaugh LDEO Director of Contracts
LDEO SODV Implementation Team
Rick McPherson TAMRF VP-Administrator Contracting Officer
Lynn Schulze VP Contracts & Procurement
Bill Lancaster VP Fiscal Affairs
Stacy Greer Supervisor of Project Accounting
Jayson Burpee Senior Project Accountant
TAMRF SODV Administrative Team
William Mills Science Technical Coordinator
Steve Midgley Drilling Technical Coordinator
TBN * Design Engineer
TBN * Interface Engineer
Leslie Seipp Administrative Coordinator
Project Scheduler (Consultant)
TAMU Project Management Office (PMO)

Engineering Design Phase

- **Commenced effort (15 December 05)**
- SODV and ODL approval of draft space arrangements & preliminary design drawings
- Draft space arrangements to CMT, PAC, Design Teams
- Revisions of arrangement (February 06)
- Finalization of arrangement drawing set
- ABS review and approvals to drawings and studies
- Finalization of contract specifications for RFP
- Finalization of shipyard work list
- Review of RFP package
- **Submit RFP to Shipyards (Spring 06)**

SODV Capability (Draft)

Vessel/Drilling

- 30 ft vessel extension
- Improved vessel stability
- Capability for larger diameter pipe
- Upgrade high pressure mud system to 5,000 psi working pressure
- >50% increase in Lab stack space
- New vessel name
- Enhanced RIG instrumentation
- New subsea visualization capability
- VSAT system with possible domes fwd and aft
- Improved handling equipment beneath moonpool
- Improved drilling component handling efficiency
- Improved loading/offload logistics

SODV Capability (Draft)

Accommodations

- Increased accommodations (from 114 to ~137)
- 1 and 2 person staterooms
- No more than 4 people share a toilet/shower
- New galley, mess deck and food storage with easier access for stores loading
- New HVAC system, quieter with individual thermostatic control of each room
- Separate movie theater, library, card room
- Gym
- Noise Abatement in Quarters and Workspaces
- Upgrade to Communications Package with access to online reference documents
- Video conferencing capability between shore and vessel
- Increased office and meeting space adjacent to science areas

SODV Capability (Draft)

Science

– Design considerations will focus on an open floor plan with sample preparation activities (noise, dust, and heat) isolated in shared support rooms centrally located

– Core handling and receiving on same level

– Environmentally controlled splitting room to support both microbiological and hydrate studies

– Automation of redundant manual tasks of processing cores and discreet samples

– Closer integration of the downhole laboratory and core tech shop to support instrumented core barrels and drilling subs

– Increased office and meeting space adjacent to science areas

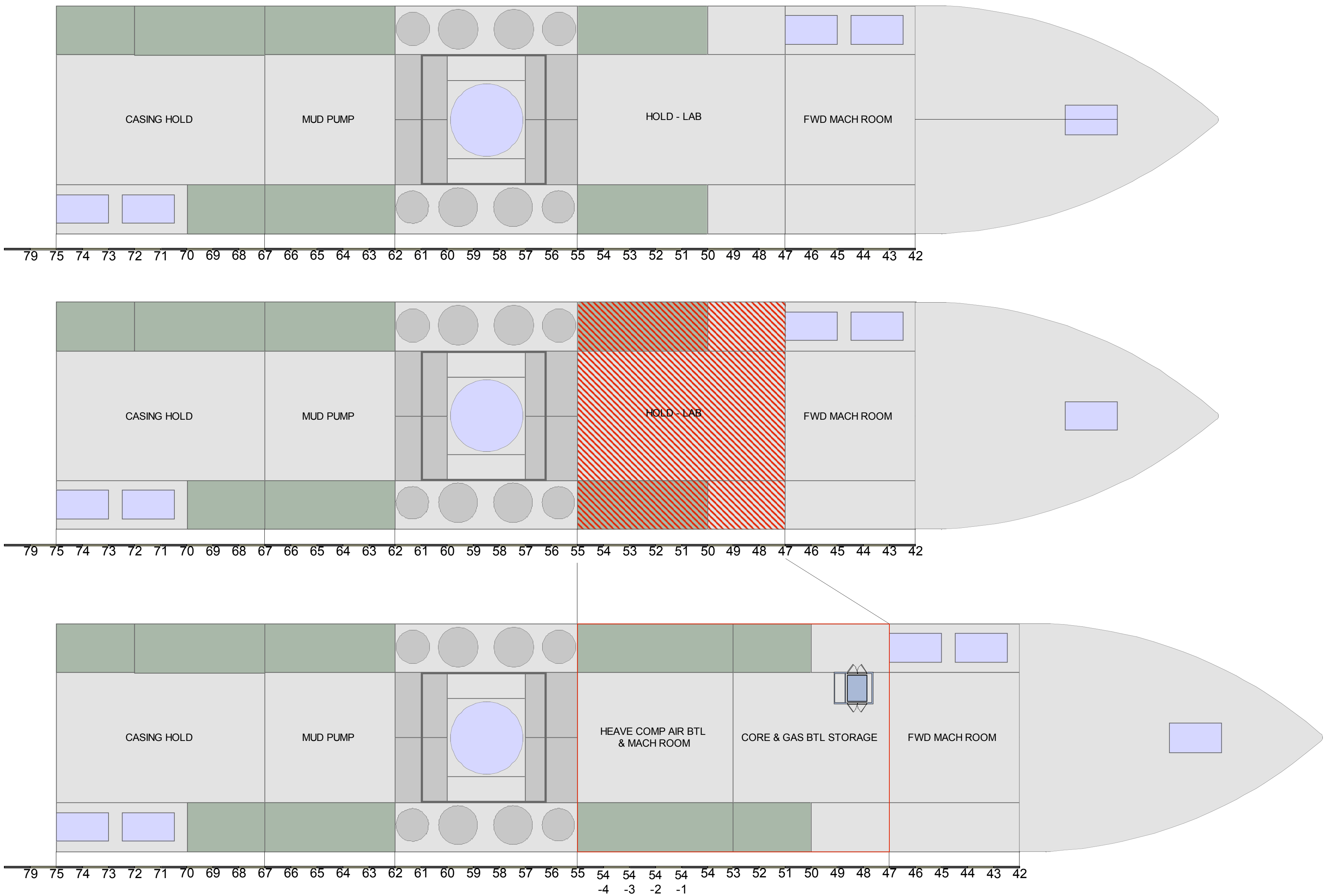
Science Capabilities (Draft)

Science

- Imagining and visualization capabilities
- Dedicated Stratigraphic Correlator’s lab in core lab
- New science computer system and network
- Each lab redesigned and scientific equipment updated or replaced with latest technology
- Core wrap system
- Improved resolution and throughput on analytical track systems
- Space for mission specific container labs

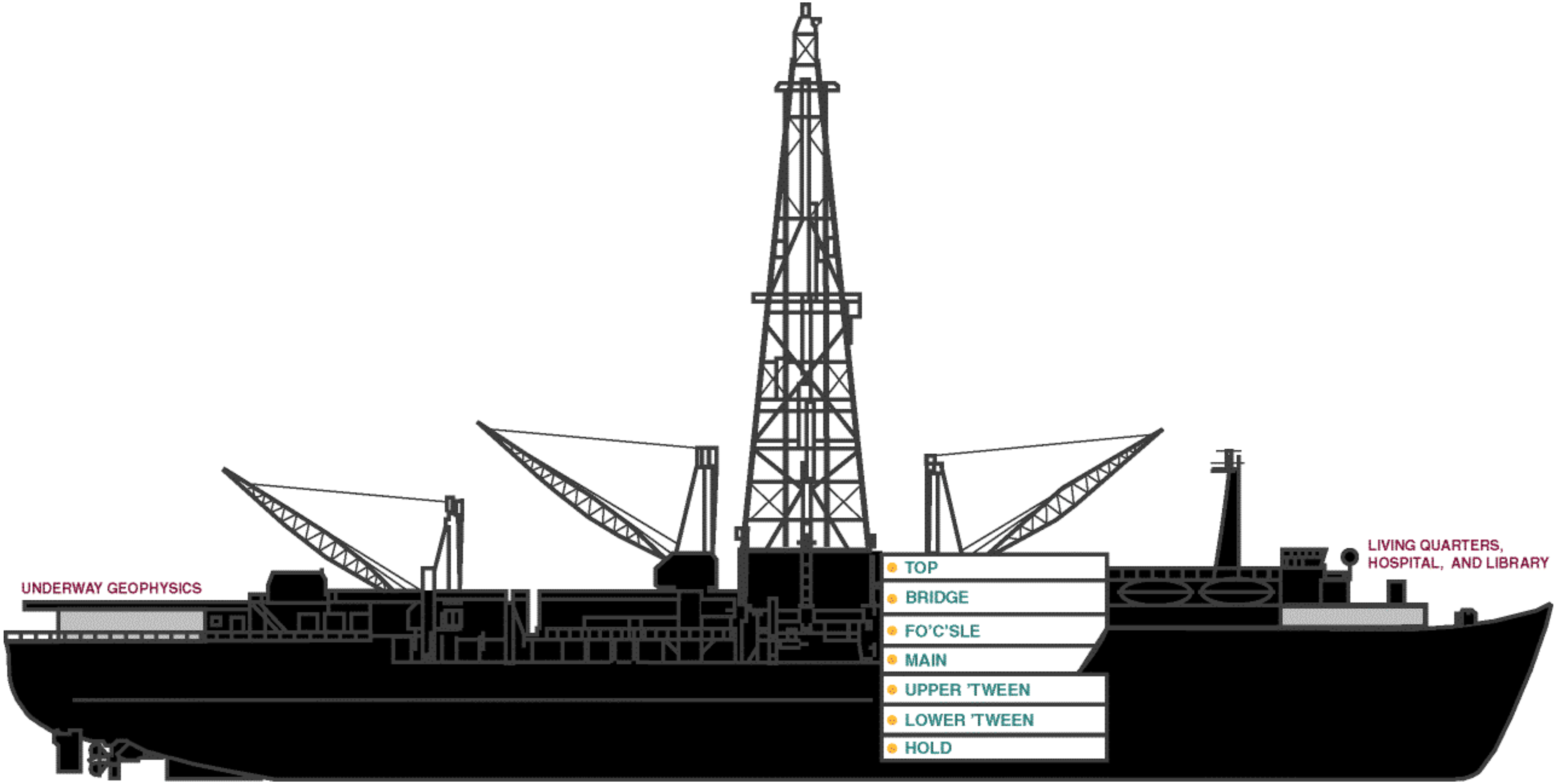
Proposed Vessel Extension

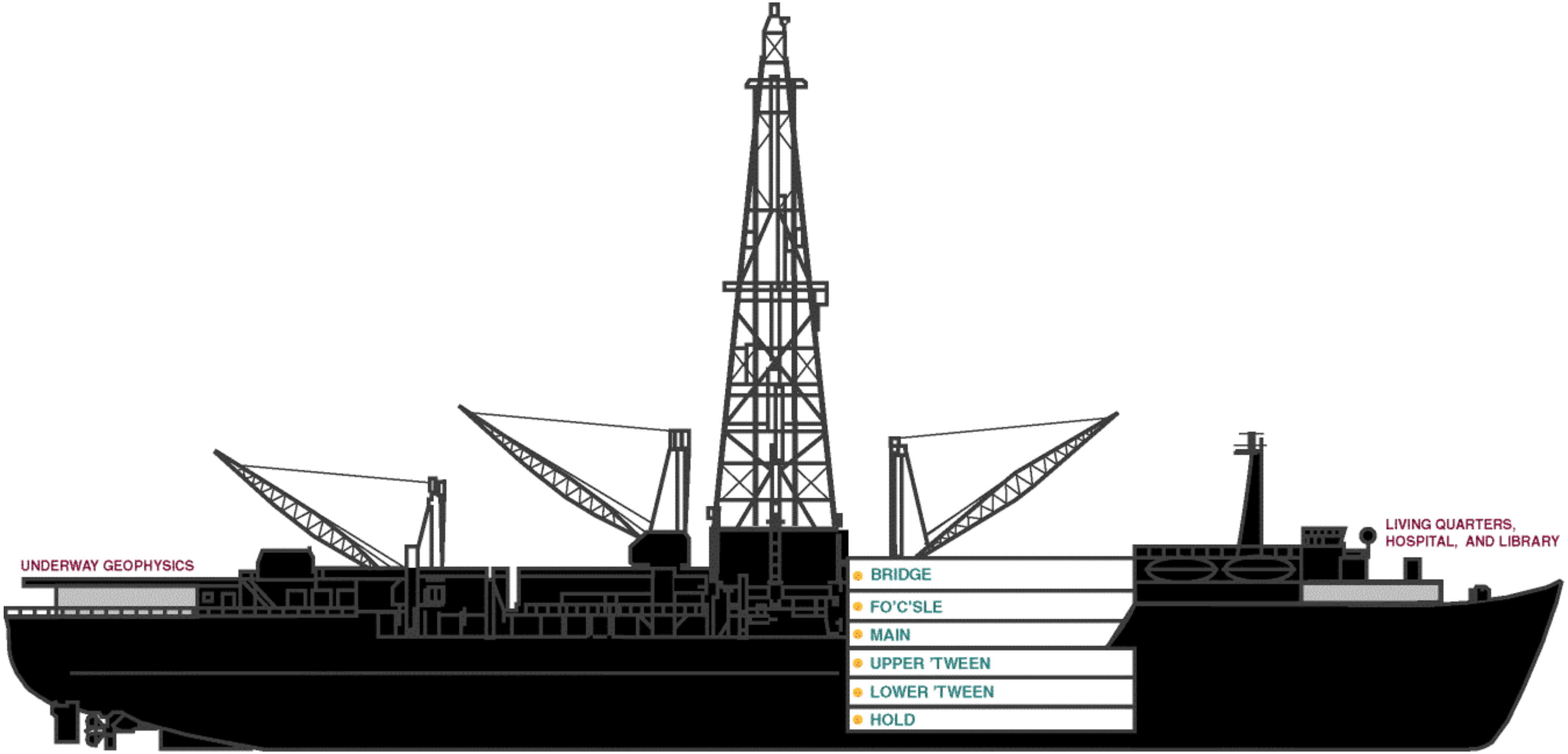
– More space w/ improved access and increased flexibility
– Improved efficiency with improved in core flow through lab
– Integration of living quarters, office space, laboratory work areas and free time areas
– Drill floor and core receiving platform on same level
– Loading / Unloading (efficiency/safe zones)
– Flexibility in stability improvements
– Time Savings in conversion shipyard
– Safer storage and handling
– Accommodate laboratory containers



CASING HOLD
MUD PUMP
HOLD - LAB
FWD MACH ROOM
79 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42
CASING HOLD
MUD PUMP
HOLD - LAB
FWD MACH ROOM
79 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 47 46 45 44 43 42
CASING HOLD
MUD PUMP
HEAVE COMP AIR BTL
& MACH ROOM
CORE & GAS BTL STORAGE
FWD MACH ROOM
79 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54-4 54-3 54-2 54-1 54 53 52 51 50 49 48 47 46 45 44 43 42

JR current configuration




UNDERWAY GEOPHYSICS
BRIDGE
FO'C'SLE
MAIN
UPPER 'TWEEN
LOWER 'TWEEN
HOLD
LIVING QUARTERS,
HOSPITAL, AND LIBRARY

Vessel Drawing

Issues for STP

- **Design validation**
  - Laboratory arrangement “Concept”
  - SODV science deliverables

- **Project Scoping “capabilities”**
  - Microbiology
  - Earth Sciences
  - Visual core description (VCD)
  - Seafloor visualization
  - QA/QC
  - Micropaleontology taxa dictionary
  - Other

Draft Prospectus for the Delivery of Analytical Systems on the SODV

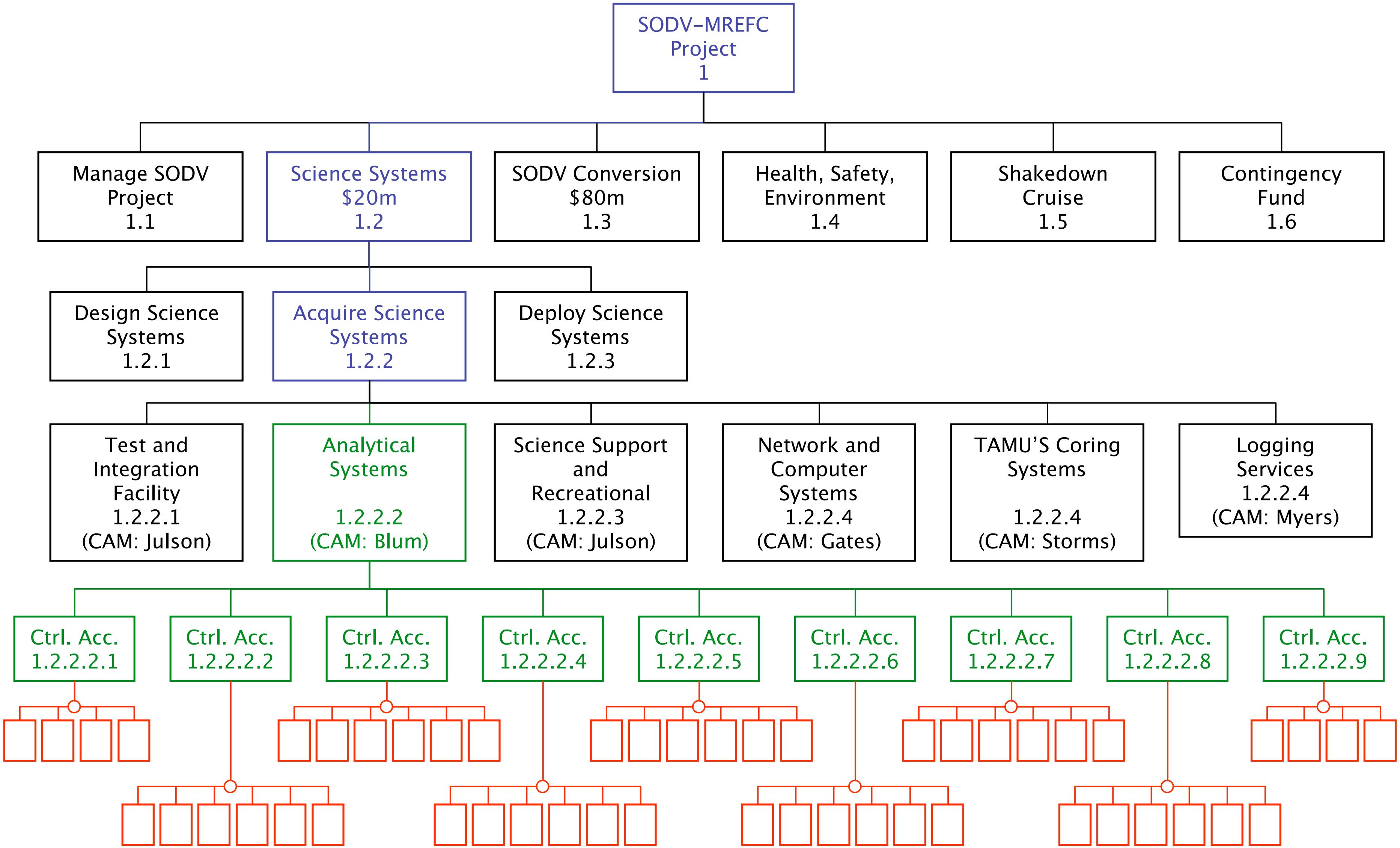
Analytical Services

18 January 2005

Outline

- Overview of work in planning stage
- Continued engagement of community stakeholders throughout systems implementation

SODV Work Breakdown Structure



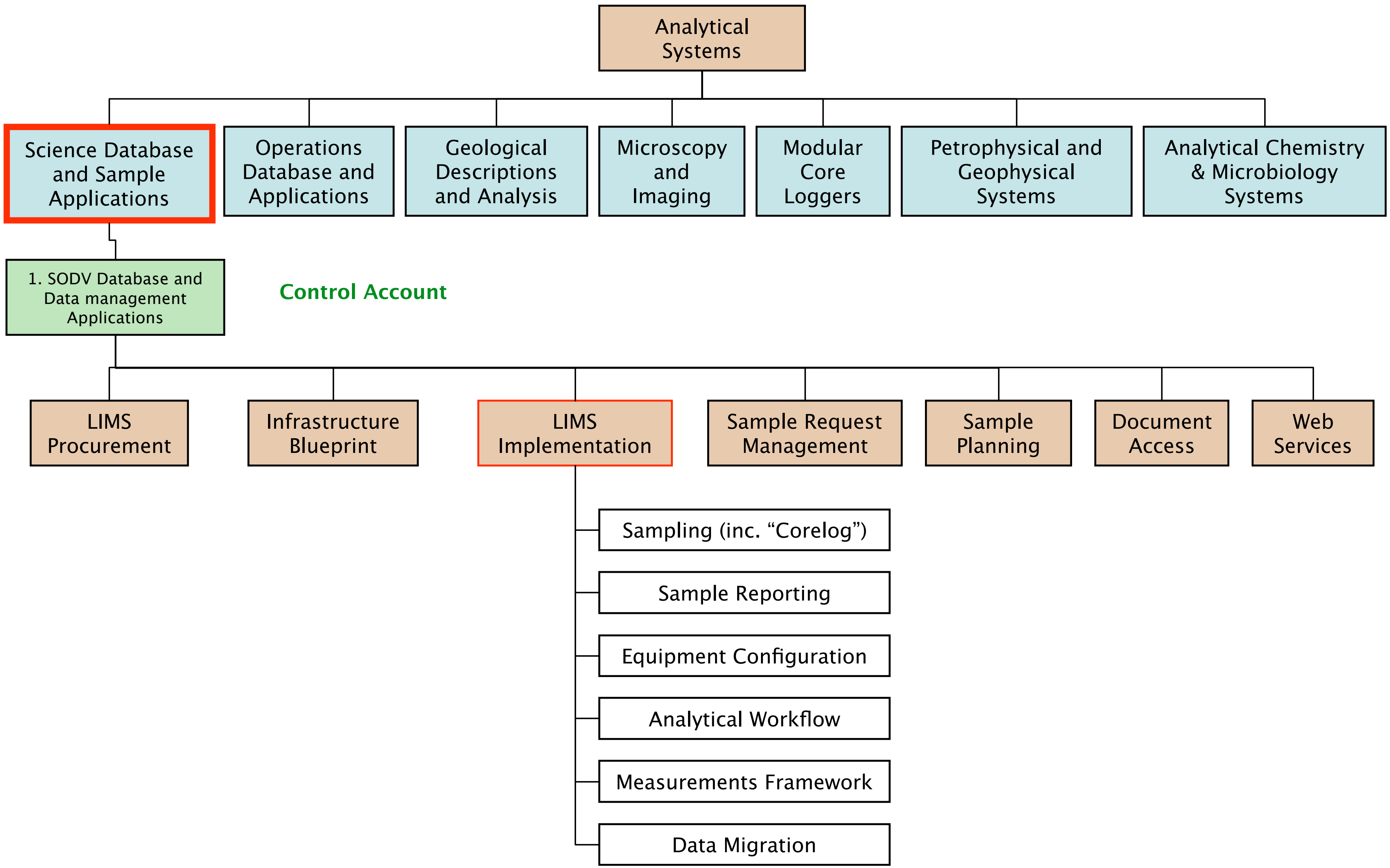
Schedule Constraints

- Control Account Managers (CAM) received planning authorization in January.
  - 9 Control accounts with ~50 work packages for analytical services
- Control Account Plans (CAP) that will serve as baselines for performance measurements are due to the project office by February 15.
- All systems to be delivered for shipping in April/May 2007

Systems Project Groups

- Analytical systems projects are presented within the following groups:
  1. Science Database and Sample Applications
  2. Operations Database and Applications
  3. Geological Descriptions and Analysis
  4. Microscopy and Imaging
  5. Modular Core Loggers
  6. Petrophysical and Geophysical Systems
  7. Analytical Chemistry and Microbiology
- This grouping is based on:
  - type of user/operator expertise requirements
  - hardware, software, or design commonalities
  - shared infrastructure
- Some deliverables are still being discussed and/or prioritized by the Science Conversion Design Team, Project Advisory Committee, or the Project Management Office.

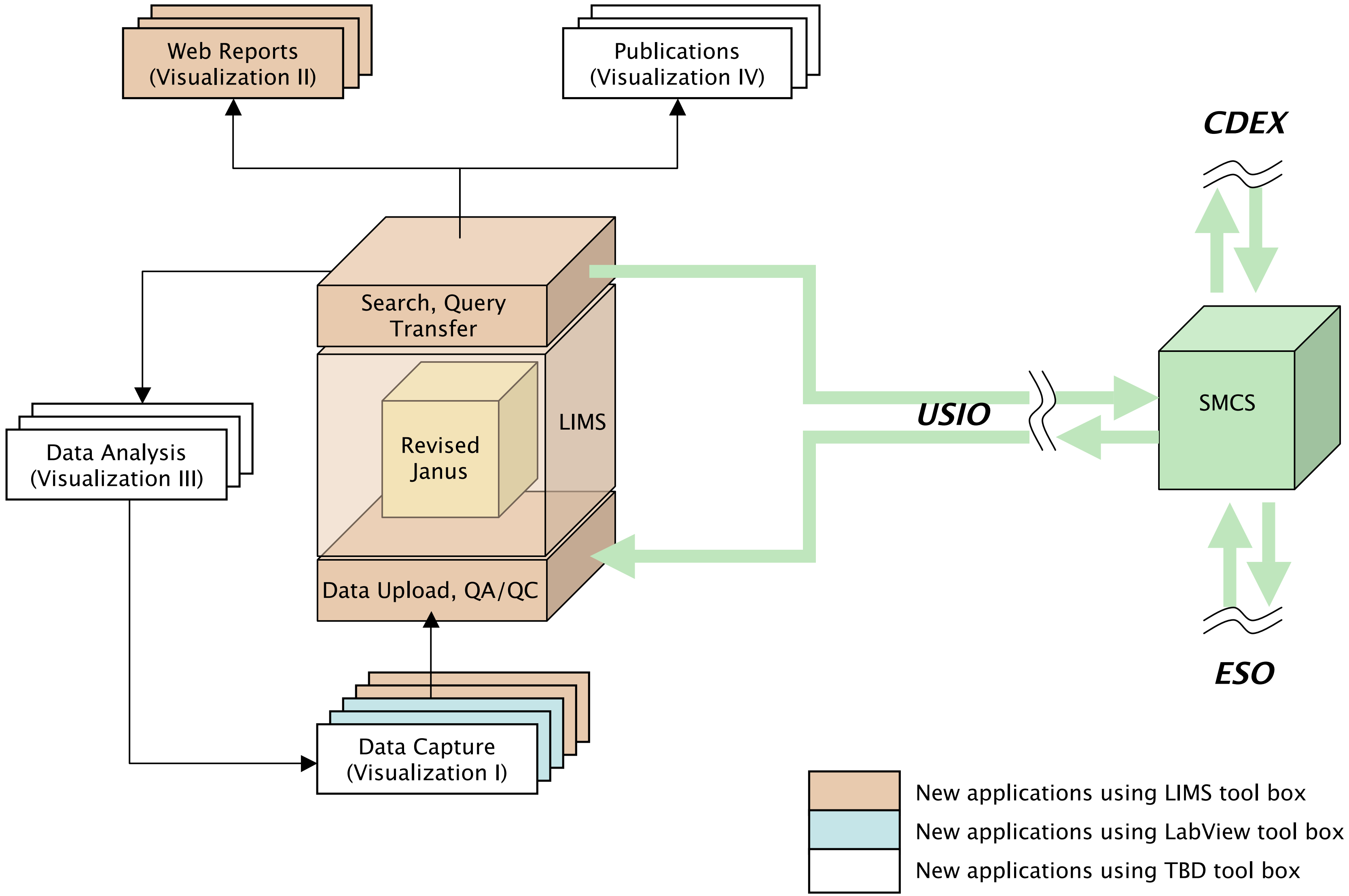
1. Science Database & Sample Applications



Science Database & Sample Applications…

- Group characteristics
  - Address data management issues
  - Construct and support more generic and extensible data model
  - Implement a new QA/QC infrastructure to support science requirements
  - Implement tools for more versatile and user-friendly data access
  - Provide all sample data and sampling functionalities
  - Includes an improved scheme for depth calculation

Science Database & Sample Applications...



Science Database & Sample Applications…

- LIMS Procurement
  - Select and acquire a LIMS tool box that can be leveraged to the greatest extend possible in building a sample-based data model, data entry and data upload applications, and data retrieval.
  - Completion of this work package is critical to the other components in this group
  - Requirements include:
    - Sample tracking/chain of custody
    - Laboratory test processing
    - Instrument interface and data capture
    - QA/QC management
    - Maintenance and calibration tracking
    - Data reduction
    - General laboratory reporting
    - Data export and import
    - Laboratory inventory control
    - Audit trail
    - Cost accounting
    - Training and validation management
  - RFQ issued in mid January to 7 potential bidders
  - Procurement scheduled for early March

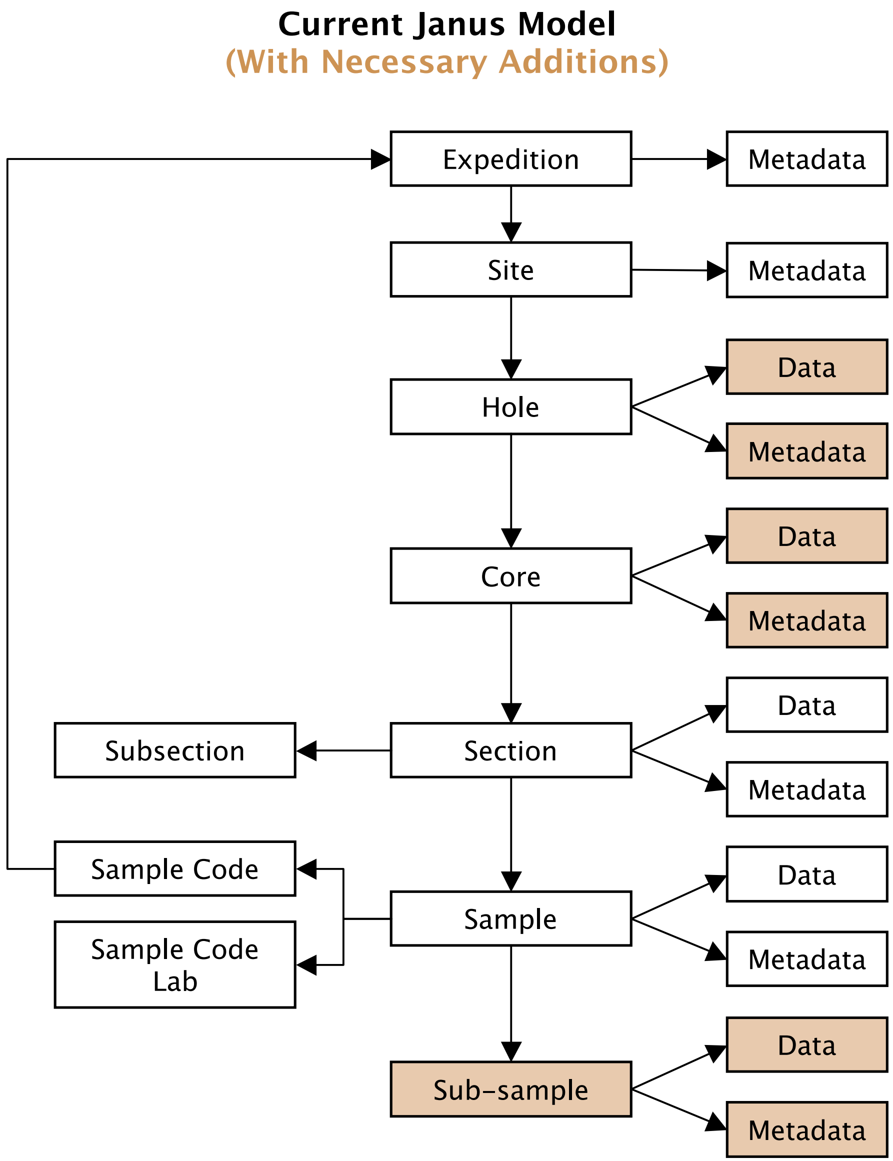
Science Database & Sample Applications...

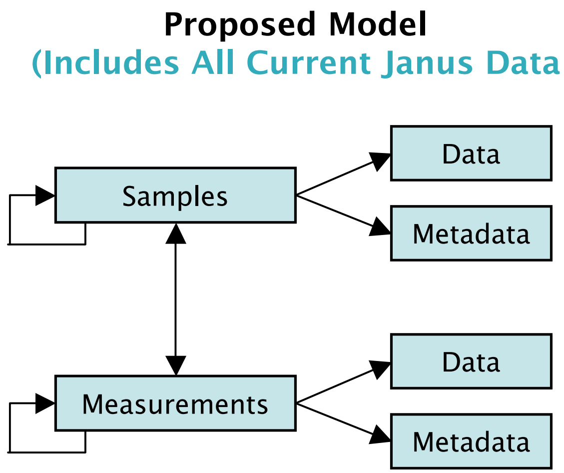
- Infrastructure Blueprint
  - Implement a more generic sample-based data model
    - Comply with fundamental structure of any LIMS
    - Allows for straightforward implementation of International Geoscience Sample Number (IGSN) and/or other standard sample IDs
    - Implement “sample type” to generalize and make extensible the concept of “sample”
    - Give each physical sub-sample a unique identity and a user-defined name
      - (e.g., three section identities for whole-round, archive-half, working-half sections)
    - Ensure successful data searches in cases where holes are revisited during multiple expeditions
    - Each sample type has a rigorously defined set of dimensional and other metadata
    - Implement a geographic coordinate system to locate reference points in subsamples relative to reference points in parent samples

Science Database & Sample Applications…

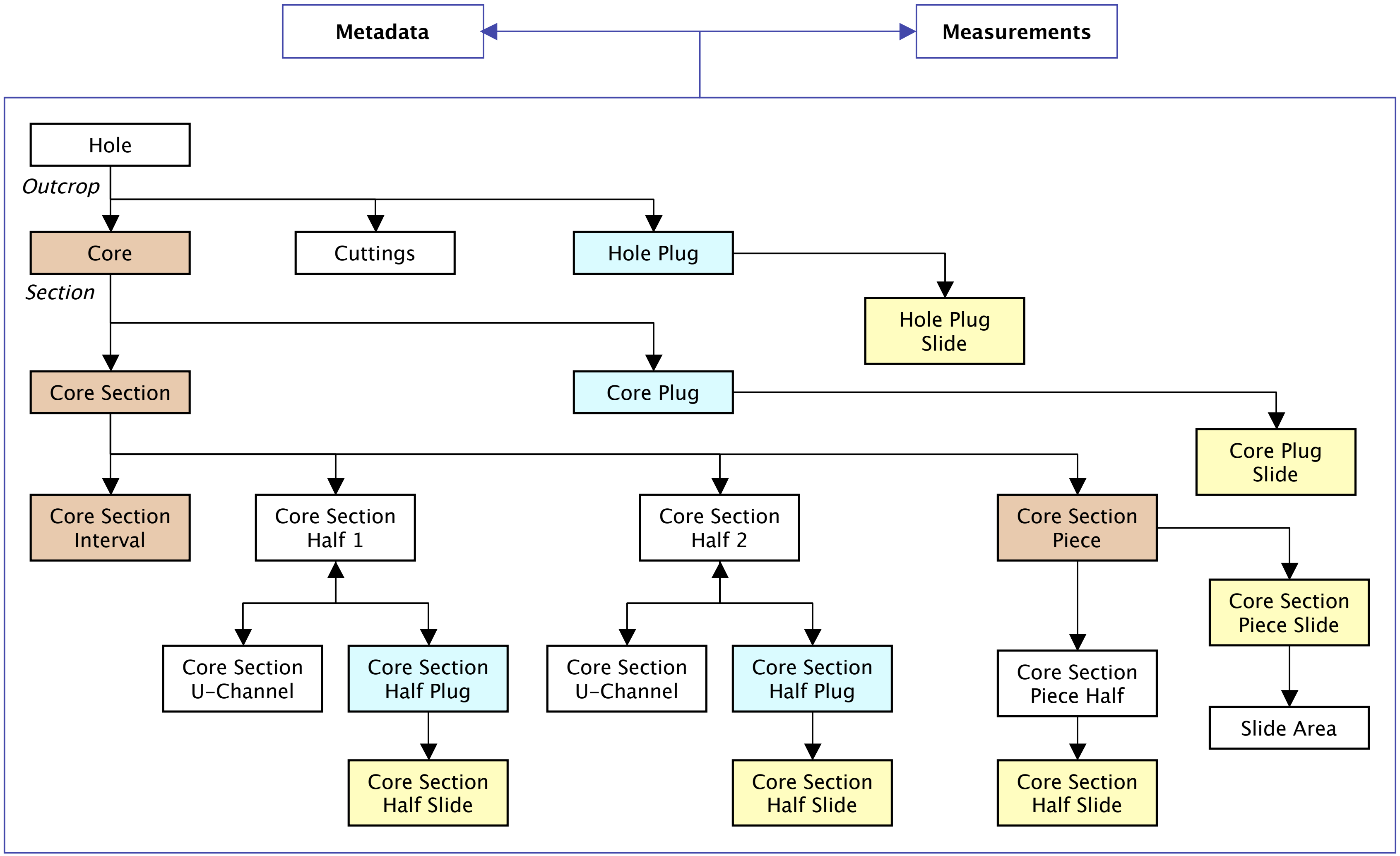
- Implement sample depth
  - Each sample has reference depth that is part of the sample identity and does not need to be calculated on the fly with our applications
  - Track the sample interval relative to a growing core, whole-round core section, and split core sections as they are measured at successive station
    - Ensures that all material and measurements are always registered and reported
    - Allows for depth normalization that prevents artificial "stratigraphic inversions"
- Measurement data framework
  - Allow "measurements on measurements"
    - Descriptions made from images rather than the physical sample
    - Data reductions and interpretations made based on data and stored as such in the database
  - Sample - measurement relationship is many-to-many to accommodate unusual workflows established by scientists, such as performing a measurement on a collection/mixture of samples
- RFQ for external review of the data model is in preparation; review to occur in February

Science Database & Sample Applications...





Science Database & Sample Applications...



Science Database & Sample Applications...

- LIMS Implementation
  - Sampling applications
    - Includes replacement of current Corelog & Sampling data capture applications
    - Includes capture of sub-sampling data at measurement stations such as MAD plugs, core catcher size fractionation, thin section generation, etc.
  - Sample reporting
    - Flexible sample queries, also web based
    - Data reporting tools that can also be used for analytical data and include basic analytical functions and graphics
  - Equipment configuration and maintenance
    - Provide configuration records for each analytical system that can be queried with any data set
    - Instrument maintenance, preventative, troubleshooting
  - Analytical workflow
    - Generic expedition workflow that can be configured for specific expedition requirements
  - Measurements Framework
    - Build the framework that will allow addition of measurement-specific data tables as needed
    - Collection and reporting of calibration, calibration verification, and other QC information for all analytical systems
  - Data Migration from Janus tables

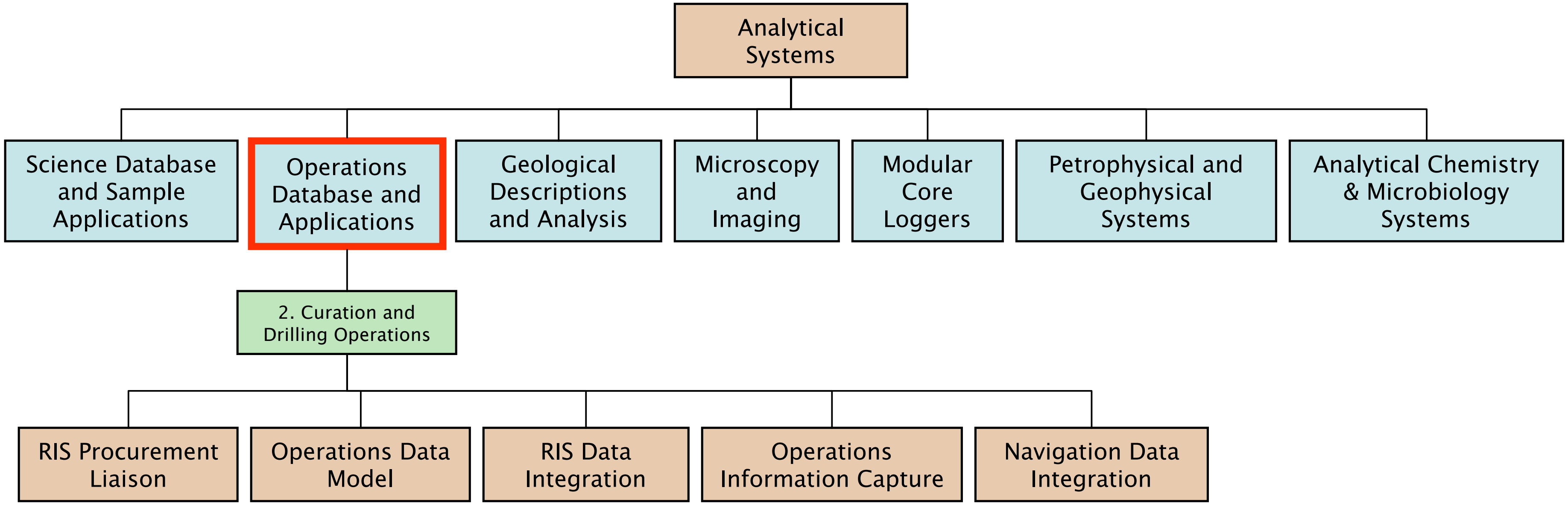
Science Database & Sample Applications…

- Sample request management
  - This is the USIO, platform-specific sample request tool (as opposed to central IODP system)
  - This may or may not be similar to the IODP central sample request capability, depending how that project will proceed
  - Allows shipboard curators to receive, log, and process relevant sample requests submitted to ship or shore
- Sample planning
  - This new capability will allow expedition managers and curators compile sampling plans and request and generate detailed sampling lists using material inventory information from the database
  - Particularly useful for managing sampling parties where tens of thousands of sample are taken within a few days
  - Given that this is a new initiative it may be of lower priority and be completed during FY08.

Science Database & Sample Applications…

- Document access
  - Could be implemented using LIMS tools (or not)
  - At a minimum, provide easy access to relevant systems documentation, SOPs, “cookbooks”, etc., from any workstation
- Web services
  - A “data extractor” will allow fast and secure data access over the internet without direct access to the database
  - Will ultimately be established for all data

2. Operations Database and Applications



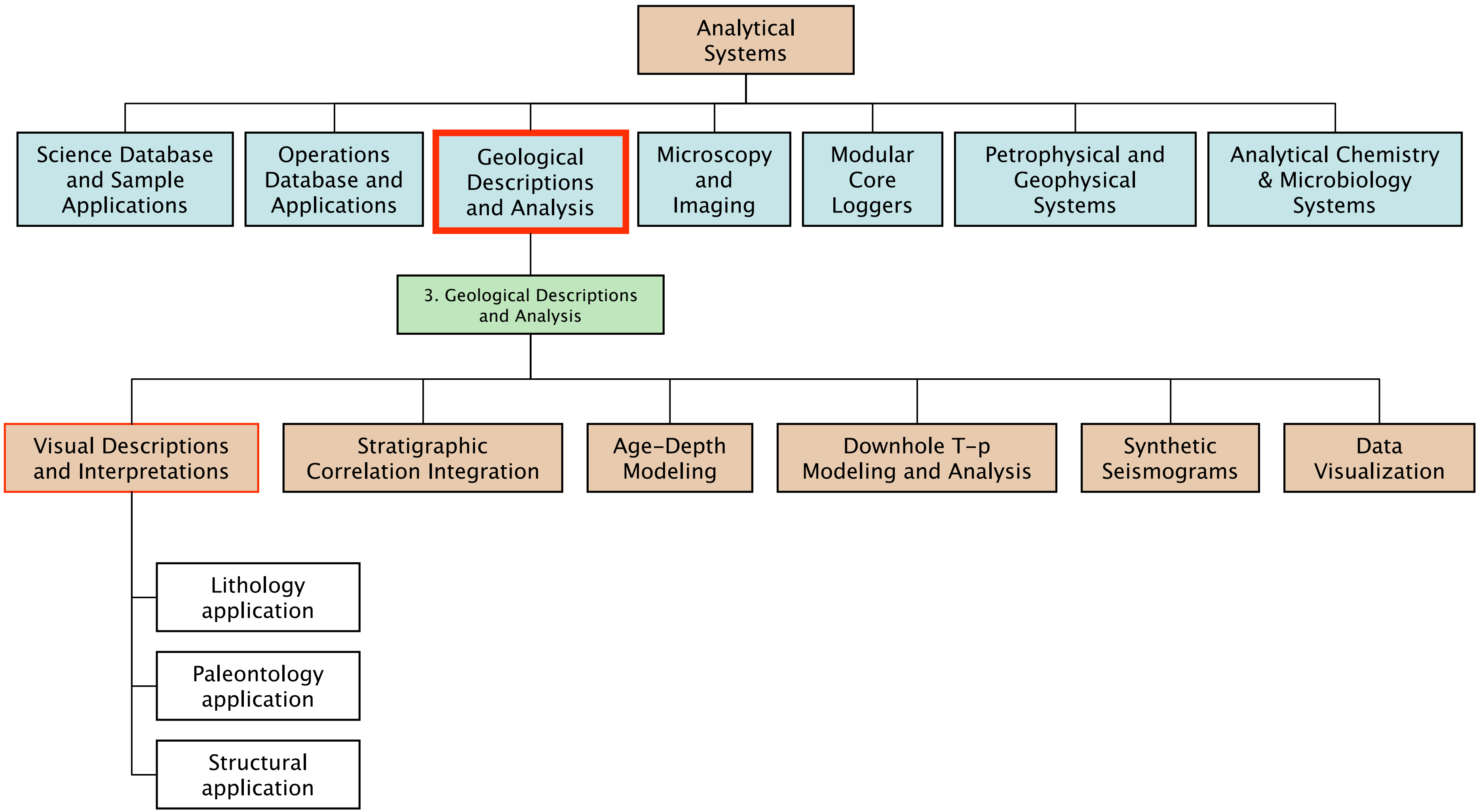
Operations Database and Applications…

- Group Characteristics
  - Time-based information about operational events and activities, including drilling and other hole-completion data.
  - Requires close cooperation with engineers in operational (SCIOPS) and development (TAS) groups as well as key personnel from the drilling subcontractor
  - Depends significantly on the selection of a rig-instrumentation system (RIS); detailed planning will not begin until the RIS is selected

Operations Database and Applications…

- RIS Procurement Liaison
  - Assist in the selection of an RIS with overall data management requirements in mind
- Operations Data Model
  - Dependent on RIS selection and capability
  - Workflow analysis with operations staff
- RIS Integration
  - Capture data associated with hole completion and installations and collected with a new RIS
  - Make data available to scientists in relation to core samples and downhole measurements
- Operations Information Capture
  - Includes migration and extension of current Operations Application
    - cruise data and metadata;
    - port activities
    - materials used
    - routine reports
- Navigation Data Integration
  - Access to raw data
  - Reduced data for hole location

3. Geological Descriptions and Analysis



Geological Descriptions and Analysis…

- Group characteristics
  - Applications used by expert users to enter qualified information into the database and/or process data using expert analytical procedures and algorithms.
  - Working with images
  - Integrated visualization of the respective data types as well as other data is an essential part of these analytical systems.
  - Significant planning with broad stakeholder engagement is required
  - These are service areas in which the ODP and early IODP have been less successful and a high risk remains to successful project completion

Geological Descriptions and Analysis…

- Visual Descriptions and Interpretations
  - Capture, store, and retrieve visual descriptions of recovered sample material and interpretations based on the data
    - “Sample” refers to hole, core, core section, plug, thin section, smear, isolated specimens, etc.
    - Includes data from all geological disciplines, including sedimentology, petrology, structural geology, paleontology, magnetostratigraphy, etc.
  - Database:
    - Establish a data model that allows for effective global searches independent of a particular classification scheme or nomenclature.
  - Data Entry:
    - Provide tools to capture and store information for a sample or a location within a sample
    - Integrate with image capture (see Core Loggers and Microscopy & Imaging) and capture of image descriptions
    - Allow tabular recording of occurrence and abundance of specific components, features, properties, taxa, etc.
    - Support the creation and storage of summary descriptions, such as lithologic hole summaries
    - Observations of sample disturbance features
  - Reference information
    - Taxonomy/classification dictionaries
    - Digital reference collections

Geological Descriptions and Analysis…

- Stratigraphic Correlation Integration
  - Assumption:
    - the latest Splicer/Sagan versions will be used for hole-to-hole and core-log correlation/integration, using correlative signals or observations on recovered samples
  - Integration:
    - Provide the correlation tools with the appropriate data
    - Capture the correlation tool output and store it in the database
    - Write the appropriate depth shifts to all relevant samples
    - Provide data reports with the user-selected depth type

Geological Descriptions and Analysis…

- Age-Depth modeling
  - Modeling application
    - Creates age-depth maps for a hole or at a site using stratigraphic data retrieved from data base, such as age-depth control points from paleontology, magnetostratigraphy, tephra-chronology, etc.
    - Support use of stratigraphic information acquired as part of a different project that can be correlated to the drill cores, such as radiometric dates, Marine Isotope Stratigraphies, etc.
    - Support multiple curve fit models and constraints from which the user can select the appropriate one
  - Age-depth model storage and age reporting
    - Store age-depth maps in science database along with metadata such as model creator, depth scale used, modeling parameters, etc.
    - Support multiple age-depth models for each hole or site
    - Support use of any of the existing depth types for modeling
    - Create the necessary database structure and functions to allow retrieval of all data relative to age based on a selected age-depth model
  - Implementation strategy
    - Explore the possibility to start out with the CHRONOS Java application for age-depth modeling

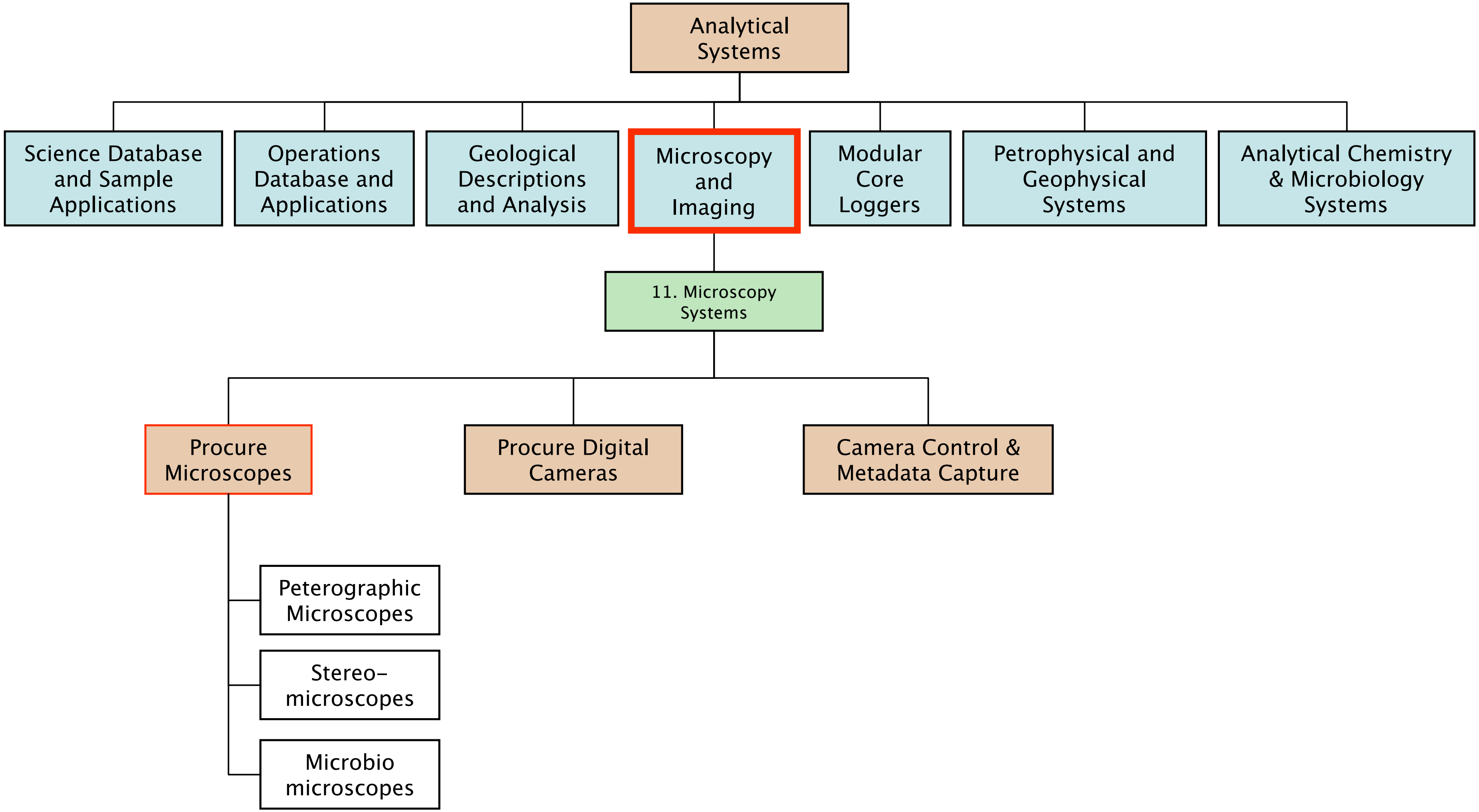
Geological Descriptions and Analysis…

- Downhole T and p Modeling and Analysis
  - Create application to reduce instrumental data sets using well-defined geophysical models and expert knowledge
    - T and p time series collected with downhole tools such as the APCT, APCT3, DVTP, DVTPP
    - Replace current TFIT application with a more user-friendly application using better numeric analysis and running on a current operating system.
  - Store resulting equilibrium temperatures and pressures, along with metadata, in science database
  - Add functions to integrate thermal conductivity results and calculate heatflow as a routine analysis on each expedition
- Synthetic Seismograms
  - User-friendly application for creating synthetic seismograms
  - Store results with metadata in science database

Geological Descriptions and Analysis…

- Data Visualization
  - Provide a data visualization environment that can be customized for the broad range of data types that users want to display together:
    - Core logging
    - Downhole logging
    - Images
    - Analytical chemistry and petrophysical data
    - Scriptable/customized graphic representation of any type, such as graphic lithology, symbols, histograms, etc.
    - Text with depth/age tags
  - Support IODP standard templates for routine displays as well as user-customizable layouts and data type selection
  - Support publication-ready graphics
  - Rendering of large data sets must be reasonably fast to be useful for general data review throughout the shipboard work flow

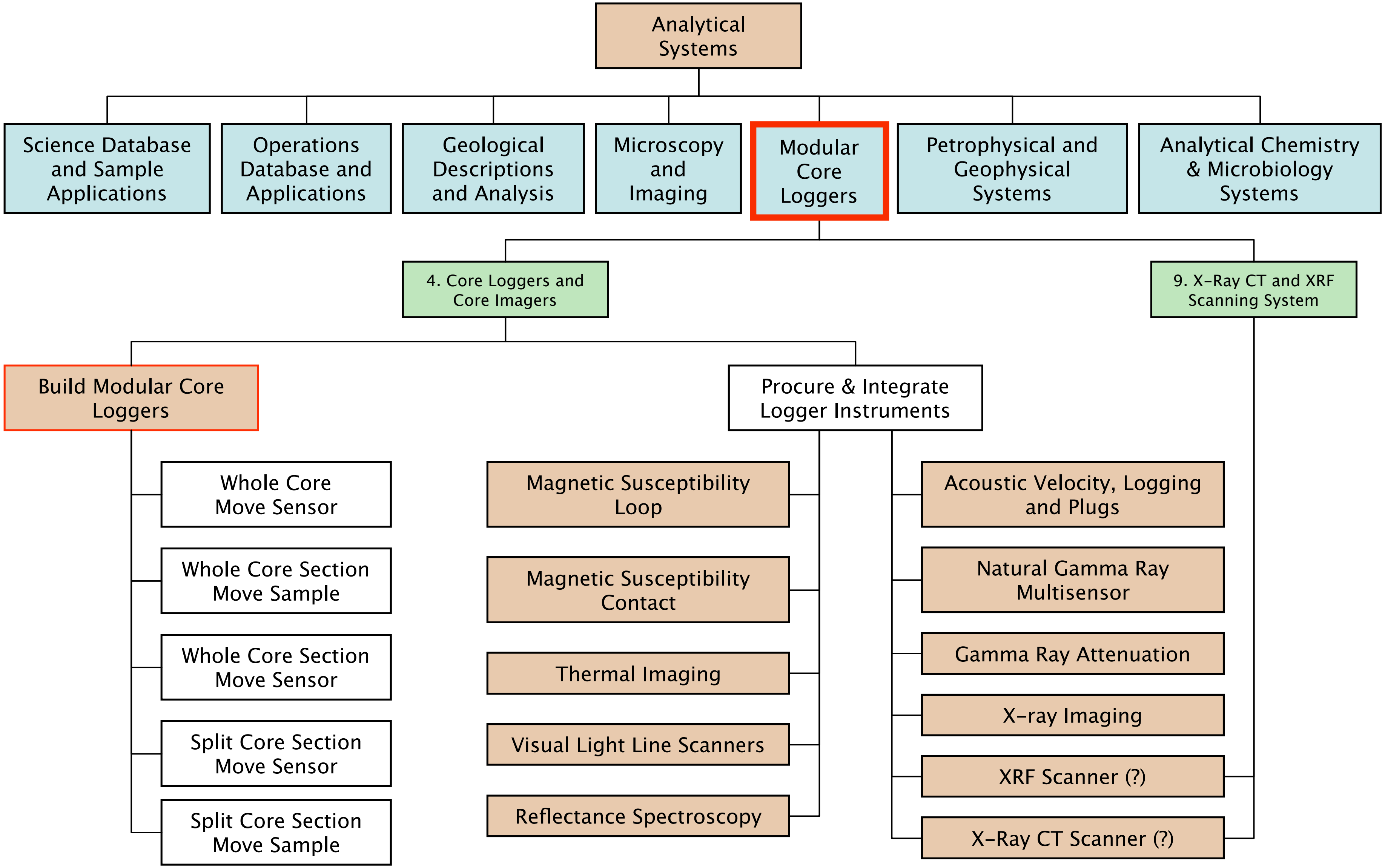
4. Microscopy and Imaging



Microscopy and Imaging…

- Group Characteristic
  - Support functions for Geological Descriptions (and microbiology)
  - Off-the-shelf instrumentation for which integration effort required
  - Applications to capture image data files and add metadata, and interface with a Digital Media Management System (a ITDS project)
- Procure Microscopes
  - Replace or add up to eight petrographic microscopes
  - Replace or add up to four stereo-microscopes
  - (?) Add microscopes with epifluorescence?
  - (?) Cathodoluminiscence X-ray Spectrometer
  - (?) Confocal Laser Macroscope/Microscope
- Camera Control and Metadata Capture
  - Image capture for all scopes; direct capture of microscope/camera metadata
  - Interface for users to enter metadata (source description, user name, etc.)

5. Modular Core Loggers



Modular Core Loggers…

- Group characteristics
  - Automated measurement machines for whole-round or half-round cores of sediments and rocks, configured with single or multiple instruments
  - Maintainability and user-friendliness are of great importance given the number of core loggers to be operated on every expedition
  - Workflow considerations are extremely important for scientific data quality and quantity in a situation of limited measurement time

Modular Core Loggers...

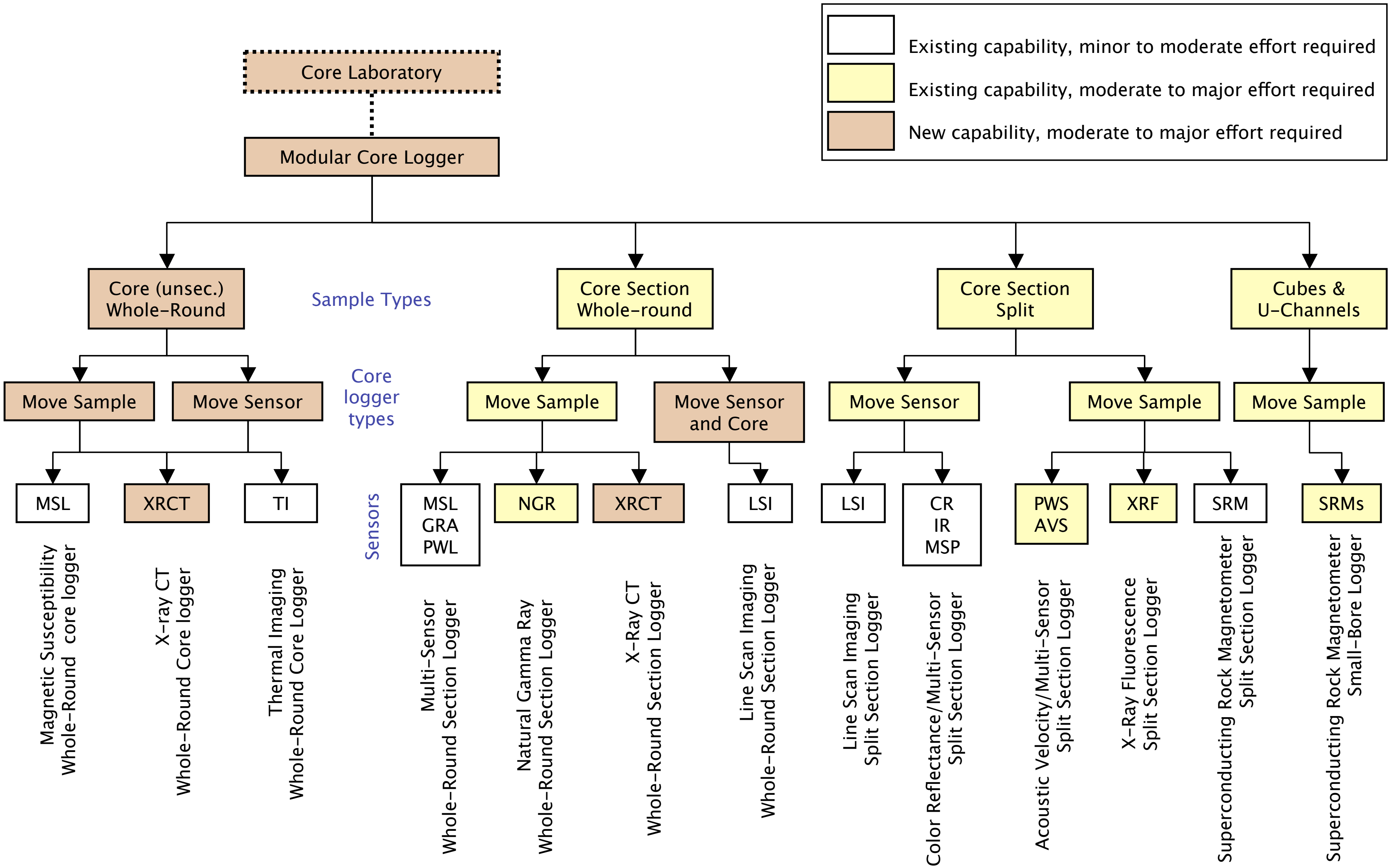
Whole Round Core/Core Section

- Whole-core logger (core receiving platform)
  - Thermal imaging
- Whole-round multisensor track
  - Gamma ray attenuation
  - Magnetic susceptibility
  - P-wave logger
  - Natural gamma ray
- Magnetic susceptibility core logger
  - Magnetic susceptibility
- DMT logger
  - Digital camera

Split Core Section

- Digital imaging system (archive half logger)
  - Color line scan camera
- Archive-half multisensor track
  - Reflectance spectroscopy
  - Magnetic susceptibility
- Working-half multisensor track
  - P-wave sensor 1
  - P-wave sensor 2
  - P-wave sensor 3
  - Automated Vane Shear
- Superconducting rock magnetometer
  - Color line scan camera

Modular Core Loggers...

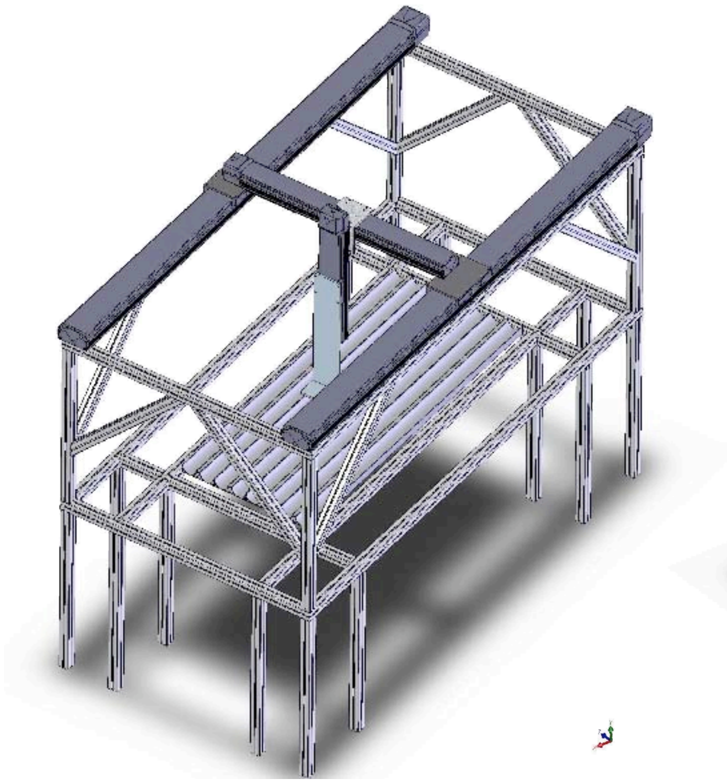


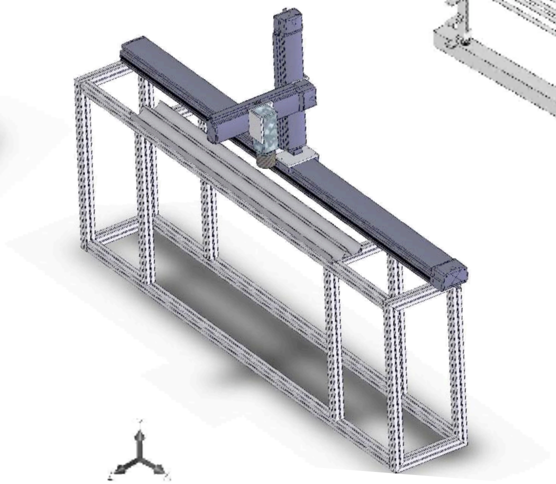
Modular Core Loggers…

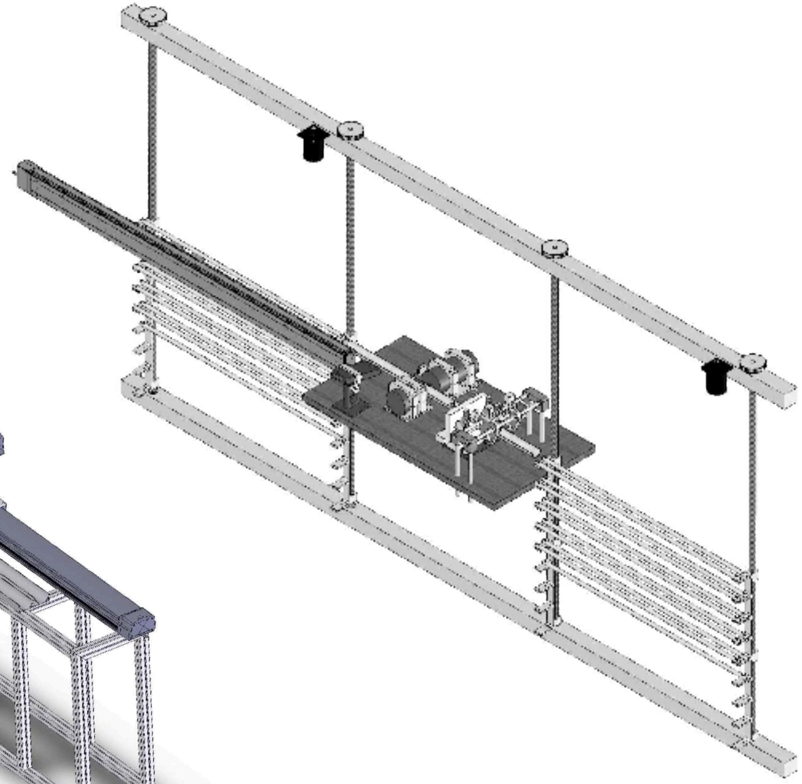
- Build Modular Core Loggers
  - Design all loggers “top-down” to maximize common software architecture and hardware components to greatest extent possible
  - Meet core logging requirements for different types of samples
    - 10-m long whole-round cores
    - 1.5-m long whole-round sections
    - 1.5-m long split sections
    - Other samples such as U-channels or cubes
    - Optimize logging quality by either moving the sample or moving the sensor
  - Provide for all core logging needs using a common software architecture and common motion control and other components to the greatest extent possible.
    - maintainability and extensibility into the next several years
    - Provide for cost-effective development and operation
    - Provide flexibility in configuring the loggers for expedition-specific needs

Modular Core Loggers…

- Status
  - Preliminary designs have been created
  - Market research has been conducted for most sensor updates/additions
  - Vendors for motion control solutions have been interviewed and soft quotes obtained



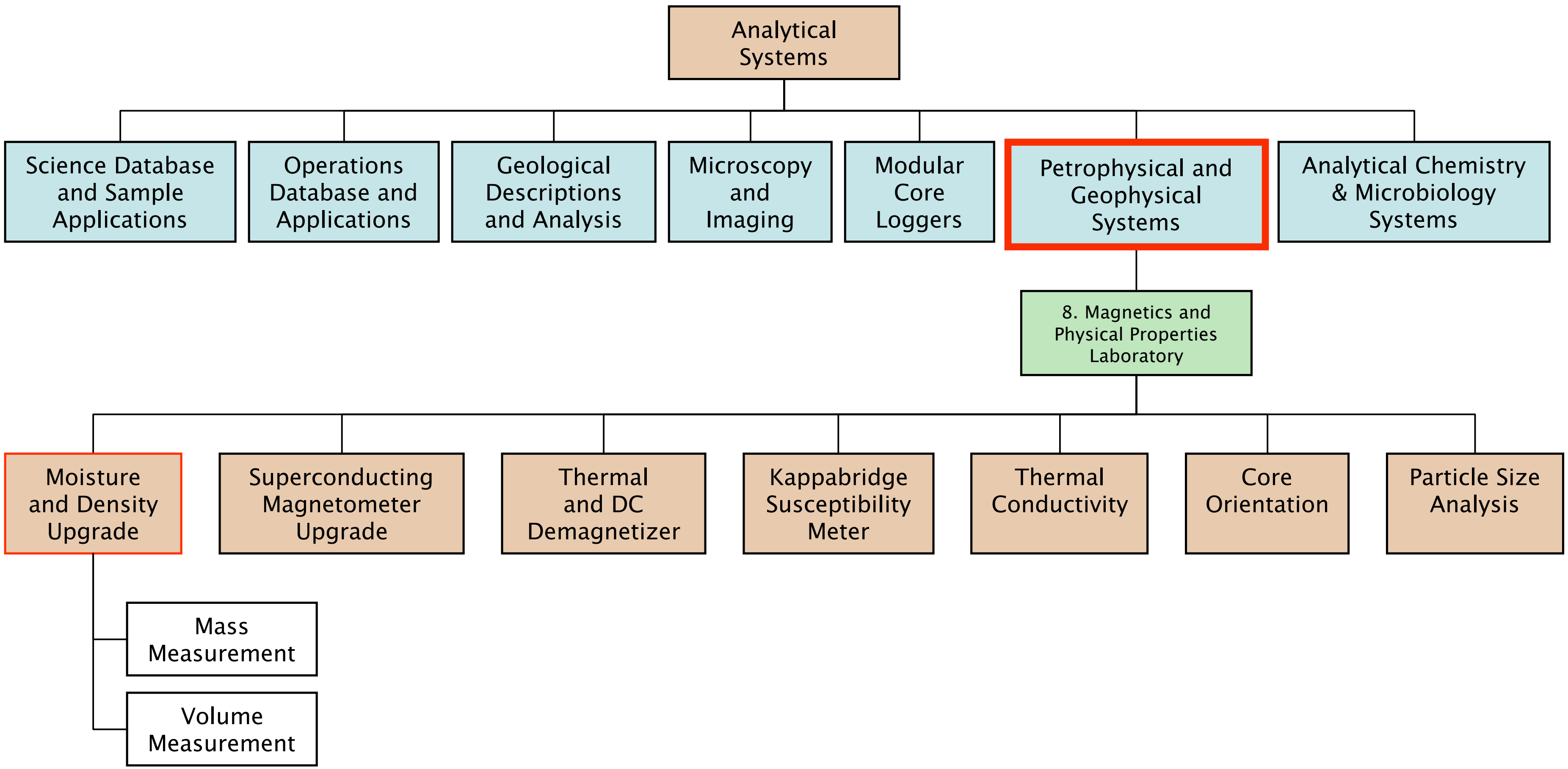




Modular Core Loggers…

- Procure and Integrate Logger Instruments
  - Replace current instrumentation with latest technology upgrades for better data and faster logging
    - Cameras
    - Reflectance spectroscopy
    - Natural gamma ray
    - Magnetic susceptibility?
  - Add new capabilities
    - XRF?
    - X-ray CT?
    - X-ray imaging?
  - Configure and integrate sensors with loggers
    - Define data output parameters, including QA/QC
    - Configure user interface and establish optimum set of measurement parameters (measurement time and spatial resolution) needed to achieve scientific objectives

6. Petrophysical and Geophysical Systems



Petrophysical and Geophysical Systems…

- Group characteristics
  - All petrophysical instruments that are not core loggers
  - Off-the-shelf, custom built, or customized
  - Some new analytical capabilities that require significant research/input before implementation can proceed

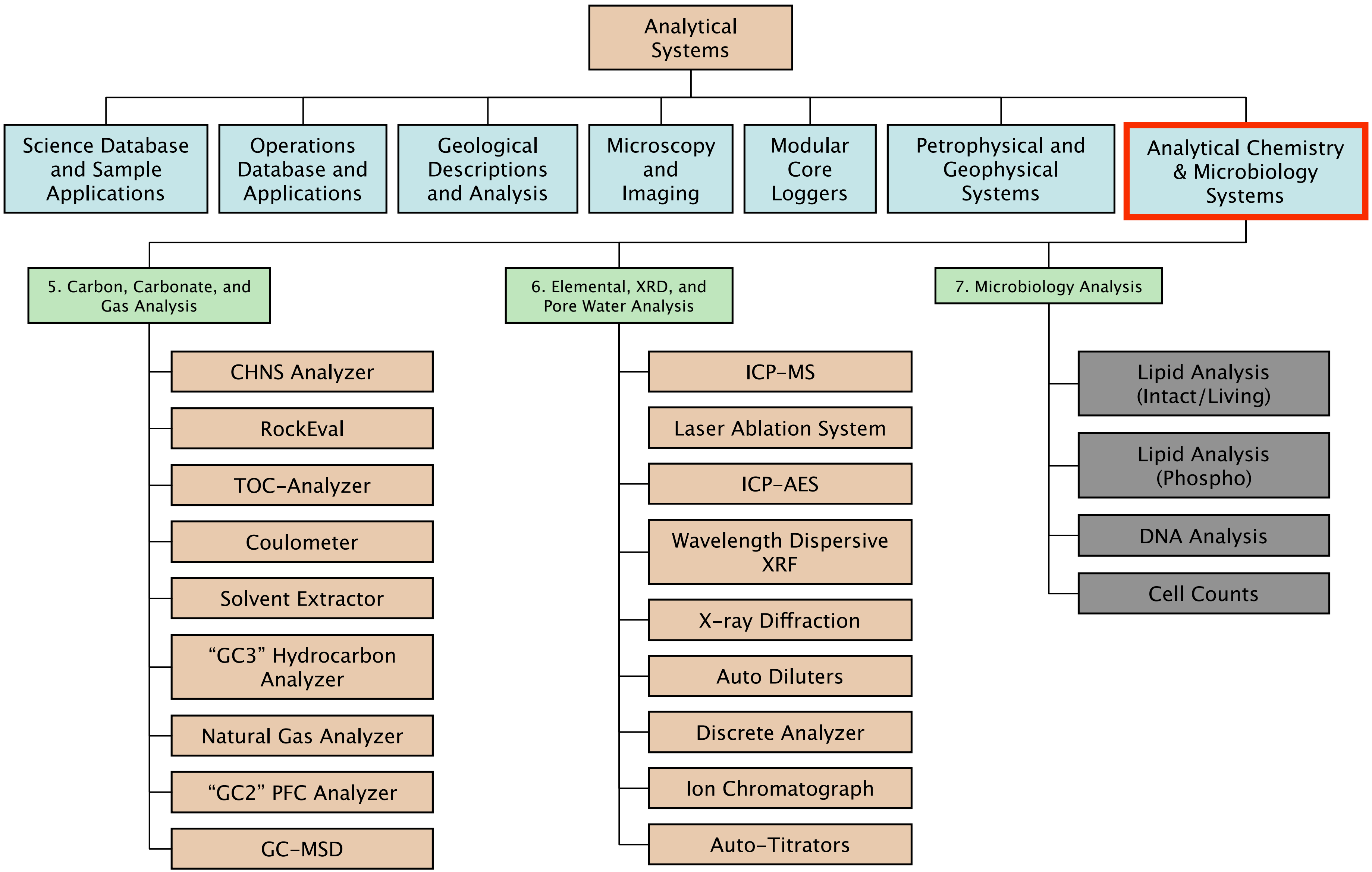
Petrophysical and Geophysical Systems…

- Moisture and Density system upgrade
  - Shipboard analytical balances
    - Implement state-of-the art, commercial balances that users are confident in
    - Clarify and standardize algorithms and statistics used to compensate for the ship’s motion using a reference measurement
    - For medium-precision and wide-range measurements, Analytical Services purchased and tested a pair of Mettler-Toledo balances in 2005
      - Balances are designed to compensate for vibration and shocks
      - Test results indicate superior performance compare to ScienTech balances used previously
    - For high-precision, low-range measurements, the current Cahn balances will be retained.
      - Software will be upgraded
  - Helium pycnometer replacement:
    - Support simultaneous measurements in multiple cells
    - Full computer control to monitor measurement process and gather QA/QC information
    - Better mechanism for sealing measurements cells (than current threaded caps)

Petrophysical and Geophysical Systems…

- Superconducting Magnetometer Upgrade
  - He-free cooling system is available now
  - Feasibility and cost-effectiveness to be assessed - decision pending
- Thermal and DC demagnetizers
  - Upgrade/add
- Kappabridge susceptibility meter
  - Recently purchase latest model
  - Needs to be integrated
- Thermal conductivity
  - Replace old system running on DOS
  - Several systems on the market to evaluate
- Core orientation
  - Replace Tensor tool
  - Modern instruments available off-the shelf
- Particle size analysis
  - Need better definition from community
  - Many techniques exist but no standard
  - Sample preparation methodology is the critical issue

7. Analytical Chemistry and Microbiology



Analytical Chemistry and Microbiology…

- Group characteristics
  - Analytical systems that are widely used and can be purchased off the shelf
  - Purchase new, replace current, upgrade/repair current, or keep old system
  - Require integration for the purpose of QA/QC, storing data in the database, data retrieval via user-friendly queries, technician training, etc.
  - Integration will be decisively more feature-rich and faster if a commercial LIMS is used

Analytical Chemistry and Microbiology...

- CHNS Analyzer
  - Replace; more sensitivity and faster throughput offered by modern systems
- RockEval
  - Replace; old system not supported anymore
- TOC Analyzer
  - Keep; integrate with LIMS
- Coulometer
  - Assess new systems (incl. the one on Chikyu) and decide if replacement is warranted
- Solvent Extraction System
  - New; similar to the one on the Chikyu

Analytical Chemistry and Microbiology…

- “GC3” Hydrocarbon Analyzer
  - Keep; integrate with LIMS
  - Some methods development and/or retrofitting
- Natural Gas Analyzer
  - Repair work on valves for wear that occurred in Phase 1
- “GC2” Perfluorocarbon Tracer Analyzer
  - Replace with more modern system
- GC-Mass-Selective Detector
  - Keep; integrate with LIMS
  - Methods development in conjunction with solvent extraction system

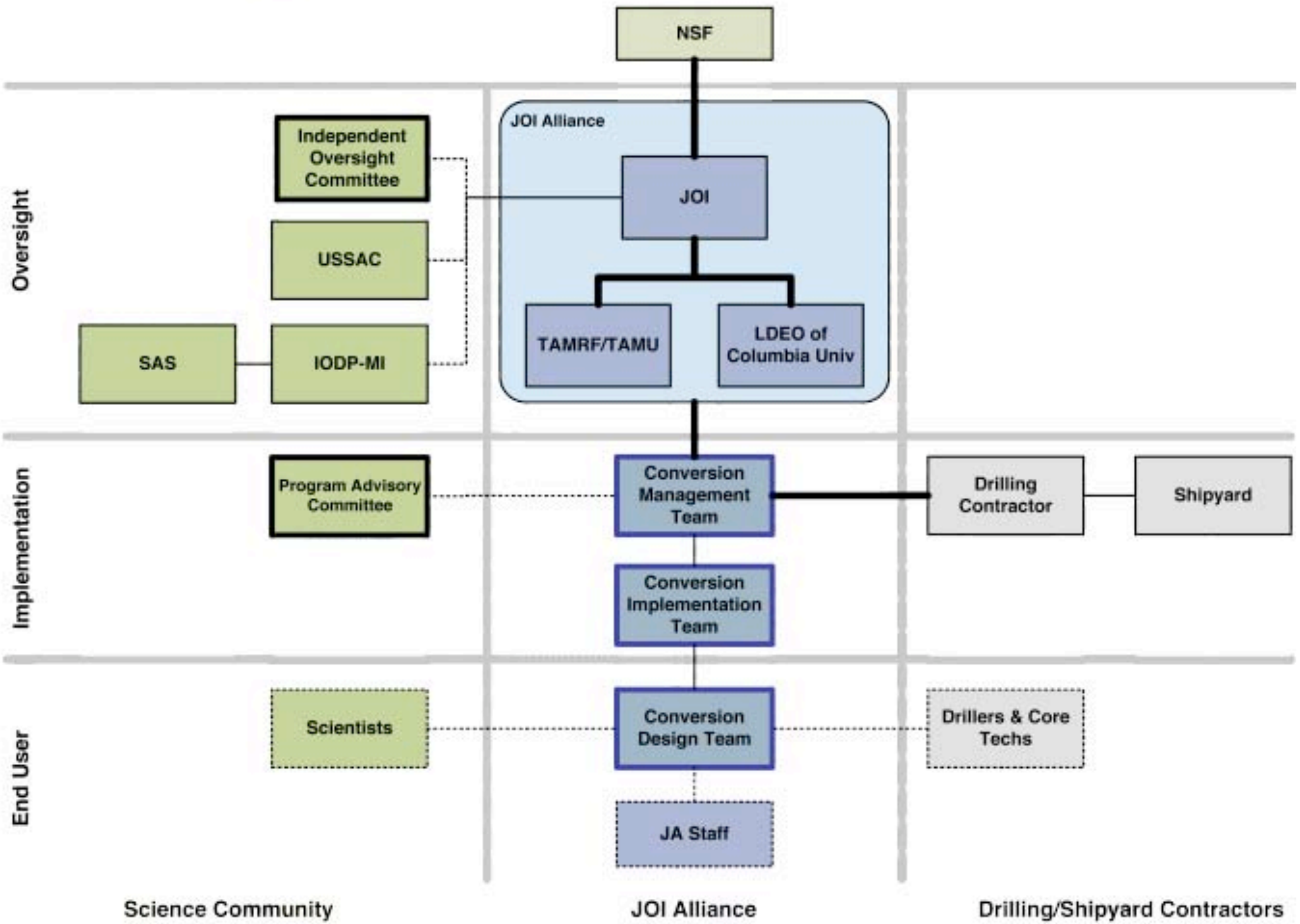
Analytical Chemistry and Microbiology…

- ICP-MS
  - New; significant enhancement of analytical capabilities
- Laser Ablation
  - Awaiting operational results from Chikyu for assessment
- ICP-AES
  - Replace with simultaneous or semi-simultaneous detector system
  - Better resolution and faster throughput
- Wavelength-dispersive XRF
  - New; significant enhancement of analytical capabilities
- X-ray Diffraction
  - Replace with modern system

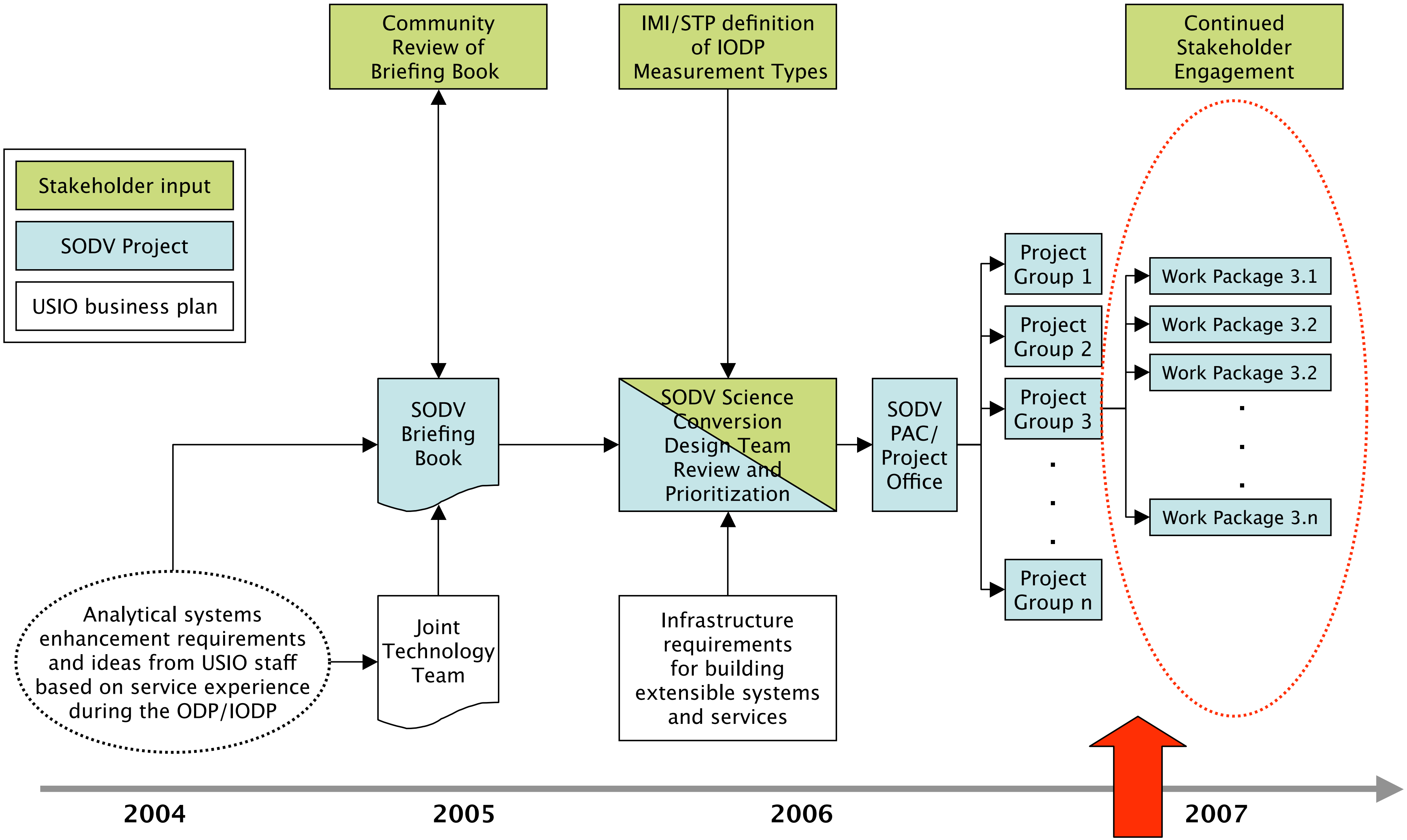
Analytical Chemistry and Microbiology…

- Autodiluters
  - Add modern equipment
- Discrete Analyzer
  - New; automated analysis of pore water constituents
- Ion Chromatograph
  - Replace with modern system for more throughput and lower maintenance - or repair old system
- Autotitrators
  - Procure modern, flexible system

Continued Stakeholder Engagement



Continued Stakeholder Engagement

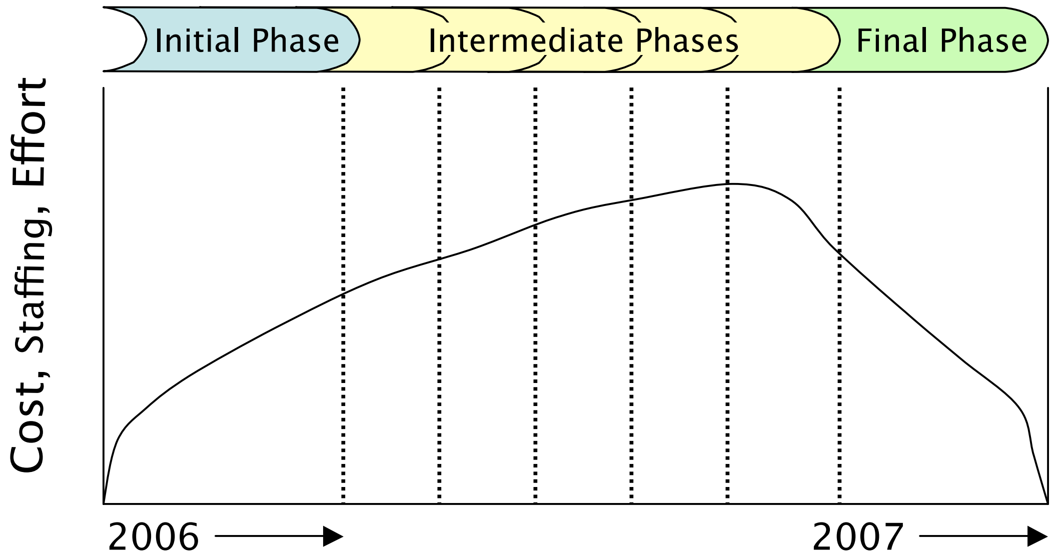


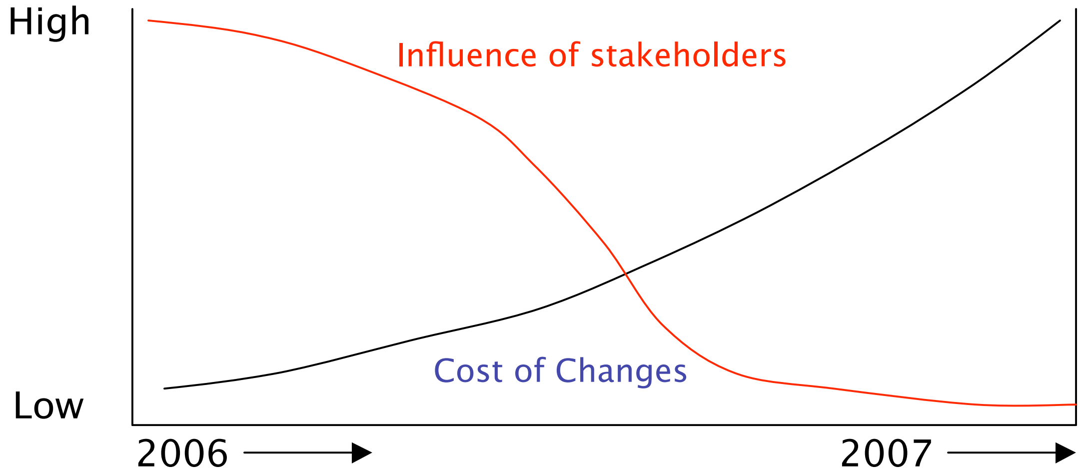
Continued Stakeholder Engagement

- Science Conversion Design Team will complete its planning input activity in February/March
  - Output: prioritized list of recommended analytical capabilities and infrastructure
- SODV project managers prepare initial implementation plan (control account plans) by mid-February
  - Project managers commit to scope, cost, and schedule for deliverables
  - For many projects, the initial work packages consist of planning activities that will extend into early summer
    - Science Database and Sampling Applications
    - Operations Database and Applications
    - Geological Descriptions and Analysis
    - Core Loggers
  - This provides an opportunity for expert stakeholders to help define the detailed requirements, and even help define solutions for some of the projects
- Further input from community stakeholders must be managed such that it can occur effectively and within the time frame of the projects

PMBOK

Continued Stakeholder Engagement…





Continued Stakeholder Engagement…

- Proposed mechanism for involving community experts and IODP staff in the project scope management:
  - Establish master list of stakeholders including
    - Scientists with known expertise from the ODP/IODP staffing list
    - IODP-MI and IO staff
    - STP members
    - Others as recommended by above stakeholders
  - Identify individuals as belonging to one or more expert groups
  - Post key project documents on USIO web site for stakeholder review
  - Distribute email to solicit reviews of key project documents
- Suggestions?

Laboratory Information Management Systems (LIMS)

A Tool Set to Achieve the USIO's Data Management and Quality Assurance/Quality Control Goals

Outline

- Definition of LIMS
- LIMS products and their scope
- LIMS deployment
- Common LIMS features and functionality
- Leveraging a LIMS to meet organization-wide challenges
- Challenges and risks
- USIO implementation strategy
- Summary

Definition of LIMS

- The acronym “LIMS” stands for Laboratory Information Management System

- In its simplest sense, a LIMS is a relational database with a suite of supporting applications. Within that limited definition, the USIO already has a number of programs that serve in the role of a LIMS.

LIMS Products and their Scope

- LIMS vendors have produced a variety of systems of different sizes that are aimed at different laboratory types. They are available in both limited and broad scopes.

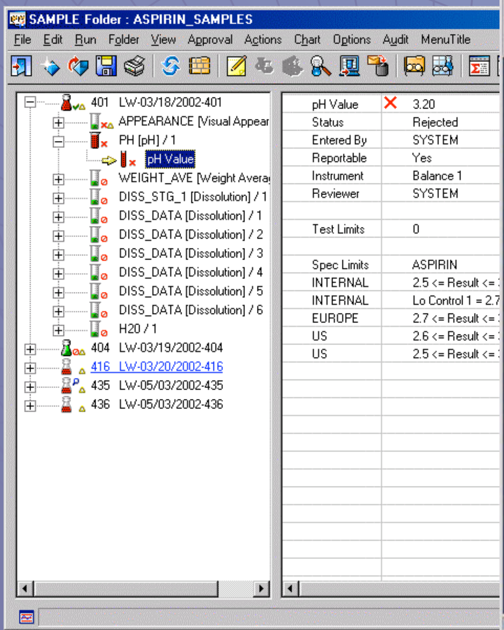
- Limited scope examples usually arose out of an individual laboratory's internal development which was then marketed externally. Some examples:
  - Drinking water microbial laboratories
  - Medical blood testing laboratories
  - Industrial production QA/QC laboratories (specific products or product lines)

LIMS Products and their Scope

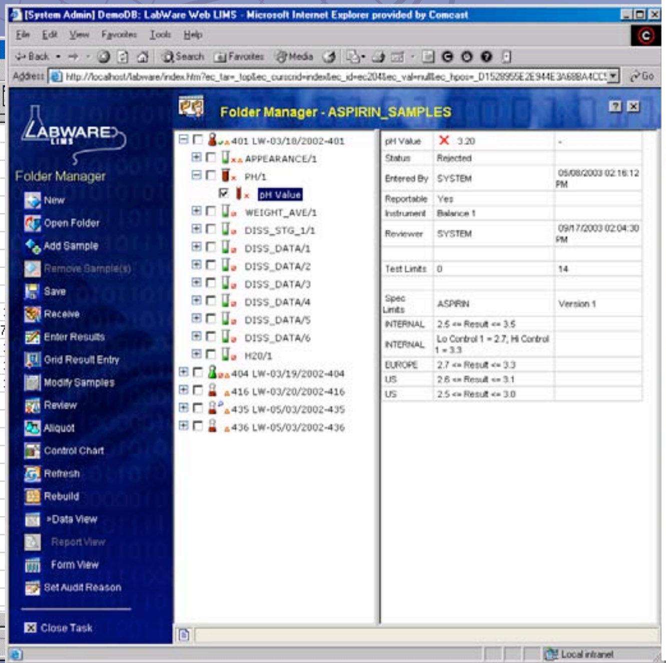
- The broad scope systems were designed from the beginning to deal with a variety of laboratory types, which makes them more flexible. Some examples are:
  - EPA contract laboratory protocol (CLP) laboratories
  - Medical laboratories
  - Pharmaceutical research laboratories
  - Food testing laboratories
- Our discussion will focus on the broad-scope LIMS products; such products are flexible enough to adapt to a wide variety of industries.

LIMS Deployment

- A commercial LIMS can be deployed in a variety of ways for maximum flexibility:



Network-based



Web-based

PDA-based

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LIMS Deployment

- A network-, or client-based, LIMS is the default interface. The client is resident on a workstation, usually a PC, and the database and its surrounding set of applications are accessed across the network.

- Client-based access is the fastest and most efficient way of using the LIMS, presenting all of the graphical user interface (GUI) options to the consumer.

LIMS Deployment

- In addition to client-based access, many systems can be accessed via a Web page interface. In our case, this could even allow ready remote access for authorized users (e.g., administrators, non-sailing science participants) across the satellite feed to shipboard data as it is acquired.

- The disadvantage of a Web interface (even within the internal LAN) is that some of the GUI features are not as smooth. However, the Web deployment has the advantage that the LIMS becomes cross-platform, accessible via PCs, Macs, and others, all without the need for the installation of any software on the client.

LIMS Deployment

- Finally, many systems are deployable on handheld devices such as a PDA. This might allow a curator, for example, to use a weatherproof PDA to enter core data directly from the catwalk (whatever its USIO Phase 2 incarnation) or down in the core storage hold.

LIMS Features and Functionality

- Sample tracking
- Quality assurance/quality control
- Instrument interfacing and data capture
- Document access and control
- Workflow management/scheduling

LIMS Features and Functionality (Continued)

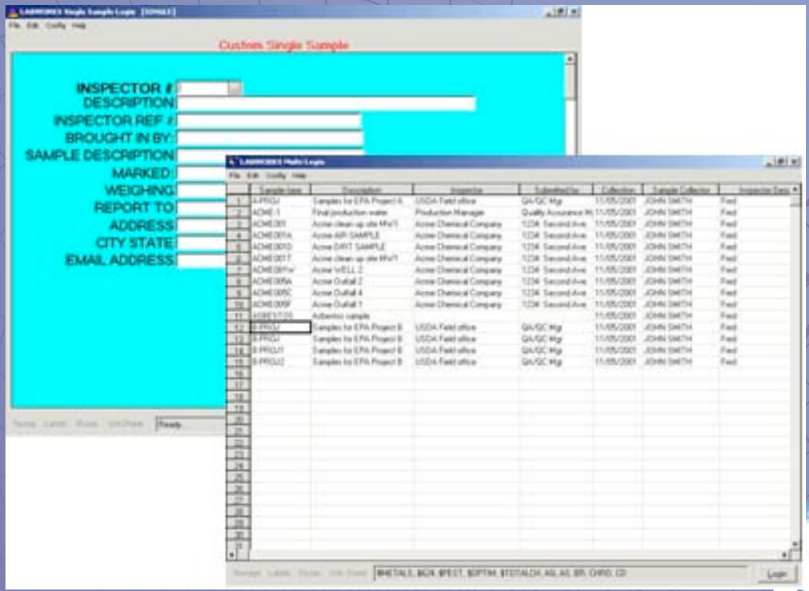
- Chemical/consumable inventory control
- Instrument calibration and maintenance
- Data analysis and reporting tools
- Audit trail for accountability
- Costing and accounting functions

Sample Tracking

- Historically, most LIMS products were aimed at the legal requirements of environmental, forensic, and regulatory industries, where the need to rigorously track samples was paramount.

- Consequently, all of them have very strong sample tracking functionalities so that the parentage and identity of the sample is known from the time the sample is collected, to subsampling, through analysis, and eventually to storage.

Sample Tracking



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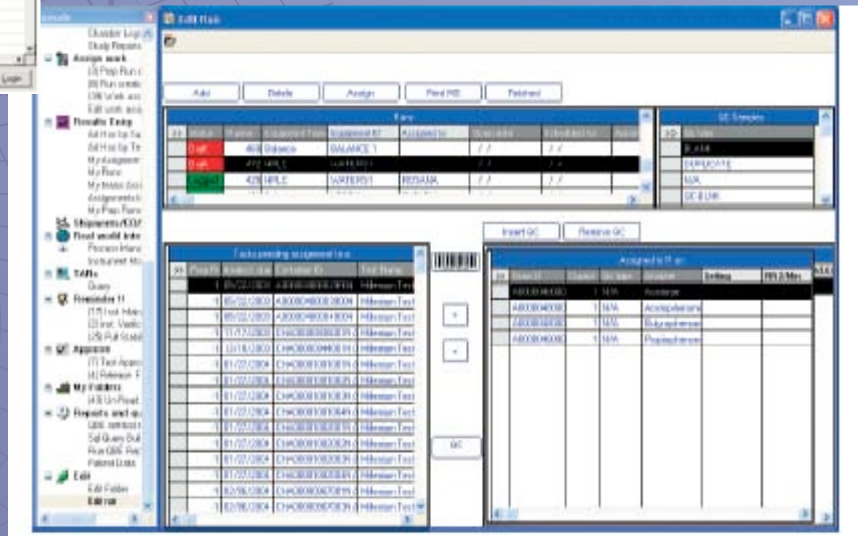
The word "sample" here is defined as any material, whether it is analyzed or not. A sample might be a core, a core section, a chemistry split, or even the borehole itself.



Copyright StarLIMS Corporation

Sample Tracking

- While a LIMS in and of itself won't address all of our curation needs and issues, it will handle a number of them admirably. For example:
  - The creation/management of a scientist name database
  - The assignment of scientist (and technician) roles
  - The tracking of core samples and subsamples.

- Thus, much of the USIO application development surrounding internal curation and sampling applications will be expedited considerably by the implementation of a LIMS.

Quality Assurance/Quality Control

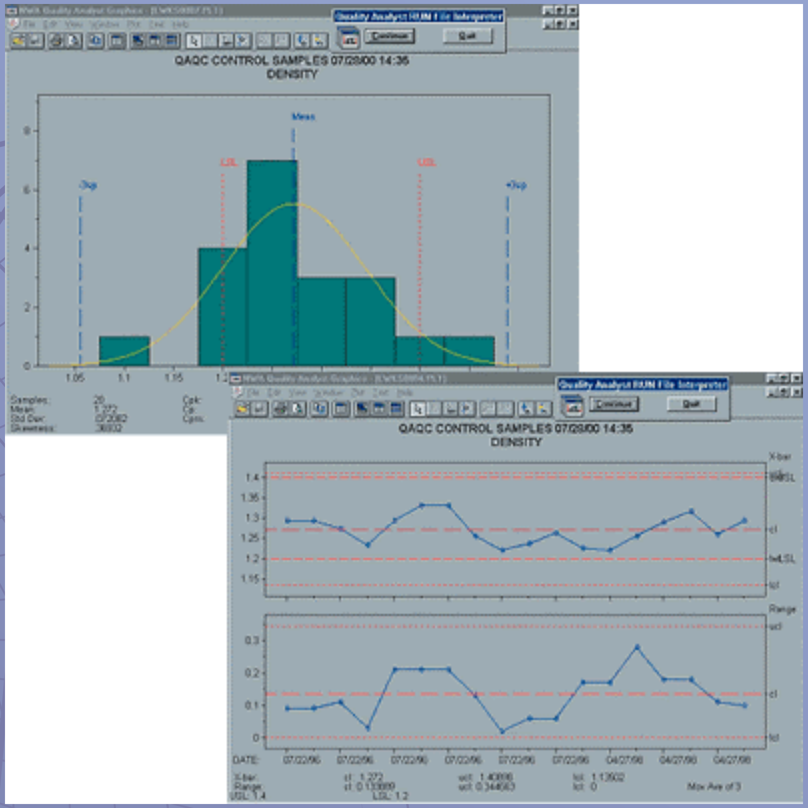
- QA/QC functionality is robust and extensive in a LIMS and includes:
  - Analytical batching
  - QA/QC control charting
  - Traceability of standards
  - Traceability of data
  - Staff proficiency tracking
  - Staff training tracking

Quality Assurance/Quality Control – Analytical Batching

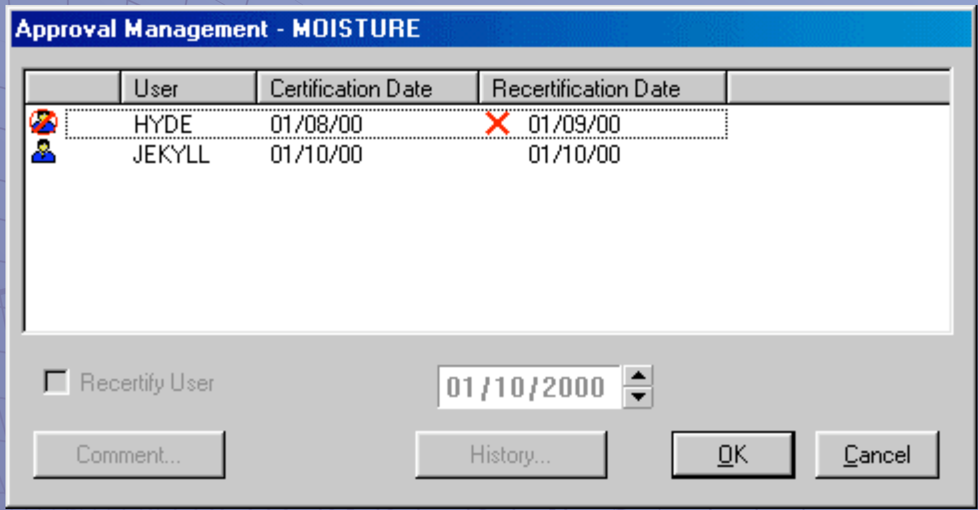
- Analytical batching is a grouping technique that associates a number of samples (usually 10 or 20) with a specific set of QA/QC markers (such as calibration check standards, fortified samples, and process blanks).
- Batching is done to efficiently associate markers with a group of samples in instances when it is infeasible to replicate and/or fortify every sample.

Quality Assurance/Quality Control – Control Charting

- Control charts are a statistical tool to quickly identify and isolate data quality problems.
- Nearly every LIMS includes the NWA Quality Analyst program as its statistical toolbox which can generate screens, like this one for a density analysis, on-the-fly from within the LIMS.



Quality Assurance/Quality Control – Staff Proficiency Tracking



- In this screen shot, "Hyde" is not (or is no longer) certified for the moisture determination, and will trigger a flag if he is assigned this type of work. The laboratory's business rules may even disallow the assignment of Hyde to this type of analysis; this is user-configurable.

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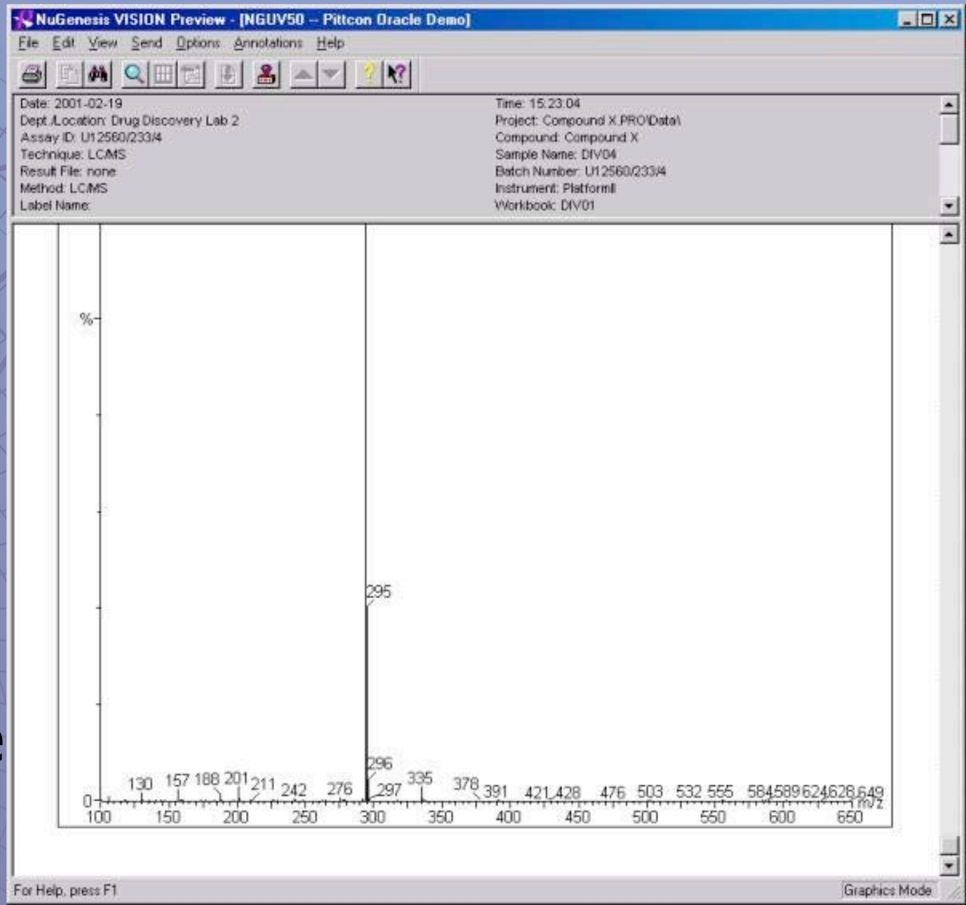
Instrument Interfaces

- LIMS development originally arose from a need to capture analog (i.e., raw voltage) output from laboratory instrumentation digitally so that it could be saved, analyzed, and reprocessed.
- Consequently, direct data capture is a basic functionality of all commercial systems and all of the LIMS products we are considering will be able to capture data from the USIO’s analytical systems and data streams.

Instrument Interfaces

- Complex outputs, such as the mass spectrum to the right, can be captured in image form; reduced data can be parsed into the data tables.
- Simpler data streams, like gamma ray attenuation (GRA), are captured as raw numerical data.



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Instrument Interfaces

- The instrument interface of a LIMS can vary by vendor, but are basically one of two types:
  - Configurable by in-house programmers
  - Purchased from the vendor in relatively inexpensive modules
  - (The USIO prefers the former case.)
- In either case, the burden of in-house staff to develop custom capture and uploader applications is greatly reduced. This could have a significant impact on the handling of third-party analytical tools.

Instrument Interfaces – Third Party Analytical Tools

- Throughout ODP as well the USIO Phase 1, consistent capturing of the data produced by third-party analytical tools and providing it to the scientific community at large was a challenge for the program. LIMS helps us address this challenge.

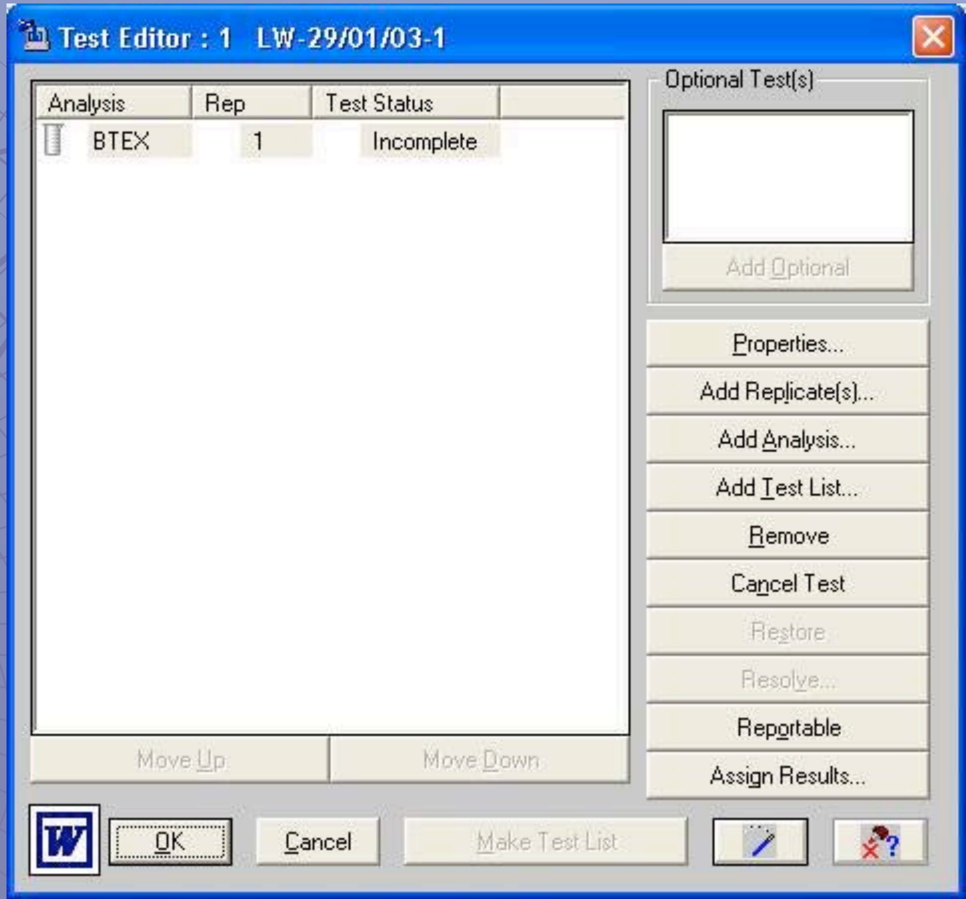
- Presuming that the data and metadata outputs and format are provided to the USIO pre-cruise, third-party systems that are brought on board the Phase 2 vessel can be set up relatively quickly to output to the LIMS structure so that their data and metadata can be captured.

Document Access and Control

- One of the integration features that a LIMS offers is the ability to access documents within the LIMS and to attach nearly any type of document to data.
- The analyst will be able to capture methodology, data qualifiers, and even images and instrument outputs (as shown previously with the mass spectrum) and associate them with the scientific data.

Document Access and Control

- The picture at right shows an MS Word icon in the lower left. Clicking on that icon brings up the BTEX* analytical method in this case. Any document, from cookbooks to SOPs, can be linked within the LIMS.



*BTEX = benzene, toluene, ethylbenzene, and xylene.

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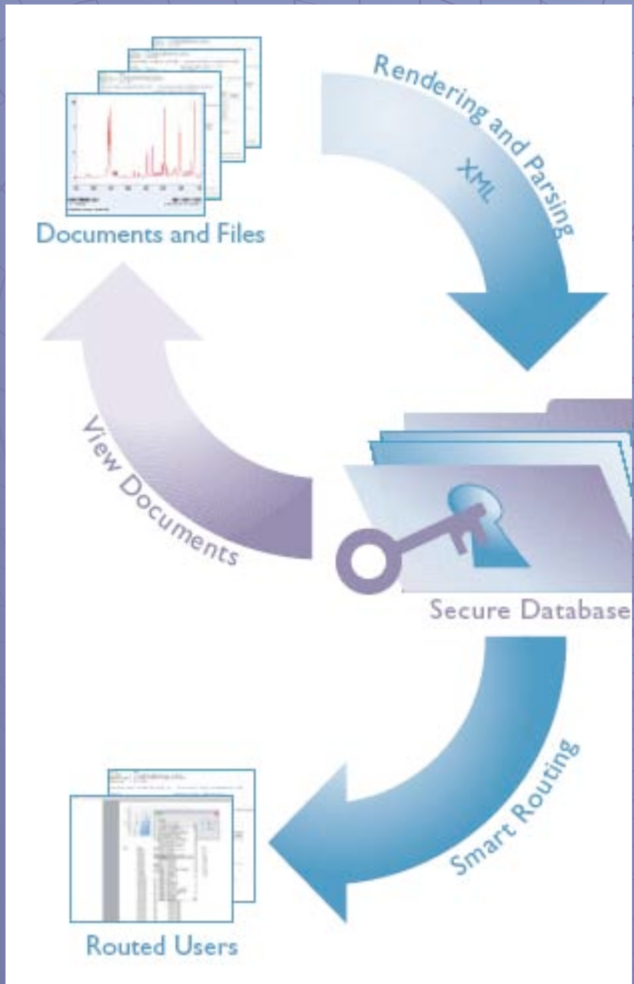
Document Access and Control

- A rigorous QA/QC program requires that analytical methodology be followed consistently across time. One method to ensure that the same method is used by different analysts is to adopt a controlled document system. Many LIMS products support this approach.

- Under a controlled document program, changes to methodology happen only in a formal, controlled manner, with layers of review and approval.

Document Access and Control



- Many LIMS systems, such as this one, offer a secure document database from which documents can be viewed, but alterations are controlled to ensure compliance with agreed-upon methodology.

Workflow Management

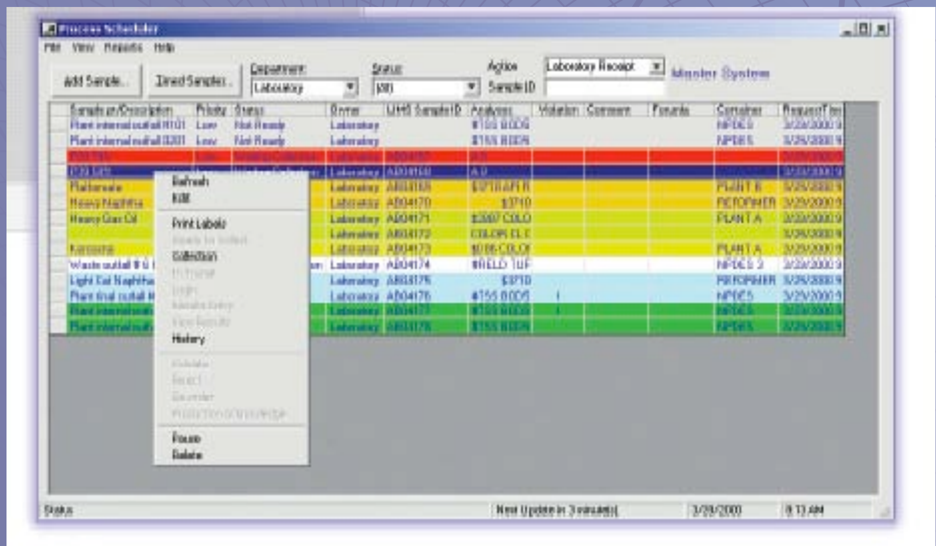
- In any laboratory, samples are assigned work, defined as preservation, preparation, derivitization, analysis, or storage tasks. This work is also assigned to a particular laboratory, a lab work group, or a specific scientist or technician.
- Within a LIMS, the assignment of such work can be scheduled ahead of time (using a template) or on-the-fly by the analyst. For example if the sampling frequency has been determined during the pre-cruise meeting, it can be set up for the cruise beforehand, and can be easily changed by the users if [when!] cruise circumstances change.

Workflow Management

- Laboratory management
  - A LIMS organizes and assists in the management of laboratory activities, from sample preparation steps to analytical and data reduction steps.
  - The progress of work throughout the laboratory is tracked by the LIMS in a variety of ways, all of which can be used as search keys because of the relational nature of the database. For example, one could search:
    - By sample type
    - By location ID (i.e., site or hole)
    - By laboratory
    - By technician or work group

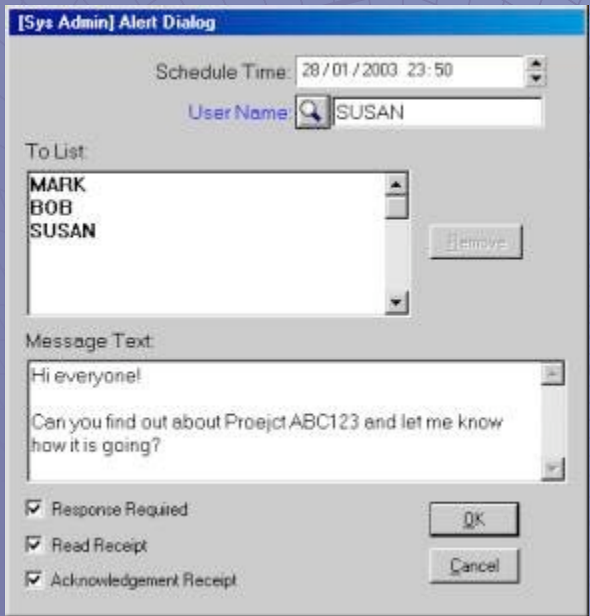
Workflow Management (Example)

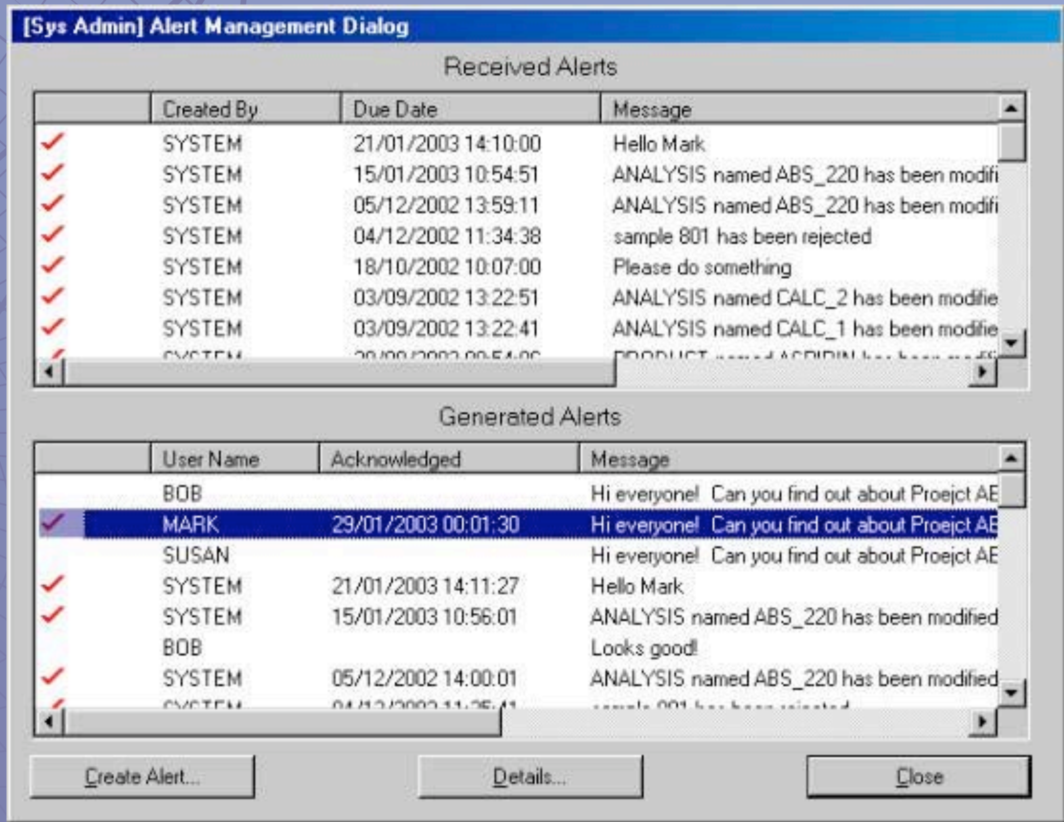
- All LIMS products offer some form of process scheduling, which allows a manager or supervisor to see time-dependent events in a well-organized, color-coded way. The specific color schemes are usually user-configurable.



Workflow Management (Example)

- Some LIMS have the additional capacity to e-mail workers with alerts or pertinent information and create an audit trail of the generated alerts and responses.





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Chemical/Consumable Inventory Control

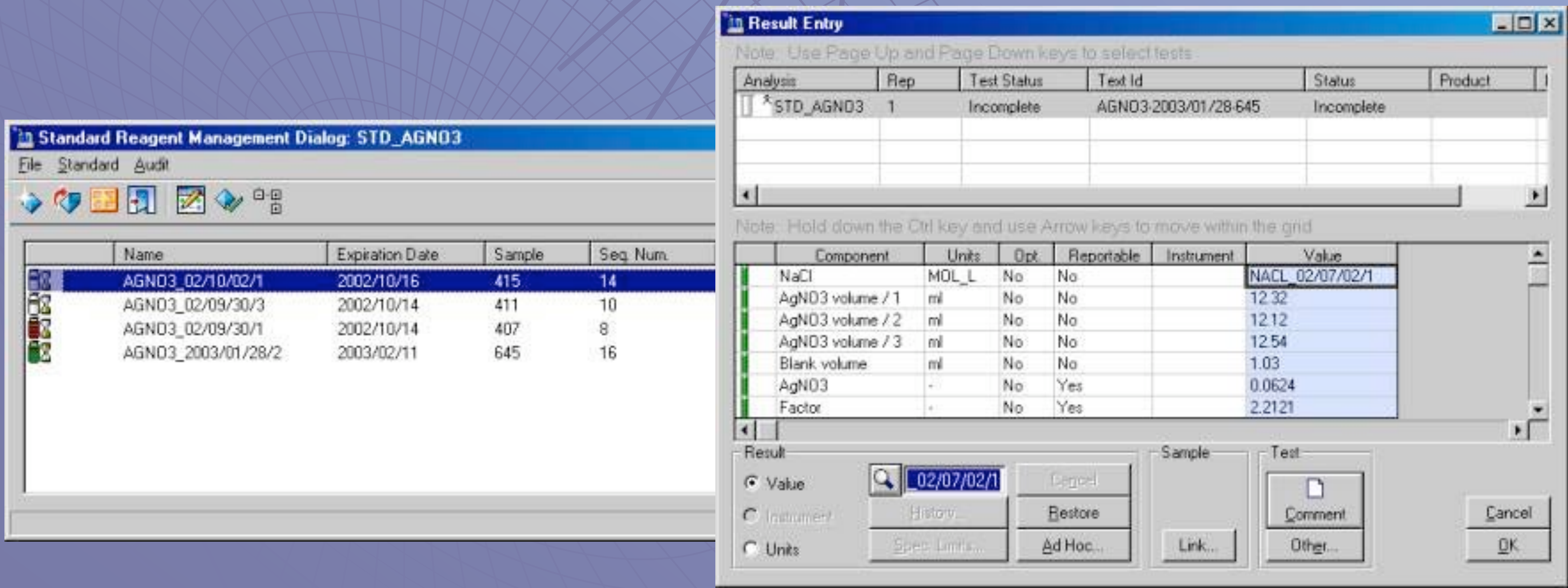
- Consumable inventory control

  - Most LIMS products have chemical inventory control features which can be adapted to any laboratory consumable (reagents, gloves, tubes, etc.).

  - The usage quantity for each test can be programmed into the LIMS and the inventory decremented accordingly, even to the point of alerting the user when reorder points are reached.

Chemical/Consumable Inventory Control (Example)

- Standardized solutions are tracked, their concentrations recorded for data reduction, and alerts given if they have expired or are out of range.



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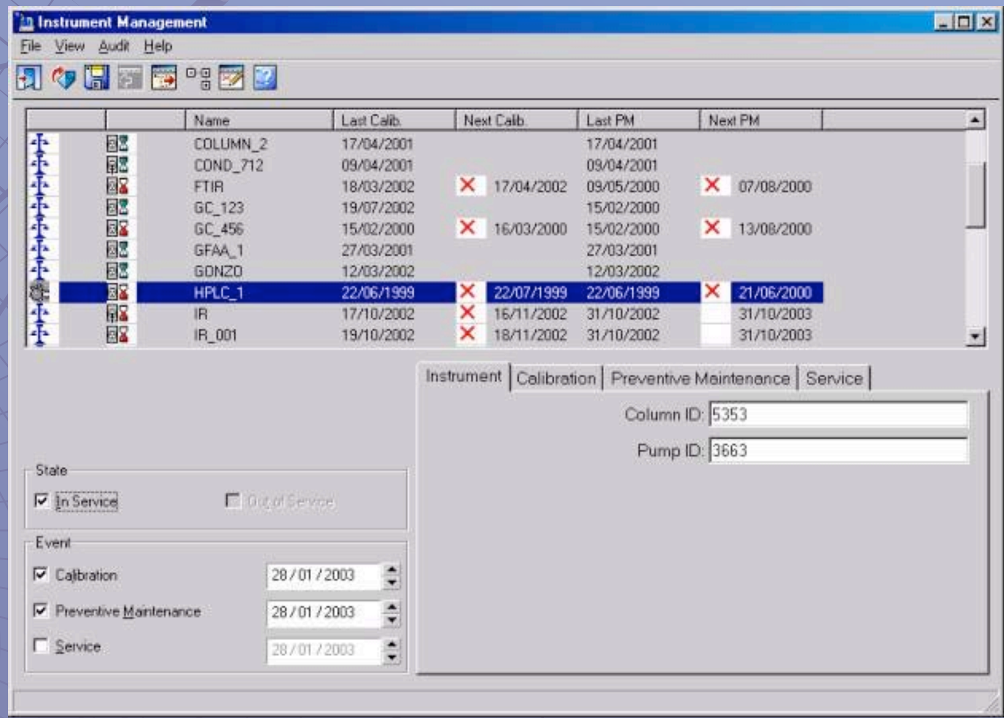
Instrument Calibration and Maintenance

- LIMS tracks instrument calibration, preventive maintenance, and service calls within the database.



- Complete records of instrument and equipment maintenance are associated with data generated by the particular instrument.

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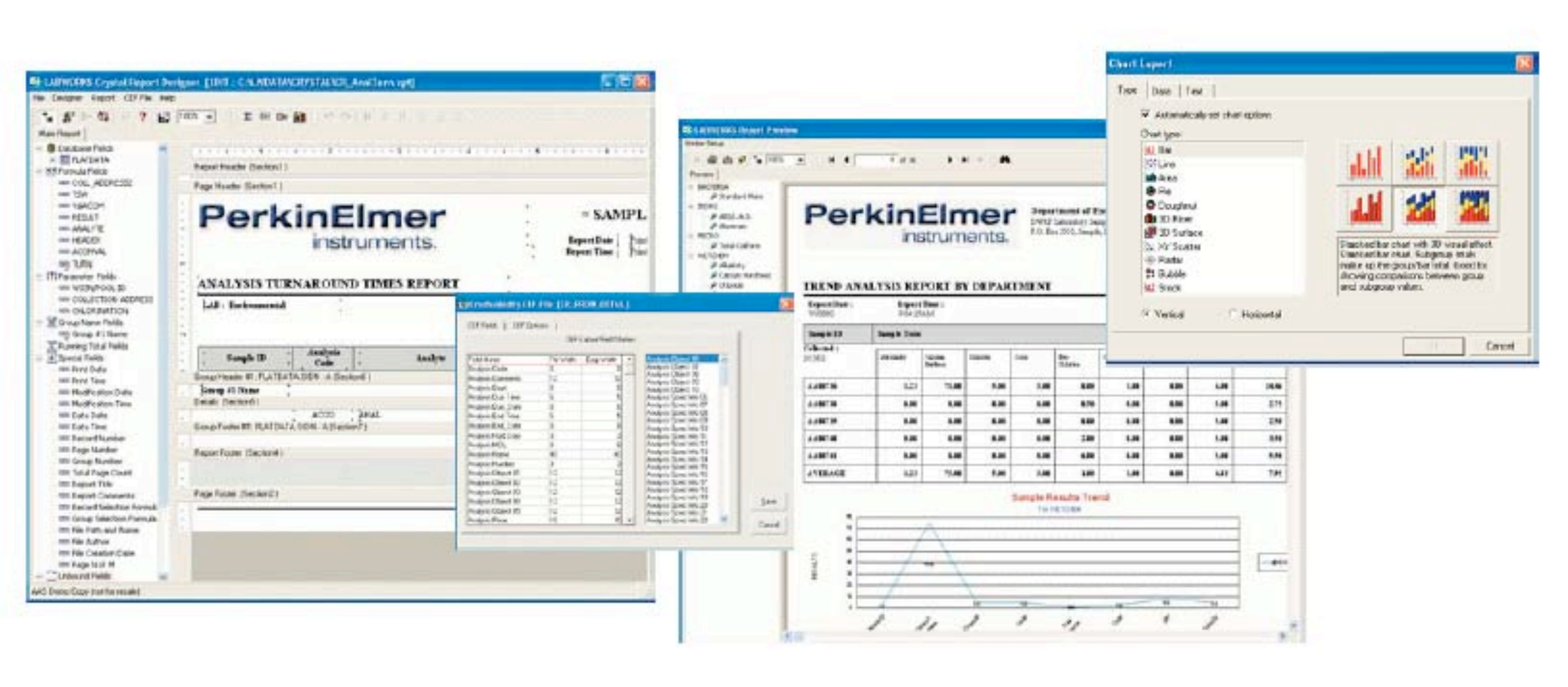
Data Analysis and Reporting Tools

- Most LIMS products use Crystal Reports™ from Business Objects, Inc. to generate reports.
  - Crystal Reports™ is a powerful tool for creating report templates, configurable in a variety of ways, for example to print reports on a specific organization's letterhead.
- Using this tool, the LIMS can produce data reports on the fly that can be configured to match a user's needs.

Data Analysis and Reporting Tools

- In addition to tabular reports, the use of Crystal Reports™ allows the LIMS to generate on-the-fly graphical representations directly from the database in basic "Excel-like" formats.

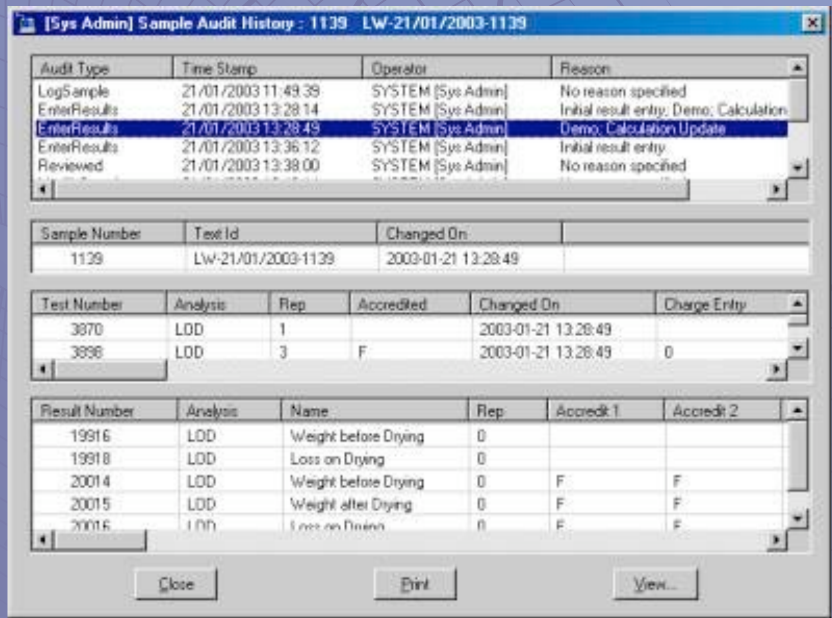


Audit Trail

- All actions are retained by the LIMS. That somewhat sweeping statement is the result of regulatory and legal requirements around which the original LIMS products were built.
- If a technician changes a result, the change is recorded and will be prompted for some sort of explanation (e.g., typo, miscalculation) or a code to represent the types of explanation commonly used.

Audit Trail

- Audit trails allow an administrator to see the state of a given sample or data point throughout its history to ensure complete reproducibility and, in regulatory and forensic labs, legal defensibility.



Images used with permission of LabWare, Inc.

Audit Trail

- In addition, the LIMS retains all the raw data it captures, as well as any reduction steps. Again, this is to ensure complete reproducibility of data by later users.

Costing and Accounting Functions

- The most common LIMS deployment is in a commercial laboratory of some kind, which needs to be able to bill its clients for work. Consequently, the majority of LIMS products have the ability to create invoices automatically during report generation.
- In our case, the need to bill our customers isn't an issue, but it can be used to determine the cost of analyses which would allow for estimation of the actual laboratory cost per expedition.

Additional Functions

- There are many other functionalities found in various LIMS products, e.g.:
  - Electronic laboratory notebooks
  - HAZMAT integration
  - Data mining tools
  - Chromatogram analysis
  - Remote monitoring of laboratory
  - Retention of certificates of analysis

Leveraging a LIMS To Meet Organization-Wide Challenges

- The purchase of a LIMS will provide a framework for the shipboard laboratories and possibly the shore labs as well, depending on the scale of deployment.

- This framework will allow for:

  - The recording of crucial QA/QC information
  - Reproducibility of data
  - Automated data acquisition and reduction
  - Elimination of external uploaders and data transfer applications
  - Effective workflow management tools for laboratory supervisors.

Leveraging a LIMS To Meet Organization-Wide Challenges

- A LIMS will also assist the USIO in development of a number of applications development projects, e.g.:
  - Subsume current efforts to migrate Neuron Data applications to Java (Corelog, Operations, and Sampling)
  - Provide a framework for the direct acquisition of instrumental data without human entry.
    - This is especially important in the shipboard chemistry laboratory, where considerable effort is required to upload the chemistry data into Janus.
  - Provide graphical and reporting tools to the applications developers and sailing scientists.

Challenges and Risks

- Deploying a LIMS is a significant amount of work, both for the vendor’s programmers and for internal staff.
- Deploying a LIMS will require good planning, consume staff resources, will need to be guarded against scope creep, and will force the USIO to better define its business practices.

Challenges and Risks

- It is important to note that a LIMS does not define an organization's practices, but rather provides tools to enforce them.
- In addition, the use of a LIMS requires training and experience. Science participants, for example, will have to be instructed in the use of the LIMS when they board ship.
- We expect the training curve to be less steep than for users who are newly exposed to the existing applications framework, however.

Challenges and Risks

- The vendors that supply LIMS products are well aware of these (and other) potential problems, and deployment strategies have been developed by each of them to mitigate these factors.
- For example, LIMS deployment strategies in the past were heavily dependent upon vendor programmers to make fixes and changes, with the high cost associated with that philosophy.
- This is no longer true – most vendors want to hand the client the "keys to the kingdom," turning over control over the LIMS and its database to the user once the deployment phase is completed.

USIO Implementation Strategy

- As part of the U.S. SODV project, an RFQ for a commercial LIMS was released on 23 January 2006. (Vendor responses are due on 8 February.)
- The acquisition project manager (David Houpt) will compile vendor responses and produce a report to management by mid-February.
- The USIO will select a vendor in March and begin implementation shortly thereafter.
- Implementation of the central LIMS applications will take approximately six months.

Summary

- The proper implementation and use of a LIMS can not only enhance the data quality in the laboratory, but can also offer significant savings in time, money and other resources.

- These savings happen as a result of automation, inclusion of toolboxes to aid in configuration and applications development, and better access to the data in the laboratory.

Summary

- A LIMS
  - Enhances any QA/QC program
  - Decreases human input errors due to direct data acquisition from instruments and equipment
  - Provides tools for time and resource management
  - Augments standardization and traceability
  - Speeds up a number of processes (especially in the reporting of data).

Questions and Comments?

Thank You

STP Report on Downhole temperature and pressure tools

January 2006

Many of IODP's scientific objectives require accurate downhole temperature and/or pore pressure measurements. For example, temperature and pressure data are vital to studies of the seismogenic zone, subduction factory, the subseafloor ocean, and methane hydrates. In addition, temperature data are important for studies of subseafloor microbiology. However, temperature and pressure data are not a scientific priority on every leg, and many of the tools are, or began as, third-party tools. As a result, technician and scientist training, tool deployment and QA/QC procedures, data reporting, processing and archiving have not been consistent in the past.

Downhole Tool Status

Temperature tools previously used by the USIO include those for the APC system and wireline "probes" such as the DVTP, used with XCB and RCB coring. The previous APC/Adara tool has been discontinued, and a new APC tool (called APC3) is under development by A. Fisher, UCSC and H. Villinger, Univ. Bremen and the prototype was successfully tested during Expedition 311.

Pressure tools include the probe, DVTP-P, and the newly developed "T2P" tool. Other options are available from industry (e.g., the Piezoprobe), packer measurements, and long-term monitoring. Background pressure from packer tests (in which the borehole is temporarily isolated from hydrostatic pressure using inflatable rubber elements) have been difficult to interpret due to drilling disturbance. Probes such as the Piezoprobe and DVTP-P have yielded satisfactory results but do require longer equilibration times than temperature. Deployment difficulties with the probe can be created by formation cracking, probe bending, or lack of isolation from the drill-string.

Because of the importance of temperature and pressure measurements, it is vital that appropriate tools (e.g., for APC, XCB, RCB, or other coring/drilling systems) be available for shipboard scientific purposes on each platform. However, because of the non-standard nature of these tools, STP does not specify individual equipment types.

Calibration, QA/QC

Calibration procedures should be developed by the IO's so that results are internally consistent, and consistent between platforms. At least once a year calibration in temperature bath (capable of holding the first half meter) is recommended for all downhole temperature tools. As a secondary check, mudline temperature at each site (before hole is spudded) should be compared to independent measurements, available in global oceanographic databases. Values should be consistently reported in Expedition Report and stored as a data item in the site table(s) of the IODP database(s).
For pressure tools once a year calibration of the sensor by the manufacturer is recommended. As a rough quality check, pressures recorded at several stops during the lowering of the pressure tool in the drill pipe (3-5 mins w/no pumping) should be compared to depth from coring line.

For all downhole probes, STP recommends that IOs, with input from STP/appropriate scientists develop standard deployment procedures/advice for each tool (for each drilling type -- APC,XCB, RCB, etc, as appropriate). As part of this, standard forms should be developed so that deployment information can be archived and be accessible via the web.

Staffing

Downhole temperature probes:

Technicians: should be trained in operation and maintenance of tools, downloading of data, and processing of the data. While duties can be shared with other labs (especially on legs where downhole measurements may be minimal), downhole tools should clearly be part of the technician's job duties and training.

Scientist: It is recommended that one scientist on each shift has specific responsibility for overseeing collection, interpretation, and reporting of the downhole temperature measurements. One of the two scientists should be experienced in thermal data collection. These scientists will work with IO personnel to plan data collection, review data interpretation and QA/QC information, and write the report. If time allows, data could be reprocessed shipboard, such as using available thermal conductivity data.

Downhole P probes:
At present, interpretation of P-probe data is not routine. Scientific deployment will require scientific specialists working in consultation with the instrument developers, technical staff, and drilling personnel.

Packer Tests:
Planning and interpretation of packer tests for scientific purposes will require an experienced shipboard scientist.

Resources for training and interpretation

Downhole T probes:
For each instrument used on a recurring basis, a current version of software plus sample data should be available online as part of a tutorial for future shipboard scientists, or shorebased users of temperature data .

Downhole P probes:
When available, software and sample data sets should be made available online.

Reporting:

Explanatory notes for each expedition should clearly note the most recent calibration information and dates for any instruments used. These data should also be archived and accessible via the web.

Initial reports should include plots of temperature (or pressure) versus time for all deployments and describe reasons for any failed deployments.

Initial reports should note any QA/QC issues for each run and these issues should be archived in the database and accessible via the web.

For all tools, time versus measured value (either T, P, or both) data for all tools should be archived and accessible via the web (following standard moratorium restrictions), including deployment information (ideally in a standardized form).

Relevant downhole drilling parameters (e.g., weight on bit, coring line information, bottom hole temperature and pressure) is also potentially valuable for interpretation of downhole tool results.

Action Item: Continued STP interaction

Because the program and the temperature/pressure tools are in a state of transition, a sub-group of STP should continue to track developments and tool status on all platforms. As software is developed for newly developed tools, the IOs should develop standard protocols for deployment and processing in consultation with tool developers and STP.

Temperature and Pressure downhole measurements

Vital for:

- understanding deep processes
- fluid flow indicator
- interpretation of gas hydrates, microbiology, geochemical reactions

Current Status

USIO:

- APC coring system
  - APC/Adara tool: no new tools being made; old tools being used
  - APC3: tested on 311
- wireline probes
  - DVTP and DVTP-P
  - “T2P” tool (newly developed, run on 308)
- drillstring packer

CDEX: no tools yet

ESO: no tools yet

Calibration, QA/QC

- all temperature tools:
  - 1/ year calibration
  - mudline temperature at each site
- pressure tools:
  - 1/ year calibration
  - comparison of P during lower (several stops) and coring line depth

Protocols:

- IOs should develop standard deployment procedures/advice for each tool (for each drilling type -- APC,XCB, RCB, etc, as appropriate).
- standard forms should be developed so that deployment information can be archived and be accessible via the web.

Staffing

Downhole temperature probes:

- **Technicians:** should be trained in operation and maintenance of tools, downloading of data, and processing of the data.
- **Scientists:**
  – One scientist / shift has specific responsibility.
  – One scientist/leg should be experienced in thermal data collection.

Downhole P probes and Packer Tests

- requires experienced scientific specialists

Reporting:

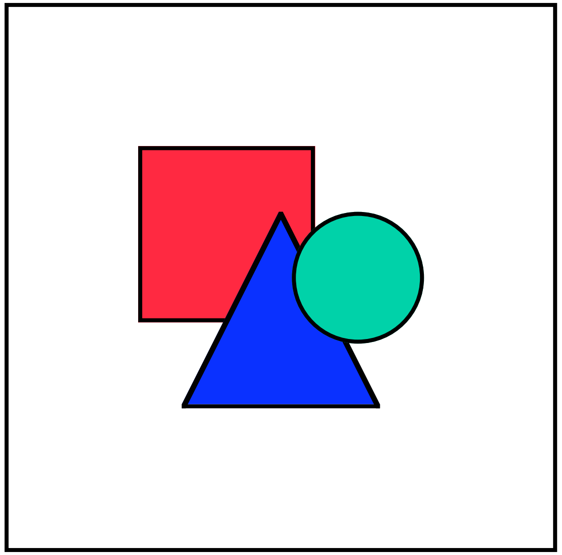
- Calibration information:
  - Explanatory notes
  - archived and accessible via the web.
- Initial reports should:
- include plots of temperature (or pressure) versus time for all deployments and describe reasons for any failed deployments.
- note any QA/QC issues for each run

To be archived (and online accessible)

- current version of software plus sample data for each instrument (training tool)
- deployment information
- instrument calibration history
- link to relevant drilling parameters(?)
- time versus measured T and/or P
- estimated equilibrium value

Action Item: Continued STP interaction

- Because the program and the temperature/pressure tools are in a state of transition, a sub-group of STP should continue to track developments and tool status on all platforms. As software is developed for newly developed tools, the IOs should develop standard protocols for deployment and processing in consultation with tool developers and STP.



ICP-MS on the Riser and non-Riser Drilling Platforms

Laser Ablation ICP-MS

Nd:YAG 213 nm laser.

Minimal sample preparation.

Rapid turn around and sample throughput.

Samples that could be analyzed are glasses, minerals, and microfossils (i.e., individual foraminifera), pressed whole-rock powders.

Spot size: ≥ 5 μm.

Laser Ablation ICP-MS

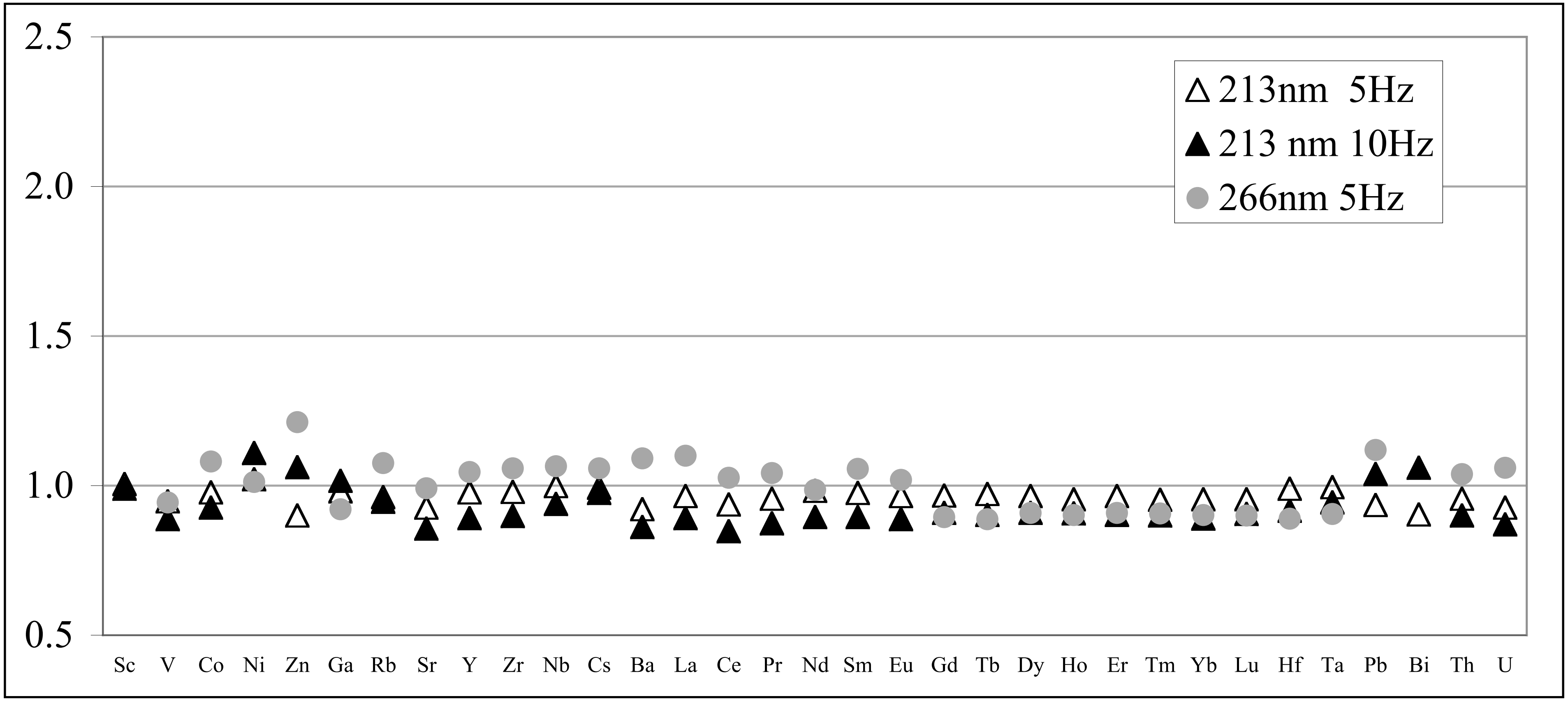
Data:

Need a known element concentration for full quantification of abundance data (to correct for different ablation amounts).

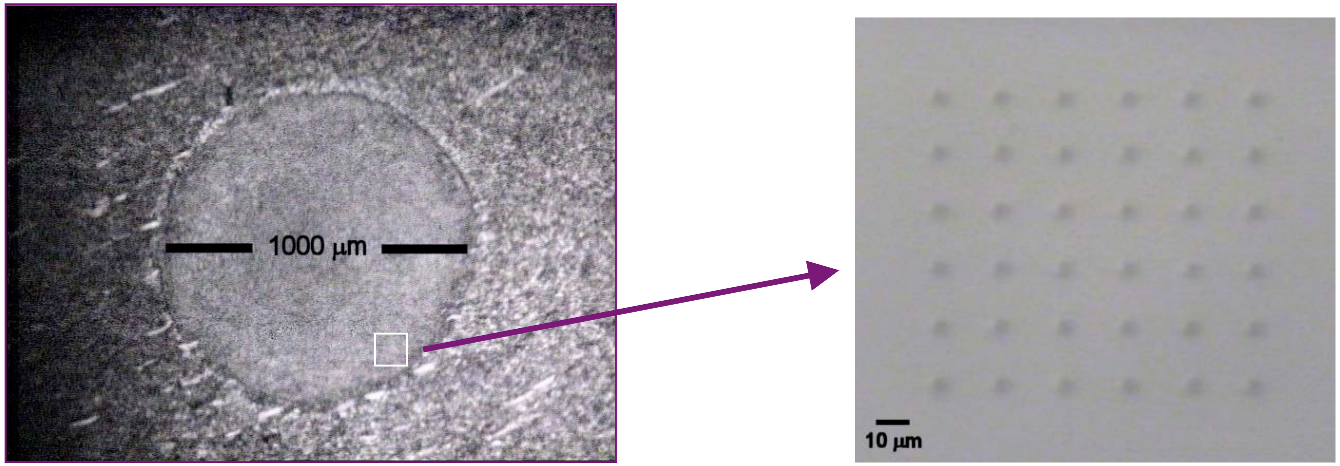
Ratios of counts are very useful - can influence drilling.

Data can be quantified later on-shore.

Laser Ablation ICP-MS

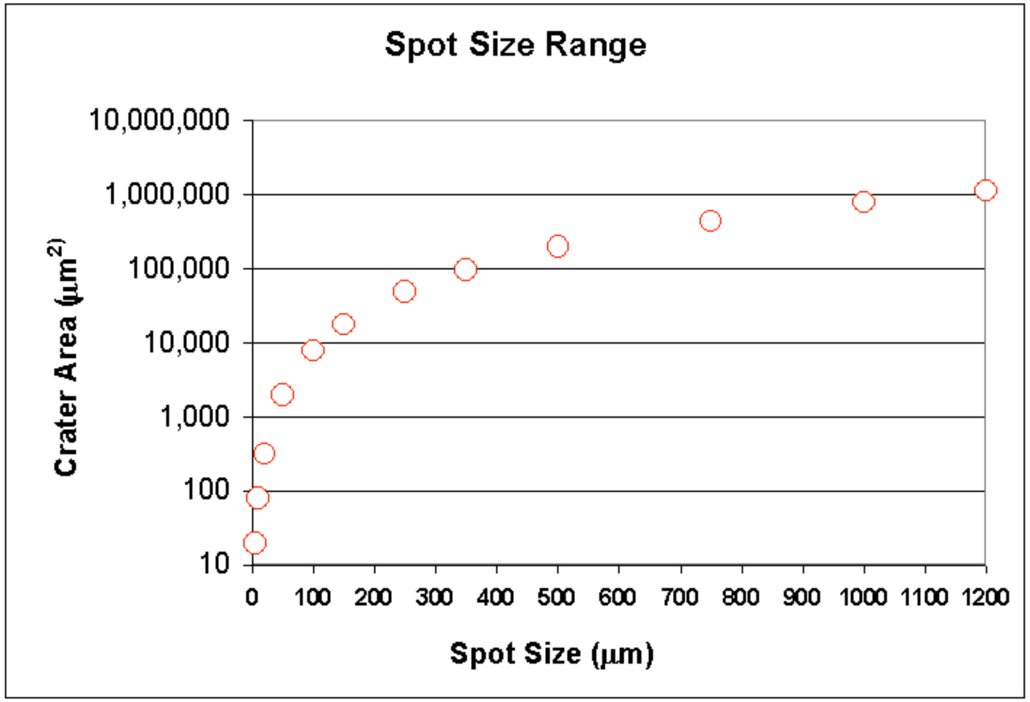


Spot Size Range



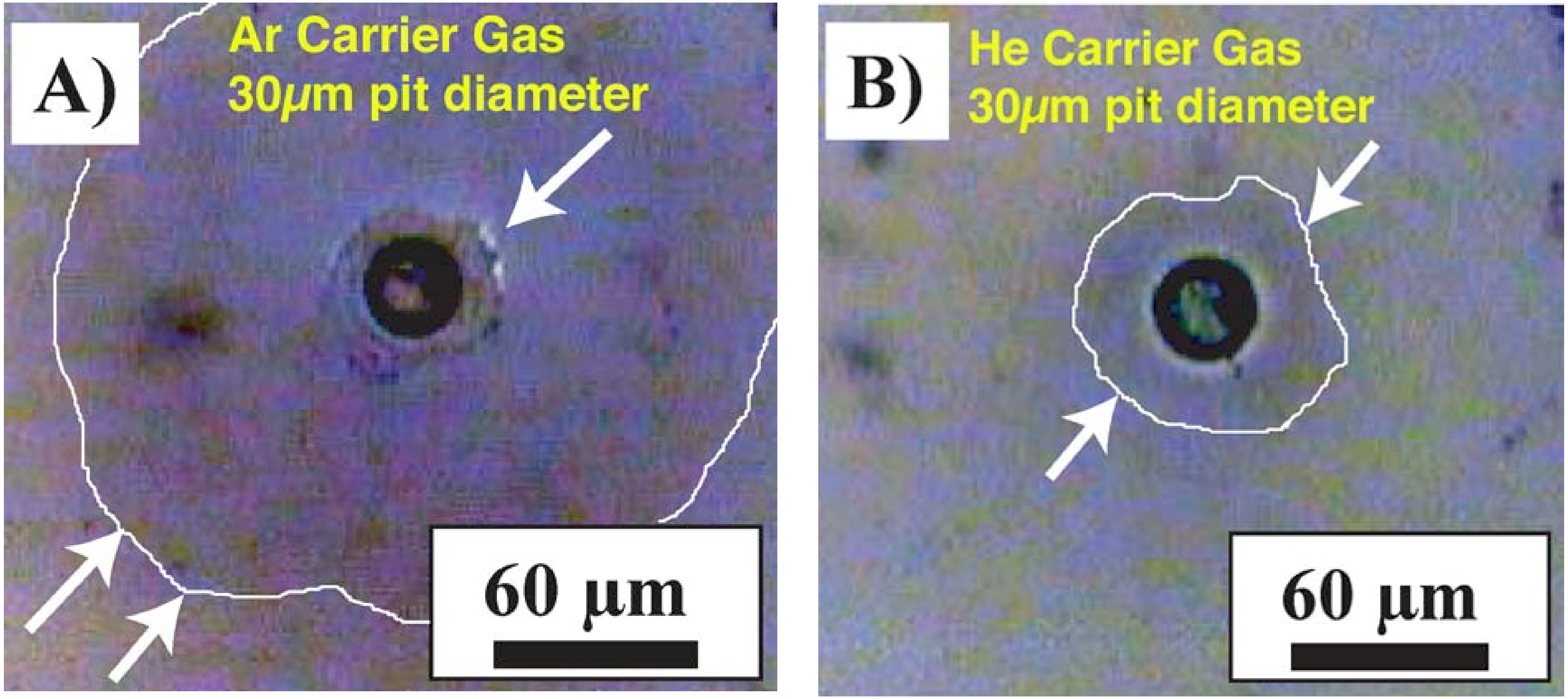
1000mm spot in NIST 610 Glass

5µm spots - 100µm x 100µm raster



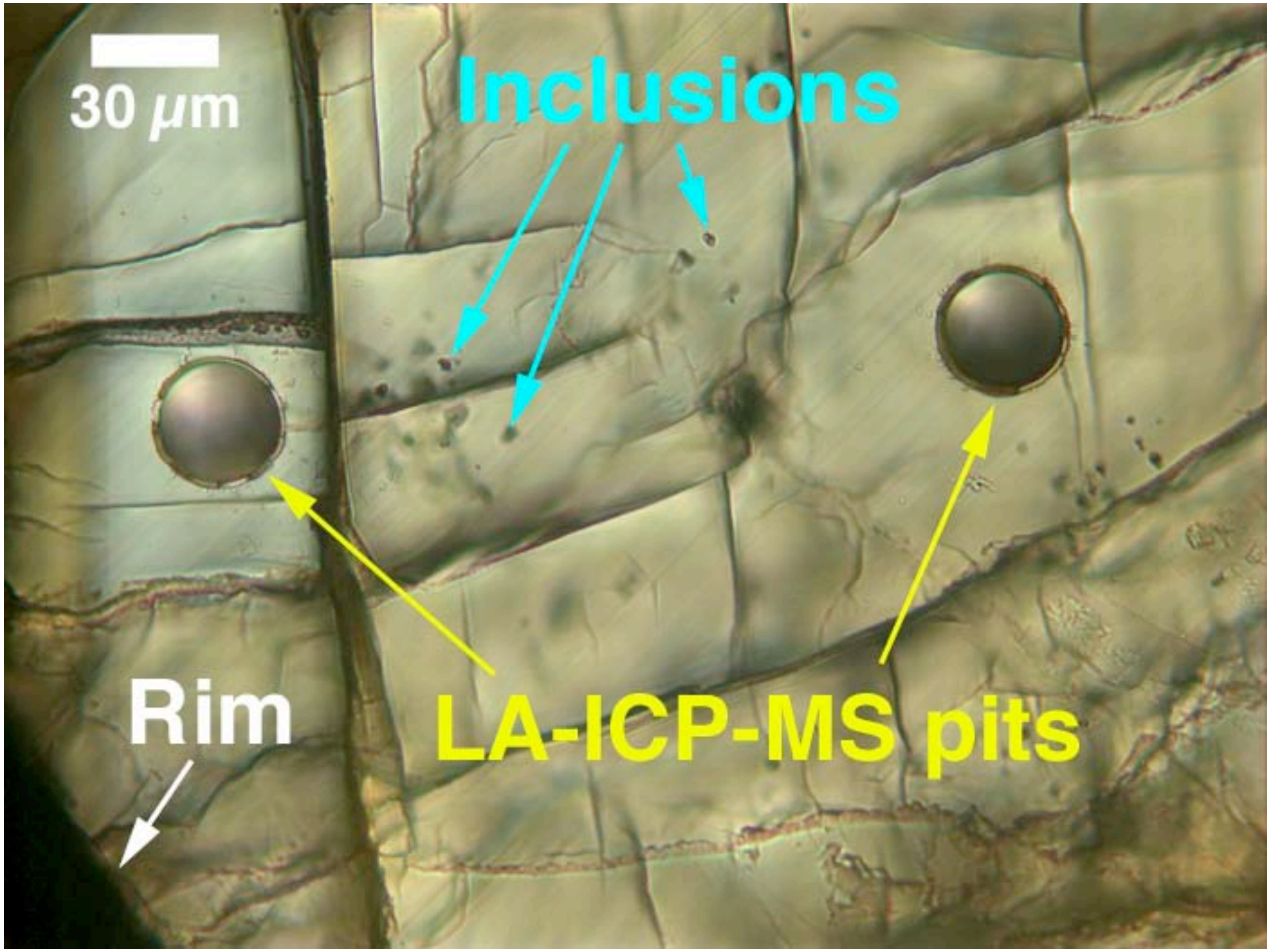
Universal Platform product line spot size range: < 4µm to > 1200µm

Laser Ablation ICP-MS



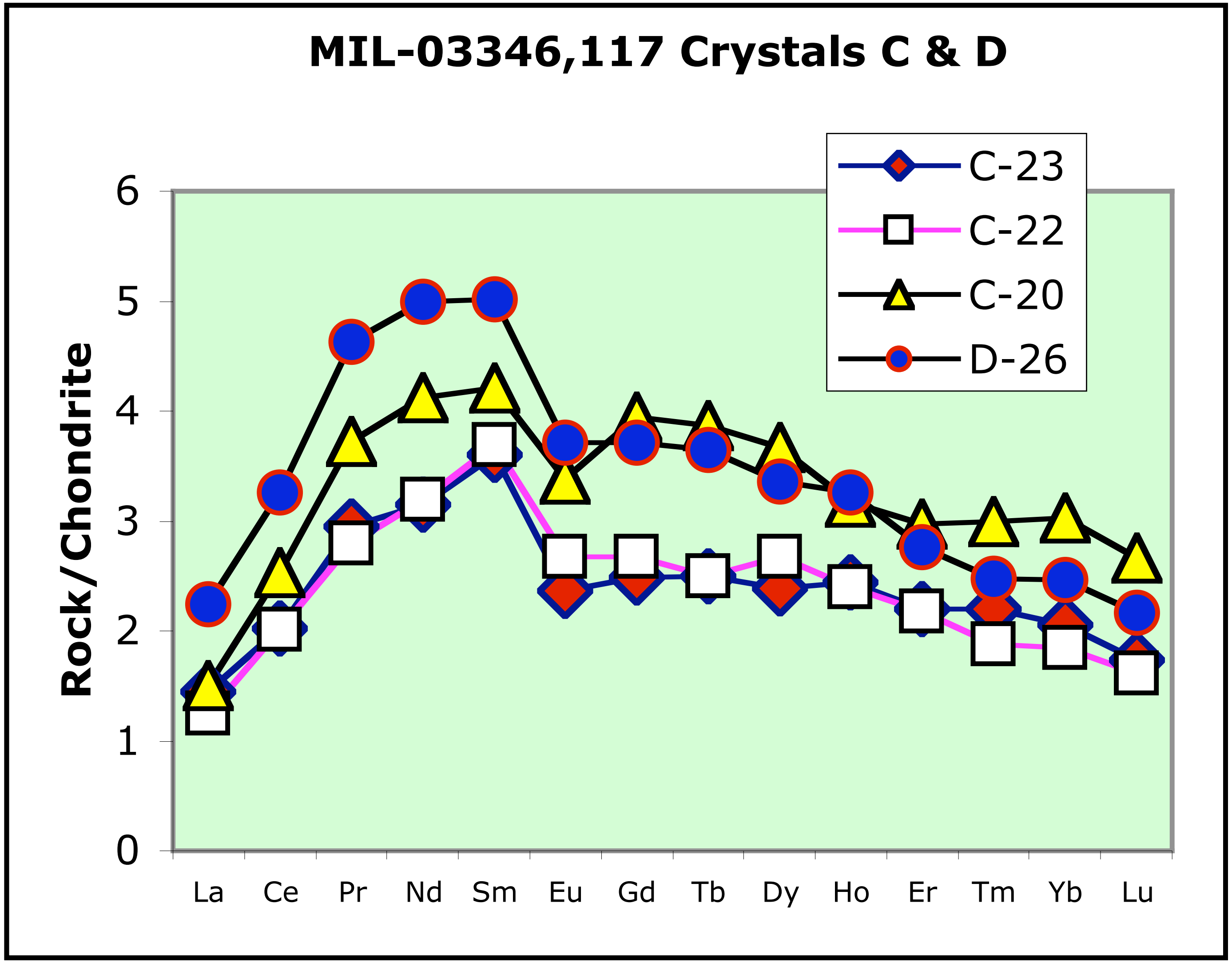
Laser Ablation ICP-MS

Clinopyroxene from Martian Meteorite MIL-03346



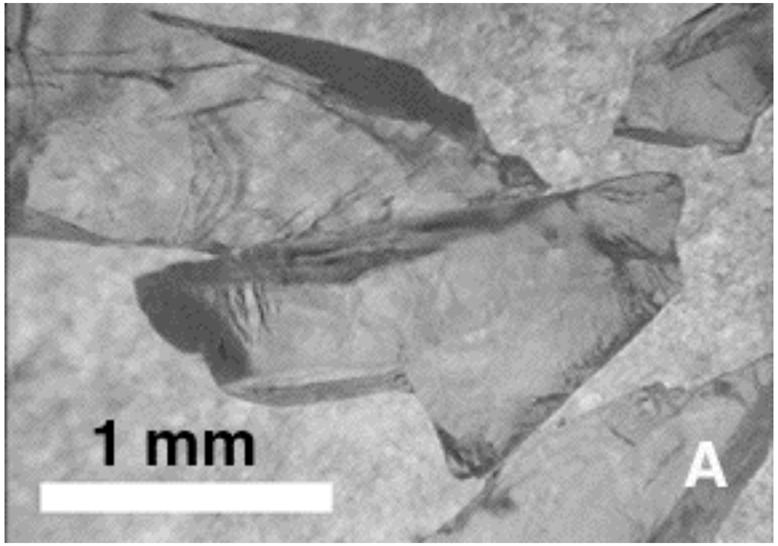
Laser Ablation ICP-MS

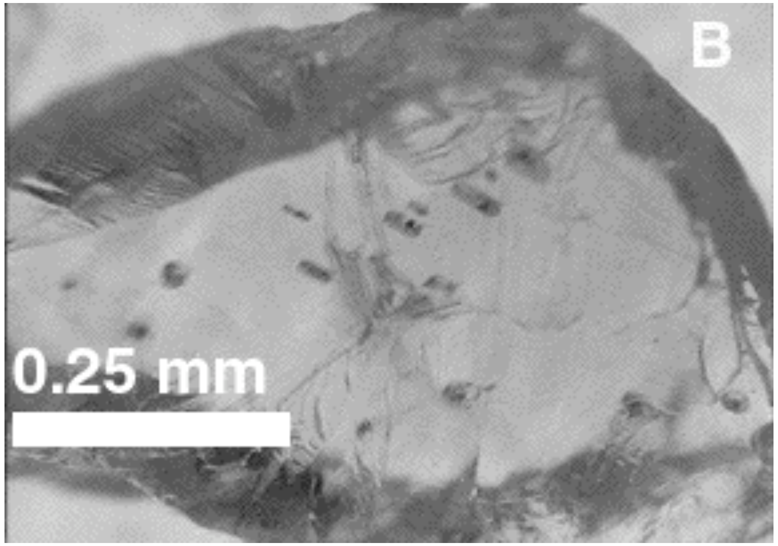
Clinopyroxene from Martian Meteorite MIL-03346

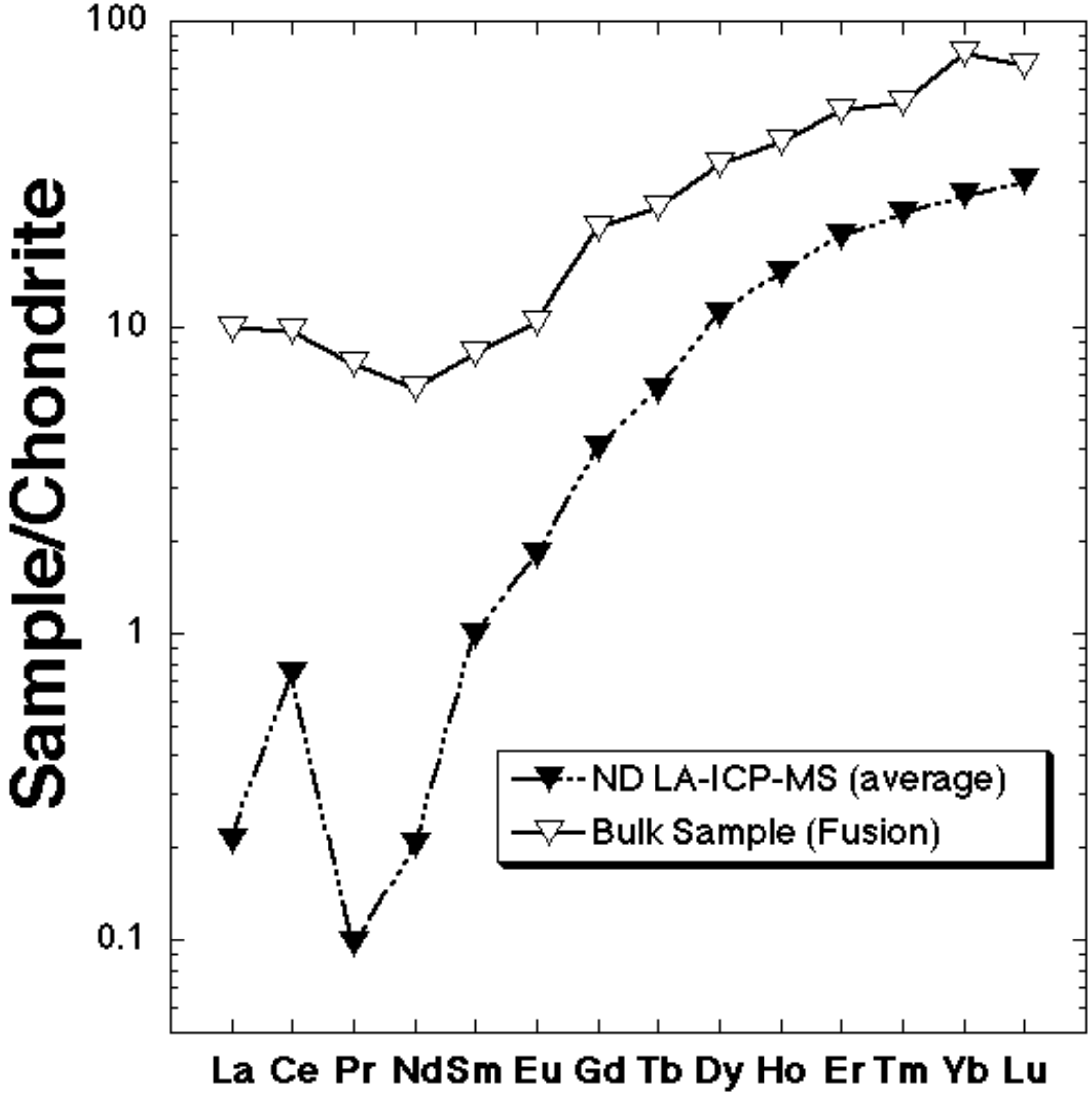


Laser Ablation ICP-MS

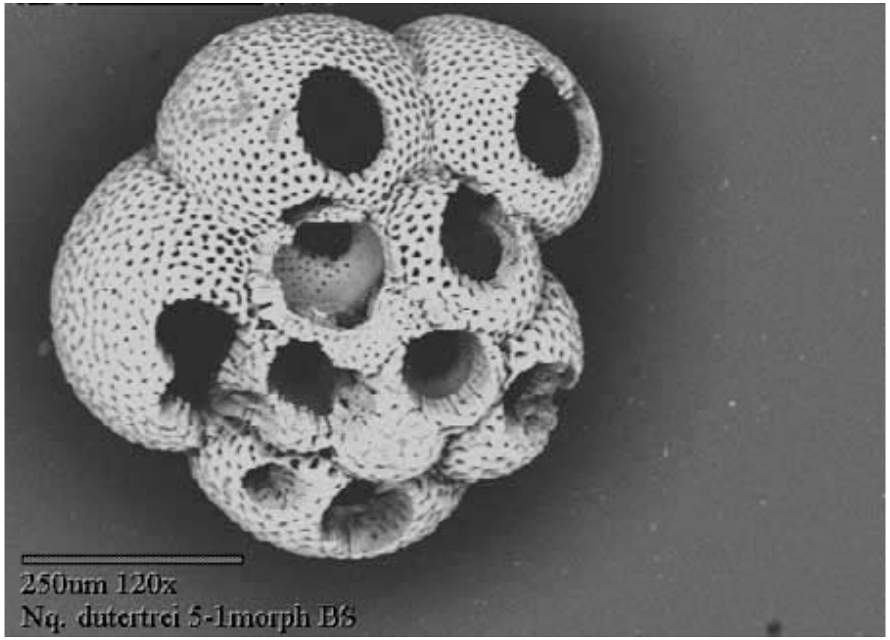
Zircon Data (Quadrupole)





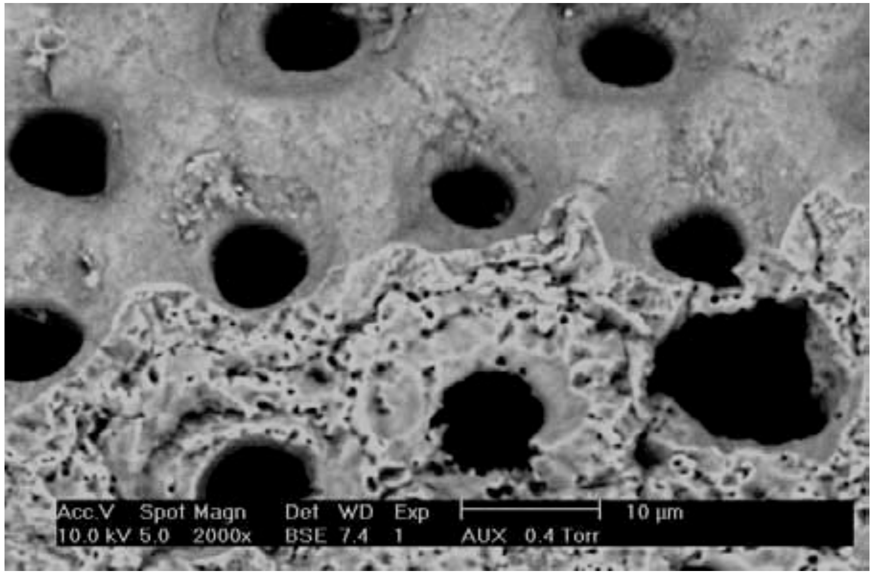


Trace Elements in Foraminifera

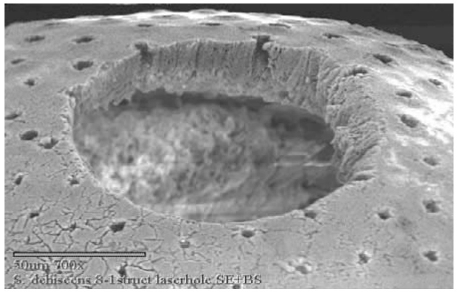


SEM image of laser-drilled spots in *Neogloboquadrin a dutertrei*.

Universal Platform
UP- 213 AI



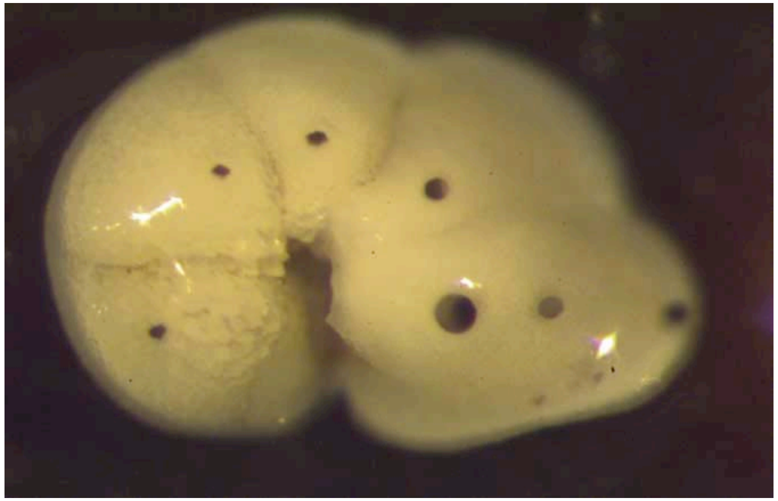
Environmental SEM surface image of the foraminifera *Globigerinoides sacculifer* after rastering with the laser.



SEM image of laser-drilled spots in Sphaeroidinella dehiscens

Hathorne, E.C. et al, *G3*, 2003, (4), # 12

Trace Elements in Foraminifera



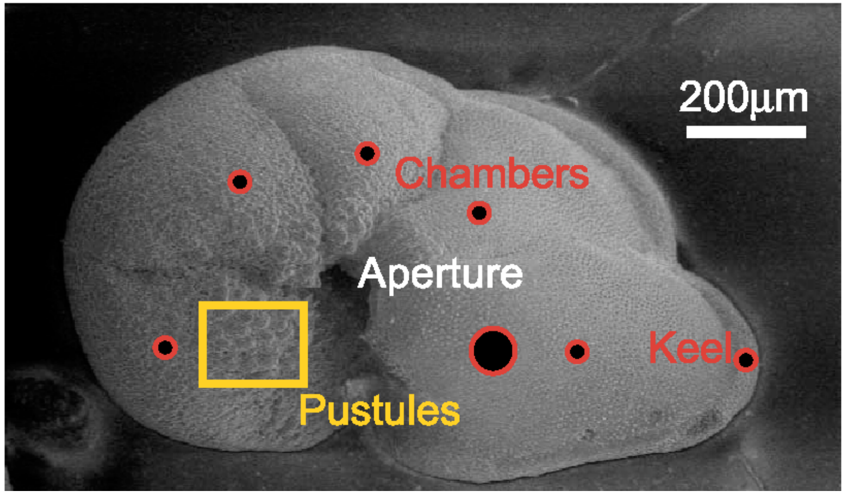


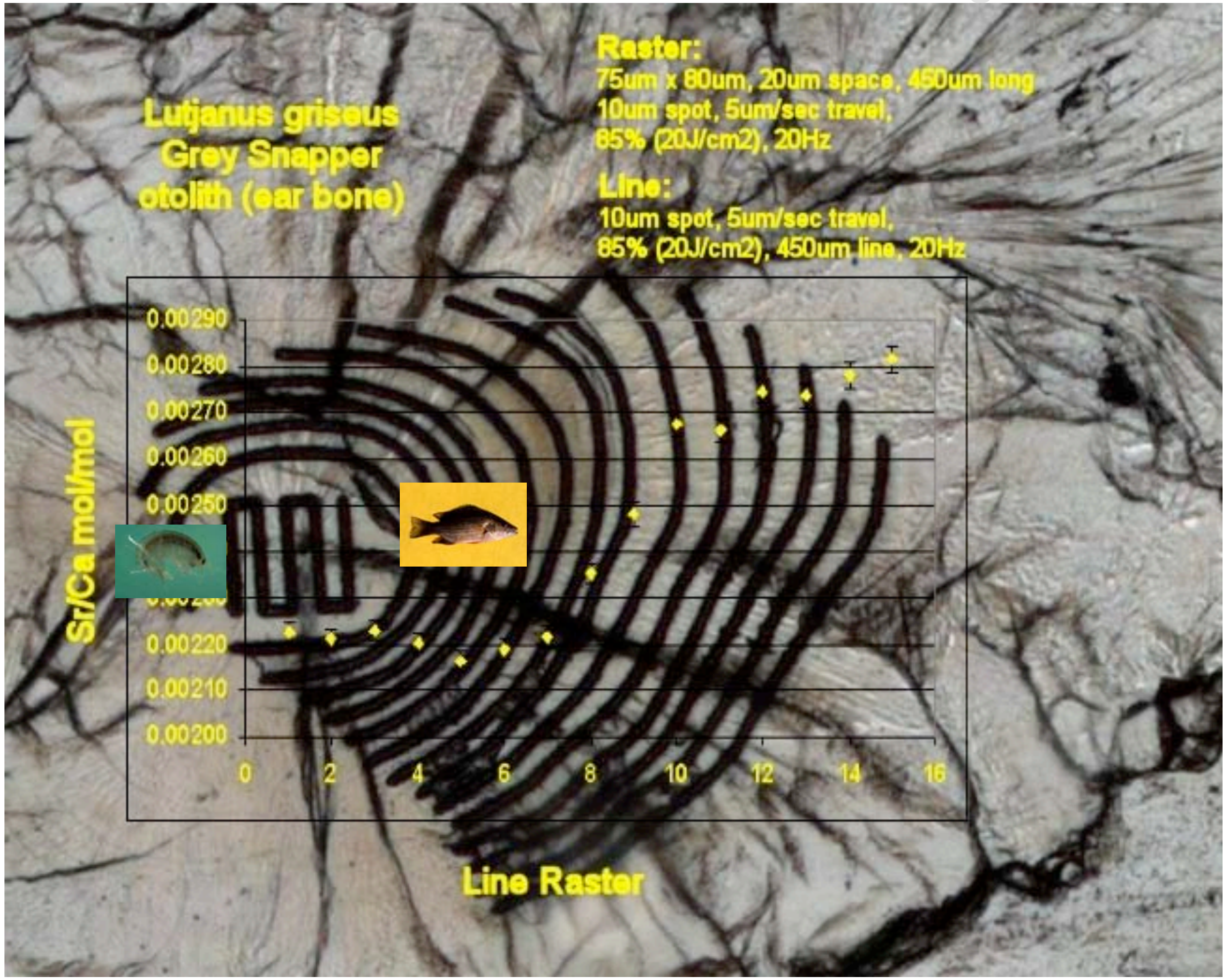
Table 5. Element/Ca Ratios and Partition Coefficients (D) for Li, Sr and Ba in Different Parts of a *Gr. tumida* Test[a]

Sample	Li/Ca Mean ± $1\sigma_m$ µmol/mol	D_{Li} 10^{-3}	Sr/Ca Mean ± $1\sigma_m$ mmol/mol	D_{Sr}	Ba/Ca Mean ± $1\sigma_m$ µmol/mol	D_{Ba}
Seawater[b]	2550		8.54		3	
Inorganic calcite[b]		0.25		0.04		0.08
Foraminiferal calcite literature	15–20[c]	5.88–7.84	1.17–1.49[d]	0.14–0.17[d]	0.6–13[e]	0.2–0.70
Keel spots (n = 3)	18.28 ± 3.56	7.17	1.12 ± 0.08	0.13	1.79 ± 1.03	0.60
Chamber spots (n = 6)	12.72 ± 2.98	4.99	1.02 ± 0.03	0.12	1.68 ± 0.69	0.56
Pustules raster (n = 1)	22.95	9.00	0.30	0.04	0.32	0.11

[a] Partition coefficients for foraminifera calcite (from the literature) and inorganic calcite are also provided. D_{Ba} is calculated using a value of 3 µmol/mol for surface seawater. The standard error is a measure of the variability in element/Ca ratios between different chambers, or different parts of the keel.
[b] *Elderfield et al.* [1996, references therein].
[c] *Delaney et al.* [1985].
[d] *Brown and Elderfield* [1996].
[e] *Lea and Boyle* [1991].

Hathorne, E.C. et al, *G3*, 2003, (4), # 12

Fish Otolith Analysis



Two distinct data series. One set associated with the larval stage (Line 1-7) of development and one associated with the juvenile stage (Line 8-15) of development.

Laser Ablation ICP-MS

Stability:

Everything will be moving in unison.

Optics at high magnification (100x) may be a problem.

Test Specifications:

Vibration and Shock (maintain 85% full power energy):
1 G, 5-500 Hz random, X, Y, Z, 30 minutes;
1 G, 4-100 Hz Sine sweep, 5 minutes (look for resonance in critical components; Shock - 30 G's, 1 ms saw-tooth X, Y, Z.

Transportation Shock (non-operating shock to laser head & power supply):
12 inch flat drop, each side, 2 times;
12" edge drop, each edge 1 time.

Chikyu ICP Lab

Laser Space

Notre Dame ICP Lab

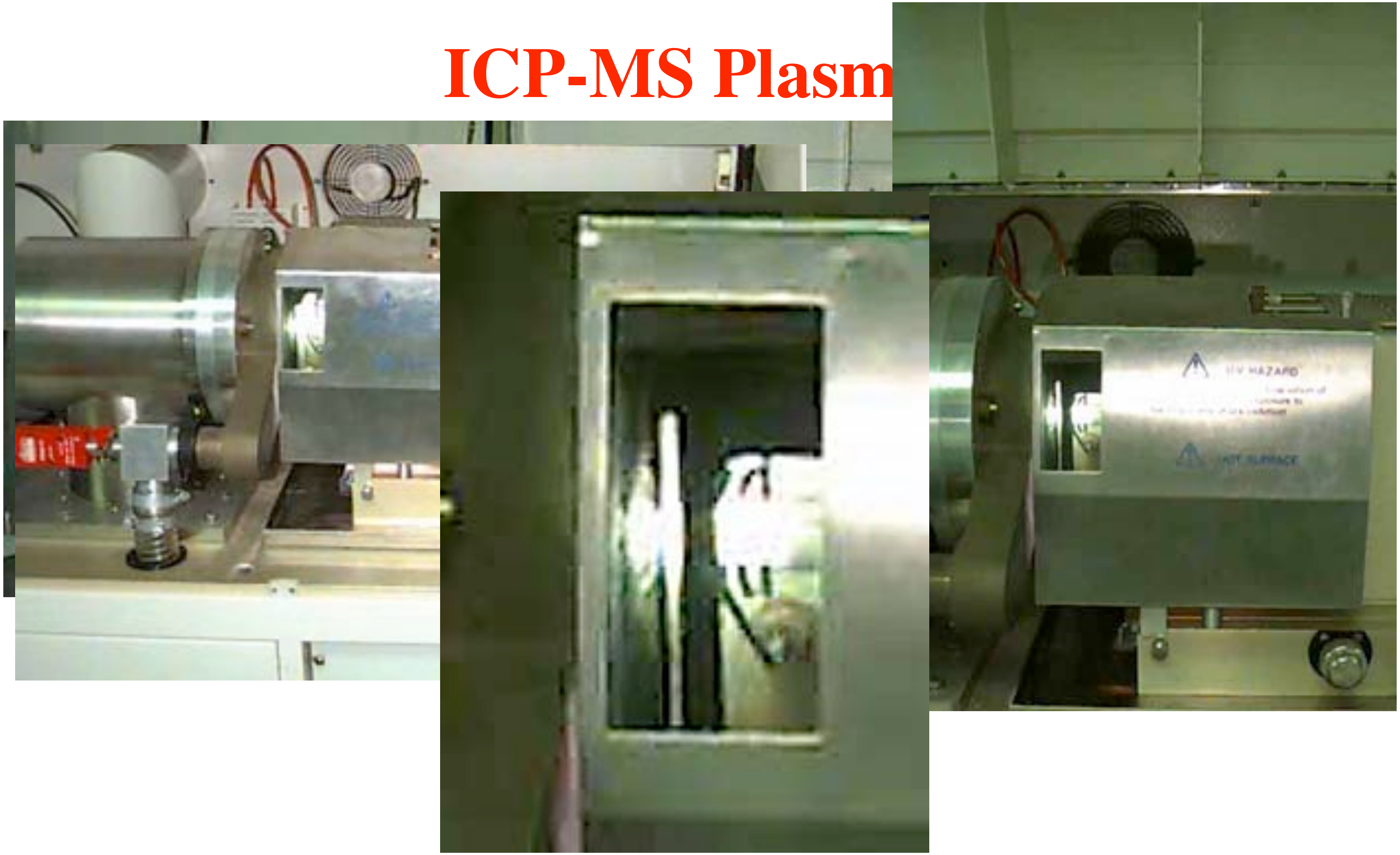
Chikyu ICP Lab

Laser Space

Other Questions

SciMP Consensus 0502-02: In investigating the potential problem of an oscillating (moving) plasma when using a quadrupole ICP-MS on a moving platform, SciMP was assured by various vendors that this would not be a problem as the plasma is a supersonic jet and will not be deviated by a moving platform. SciMP notes, however, that no actual testing of this has been conducted. We note that CDEX has installed an ICP-MS on the *Chikyu*, which will be tested within the next year. (In a separate action item SciMP ask that CDEX report to SciMP on the results of this testing.)

ICP-MS Plasm



Iintegration

- International workshop held in Tokyo, Octobe 2005-Organized by CDEX-JAMSTEC and th DESC following an initiative discussed during February 2005 IODP Scientific Measurements (SciMP) meeting.

- Overview of workshop discussions

- CLSI Issues that STP can help with...

OBJECTIVES OF CI

- Extending information beyond the borehole from 1-D to 3-D or even 4 with multiple measurements or time

- Need integration between different measurements to fully understand th system

UNDER IN-SITU CONDIT

- CLSI Challenge: Measurements at various scal
wide array of instruments with different theore
methodological foundations, pose a significant
to core-log- seismic integration. Example of po
data: (1) weight and volume are measured usin
wet and dry samples, (2) neutron-porosity logg
calibrated for limestone are used in a wide arra
geological settings to estimate porosity data, (3
grain densities are used to derive porosity data
density logs, (4) assumed slowness values for b
and rock are used to derive porosity values fro
logs, or (5) Archie's law is used to derive poros
from resistivity logs. So, porosity as measured

at In-Situ T&F

- The importance of temperature- and pressure-c and calibrated physical properties measuremen (acoustic velocity and velocity anisotropy, dens porosity, electrical resistivity, and etc.) has bee emphasized, and clearly underlines the need fo measurements of pressure and temperature.

- Industry petrophysicists present stated simply measurements taken on samples that are not ur proper confining pressure are not useful for co with wireline/LWD/MWD

PRESSURE AND TEMPERA

- Need equipment onboard to simulate higher temp pressures or use PCS

- Need to measure p and s wave velocities, but prob resolution of sampling; Expedition specific as to n

- For soft sediments one sample may work over a ra porosities, depths, and temperatures; Idea: pick representative samples (10 or 20) of the different l different depths, etc.

s

ph Stephen, Woods Hole Oceanographic Instituti

e our best images of the interior of the earth are base
hods, one important goal of many deep boreholes is to
n and to calibrate seismic record sections. Borehole se
e few tools we have to link the borehole scale (define
logging) to the regional scale (defined by multi-chan
ction seismics). Also given the significant lateral hete
rved along strike in all subduction zone environment
orehole results along the subduction zone will requi
wledge of how the reflected seismic wave field is crea
es to the borehole observations. Normal incidence V

- Operational problems need to be overcome: more of a r
problem than a source problem, seismic while drilling, h
conditions may be the root of the problem; Why is it wo
industry?

- Installation of seismometers in the borehole that can be

- Difficult to do VSPs at a high resolution

- Borehole sources?

- EDP to investigate VSP problem? Ideas: Wash seismon
the hole…Put sensors on the outside of casing…but hav
past the well head

Q AND ANISOTRO

- Difficult topic; Heterogeneities at all sc
- LWD resistivity tools can investigate anisotropy, sources:Pore space, phyllo hydrates, etc.
- Need for a well-understood location to

- Standardizing the depth positioning and accur
collected data sets, including: drilling and engi
parameters, cores, log data sets, mud-logging a
cuttings in riser-drilling operations (where app
remains a critical problem across academic and
industrial operations.

- The generation and calibration of synthetic seis
and the attendant problems associated with tim
conversion of seismic data (either using velocit
from refraction data or reflection coefficients c
from logs) generated an extensive discussion a
centered around the contribution of vertical sei

RESOLUTION EDUCATIO
COMMUNITY

- Need standard way to refer to measurements that is
independent

- http://spwaa.org and schulemberger, baker, halibur
websites have helpful info for this issue

- Challenge for IODP to come up with standard meas
descriptions

- Downhole imagery tools to bridge th
gap between core and log measureme

- Logging while coring systems potent
equipped with geophones (for check
surveys while coring)

- Development of new downhole prob
microbiology and geochemical invest

Challenges

- To promote better documentation c methods, assumptions, tools, resolut and limitations inherent in each new acquired data set

- To widely disseminate the results of successful core-log- seismic integrat efforts

- Depths- Industry workgroup is being for
Sakurai-san volunteered to be contact;IC
connection = Taskforce or Data Manage
Group develop guidelines for composite
scales and investigate software implemen

- VSPs-Recommendation crafted with spe
regarding sources and depths

- QA/QC Oversight, Aiding in communica
CLSI between industry and academia

Workshop Reports

Core-Log-Seismic Integration – New Scientific and Technological Challenges

"Core-Log-Seismic Integration: New Scientific and Technological Challenges," a technical workshop addressing critical issues in scientific drilling and coring was held in Tokyo, Japan on October 3-4, 2005. The workshop was organized by the Center for Deep Earth Exploration - Japan Agency for Marine-Earth Science and Technology (CDEX-JAMSTEC) and the Japan Drilling Earth-Science Consortium (J-DESC) following an initiative discussed during the February 2005 IODP Scientific Measurements Panel (SciMP) meeting.

An aim of this workshop was to promote discussions between two main groups of scientists, those who use core, log and seismic data to address academic or industrial problems and those who are developing new databases, data handling procedures, and visualization technologies. Goals of the workshop included reviewing and exploring extant methods for processing and analysis of core, log and seismic data with significance placed upon problem solving using a variety of methodologies and approaches to core-log-seismic integration. Special emphases were placed on recognizing the interdependence between problems addressed and the technology/methodology used for data collection, analysis, integration and promotion of core-log-seismic integration as an important focus within the drilling science community. To these ends, 40 scientists attended 17 high-quality talks (6 from US, 6 from Japan, 4 from Europe and 1 from Taiwan). The topics discussed included: (1) the different approaches to core-log and core-log-seismic integration from theoretical (scaling problems, modeling, petrophysics) or technological (engineering, IT) points of view, (2) the possibilities for testing these methods using individual case-studies (including marine, coastal and continental environments), and most importantly, (3) comparison and exchange of methods and views between researchers working in related or complementary fields. Numerous exchanges of knowledge and experience regarding both standard and newly developed practices and methods clearly underlined the benefits of such workshops. Benefits that are both for scientists and science itself due to the identification of new technological and methodological avenues for development of innovative solutions to long-standing scientific and technological challenges. The workshop program, proceedings and most of the presentations can be accessed at :

http://www.jamstec.go.jp/chikyu/jp/news/nw_050712.html.

Major discussion items are summarized below.

Information Exchange: Terminology, Units, Tools, Methods, Assumptions

Because core-log-seismic-integration methodology and practice is intrinsically sited at the interface between multiple scientific and technical fields of inquiry, a major effort is needed to: (1) promote better documentation of methods, assumptions, tools, resolution, and limitations inherent in each newly acquired data set, and (2) better address problems associated with parallel measurements acquired at different scales or resolution, often using different equipment or tools, and/or relying on different principles/assumptions. A clear example of potential problems associated with these kinds of overlaps is the measurement of "porosity". Porosity can be measured or derived from discrete samples (moisture and density measurement vs. Hg or BET porosities), neutron-porosity logs, density logs, resistivity logs and/or analysis of downhole imagery, and all reported in any database as "porosity," in the same units; however, these measurements of “porosity” can have vastly different values depending on methodology, even within the same core interval.

In collaboration with industry, a project has been initiated to set up a working group that will propose discipline-wide descriptive terminology for standard measurement techniques and results. Any contributions and participation in this working group are greatly welcomed. If successful, accepted by the scientific community, and adopted or supported by the relevant scientific programs and investigative initiatives, this terminology will be disseminated in the form of a series of manuals. This manuals will include documentation of the many potential quality assurance and quality control caveats.

Depth Issues

A critical issue in core-log integration is the question of standardizing depth positioning and depth accuracy of collected data sets; this issue generated extensive discussion and debate. Participants clearly identified the need for standard definitions and processing procedures for generating depth scales for the geological and geophysical aspects of drilling, coring and logging.

• Geological measurements, including cores, cuttings, and gas/mud logging operations, must be calibrated accurately and efficiently. Specifically, conversion of incident time (for mud logging, cuttings, and gas logging data) and conversion of curation depth (for cores and samples) must be undertaken to derive accurate and internally consistent depth values.

• Geophysical measurements, including logging (wireline and logging while drilling) and seismic (vertical seismic profiling, seismic while drilling, and regional 2-D and 3-D seismic surveys) data must be converted from either rig-floor depth or seismic two-way traveltime into the final depth reference frame. At the workshop, as it is in industry, the role of Vertical Seismic Profiles (VSP) in seismic calibration of depth scales was widely emphasized, and led to discussions of:

- receiver technology (i.e. frequency range),
- nature of the source (e.g.. borehole, seafloor, sea-level, air gun, vibration, explosion),
- coupling between formation and seismic tool in complex environments,
- the role of offset VSPs and multi-component tools in investigation of S-waves and acoustic/seismic anisotropy.

Both discussions gave rise to a series of complementary proposals for depth processing procedures dependent on data type and quality. The consensus recommendations reached during this workshop are currently being summarized and will be submitted to an IODP-ICDP depth processing working group for evaluation and further discussion.

New Technology: Initiatives and Needs

Presentations and discussions of new technological developments and challenges focused on depth issues, data acquisition in extreme environments and integration of a wide array of new data types and formats. Examples of such developments included intensive feasibility testing

of logging while coring systems potentially equipped with geophones (for check-shot surveys while coring), and development of new downhole probes for microbiology and geochemical investigations in order to meet the scientific needs to investigate the deep biosphere.
Additional discussion focused on the problem of in situ conditions versus laboratory core or sample measurements, with respect to core-log-seismic integration. Challenges arose regarding the differences between, for example, acoustic properties (e.g. P- and S-wave velocities, Q factor values, anisotropy) determined from sample or core measurement as opposed to downhole (i.e. in situ) seismic velocity or attenuation values.
Recommendations were devised for a review of available equipment and expertise (specifications vs. needs), and adoption of an optimal strategy (selection of samples, on site vs. delayed investigations) depending on scientific objectives.

Proposal for a Natural Laboratory or Test Site

Finally, after two days of intensive discussion, a competence network for consultation, feedback, advice and interaction was put in place. Cooperative initiatives and collaborative projects that grew naturally out of the workshop discussions gave rise to the following proposal: *Dedicate one or several well-characterized test site(s) encompassing a wide variety of geological settings for educational and methodological uses. At such a site(s), experiments, methods and tools could be calibrated and tested, providing references for further study, and a basis for continued progress.*

Acknowledgements
Local organizing committee members would like to acknowledge the Steering Committee members, i.e., Tim Brewer (Borehole Research Group, Univ. of Leicester), Ulrich Harms, (International Continental Scientific Drilling Program), Sean Higgins (Borehole Research Group, LDEO, Univ. of Columbia), Yasuyuki Nakamura (Ocean Research Inst., Univ. of Tokyo, rep. J-DESC), Tatsuhiko Sakamoto (IFREE, JAMSTEC, rep. IODP STP), Kazuhiko Tezuka (JAPEX, rep. SPWLA), as well as financial support from CDEX – JAMSTEC and technical support from CDEX and J-DESC members. We also thank all speakers and participants for their active participations. Daniel Curewitz and Shin'ichi Kuramoto of CDEX, Tim Brewer (Univ. of Leicester) and Sean Gullick (Univ. of Texas - Austin) are warmly thanked for their review of this report.

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Related Weblinks
http://www.jamstec.go.jp/chikyu/jp/news/nw_050712.html
http://www.iodp.org/
http://www.icdp-online.de/welcome.html

Vp Vs measurements under the pressure

Koji Masuda (Geological Survey of Japan, AIST)
Weiren Lin (JAMSTEC)
Junzo Kasahara (Tono Geoscience Center)

STP Kochi, Jan.30-Feb.1, 2006

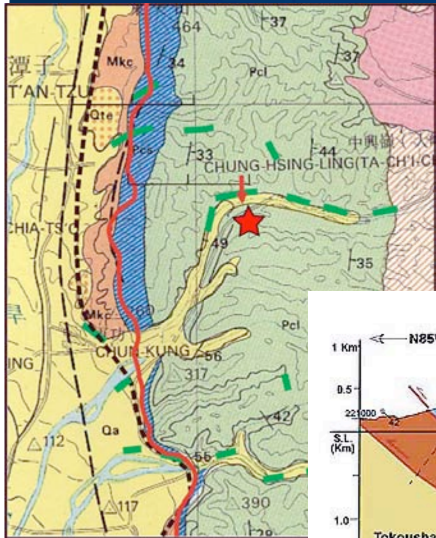
AIST

Gas-medium High-Pressure High-Temperature Apparatus

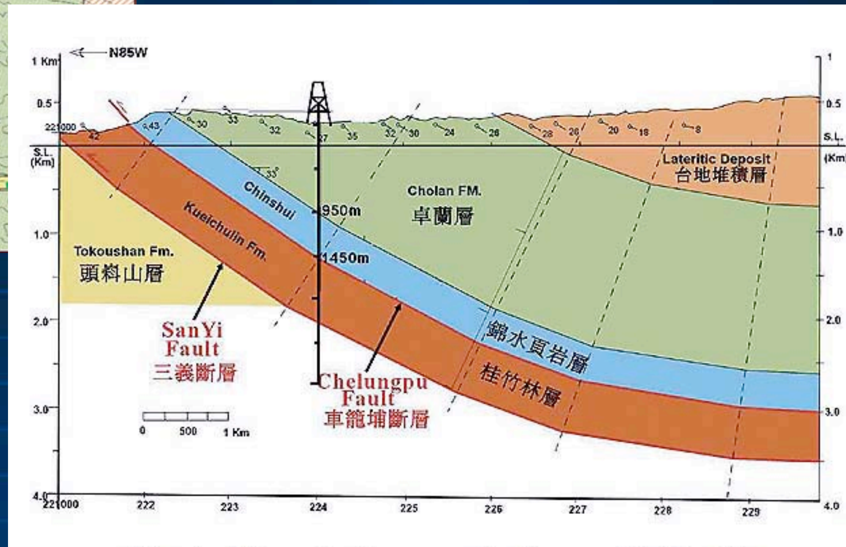
Max. Pc 200MPa (Ar gas)
Max. Pp 200MPa (Ar gas or water) pore pressure
Max. Temperature 800C
Deformation, friction, internal furnace, internal load cell

(Geological Survey of Japan, AIST)

TCDP hole A（台湾・車籠埔断層）



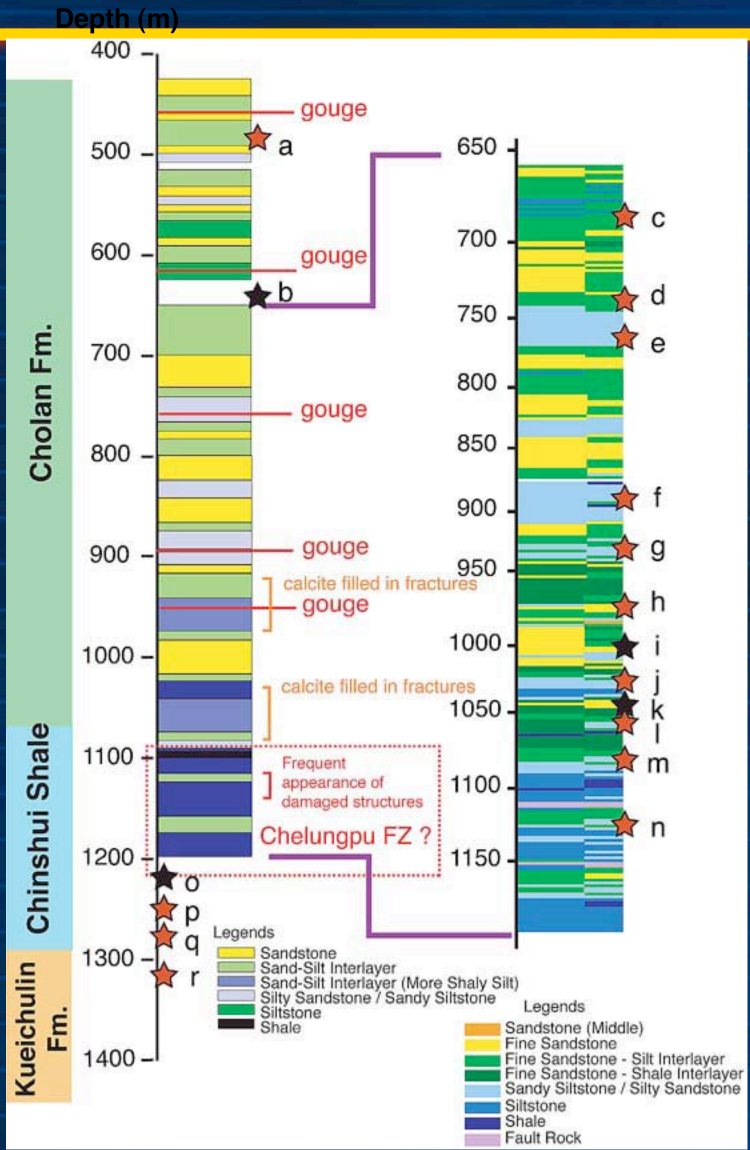
Drilling site and its geology



Structural Cross Section across the Proposed Drilling Site

http://www.icdp-online.de/sites/chelungpu/wellsite/well.html

TCDP Hole-A core samples



	Depth (m)
a	482.4
b	640.2
c	679.6
d	738.4
e	832.1
f	885.8
g	926.6
h	975.1
i	999.9
j	1023.7
k	1043.8
l	1056.2
m	1082.1
n	1121.8
o	1209.4
p	1246.8
q	1276.6
r	1316.2

total 18 samples
Cholan Formation 12
Chinshui shale 5,
Kueichulin Formation 1

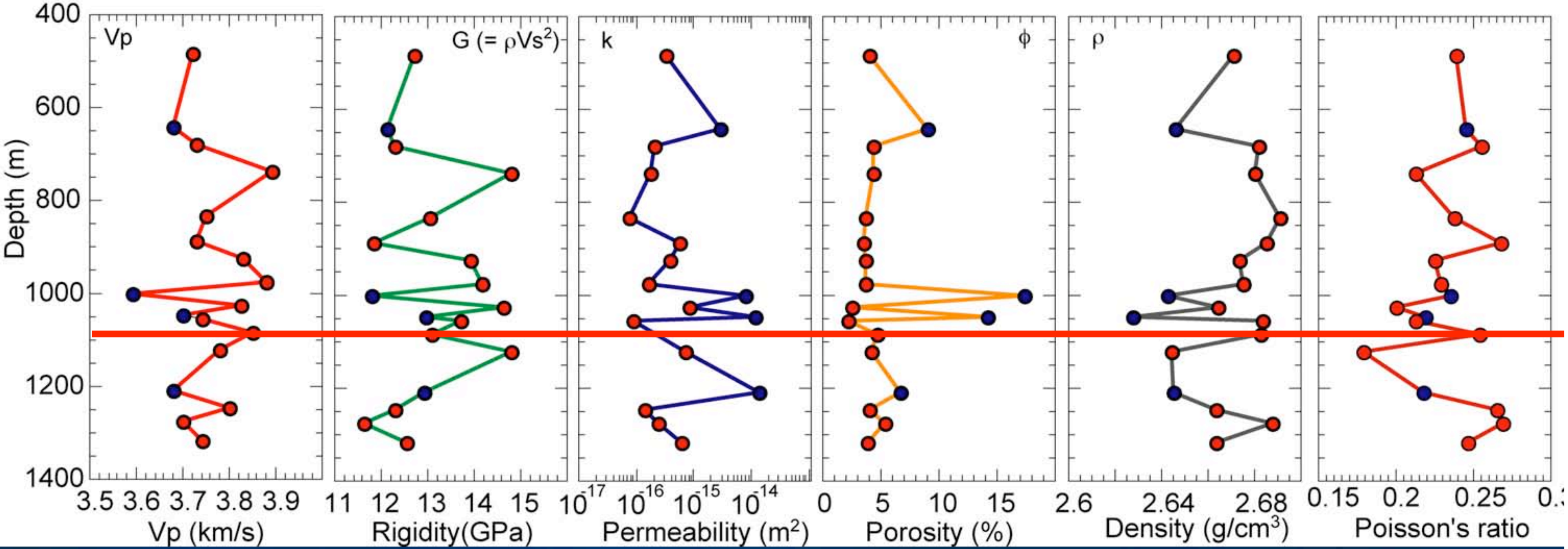
20m interval sampling
(depth 975m – 1056m)

50m interval sampling
(other depth ranges)

cylindrical sample
diameter 20 mm
length 20 mm

曽根大貴氏（京都大学）提供 Sone (Kyoto Univ.)

Depth profile of physical properties



Kitamura, Takahashi et al.

OUTLINE

Vp Vs measurements under the pressure

- Why Vp Vs measurements should be done under the pressure
- Procedure of the velocity measurements

Conclusions:

・Vp Vs measurements under the pressure are important and necessary.
・Measurements can be done routine-basis in safe way.
・We need hard rock samples from drilling.

Rock structure (Matrix and Pore)

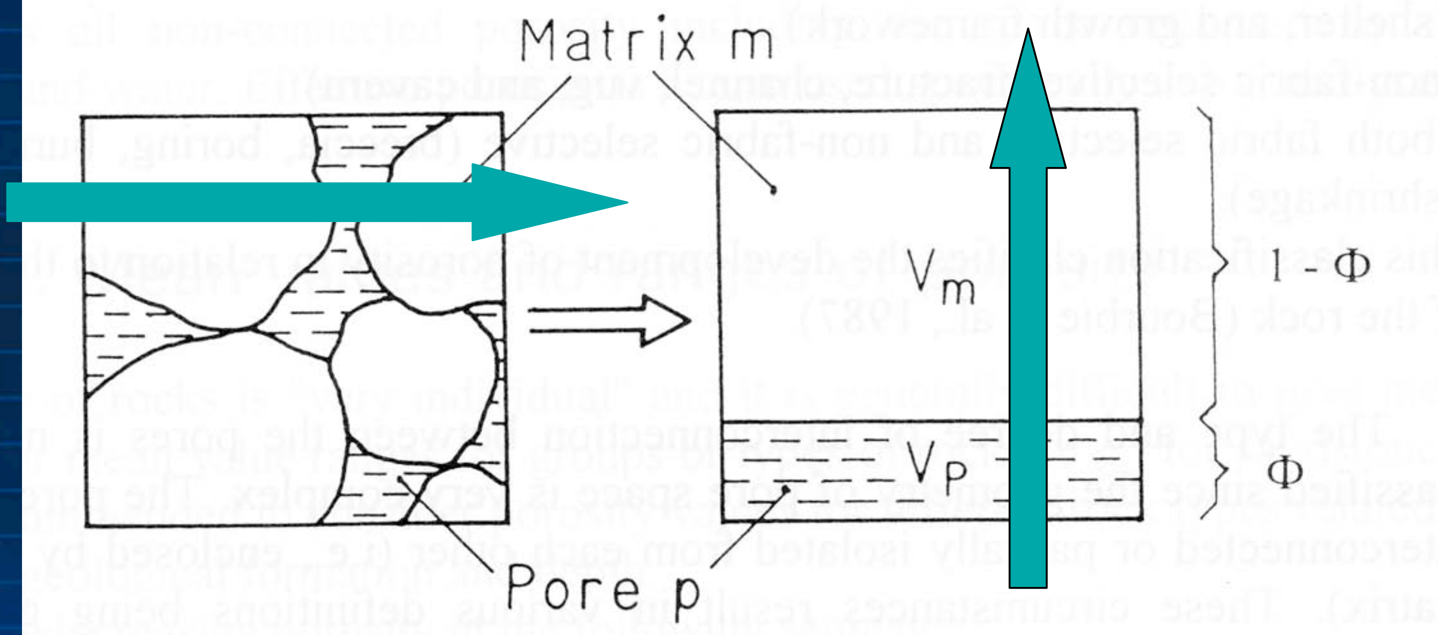
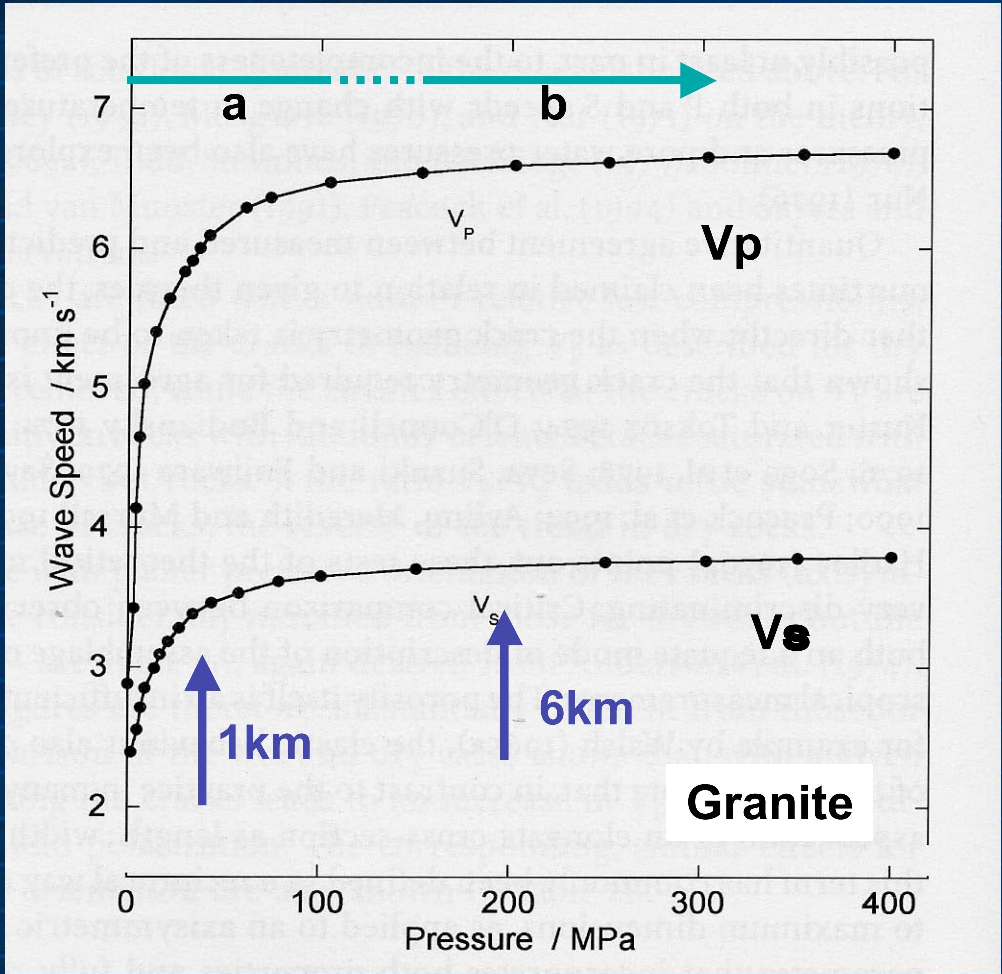


Figure 2.1. Definition of porosity

Rock : matrix and pore

Vp, Vs : Vp/Vs, Young modulus, Poisson's ratio

Influence of pressure on Vp and Vs



(Nur and Simmons 1969)

a. Pressure closes the cracks aspect ratio (Eα), microjoint

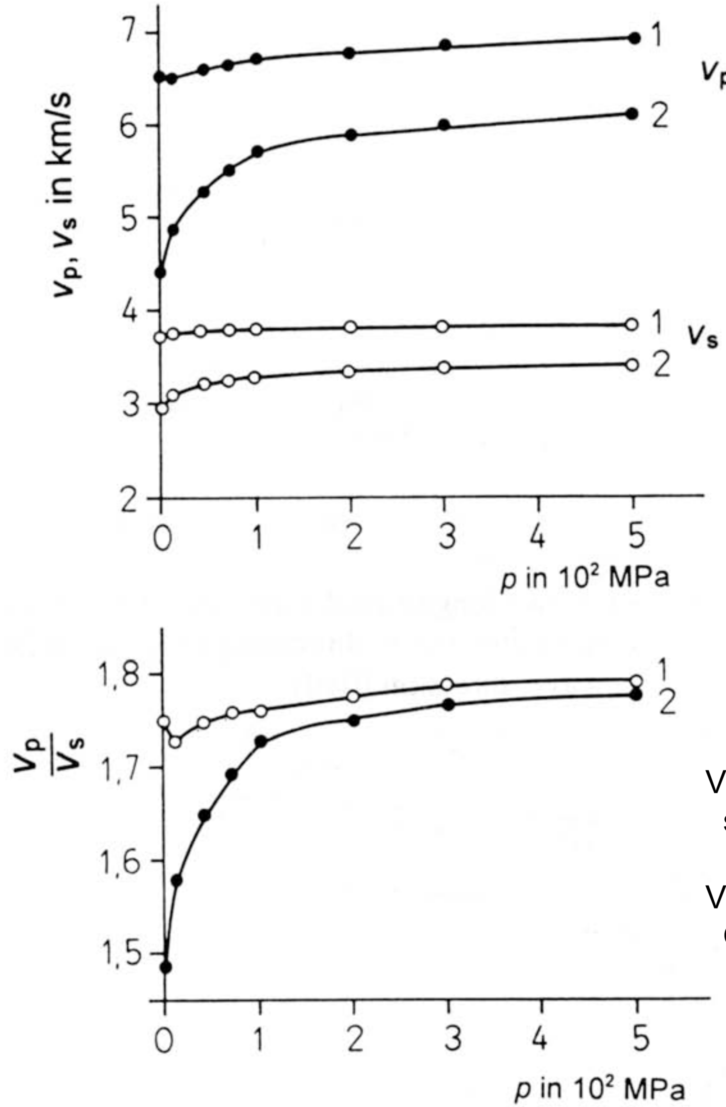
b. crack-free state ca. 200MPa

(1) Vp and Vs are dependent on the pressure.

(2) Vp and Vs are NOT linearly proportional to the pressure.

(3) V-P curves are different for rock types.

Vp / Vs



Vp/Vs>2-3
serpentine, chlorite
（マントルウエッジ?）
Vp/Vs<1..15-1.6
Quartzite
（二重深発地震面の下面など?）

Figure 6.14. Dependence of the longitudinal and transverse wave velocity on the pressure; data after Simmons and Brace, 1965: 1- diabase (Maryland), 2 - granite (Westerly)
a.) velocities vs. pressure b.) ratio v_p / v_s vs. pressure

Temperature

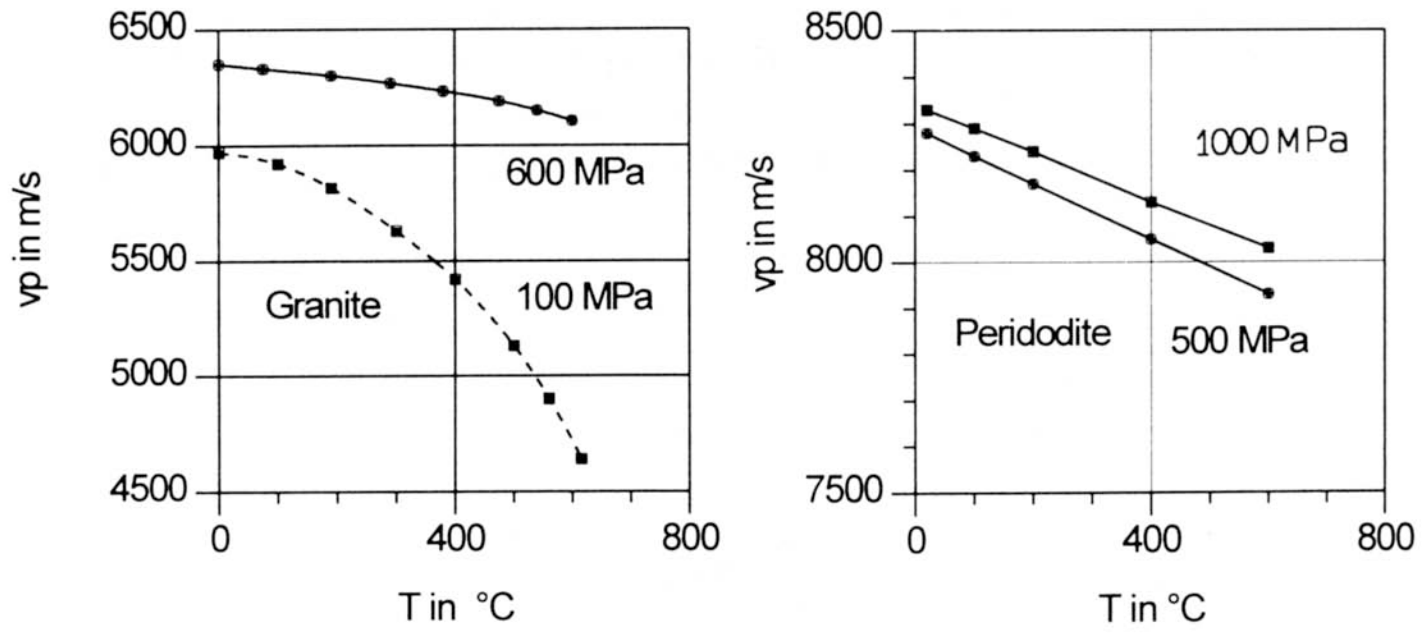


Figure 6.19. Temperature dependence of longitudinal wave velocities at different confining pressures; a.) granite, after Kern, 1990 b.) peridodite, data after Bajuk and Levitova, 1990.

<150C, change of fluid properties

higher, T dependence of elastic properties of rock-forming minerals and phase change

Vp Vs measured under the pressure

Logging data
Vp & Vs
(Matrix + pore) at depth

Velocities under the pressure
Vp & Vs (matrix, intrinsic)

Fractures at depth

Models in rock physics

Measurements of physical properties under the pressure

Geophysical exploration can not identify the materials

compare

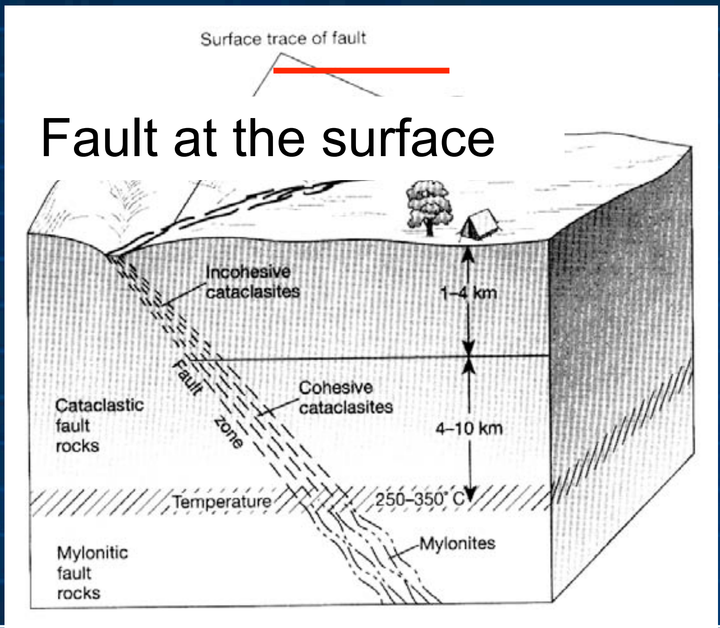
estimate

Measurements of physical properties under HPT

In situ conditions（P, Pp, T）, water

Friction and/or fracture under HPT

Elastic-wave speed
Electrical conductivity
permeability



Procedure of the velocity measurements under the pressure

(1) Prepare the specimen

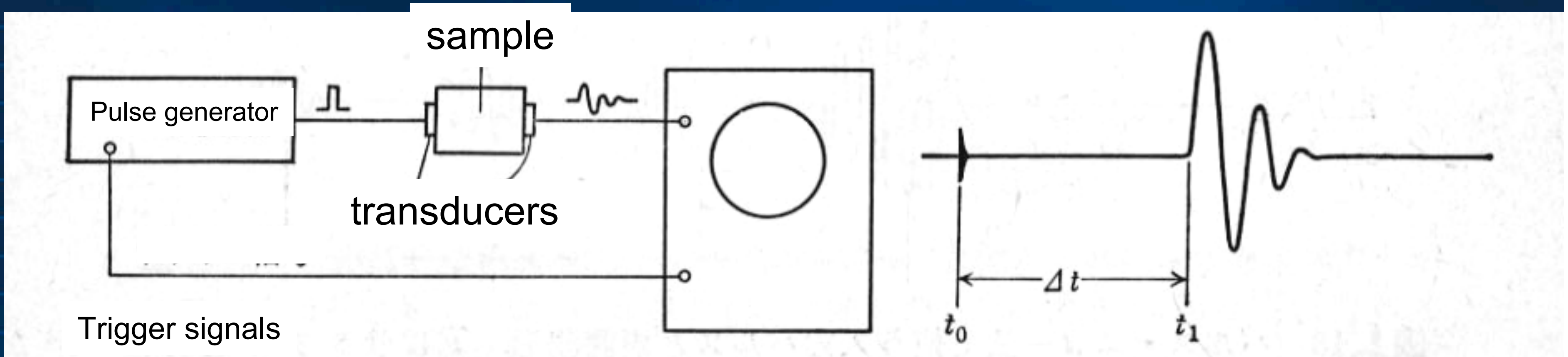
cut, glue the transducers, jacket

(2) Apply the pressure

(3) Measure Vp and Vs

Routine base, safe

Pulse transition method

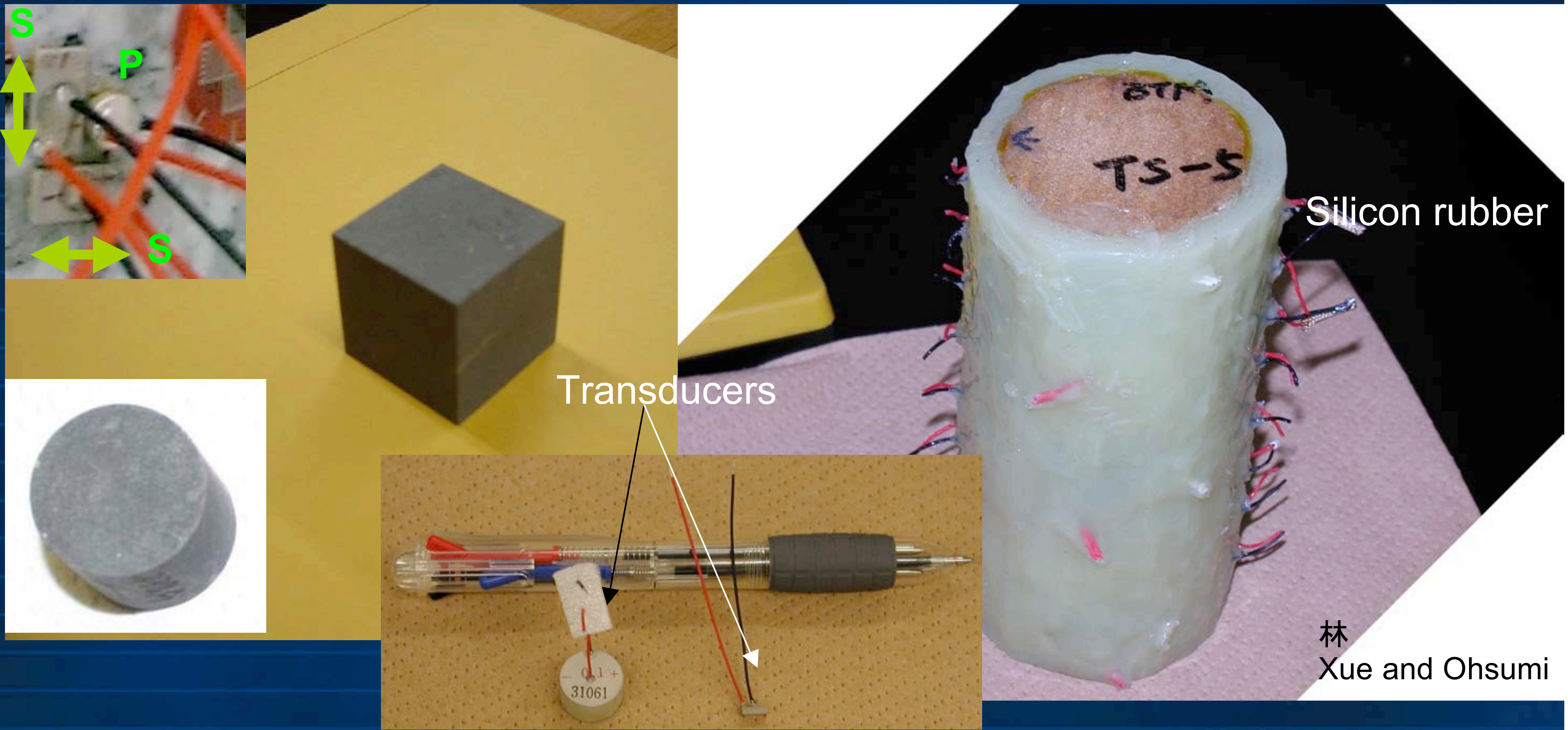


Observed waveform on the scope

L :length of the sample
Δt:travel time
V :elastic-wave velocity

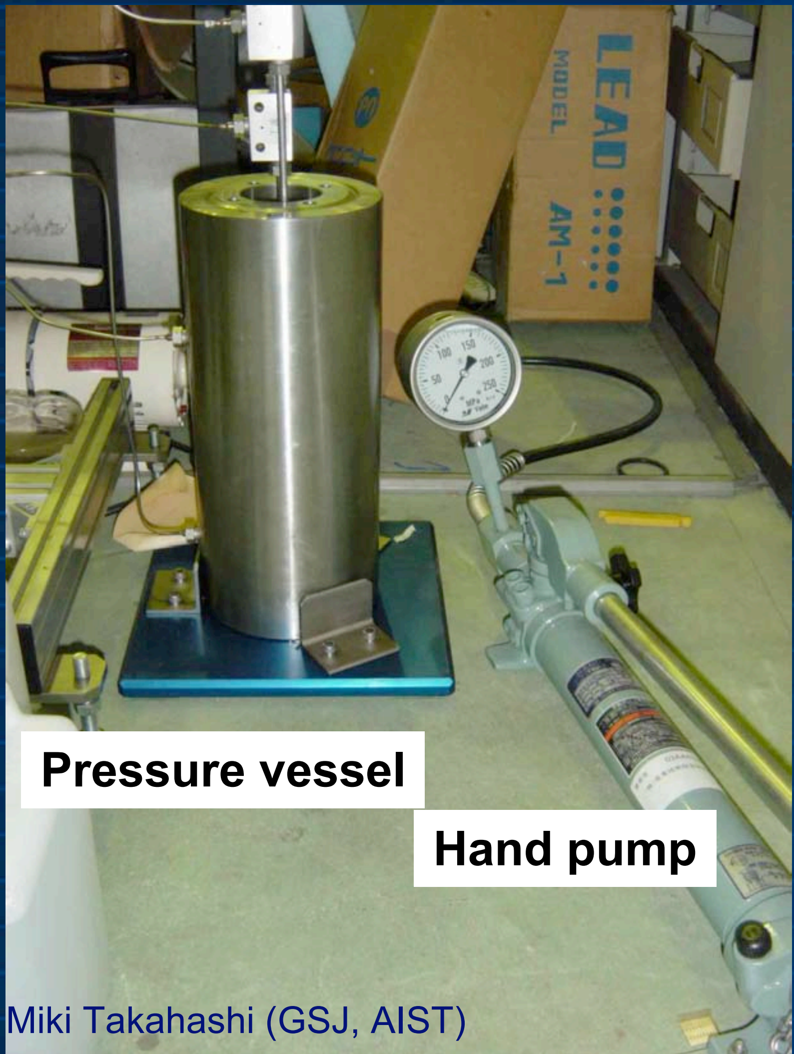
$$V = L / \Delta t$$

Prepare the specimen



(1) Cut to rectangular（20mm）or cylinder（20ψx20mm）
(2) Glue the transducers
(3) Jacket the specimen（ex. silicon rubber）

Apply the pressure



Miki Takahashi (GSJ, AIST)

(1)Set the specimen in the pressure vessel

(2) Rise the pressure
hand pump
up to 200MPa
easy, short time

Measure Vp and Vs

Measure Vp and Vs up to 200 MPa
Ex. every 20MPa (10 points)

Sampling interval：
fixed intervals or each geological setting

Time necessary for each sample
（1）prepare the specimen：　ca.**1－2** hours
hardening of the glue or rubber
（2）apply the pressure：　a few minutes

（3）measure Vp and Vs: very short time

Routine basis, safe

Conclusions

- Vp Vs measurements under the pressure are important and necessary.
- Measurements can be done routine-basis in safe way.
- We need hard rock samples from drilling.

APPENDIX I MEASUREMENTS PLAN

New Jersey Margin

ESO Sampling and Measurement Plan

This plan is currently under discussion with the Co-chief scientists. The plan is subject to amendment according to the scientific needs and interests of the Expedition Scientists or operational constraints. The most pressing operational constraint is likely to be space, both for analysis and for accommodation. The priority given to the respective measurements are as follows:

1. Curation
2. Downhole logging
3. Multi-sensor core logging (MSCL)
4. Inorganic geochemistry*
5. Microbiology*
6. Sedimentology

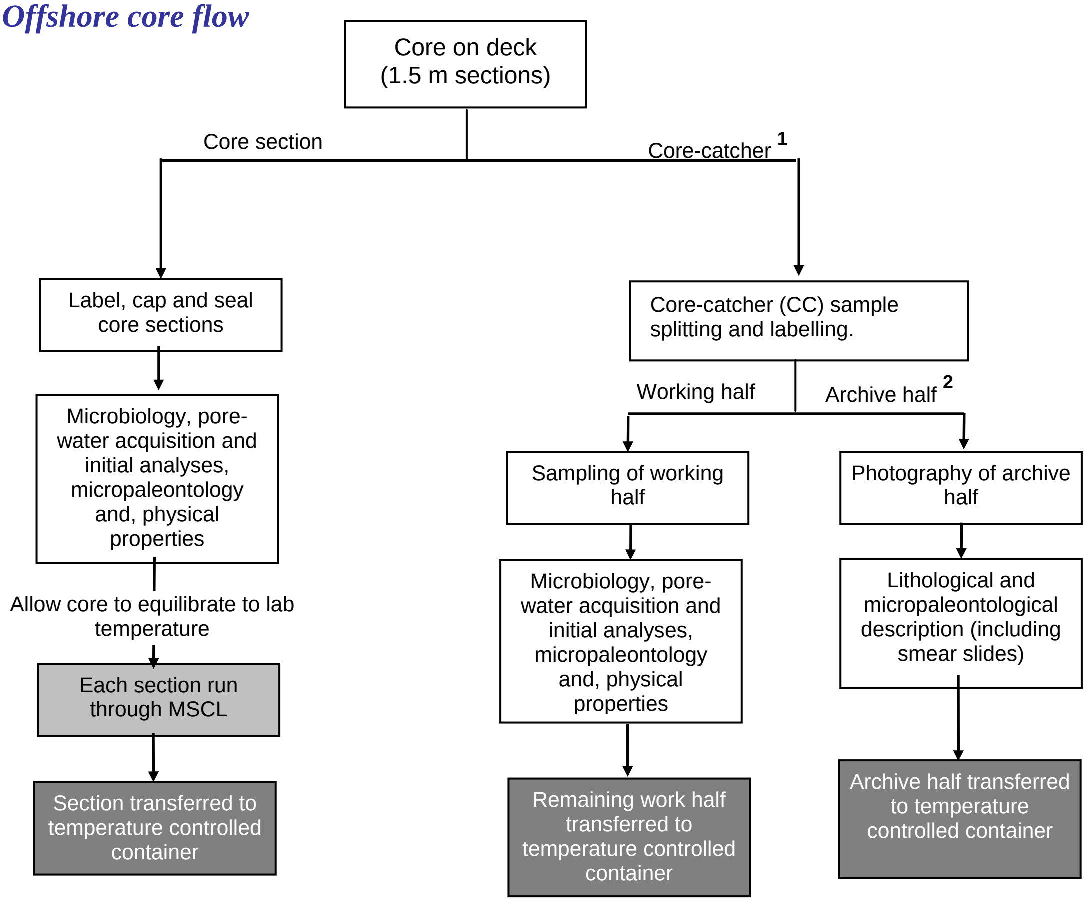
(*will it be sufficient to do the sampling for pore water & microbiology after core logging?)

Offshore sampling and analysis

Core curation

There will be a mobile core curation laboratory container onboard the drilling platform, supervised by the Chief Curator. A second curator will cover the opposite shift. The curators will have delegated responsibility in the absence of the ESO Curation Manager and IODP Curator Ursula Röhl. A sufficient number of core storage containers will be on the drilling vessel. There will be no splitting of the cores at sea, as it will be more efficient to carry out most of the following scientific analysis during an Onshore Science Party in Bremen.

Offshore core flow



[1] If no core catcher is collected, a sample from the lower end of the section will be taken for ship-board lithological and micropaleontological description and initial, ship-board, measurements.

[2] Depending on the length of the core-catcher additional material from the archive half can be used for sampling and ship-board analysis

Lithological description & initial micropaleontological characterization

Core catcher samples will be collected, split and labeled, and the working half handed over to the scientists in charge for lithological and micropaleontological description. If no core-catcher is collected, a sample from the lower end of the section will be taken for shipboard lithological and initial micropaleontological analysis. Lab space for applying acids to subsamples etc. might be very restricted.

Inorganic geochemistry

Pore-water samples (e.g., squeezers, rhizone moisture samplers; Seefeld et al., 2005*) will be taken on a routine basis (interval to be decided). Pore water should be extracted immediately from a core sample, and ephemeral properties, e.g. salinity, pH, alkalinity and ammonia, will be analyzed immediately. Sample splits for onshore analysis (e.g. cations, sulfide, ^{13}C) will be prepared and preserved offshore. Depending on the parameter the interstitial water sample might be specially treated in order to conserve it for later analyses.

Microbiology

The precise sampling strategy will be mainly depend on science party requests and IODP policies, which are right now under discussion in relation to routine sampling for microbiology. There will be taken care of at least proper sample archiving (deep freezing). Ideally samples should be taken immediately in the field under the most sterile possible conditions. Results should be interpreted with care as contamination may occur during drilling and any microbial material found may not be in situ. Chemical fixing as well as growth studies and , phospholipids and cell counts may also have to be made on site.

Offshore petrophysics measurements

Downhole logging

The following is a generic list of minimum and additional tools, based on formation properties discussed with proponents, and not on 'operator'-based trademark names:

- natural gamma ray
- spectral gamma
- density
- porosity
- resistivity (for pore fluid salinity and porosity)
- sonic (for cm-scale impedance and mesoscale porosity)
- borehole imaging (for mm-scale geological description)
- checkshot (for correlating borehole geological horizons with seismic sections)

It is intended for these measurements to be carried out whilst drilling (Logging While Drilling) and that this will precede any coring operations on site.

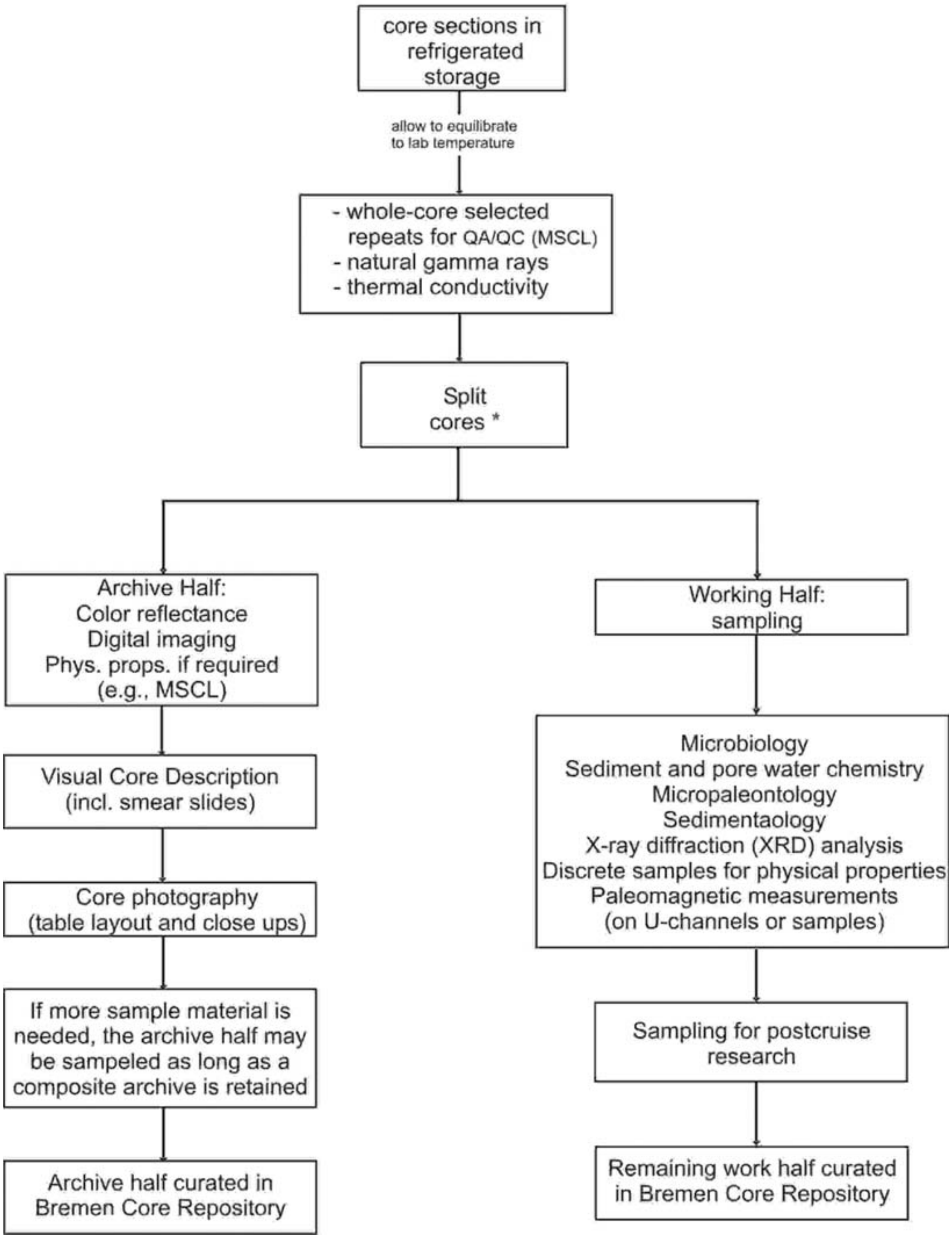
Core logging

Cores will be logged on the drilling vessel in a modified 20 ft container, housing a single MSCL track comprising one magnetic susceptibility loop, density, velocity and resistivity sensors measuring gamma ray attenuation, magnetic susceptibility, resistivity and *P*-wave velocity. The single core-logger system will include spares kit.

All the temperature-equilibrated core log data acquired at sea will provide QC/QA checks when compared to repeat measurements planned for Bremen.

Onshore sampling and analysis

Onshore core flow



Location

The Onshore Science Party will be undertaken at the IODP Core Repository and Laboratory on campus of the Bremen University in combination with access to some laboratories at the Department of Geosciences, the Research Center for Ocean Margins (RCOM), and the Centre for Marine Environmental Research (MARUM).

Planned analysis and available facilities

The following facilities will be available for the Expedition Scientists at the new Bremen IODP/ODP Core Repository. Note that it is not considered prudent to transport all these facilities to the drilling platform:

- **Core splitting** - an archive half will be set aside as per IODP policy.
- **Core description** - ESO will provide a system that is IODP/ODP standard. For data entry, ESO will employ an Offshore Drilling Information System (DIS) system that is entirely compatible with others being used in IODP.
- **Core Photography** (core shots (table layout) on a routine basis, close-ups on request).
- **Core sampling** - A detailed sampling plan will be devised at the completion of the offshore phase and after the scientists have submitted their revised sample requests.
- **Smear slide preparation –** as requested, preparation, description and interpretation.
- **Micropalaeontology** - microscope lab (& access to lab with hood for sample preparation if acids needs to be applied).
- **Inorganic geochemistry** - whole-rock and pore fluid chemistry; ICP-OES (PERKIN-ELMER OPTIMA3000), EDP-XRF (SPECTRO-XEPOS); carbonate & total organic carbon content TC/TOC (LECO).
- **Bulk mineralogy,** X-ray diffraction (XRD) analysis (Philips XpertPro):
- **Petrophysical measurements**
  - Selected repeat whole-core measurements for QA/QC
  - Natural gamma-ray logging on whole-cores.
  - Thermal conductivity measurements.
  - Split-core multi-sensor core logger .
  - Physical properties of discrete samples (moisture/sample density): determination of **index properties** (wet bulk density, grain density, porosity, void ratio). Following IODP procedure, core samples will be oven-dried, the dried sample volume quantified using a Quantachrome Penta-Pycnometer, and masses using a high-precision balance.
  - Shear strength measurements.
  - Velocity measurements (Hamilton frame).
  - Plasticity measurements with penetrometer.
  - Color reflectance measurements (Minolta spectrophotometer).
  - Digital imaging (line-scan camera on split-core multi-sensor core logger track).
- **Paleomagnetic measurements**
  - Natural remnant magnetism (NRM) with stepwise demagnetization (2G longcore cryogen magnetometer) on U-channels (pass through) or samples (robot system which feeds up to 100 adapted sample cubes)

IODP
INTEGRATED OCEAN DRILLING PROGRAM

2nd STP Meeting

30th January -1th February 2006, Kochi

New Jersey Sea Level Expedition Measurement Plan draft

Ursula Röhl (Bremen)
Jenny Inwood (Leicester)

ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

Universität Bremen rcom marum

EPC European Petrophysics Consortium

BGS British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL

New Jersey Sea-Level Expedition (313)
IODP Measurements

OFFSHORE – Downhole Measurements and Core Logging

Operations, core characterization and curation:

Logging While Drilling/Wireline:

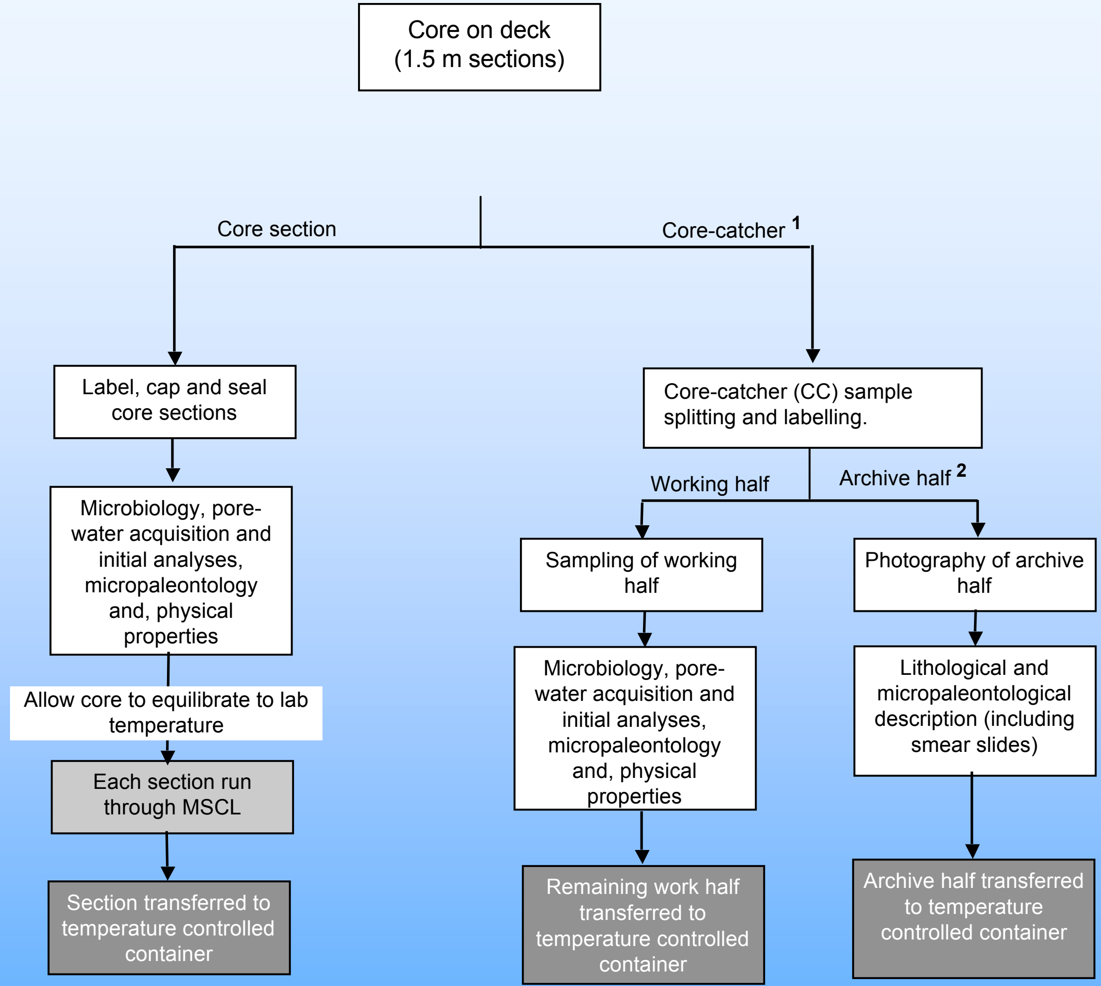
1. Borehole diameter
2. Natural gamma (total counts and spectral)
3. Porosity (this may require a radioactive source)
4. Electrical resistivity (shallow-deep measurement)
5. Sonic measurements
6. Check-shot (*)
7. High-resolution borehole imaging

Core Logging to facilitate core-log integration

MSCL (density, velocity, resistivity, magnetic susceptibility)

Other potential ephemeral properties ?

Offshore core flow



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[2] Depending on the length of the core-catcher additional material from the archive half can be used for sampling and ship-board analysis

ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

New Jersey Sea-Level Expedition (313)
IODP Measurements

OFFSHORE - Summary

Measurements for safety: gas (methane), headspace

Operations, core characterization and curation:

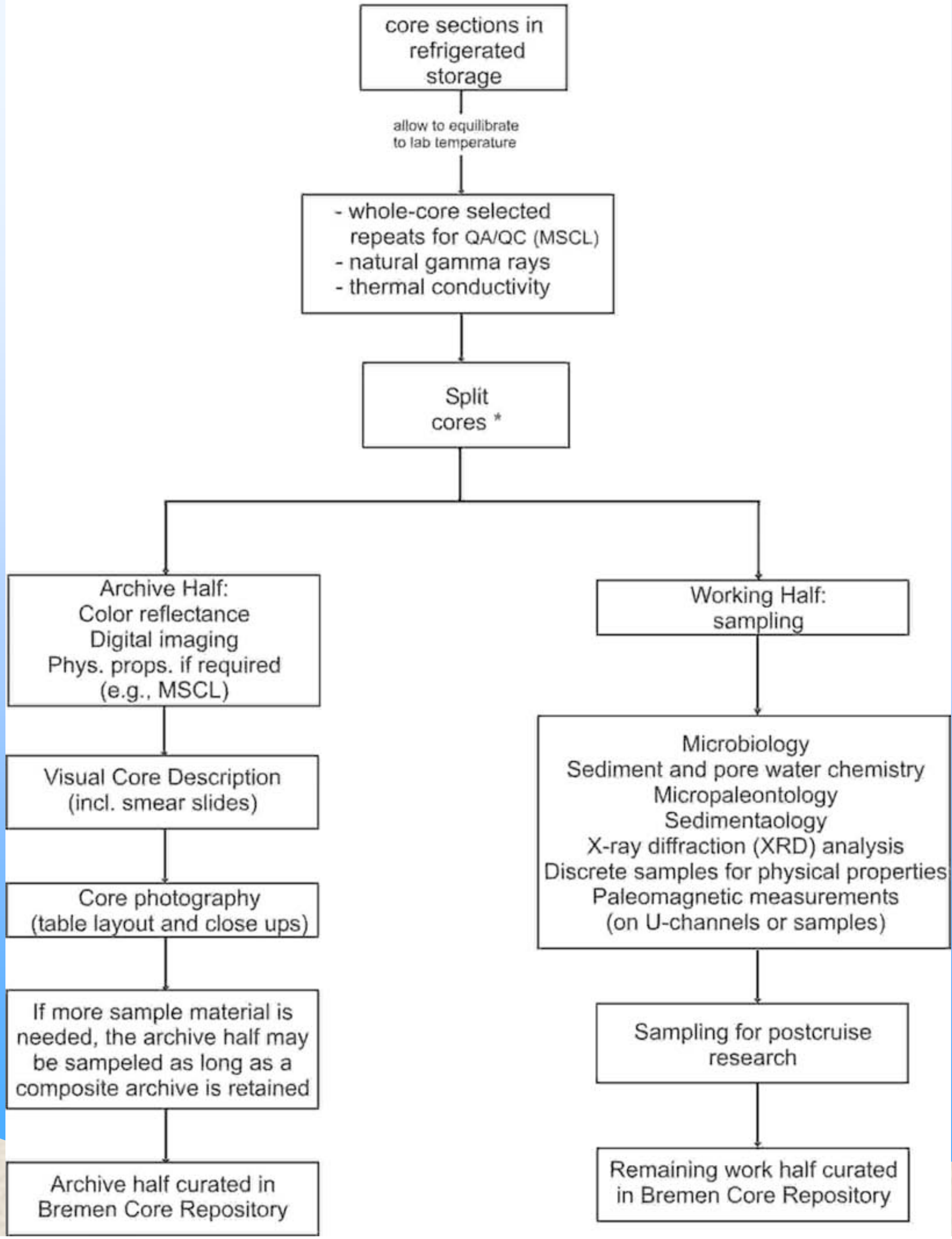
Downhole Logging (LWD + Wireline)

On Core Catcher:
- Biostratigraphy (microscope, HF)
- Visual Core Description (VCDs, offshore DIS)
- Digital Core Photography
- Smear slides

On Whole Cores:
- Core curation (engraving, labelling, etc.)
- Core Logging (Magsus, *P*-wave, GRA, resistivity)
- Pore water acquisition (whole round samples for squeezing or rhizone moisture samplers)
- Microbiology sampling & storage (glove box, deep freezer)
- temperature controlled core storage

On pore water samples
- pH, alkalinity, ammonia, chloride
- fluorescence microscope, fluorospectrophotometer, enzyme kits.

Core Flow ONSHORE



New Jersey Sea-Level Expedition (313)
IODP Measurements

ONSHORE - summary

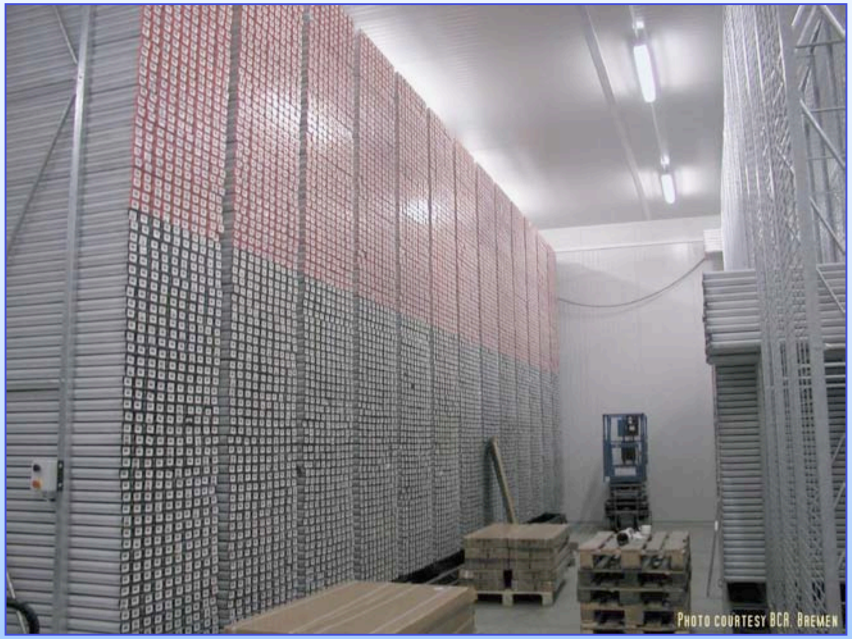
- NGR logging
- Thermal conductivity measurements
- Core splitting
- Biostratigraphy (microscope, HF)
- Visual Core Description (VCDs, offshore DIS)
- Digital Core Photography (incl. close-up and micro-imaging)
- Line-scan digital imaging
- Color reflectance (photospectrometer)
- Split core logging
- Pore water chemistry (nutrients, sulfate, major and trace elements)
- Whole rock major and trace elements
- Carbonate analysis
- Mineralogy (X-ray diffraction (XRD))
- Organic geochemistry (CNHS, TOC)
- Microbiology (phospholipids and cell counts)
- Moisture and density/porosity (discrete samples)
- P-wave velocity (discrete samples, Hamilton frame)
- Penetration strength/shear strength
- Natural remanent magnetism (NRM) with step-wise demagnetization (discrete samples or U-channels)

New Jersey Sea-Level Expedition (313)
IODP Measurements

ONSHORE

- Curation & sampling

307 sampling party



303: record number of 45,089 samples taken within 1 week

303 sampling party

ECORD European Consortium for Ocean Research Drilling

ESO ECORD Science Operator

Scientific Technology Panel

STP response on the designs & proposals for the SODV: vessel design and proposed delivery of analytical systems

Kochi, Japan

January 31st 2006

Overview

An invitation to provide input to the design concepts for the SODV was received from the chair of PAC (SODV conversion). STP responded by developing a detailed response through two half day sessions. A series of presentations (from the PAC chair and USIO staff) provided the background, timetable, and proposed delivery of the non-riser vessel and associated analytical services, while discussion sessions involved breakout groups and panel meetings with involvement from liaisons and guests.

Overview

STP welcomes the opportunity to input to the design and provision of analytical services.

Through 4 working groups STP have considered the proposals under three broad titles :

- Petrophysics (geophysics, physical properties, downhole measurements, observatories, seafloor visualisation: two groups)
- Geochemistry & Microbiology
- Core Description (including micropalaeo, petrology, structural geology)

Report

STP reports the results of discussions in breakout sessions and as a panel in a series of groups of powerpoint slides. There are three groups (colour coded) concerning the design plans; one group (grey) on the non-scientific aspects; and a final group (green) on the delivery of analytical services.

Comments on design plans have not been ranked; indeed, because of time constraints, some suggestions conflict since the working groups were allowed to express their view of the design without recourse to considering the effects on other areas.

Design Concepts:

Petrophysics WG

Core Description WG

Geochemistry & Microbiology WG

Petrophysics WG

- Try to consolidate Phys Props.
  - If B/P is balance/pycnometer, it should be near the ovens so no moisture gain/sample loss in transit.
- separate 2 mst tracks and not in line with cryo
- keep track area configurable
- move core log desk near core entry (or make it PDA)

- Move Core Splitting room to side/corner of core lab.
- Move Stratigraphic Correlators back into main core lab.
  - Geophysical lab needs to expand to include where the strat corr. was and discussion table should designed for maps/seismic sections
- Consider space for visualization/ for example Core Wall

- consider space for core overflow/storage capacity
- consider space/access for observatory legs. Preparation of CORK heads, cones, bodies.
  - Strengthen roof of core lab for possible storage.
- Consider storage area for ROV and deployment system.
- separate break area from microscopes and other quiet work areas.

Better camera system (better lights, pan and tilt, orientation)

- locating the site and geologic context (e.g., in vent/hydrate/fault area)
- CORKs:
  - are valves open or closed?
  - Better fishing (Dropped equipment, blocked hole, dropped drill string)
  - inspect after installation
  - inspect for problems such as casing collapse during installation.

borehole camera for casing inspection, view of flow, microbiology

Priorities: <u>Beyond the minimum, standard and supplemental measurements</u> the Petrophysics WG proposes:

- Highest priority:
  - Updated T and P downhole tools high priority. Hardware and Software.
    - T more pressing (and more mature) than P.
  - MST with separate NGR track.
- 2nd highest:
  - More pycnometers
- lowest priority:
  - updates/upgrades of current (e.g., not in-situ pressure) discrete P-wave, vane shear.

- Suggest phased-in implementation of LIMS and QA/QC
- Down the road: Integration of logging data with LIMS?
- There is no requirement for separate synthetic seismogram software if Geoframe is available

- Seismic acquisition should be limited to sources for VSP & checkshots,and for limited seismic survey capability to validate site location. Given the limited technical support available there is no requirement for a magnetometer.
- The following extract is from the iSciMP WG report on underway geophysics and this section on seismics is endorsed by STP:

Non-riser Platform: While it may be important for non-riser ship to have the capability to shoot small single channel to low fold seismic surveys, these surveys should only be done in the case of very shallow target depths or for “at sea” requirements. The non-riser ship is in no way a seismic vessel and for all but the most basic situations a bonafide seismic survey should be collected using multichannel seismic acquisition systems. The airgun capability for a single or low-fold seismic system for the non-riser platform should be capable of serving as the source for zero offset VSPs as well.

Core Description WG: Traffic Flow- Paleo (1)

- Core catcher
  - Easiest route is through geochem labs; Alternate is through core lab but longer, more doors
  - Shorten the route
- Contamination/ confusion/ noise from movement through connected paleo-prep and geochem labs
  - Microbio flow will add to traffic
- Need a door from port stairs directly into paleo scope
- Relocate primary sample prep table
  - Isolate from traffic and possible contamination from geochem

Traffic Flow- Paleo (2)

- Library space/book shelves in paleo microscope room for abundant paleo reference (double what's on the JR)
- Need to have room to work comfortably with scope, computer, samples and reference material all on desk.
- HF hood room has only one door; need immediate access to stairwell
- Need to confine grinding room for noise and contamination issues
- PORTHOLES
- Don't use doors to separate paleo prep and paleo scope spaces

Traffic Flow- P-mag

- Add another core rack near P-mag lab
- Is isolating the P-mag from traffic necessary, to possibly improve data quality?

Traffic Flow- Logging

- Container and door configuration may block access and ability to move larger tools
- Is open area connecting loggers and core description beneficial, or should downhole be more isolated?

Traffic Flow- Core description/ Core Flow

- Large format screen near core description table to view data
- X-ray Scanner
  - Does it need to be isolated and have dedicated space?
- Can the smear slide prep and scope areas be swapped to make the work area more isolated from the break area
- No natural light in core description area (porthole is blocked by P-mag)
  - Is this a problem?

Library

- Regardless of media type, we want a quiet place to work
  - All other break areas are integrated into work areas
- Some micropaleo references need to be in the original form (electronic reproductions are not usually suitable for species identifications)
  - This is true for many scientific figures in the older (paper) literature when they are scanned

Loved it

- Paleo microscope room
  - Good size
  - Separated from geochem and other labs so there is reduced risk of air currents through room
  - Good space for computer and scope
- Core lab
  - Core flow seems good
  - Good layout between strat correlator, sedimentologists, and smear slide work area

Communications

- Ship to ship?
- Interlab?
- Lab to drill floor?

- How can personal laptops be integrated into the workspace and computer network

Noise

- Labs are big, especially core lab
  - Minimize machine and human noise

How do they apply to the descriptive sciences?

- We usually generate qualitative or semi-quantitative data at sea
- QA/QC
  - Consistency is attached to the science party
  - QA/QC attached to the database
    - How would conforming to a single definition impact our science?
      - E.g., What defines a layer? Volcanoclastic rocks and classification scheme? What carbonate classification scheme to use?
  - How could LIMS benefit our science objective?
  - How would LIMS manage descriptive data?
    - Core barrel sheets

PaleoLab

- Switch microPaleo to other end of lab corridor to share with microBio
  - Shortens distance with core catcher
  - Reduces traffic and contamination
  - Allows for integrated paleoPrep and Microscopy
  - Ig pet would not negatively impact MicroBio
- Alternatively, extend microscope lab and convert to integrate paleoPrep and scope areas
- Provide core board and white board areas, and bookshelf space

PaleoLab

- **STP Meeting #2 (Kochi, Japan)**
- **Micropaleontology Requirements**
- **The remaining blue slides are based on a second informal evening discussion:**

- Biostratigraphy is vital to the success of any SODV mission and is a *minimum* data collection requirement. Micropaleontology must be a priority for the SODV missions and should be reflected in appropriate space and technical support. Micropaleontology routinely makes up 20% or more of the science party. Planning should focus on a minimum of 6 micropaleontology workers in the lab at the same time, although additional members of the micropaleontology party would permit the development of an even more detailed and refined age model. Below is what we consider an absolute minimum of space for mission success. This space need should not be compromised to accommodate instrumentation for *supplemental* data acquisition.

- **Desk Space.** Desk space should be large enough to permit simultaneous use of a computer, microscope and reference books, in addition to samples and tools. The minimum space per worker is 1.6 m. If an L-shape is employed, then at least 2 stations of the same type of scope will need to be in a linear arrangement to facilitate passing samples between scientists for comparative purposes.
- **Freeze Drier**. Micropaleontology requires free access to a freeze drying system. Sample preparation for micropaleontology is generally not consistent with microbiological protocols and could contaminate those samples; thus, a separate instrument is necessary.
- **Hoods.** A minimum of three hoods is necessary for micropaleo preparations (HF, acid, and acid-free).

- **Sinks.** A minimum of three sinks (diatom/ nanno; foraminifera; radiolarian) with at least 1 m on each side of the sink is necessary for sample processing (washing, sieve storage, heating lamps, a nearby balance, etc.). There should also be sufficient buffer space between the work areas.
- **Core Catcher area**. A minimum of a meter of preparation area is required to organize the core catcher material.
- **Dishwasher.** 1 is required at a minimum.
- **Bench space**. Additional bench space is needed for complementary instrumentation such as UV sample preparation and balances.

- **Group space**. Additional space for the nearly continuous informal conferencing that occurs among the workers, and between other laboratories and the co-chiefs, is essential. Space is needed to lay out maps, plots, data, etc. This space should not be dependent on the number of scientists working in the laboratory, i.e., if a full complement of scientists sail, the need for adequate group space will increase, thus, a plan that converts unused microscope areas to group space is not sufficient.
- **Technical support**. Technical support for complex sample processing involving HF. Technical support to assist in basic sample preparation would ease the workoad significantly and allow micropaleontologists to focus on data acquisition. Support will be needed for the more complex video systems as well.
- **Other needs.** A core board and a white board are criticial. Also, cork board behind the microscopes will increase vertical workspace.

Geochemistry & Microbiology WG

‡ ICP's on benches, but O.K. for now; make sure that benches are removable

‡ Microbiology cold room must be called microbiology environment room – too large for a cold room (expensive, inconvenient to work in) (REVISIT Appendix 22 regarding core processing and sampling from the Boston STP meeting).

ǂ Workstation area not really needed; bench spaces are needed near each microscope, instruments, etc where scientists can set up glove bags, open their laptops, notebooks, etc. - so they can start working, prepare their reports, etc.

ǂ No “clean room” or clean space for preparation of ICP samples

ǂ Move acid hoods from middle of the room

ǂ

Alternatives -

1. Perhaps have a small flexible area within the room – a cold space);
2. Another option is to create a “smaller” cold room near the chemistry storage area
3. ????

ǂ

- Corridor position is not convenient. If people are working on benches, they are blocking access. This needs to be relocated.
- There is lot of potential of contamination for paleontology samples because they have to pass through a lot of sample prep area (e.g., powders from rock samples)
-

- More squeezers needed (~6 and the option to take them apart)
- ｷ No microwave digestion oven and rock grinders/crushers and spaces for these.

A separate image

Focsle Deck_rev3a

is a photoshop image file with re-allocated deck space (Clive Neal is the contact for queries concerning the explanations for the proposed changes)

Non-science

Conference/ Break rooms

- If there is an expanded science party it won't fit into the conference room
  - Seems to accommodate only about 25- 30 now
  - Current configuration probably too small to accommodate techs as well as science party
  - Need tables large enough to view seismic lines, etc
  - Tables should be parallel to center line to accommodate motion while underway

Rec Areas

- Gym space (needs air-conditioning)
  - Ping pong
  - Movie room should be parallel to center line to accommodate motion while underway
- Dedicated smoking areas
- Outdoor activity
  - running
- Steel beach

Water bath
(temperature controlled)

For calibration of temperature tools and welfare of petrophysicists (only)

Location aft deck, next to the casino

Delivery of Analytical Services:

Priorities: We support the IODP general philosophy that minimum measurements should be the highest priority, followed by standard, then supplemental measurements.

It is essential that the SODV can provide minimum measurements, and has the capability for the full suite of standard measurements.

STP recognises the time constraints on the USIO but encourages innovation from the USIO for establishing the basic (minimum and standard) measurements capability in time for the first SODV Expedition in 2007.

STP urges the USIO to look to the community for off the shelf solutions where possible to provide pragmatic and evidence-based solutions which are acceptable to the majority of the scientific community

STP Response to a request from the JOIAlliance for comment on including an ROV as an enhancement to the new US drillship.

The following is a summary of an electronic-based discussion amongst volunteering members of STP during late October/early November 2005 in response to a request from the JOIAlliance.

Background:

a. JOIAlliance request from Kelly Kryc:

I am writing on behalf of the SODV team to request advice from STP.

As part of the responses we received to the Briefing Book questionnaire, an ROV was requested as an enhancement to the new U.S. drillship. For the Conversion Design Teams to fully consider this request, the needs of the community need to be better defined. As the representatives of the community, I would like to request that STP (or a subgroup of STP) compile a list of scientific requirements that an ROV should meet to be of scientific value to the program (examples might include things like a moveable camera, a manipulator arm, maximum water depth for operations, etc.)

Time is of the utmost importance, so a prompt response (2-3 weeks) would be greatly appreciated by the SODV team. Please contact me if I can provide any more information. Thank you so much.

b. Clarification from Sean Higgins (JOIAlliance)

As a member of the Science Conversion Design Team, we are being asked to judge the science measurement side of the question. Basically, is there enough justification science-wise to keep an ROV on the ship full time, part-time, expedition specific.....etc.. There may be safety reasons to have one or other practical needs but is there a real science need. So, should we just build in the infrastructure to support the occasional deployment of an ROV for non-science needs (i.e. Safety) and what would we have to give up space- wise to do that. Or are there other means of accomplishing the same thing like more advanced camera systems, etc...
.

So, as the science side, we're basically trying to figure out if there is any science being proposed with ROV's or is it simply a technical or safety support issue which is still important but would be considered more fully by the Drilling and Vessel Design teams.

STP Response:

1. Overall the STP does not have sufficient expertise to make an informed judgement on this issue. While some members do have experience and several have made comments we believe this issue may be better addressed by both EDP and EPSP, where panel members may have more direct experience of the benefits and limitations of using ROVs particularly for operations/ safety, and possibly for science. Having said that, the STP provides the following observations and suggestions.

2. The STP is unanimous amongst the members contributing to this discussion that the current drill string camera is inadequate and requires a major upgrade to enable a clear vision to be taken of the seafloor at the drill string entry point; this should be easily controllable and provide directional-azimuthal information to maximise the deployment of instruments (e.g. CORKS) and monitor the environmental effects.

3. Furthermore, STP suggests that the new drillship should have the capability of taking an ROV as required by science and/or safety issues. STP suggests that the Design Teams consider the impact of providing ROV capability with respect to:

    a. The impact of an ROV capability on the overall science budget. Given a fixed total, expenditure on an ROV must be offset against some loss in basic science costs.
    b. The Impact of an ROV capability against coring/drilling/logging time IF safety considerations prevent both taking place concurrently.

4. A science case for an ROV onboard may be made on a case by case basis, primarily for technical reasons to improve the efficiency of drilling (e.g. CORKs) which in turn will yield better scientific data. STP considers an ROV may considerably increase the scientific output from a drill hole in specific cases.

Discussion Summary:

The following observations have been made by individual STP panel members in reaching the above conclusions; these comments, however, do not constitute the agreed views of STP:

a) Earlier recommendations for an ROV (with other associated recommendations for a seabed frame and camera system) came out of TAP to improve coring recovery, deployment of downhole tools, and deployment of casing and CORKs. Obviously, worthwhile goals and very important to the science, although not necessarily "scientific measurements".

b) There does not appear to be a real need for an ROV on a drilling ship full time. If there are scientific needs related to specific expeditions one *could* use an ROV-carrier like Atlantis and carry out the expedition as a two ship expedition. In addition an ROV requires a significant amount of space on the ship for operations control, maintenance, highly specialized gear for deployment and recovery and a substantial crew for operating the ROV and maintenance. This all add a significant amount of money to the overall operations budget.

c) It seems an ROV requires constant maintenance when in use. These systems are much more complex than a simple camera.

d) The drill string camera provides a garbled view of very poor quality with no stabilization, pan, tilt or zoom and you don't even know what direction the camera is pointing. It is an antique and replacement of this system should be a priority.

e) The drilling ship NEEDS an ROV on a part-time basis. An ROV should be required for CORK work. Expedition 301, CORKing leg on the Juan de Fuca flanks, would have been nicely served by an ROV. An ROV is required to check the position of valves, how the CORK is progressing in the hole (an entire CORK instrument string was lost on the seafloor, but this could have been avoided with an ROV in the water while deploying the instrument string. Similar losses could have been avoided at Nankai and Costa Rica.), and that the CORK is seated. It would be ideal to deploy instruments and turn valves immediately after the holes were sealed and to verify the condition of the holes and packers before leaving the area. Having an ROV onboard would have greatly improved the science of this and all CORKing legs.

f) An ROV was on the JOIDES Resolution between ODP and IODP while drilling hydrates off Japan. So it has and can be done.

g) Some generalized uses for an ROV that would benefit science are listed below.

   i. While drilling hydrates or hydrothermal systems one could deploy instruments to monitor processes at the seafloor, collect samples, use the drilling platform and instruments on the seafloor to conduct manipulative experiments, and conduct time-series experiments that no one can presently do because of the cost of keeping a ship in one small area for more than few weeks.
   ii. Given the sensitivity to drilling in some areas, an improved imaging system could be useful for monitoring the effects of cuttings on local biological communities. Should this be the case then this could be provided by either a state of the art camera system or an ROV.

h) New instruments and capabilities that have been added to the ship in the past decade. These instruments and capabilities have greatly progressed the science and have opened up new fields, one of which (microbiology) is represented as one of the four major scientific thrusts for IODP. Adding an ROV could similarly advance science.

i) Defining the capabilities for an ROV are not that difficult these days, because there are standards in the oil/gas industry – primarily for shallow water. For example, all contracts now specify a minimum class of manipulator that an ROV must have. At first IODP should contract these services as needed. At some point it may be cost effective for an ROV to be on the ship as a routine capability.

j) Problems with having the ROV on another ship include:

   i. Because of weather and drilling condition you never know exactly when you need the ROV, thus the support ship and ROV have to be waiting on station or nearby for the duration of the expected need. At $43K/day US this is quite expensive and unlikely to be included in the budget. (Note, the cost of a permanent ROV on the drill ship, however, is unknown.)
   ii. Most of the time that an ROV will be critical will be when the drill string is near/in the seafloor. This requires the second ship to be very close to the drill string (50 to 100 m [less than the length of a ship]). Such close ship operations at sea will not be accepted by the ship operators for the periods of time that are required for the ROV to do the job.
   iii. It takes too much time to trip pipe and move off the station for the ROV to operate and then to trip pipe again to continue with drilling operations.

k) One issue of concern with an ROV is the potential conflict between operating an ROV and drilling. Will Drilling Engineers be loathe to operate an ROV while there is a drill string in the water (see response (m) below on this issue)? Tether management and the risks of getting tangled will be big deterrents. Thus the corollary is that ROV time will be competing with coring time and logging time. With the possible exception of dedicated CORK expeditions, I doubt that Co-Chiefs will look kindly on giving up core.

l) If an ROV weren't very expensive and wouldn't use much in the way of resources there would be more support. The design teams might want to look into whether it would be feasible to host a full ROV for special (CORK) expeditions.

m) Discussions with ROV operators at MBARI (who have ROV experience in the oil industry):

    i. ROVs work around drilling operations all the time. On a riser ship or a platform, ROVs are an necessary part of operations. They do not stop drilling during ROV operations. For example, some platforms have 3 or 4 ROVs in the water at the same time.
    ii. On Riser ships an ROV is in the water on a daily basis. One of the routine operations is to visually inspect the riser while operations continue.
    iii. On a riserless ship, ROV operations continue while the pipe is in the water. They do however stop rotating when the ROV is near the drill string.
    iv. During CORKing operations when an ROV is needed the drills string is not rotating and it would take as much time to lower the camera as to lower an ROV (they lower the camera for all of these operations). As for drilling and conducting ROV operations at the same time, this is typically not done in the oil industry because of the lack of interest.
    v. The pilots said that there are several ways to get the ROV in the water and conduct operations while drilling with a riserless system (once again a riser ship is not a problem because the rotating drillstring is confined within another pipe.). Thus, for example, sampling and studying nearby hydrates while drilling a hydrate field is possible.

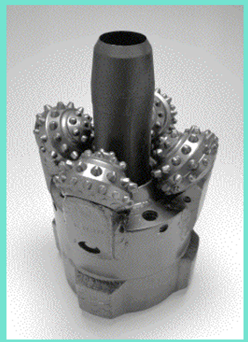
n) The new ship should have the capabilities for ROV operations and that an ROV should be included on a case-by-case basis. Operating a 3-man ROV team is expensive, but so is the loss of a hole (Costa Rica), loss of internal instrumentation, packers, and pipe (Nankai, Costa Rica, Juan de Fuca), the time it takes to clean out holes, and cost for ship/ROV/submersible operations that are required immediately after such deployments. Given the number of proposals that have CORKs, IODP could end up deploying a CORK or seismic station every year.

o) The design teams must look into whether it would be feasible to host a full ROV for special (CORK) expeditions.

p) The potential payoffs of having an ROV on the SODV are significant. It should be considered in the supplemental mode much like LWD tools work now such that if an expedition needs the ROV (such as a CORK leg) then it is put on board for that expedition.

q) Although in the oil and gas industry ROVs operate around a drill ship while the drill string is in the water as a normal operation, one should keep in mind that:

i. Examples from the oil and gas industry come most likely from 'shallow' water drilling and not from an installation of a CORK like Costa Rica in 4400m of water; few ROVs can go that deep; same problem would arise in Nankai. I know that Cascadia Basin is much shallower. That's why I suggest a case-by-case operation
ii. Having a ROV capability and need it only once a year (assuming there will be not more than one CORK installation on average per year) could be a very expensive investment
iii. In the case of Costa Rica, better 'eyes' would have helped to analyze the situation but would not have saved us from the installation problems we had. One installation at 1254 ended with about 20m of 4 inch pipe sticking out of the hole: would an ROV pilot stay away from such a potential dangerous obstacle?

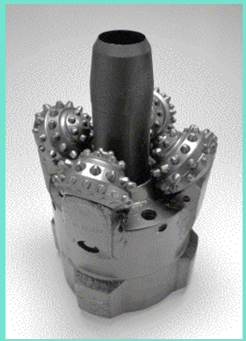


IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

A March 2000 report by the Conceptual Design Committee of the US Science Advisory Committee (CDC, 2000) identified the following logging suites to meet the scientific needs they foresaw at that time:

1. Resistivity
2. Bulk density
3. Compressional and shear sonic velocities
4. Porosity
5. Temperature
6. Gamma ray spectroscopy
7. Caliper
8. Check shots
9. Borehole imaging tools
10. Element analysis tools
11. Formation test tools for fluid sampling and permeability
12. Nuclear magnetic resonance tools for permeability
13. Magnetic susceptibility logging tools
14. Vertical seismic profile



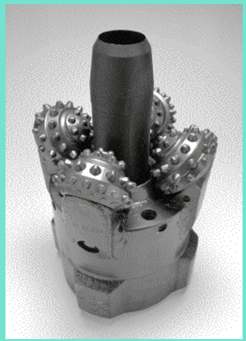
IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

Drillpipe Size

IODP could better achieve the CDC goals if they were to consider the use of a larger drillpipe. The following table lists the specific tools, providing technology not presently available below 3.75” diameter, that could be added as a function of increasing allowable tool OD:

Size Tool	Vendor	Comments/Advantages
4.63 PEX	S	Better-quality triple combo data
4.75 RCI	B	State-of-the-art formation tester, includes sampling
4.88 MRIL-slim	H	Magnetic resonance
5.00 EMI	H	Electrical imaging
5.00 FMI	S	Electrical imaging
5.00 ECS	S	Element analysis
5.00 MDT	S	State-of-the-art formation tester,includes sampling
5.00 RDT	H	State-of-the-art formation tester,includes samples
5.30 CMR Plus	S	Magnetic resonance
5.70 Star	B	Electrical and acoustic imaging
6.00 MRIL	H,B	Magnetic resonance



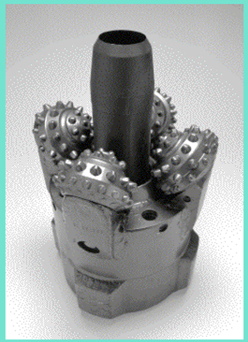
IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

EXAMPLE: IN SITU FLUID SAMPLING

SCIENTIFIC APPLICATIONS:

- Microbiology: enables recovery of pore fluids at in situ P/T conditions
- Hydrogeology: allow pore fluid chemistry and in situ permeability measurements
- Paleoclimate: enables recovery of dissolved noble gases at in situ conditions
- Fault-zone: allow measurement of in situ permeability and fluid composition



IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

•Numerous documents since 2002 outline JOI Alliance discussions on the optimal drill string configuration for the SODV, including:

- **Nov - Dec, 2002:** Summary of large diameter pipe issues introduced. Non-Riser Platform/Lab/Logging team discussion regarding logging requirements, desirables, tradeoffs including discussions for shipboard capabilities for deploying logging tools over 3.75"O.D. JOI Alliance document outlining the IODP Drill String Selection Criteria for US Non-riser Drill Ship.

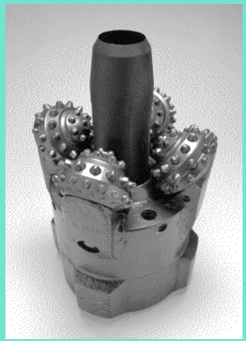
- **Jan- Feb, 2003:** Invitation to Tender draft document includes drill string options and day rates for drill string options. iTAP meeting document introducing arguments for 6-5/8 in. drill pipe as standard for IODP. Discussion about using 6-5/8 in. drill pipe for logging purposes began within the JOI Alliance. The use of the JAPEX pipe (~3,000 m) were introduced for having some capabilities for large diameter logging tool deployments.

- **Nov, 2003 - Feb 2004:** Logging Equipment Market Survey (Outsource Petrophysics, Inc) suggests IODP could better achieve the CDC goals if they were to consider the use of a larger drillpipe with a 5.0 inch diameter restriction. Market Survey for Derrick, Substructure and Drilling Equipment outlines pipe handling options for 6-5/8" pipe. Invitation to Tender enclosure 5 exhibit B section 2.6 & JOI Alliance Project Execution Plan (PEP) document Table 4 address drill string size options (i.e. wireline tools for an upgraded JR-class vessel listed as *large as possible* with a desired O.D. = 5.5").

- **October 4, 2004:** Drillship RFP asked for information regarding storage capacity for 6 5/8" pipe and storage capacity of backup drill pipe storage (Attachment O).

- **Aug -Oct 2005:** SODV Science Conceptual Design Team (CDT) meeting called to chart a direction for identifying the optimum drill string configuration to begin Phase 2 operations. Drafts of Statement of Work for Phase II SODV Drill Pipe Design Study were circulated. SODV Science Conceptual Design Team (CDT) meeting decided to form a joint WG to develop an agreed SODV strategy.

- **Jan-Feb 2006;** SODV Vessel & Drilling Systems Conceptual Design Team meeting: A drill pipe study has been commissioned to look into designing the ideal drill pipe for the SODV. Presentation and discussions at STP and EDP.



IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

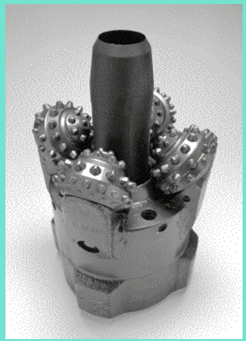
Additional Factors:

1) Current IODP wireline slim-hole tools receive limited support (technology is 20-30 years old).

2) Large-diameter tools are current industry standard and provide off-the-shelf improvements in technical capabilities:

3) Increase measurement resolution (e.g. 6-arm caliper, wide-swath electrical imaging, large-hole VSP, shorter tool strings)

4) NEW SODV MEASUREMENTS (nuclear magnetic resonance, geochemical spectroscopy, bulk permeability, and in situ fluid sampling



IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

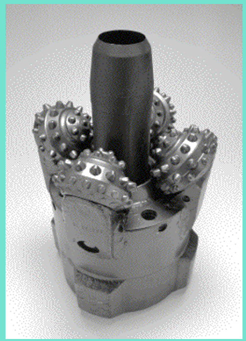
Total Depth Capabilities

(1) The SODV Vessel and Drilling Systems Conceptual Design Team proposed a shortened length of 6 5/8" pipe that would achieve the SODV logging program and normal coring depths. Approx ~3,000 m of 6 5/8" SR-140 pipe for is being considered.

(2) The SODV Vessel and Drilling Systems Conceptual Design Team is also considering the possibility of ~6,000 m of 6 5/8" SR-140 pipe in shore-based storage for expedition specific needs (i.e, not onboard at all times). Results from this study (currently underway) will provide input for the ideal drill string design.

(3) SODV Vessel and Drilling System CDT proposes optimal drill string lengths of 5”- & 6 5/8” -pipe to achieve the operational goals in the ISP.

Larger pipe diameters decrease total string length ~8-10% (unless higher strength/more brittle S-150 steel is used)**.**



IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

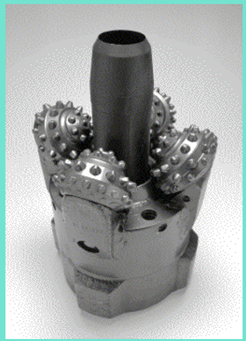
As an example here are the full length drill string specifications:

Current ODP drill string: (J/R)

- **5” 19.50# S-140 x 5-1/2” 26.70# S-140 = 33,257 ft (10,139.3m)**
- **18,270 ft^3 storage space required**

Potential IODP drill string: (US vessel)

- **6-5/8” 25.20# S-135 x 6-5/8” 27.70# V-150 = 29,816 ft (9,090.2m)**
- **25,163 ft^3 storage space required**



IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

Other Solutions ?

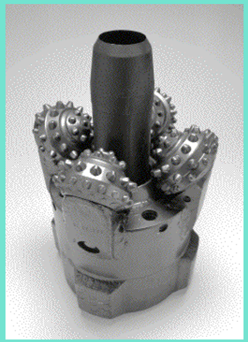
TLC (tough-logging-conditions) systems to acquire these measurements are not effective for SODV

1) Uncompensated heave effects on wireline data (std pipe- conveyed)

2) Uncompensated heave effects during re-entry (all tools at significant risk of damage and/or loss; $1M each)

3) Unlocking TLC technology does not exist (significant and untested engineering development)

4) Operation time requirements are inefficient use of rig time (e.g. one string per pipe trip --> ~4 x longer per tool string)



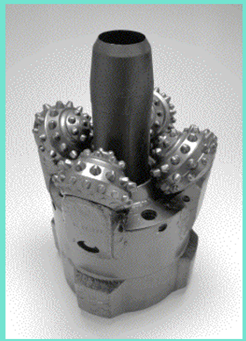
IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

LWD measurement will not replace large-diameter wireline logging measurements

- Cost and expedition-specific tool availability
- Long operational time
- Reduced measurement resolution (particular borehole images)
- Lower reliability and limited at-sea maintenance/repair

SODV Vessel and Drilling Systems CDT, LDEO BRG, and Logging Market survey recommend large pipe as preferred deployment scheme for Phase 2 logging



IODP Drill String Selection Criteria

Drilling Operations & Equipment Issues

Communications with SLB have indicated that the best approach for doing wireline logging operations in the IODP riserless mode is the use of large diameter pipe.

Recent communications between LDEO BRG and Steve Hickman (Co-PI of SAFOD) revealed the following:

1) The SAFOD project was one of the few if not the only scientific program to attempt logging operations using TLC techniques.
2) During their deployments, only 20-30% of the tools returned back to the surface alive.
3) Two cables were damaged during the deployments.
4) Although some usable data was collected, the process took ~4 times more operational time than normal wireline operations.
5) These were land deployments hence heave was not an issue.

IODP Measurements

- Safety
- Minimum
- Standard
- Supplemental

The purpose of this document is to make certain that each IO is fully aware of their responsibilities in collecting IODP data while drilling.

Based on the Executive Summary of the 1st STP meeting in Bremen (July 2005), it was recommended that: “The STP shall provide advice on scientific measurements made onboard IODP platforms, within and around boreholes, and on samples collected by the IODP and associated programs.”

IODP Measurements for safety

Expedition specific as implemented by IOs with advice from Environmental Protection and Safety Panel (EPSP).

IODP Minimum Measurements

Defined as measurements that shall be conducted in all boreholes and on all cores in IODP.

Measurement	Comments
Biostratigraphic	done on JR, done on MSP,Chikyu
Visual core description	done on JR, done on MSP ,Chikyu
Smear slides Thin sections	done on JR, done on MSP, Chikyu(Smear Slide this time)
Split-core digital photography (section line-scan and/or table layout)	done on JR, done on MSP, done on Chikyu w/ line scan)
Core logging • natural gamma ray • gamma ray attenuation • magnetic susceptibility	done on JR, most done on MSP done on Chikyu
Temperature profile[1]	
Moisture and density/porosity (discrete samples)	done on JR, done on MSP, done on Chikyu
Downhole logging[2]: • natural gamma ray • spectral gamma • density • porosity • resistivity • sonic • borehole imaging	done on JR, done on MSP, planned on Chikyu

1: SPC Consensus 0410-21: The SPC receives SciMP Recommendation 0406-10 and recommends wherever feasible measuring the temperature profile at each sedimentary IODP site.

2: SPC Consensus 0410-12: The SPC receives SciMP Recommendation 0406-1 and accepts the principle that all IODP sites should be logged. The committee recommends that the absence of planned logging at any IODP proposed sites must be explained and justified in the related proposal or expedition prospectus.

IODP Standard Measurements

Defined as standard measurements that shall, whenever practicable and appropriate, be carried out across all platforms and/or shore-based labs).

Core Petrophysics

Measurement	Comments
Natural remnant magnetism (NRM) with step-wise demagnetization	done on JR done on Chikyu
Core logging: P-wave velocity	done on JR, done on MSP, done on Chikyu
P-wave velocity (on split cores)	done on JR, done on MSP (onshore) , done on Chikyu
P-wave velocity (discrete samples)	done on JR
Thermal conductivity (both whole core and pieces)	done on JR, done on MSP (onshore), ready on Chikyu
Electrical resistivity	New
X-ray fluorescence (XRF) scanner	New, done on Chikyu
X-ray diffraction (XRD)	done on MSP (onshore), ready on Chikyu
X-ray CT scanning	New, done on Chikyu
Whole round core digital surface photography	done infrequently on JR
Color reflectance	done on JR, done on MSP (onshore) , done on Chikyu
Close-up and micro-imaging	done on JR, done on MSP (onshore)
Core orientation and structural measurements	Core orientation (also on splited cores) only available with APC in soft sediments Structural measurements better by 3D Xray scan

Downhole Petrophysics and Sampling

Measurement	Comments
Vertical seismic profile or checkshot	done infrequently on JR
Downhole pressure	currently 3rd party: done on JR
Open-hole temperature	done on JR
Magnetic susceptibility	3rd party replacement
Magnetic field	done infrequently on JR

Note: For MSPs, downhole minimum/standard measurements may be dependent on the size of the borehole.

Microbiology and Geochemistry

Measurement	Comments

Pore water chemistry (nutrients, pH, alkalinity, sulfate, chloride, major and trace elements)	done on JR, done on MSP, ready on Chikyu
Whole rock major and trace elements	done on JR, done on MSP (onshore), ready on chikyu
Microbiology (phospholipids and cell counts)	New
Bulk Carbon-Hydrogen-Nitrogen-Sulfur (CHNS) analyses	done on JR, done on Chikyu
Contamination testing	done when requested on JR
Carbonate analyses	done on JR, done on MSP (onshore), ready on Chikyu

Rig Floor

Measurement	Comments
Weight on bit	done on JR, done on Chikyu
Penetration rate	done on JR, done on Chikyu
Mud pressure	done on JR, done on Chikyu
Mud density	
Driller depth	
Pumping rate	
Rotation rate	
Heave compensation	
Mud logging	Done on Chikyu

IODP Supplemental Measurements

Defined as measurements that if are needed to satisfy expedition objectives should be made available to IODP. Some of these techniques will undoubtedly be 3rd party tools or require single expedition leasing of a tool. Some are also still under investigation by STP, EDP, and/or the IOs. Over time the successful supplemental measurements that start to become routine will likely move to Standard Measurements.

Downhole Petrophysics and Sampling

Measurement	Comments
Logging While Drilling and Measurements While Drilling	infrequently done on JR; measurements are same as in minimum downhole list but done *in situ* with no borehole contamination
Logging While Coring	under investigation/development
Permeability through packer tests	done on JR; involves some 3rd party tools
High resolution gamma	Tool under development
Nuclear magnetic resonance	currently limited by tool diameter
Formation testing	New
Pressurized core sampling	done infrequently on JR
Downhole sidewall sampling	New
Pressurized fluid/gas sampling	done infrequently on JR
Spontaneous potential (SP)	new, standard in industry and perhaps well-suited to Chikyu operations

Core Petrophysics

Measurement	Comments
Anhysteretic Remanent Magnetization (ARM) and Isothermal Remanent Magnetization (IRM) with step-wise acquisition and demagnetization	New, ARM on Chikyu
Permeability on discrete samples	under investigation/development
Vp and Vs, anisotropy and attenuation	under investigation/development
Vs	under investigation/development
Thermal imaging of core with infrared	Done on JR for hydrate legs
Nuclear magnetic resonance	New
Particle size analyzer	New
Penetration strength	Done infrequently on JR, done on MSP (onshore), done on Chikyu
Shear strength (i.e miniature vane method)	Done infrequently on JR, done on Chikyu

Non-contact resistivity	under investigation/development: insufficient information available to make it standard at this time, done on chikyu, data is under investigation

Geochemistry and Microbiology

Measurement	Comments
Laser ablation Inductively Coupled Plasma-Mass Spectrometer (ICP-MS)	under investigation/development
DNA and biomarker microbiological analysis	under investigation/development

DRAFT

IODP Third-Party Tools Policy

General Principles Governing Third--Party Tools and Instruments

In addition to the standard instruments and tools that are available on all Integrated Ocean Drilling Program (IODP) scientific expeditions, ocean drilling expeditions have historically drawn upon tools or instruments that were purchased or developed outside the framework of the primary contractors. These are known as “third-party ” tools. In IODP the term “tool” includes all forms of scientific instrumentation intended for use as part of an IODP expedition. Third-party tools may be classified as ”developmental" or “certified for deployment". Broadly speaking, tools can be divided into three types: (1) downhole (transient borehole measurements), (2) observatory (left behind in the hole after hole is completed), and (3) laboratory (shipboard or IODP core repository). Each of these categories has unique characteristics, but all of them require technical support from the implementing organizations (IOs) that, in turn, may require IODP-MI approval of associated science operating costs. In the Appendix to this statement of principles, we specify guidelines for development and acceptance of third-party tools.

Support for the purchase or development of third-party tools can come from a variety of sources. In the United States, third-party tools have generally been supported by the National Science Foundation, using funds earmarked for ocean drilling and allocated to highly ranked, unsolicited proposals. International partners operate similar procedures. It is recognized that IODP cannot impose standards on external funding agencies, but it is hoped that principal investigators and those agencies will ensure that proposals for funding of third-party tools include plans and funds for satisfying the criteria set out in this document. The final responsibility for the use of a third-party tool during an IODP expedition or in an IODP Core Repository rests with IODP-MI and the IOs.

It is important that third-party tools are certified as satisfying all of the operational and safety criteria that IODP applies to its own in-house tools and instruments. Careful pre-cruise planning is essential if third-party tools are to be successfully integrated into the scope of shipboard work. This planning is particularly necessary when a tool requires dedicated ship time for deployments. Funding agencies are urged to include sufficient funds in a third-party tool development project for travel to the IO’s main office to participate in pre-expedition planning that will ensure proper communication and laboratory testing during development, as well as sufficient funds for field tests of the tool(s) prior to deployment during an IODP expedition. The principal investigator (PI) for a third-party tool is responsible for providing funds for planning activities, shipping the tool to the site of deployment, and integrating tool deployment into the expedition work and data flow. Requests for deployment of third-party tools are often late in the schedule when IODP program budgets have been completed. Work that the IO is expected to contribute must therefore be identified as early as possible to minimize the impact of potential resource requirements.

It is important to note that funding of a third-party tool by an external agency does not guarantee time or space aboard a drilling platform for experiment execution. Scheduling of implementation of a tool on an expedition is subject to approval by the Operations Task Force (OTF) and Science Planning Committee (SPC) during their iterative planning process. Deployment also depends on acceptance by the IO. The primary responsibility for integrating a tool into IODP operations rests with the PI and not with the IO. The level of integration and potential sharing of associated costs depend on the nature of development and timing. Tools that are not ready for deployment or demand inordinate operator resources during the course of an expedition are a drain on support and platform time for all expedition participants. It is crucial that the IO accept a tool for deployment before an expedition begins and that there are no ambiguities in operation and support responsibilities.

Data and/or samples acquired through the use of certified third-party tools are subject to the same dissemination rules as any other data or samples collected by IODP. Furthermore, the data produced through the use of third-party tools is the property of the IODP and therefore will be made publicly available after the moratorium period ends. Any third-party tool deployment plan must specify the current and potential future data and sample deliverables for the tool. PIs are required to submit a Deployment Report and relevant digital data files for the *Proceedings of the Integrated Ocean Drilling Program* volume for the expedition.

If a certified third-party tool has proven itself as crucial for answering certain scientific questions, the PIs and the operator are encouraged to work collaboratively to add it to the standard pool of IODP capabilities for the duration of the program in order to make it accessible to the IODP community. After the tool has been added to the IODP standard measurement capabilities, it is no longer considered a third-party tool.

Appendix: Guidelines for Third--Party Tool Development and Deployment

Communication is the key to the successful development and deployment of third-party tools. It is the responsibility of the scientist wishing to deploy a third-party tool to consult with the appropriate IO early in the development planning process and provide tool specifications and operational criteria. Where the tool is a laboratory instrument to be operated by the PI, this process may simply require power, space, safety information, and a sampling/measurement plan. Off-the-shelf borehole tools will additionally require plans for integration with existing systems (e.g., drilling pipe, cable heads, data retrieval and storage). In the case of developmental tools for downhole or observatory deployment, the investigator must identify development milestones in terms of both the level and the timing of technical achievements such that the tool will be ready when it is scheduled for operation.

For all categories of tools, the project planning phase must define explicitly how much time and resources (funds and personnel) are needed and how much the IO is willing to commit during the development phase (if applicable) and during deployment. Development timelines and requirements as described below may be modified by agreement between the IO and the PI, subject to approval by Integrated Ocean Drilling Program Management International (IODP-MI) because the necessary IO support is related to SOC funding. Such agreements will be reported to the Scientific Technology Panel (STP), Engineering Development Panel (EDP), and Operations Task Force (OTF).

The following guidelines for third-party tool development and deployment have been formulated to reflect the fact that the IOs are responsible for assisting with and monitoring third-party tool developments and reporting status to STP, EDP, OTF, and IODP-MI. These guidelines indicate a general progression through which new tools are introduced to IODP operations.

Developmental Tool: For a noncertified tool to be considered for deployment on an IODP expedition, the following criteria must be met:

(1) There must be an identified PI who is the primary proponent and point of contact for the use of the tool by IODP.

(2) The PI must formulate a development plan in consultation with the appropriate IO. Where a tool is intended for multiple platforms, the appropriate IO will be the one responsible for the first deployment. The lead IO will coordinate with other IOs and IODP-MI as necessary.

(3) The development plan should, where appropriate

- indicate the usefulness of the proposed measurements and the financial and technical feasibility of making them,;

- include a brief description of the tool, schematic diagram(s), details of the operational procedure, and technical specifications such as dimensions, weight, temperature and pressure ratings, cable-length restrictions, cable type, etc,.;
- identify a development timeline in terms of technical achievements and reporting requirements, including a specific deadline for a "Go, No-Go" decision by the IO on deployment,;
- make provision for initial testing on land, when possible, and request ship time if testing from the drillship is necessary, subject to OTF approval
- satisfy safety considerations,;
- specify shipboard requirements such as the data processing necessary to make the information accessible aboard ship, if applicable, any special facilities (emphasizing where the tool is not compatible with existing hardware and software), and appropriate technical support;
- specify the data deliverables
- make provision for transporting tools for shipboard testing, in terms of both cost and time,; and
- contain a signed (pro forma) statement of agreement with these requirements.

(4) The IO will report the submission of development and deployment plans to STP, EDP, OTF, and IODP-MI. STP will normally bear the responsibility of determining action on these submissions in accordance with the panel mandate and will provide advice to the IO regarding further tool development. In the instance of engineering development playing a significant role in the delivery of a tool for an expedition, STP and EDP will designate individuals to coordinate panel input to OTF, SPC, and the IOs. EDP may take the lead where engineering is the major focus of the development. IODP-MI will ensure that this Third-third-party tools policy is enforced.

(5) If the IO, and STP (and/or EDP when appropriate), endorses the development plan, a staff liaison will be appointed by the appropriate IO to monitor the tool's progress through the development plan. The IO's tool liaison will be charged with providing status reports of the tool's progress to STP, EDP and OTF through their panel liaisons, and to IODP-MI.

(6) With a positive OTF recommendation, an IODP development tool may be scheduled for testing during an upcoming expedition. Development tools must be deployed in test mode. By their very definition, they are not certified tools, and therefore the scientific success of a expedition must not be contingent upon the proper functioning of such a tool.

(7) It is incumbent upon the PI to ensure that the appropriate IO is fully advised of the tool's status. If the development plan falls seriously behind schedule and the PI is unlikely to have satisfied all of the above criteria prior to a planned deployment, the IO has the right to withdraw the tool from further consideration for an expedition after consulting with IODP-MI. The shipboard test may be canceled, and an agreement may be reached on a revised schedule.

(8) If the above procedures have not been followed, then the tool in question cannot be regarded as an IODP development tool and therefore cannot be scheduled for testing in future expeditions. A development tool cannot be deployed during an IODP expedition unless the IO and IODP-MI are fully satisfied that the terms of the development plan have been fully met.

Certified Tool: For a tool to be considered an IODP certified tool, and thus suitable for scheduling on IODP expeditions on a routine basis, the following criteria must be met:

(1) The tool must have satisfied all the requirements for an IODP development tool.

(2) The tool must have been tested at sea during an IODP expedition(s) and performed satisfactorily in the opinion of the relevant (lead) IO.

(3) The PI must formulate a request for certification in consultation with the appropriate IO.

(4) The request for certification should

- be prepared in coordination with the operator's tool development liaison (or designate) to ensure adequate communication between the developer and the operator,;
- indicate the cost of routine shipboard operations including data processing,;
- outline the operational requirements for routine deployment and data processing,;
- detail the availability of spare components,;
- provide information on adequate maintenance facilities,;
- include an operating and maintenance manual,;
- satisfy safety considerations,;
- confirm the long-term usefulness of the data
- confirm accessibility of the data
- provide source code with documentation where appropriate, and
- define performance specifications (pressure, temperature, vibration, shock limits, etc.).

(5) The request for certification must be submitted for approval to the lead IO .The lead IO submits a request for certification to IODP-MI. IODP-MI seeks agreement from the other IOs and coordinates a discussion if appropriate. If and when an IO consensus has been achieved, IODP-MI seeks endorsement by the STP and/or the EDP.

(6) If and when STP and/or EDP endorse the request for certification, IODP-MI will issue a certificate confirming the satisfactory conclusion of tests and compliance with all requirements to the PI. A copy of this certificate must be forwarded to the STP and EDP chairs.

(7) Maintenance and operation of an IODP certified tool remains the charge of the third party. A certified tool can be scheduled for deployment during an upcoming IODP expedition and would be expected to contribute to the scientific success of the expedition.

(8) Third-party tools that do not possess a certificate cannot be programmed for scientific deployment on future expeditions as part of the regular planning process.

Paleontology Working Group Report

The 1st STP meeting in Hawai
(2005)

STP Recommendation 0507-08: Micropaleontology

To ensure continued effective use of DSDP-ODP legacy sites, as well as to improve IODP's own paleo data resolution and reproducibility, a paleontologic taxonomic/stratigraphic reference standard is required across all platforms. This should include digital taxonomic dictionaries for microfossil taxa, linking DSDP-ODP and current taxonomic concepts. The STP recognizes that without IODP involvement, these dictionaries will not be completed, which will adversely impact IODP science. The STP recommends that appropriate assistance be given to ensure that such dictionaries are available.

SPC meeting in Kyoto (Oct/2005)

SPC Consensus 0510-9:

The SPC receives STP Recommendation 0507-8 on defining a biostratigraphic reference standard and completing taxonomic dictionaries. The committee asks the STP to clarify the involvement of the micropaleontology reference centers (MRCs) in these activities and return with a new recommendation.

They very explicitly ask for a new recommendation that links MRCs to Digital Taxonomic Databases

Recommendation XXX - STP recommends that IODP incorporate the MRCs (Micropaleontology Reference Center) in IODP, and charge them with coordinating the community development of DTDs (Digital Taxonomic Database). These are needed to maintain and improve micropaleontologic data quality within the IODP program.

Background - ***STP, and earlier, SciMP, have repeatedly recommended to SPC (in Recommendations 0507-08) that micropaleontologic data quality needs to be secured by appropriate calibration and updating of taxonomic and biostratigraphic concepts, and further, that the MRCs should continue in IODP as a source of micropaleontologic expertise and materials. The MRCs, in their 2005 report, have explicitly offered to provide IODP with coordination of DTD development, and have suggested a reasonable budget (xx over an initial period of x years). As the MRCs Collections will be used in the development of DTDs, and have as well other potential uses (see MRC report) we agree that the MRC collections should be completed as proposed in the MRC report and integrated into the DTD effort. Other proposed uses for MRC Collections, e.g. for education, will however need to be proposed and approved separately.***