

IODP Operations Review Task Force Meeting

Expeditions 338
NanTroSEIZE Stage 3

March 22nd -23rd 2013

Beacon Hotel

Washington DC, USA

Expedition 338 Operation Review Task Force Members

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| Kyuichi Kanagawa | Co-Chief Scientist, Chiba University, Japan |
| Gregory Moore | Co-Chief Scientist, University of Hawaii, USA |
| Michael Strasser | Co-Chief Scientist, ETH Zurich, Switzerland |
| Alister Skinner | External Reviewer, Alister Coring Service, UK |
| Bob Pilko | External Reviewer, Blade Energy Partners, USA |
| Kohtaro Ujiie | External Reviewer, University of Tsukuba, Japan |
| Gaku Kimura | Specialty Coordinator, University of Tokyo, Japan |
| Toshiya Kanamatsu | Specialty Coordinator, IFREE/JAMSTEC, Japan |
| Harold Tobin | NanTroSEIZE Chief Project Scientist, University of Wisconsin, USA |
| Nobu Eguchi | EPM, CDEX/ JAMSTEC, Japan |
| Sean Toczko | EPM, CDEX/ JAMSTEC, Japan |
| Ikuo Sawada | OSI, CDEX/JAMSTEC, Japan |
| Tomokazu Saruhashi | OSI, CDEX/JAMSTEC, Japan |
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| Nori Kyo | CDEX/JAMSTEC, Japan |
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| David Divins | USIO, Consortium for Ocean Leadership, USA |
| Greg Myers | USIO, Consortium for Ocean Leadership, USA |
| Shingo Shibata | MEXT, Japan |
| Tom Janecek | NSF, USA |
| Yoshi Kawamura | IODP-MI |

MEETING FORMAT

The IODP-MI Operations Review Task Force (ORTF) met on March 22nd – 23rd in the Capital Room of the Beacon Hotel, Washington DC to review the operational aspects of IODP Expedition 338: NanTroSEIZE stage 3. The review concentrated on “lessons learned” from the expedition with an emphasis on “what should be done differently in the future.” The Task Force review was based upon confidential reports submitted by the Center for Deep Earth Exploration (CDEX), the Expedition 338 Co-chief scientists.

The meeting began with oral presentations by Co-chief Scientists: Michael Strasser & Brandon Dugan, Expedition Project Manager (EPM): Sean Toczko and Operation Superintendent (OSI): Tomokazu Saruhashi, summarizing the Co-chief Scientists and CDEX reports respectively. Following these oral presentations and clarifications of the reports, External Reviewers and IODP-MI personnel had an executive session to identify the specific and important issues through the expedition (including pre and post phases), discuss their solutions/necessary actions, and formulate ORTF draft recommendations. On the second day of the meeting, the whole ORTF reviewed the draft recommendations and finalized them. These recommendations are presented in this report.

EXPEDITION SUMMARY

Expedition 338 is part of the Nankai Trough Seismogenic Zone Experiment project. The Nankai Trough Seismogenic Zone Experiment (NanTroSEIZE) is a coordinated, multi-expedition drilling project designed to investigate fault mechanics and seismogenesis along subduction mega-thrusts through direct sampling, in situ measurements, and long-term monitoring in conjunction with allied laboratory and numerical modeling studies. The fundamental scientific objectives of the NanTroSEIZE project include characterizing the nature of fault slip and strain accumulation, fault and wall rock composition, fault architecture, and state variables throughout the active plate boundary system.

Expedition 338: October 1st 2012 – January 13th 2013

Co-Chief Scientists: Gregory Moore, Kyuichi Kanagawa, Michael Strasser, Brandon Dugan
Expedition Project Managers (EPM): Sean Toczko, Lena Maeda
CDEX Operations Superintendent (OSI): Ikuo Sawada, Tomokazu Saruhashi

The purpose of Expedition 338 was to extend and to case riser Hole C0002F, begun on Expedition 326 in 2010, from 856mbsf to 3,600mbsf. Riser operations extended the hole to 2,005.5mbsf, collecting a full suite of logging- and measurement-while-drilling (LWD/MWD), mud gas and cuttings data. However, due to damage to the riser during unfavorable winds and strong current conditions, riser operations were cancelled. Hole C0002F was suspended at 2,005.5mbsf, but left for re-entry during future riser drilling operations, which will deepen the hole to penetrate the mega-splay fault at about 5,000mbsf. After suspension of Hole C0002F, contingency riserless operations included coring at Site C0002 (200–505, 902–940, and 1,100.5–1,120mbsf), LWD at Sites C0012 (0–709mbsf) and C0018 (0–350mbsf), and LWD and coring at Sites C0021 (0–294mbsf) and C0022 (0–420mbsf). These sites and drilling intervals represent key targets not sampled during previous NanTroSEIZE expeditions, but relevant to comprehensively characterize the

alteration stage of the oceanic basement input to the subduction zone, the early stage of Kumano Basin evolution, gas hydrates in the forearc basin, and the recent activity of the shallow mega-splay fault zone system and submarine landslides.

The main objectives for combined primary riser operations and contingency riserless operations at Site C0002 were to sample the upper part of the forearc basin sediments and gas hydrate zone, the basal Kumano Basin-to-accretionary prism unconformity, and the upper portion of the inner wedge with cores, drill cuttings, mud gas sampling, and an extensive suite of LWD logs. The primary objectives of LWD operations at Site C0012 were to characterize the sedimentary section and the upper portion of the oceanic crust with a full suite of LWD logs, and to correlate those data with the previous core and seismic data. LWD operations at Site C0018 aim to characterize the sedimentary section and mass-transport deposits (MTDs) at Site C0018 with LWD data, while LWD and coring at Site C0021 aim to investigate the lateral variability of MTDs observed at Site C0018. This variability relates to the nature, provenance, and kinematics of the landslides. The main objective of LWD and coring at Site C0022 was to provide constraints on the activity of the mega-splay fault tip.

See http://publications.iodp.org/scientific_prospectus/338/index.html & http://publications.iodp.org/preliminary_report/338/index.html for more details regarding the background and objectives, and the preliminary scientific results of Expedition 338.

RECOMMENDATIONS OF THE EXPEDITION 338 REVIEW TASK FORCE

Overall, the Expedition 338 Operations Review Task Force (ORTF) found that Expedition 338 was successful, particularly with regard the technical achievement and science output, despite changing circumstances, which were managed well. For instance, conducting riser operation including emergency riser disconnect (EDS) under very high Kuroshio Current and strong cold front pass, and coring and logging (LWD) in heavily stressed accretionary prism.

This success resulted from a combination of factors including, “Lessons Learned (ORTF results)” from the previous NanTroSEIZE Expeditions, experience gained by CDEX working in the “IODP” environment, close collaboration between the Co-chief scientists and operators, and a professionalism, willingness and hard-work shown by all parties to work through issues as they arose at sea and onshore.

The ORTF identified a few potential areas to be improved for future operations, which are Staffing, Communication, Operations, and Laboratory. The longest and hottest discussion during this review meeting was staffing issue, which has been discussed since CDEX/Chikyu conducting IODP, was recommended at several past operations review task forces, and has not been solved.

While the primary focus of this review was on CDEX operations during Expedition 338, many recommendations in this report are equally valuable for new IODP operations. As such, some recommendations are also directed to new entities, such as Implementing Organizations (IOs), Facility Boards.

Staffing

Recommendation 338-01: ORTF recognizes the dilemma of scientific staff planning and MEXT/JAMSTEC budget timing. ORTF recommends bringing the issue separation/decoupled budget process and expedition planning, especially the call for scientists to Chikyu IODP Board (CIB). And ORTF suggests possibly mentioning the issue at CHIKYU+10 Workshop.

Routing: CDEX, JAMSTEC, CIB, MEXT

Background: Short lead times on staffing continue to plague NanTroSEIZE expeditions and are impacting the ability of the project to maintain high-quality research and science products. It has been caused by MEXT and JAMSTEC budgeting system/ timeline, and deeply coupled budget decision and official announcement approval. All efforts need to be taken to increase the lead time between “call” and expedition starting date.

Recommendation 338-02: ORTF encourages using Lead EPM concept from start of planning to completion of expedition.

Routing: CDEX

Background: There were several problems that arose during pre-expedition, due to having multiple EPMs involved in the planning, such as staffing. Many things were delayed, asked Co-chiefs multiple times and/or caused miscommunications. Also during expedition, rotating EPMs led to some delays and confusion on writing reports.

Communications

Recommendation 338-03: ORTF recommends continuous effort to develop informal as well as formal communication paths on Chikyu, and encourages exchange of information between scientists and technical personnel, including drillers and service companies.

Routing: CDEX

Background: CDEX developed and has been improving formal communication paths on board among, Science Party (Co-chiefs), CDEX (OSI, EPM), and MQJ (OIM), such as the EXCOM “executive committee”. However, on board researchers are still feeling some barriers to make informal information exchange to drilling operators. But also there are some concerns confusing/blurring command lines by informal communications. Need to clarify command lines, and differentiate commands and information exchanges clearly.

Recommendation 338-04: ORTF encourages CDEX/JAMSTEC and MEXT making further application to Ministry of Internal Affairs and Communications (MIC) to obtain permits/exemption for higher speed ship to shore communication for Chikyu.

Routing: CDEX, JAMSTEC, CIB, MEXT

Background: The current Chikyu broadband internet connection is not acceptable for international science projects/operations. And by Japanese law, Japanese Government (MIC) does not allow V-sat (high speed reasonable-cost satellite network) in Japan EEZ. It is necessary for CDEX/JAMSTEC and MEXT either to work for change in the telecom restriction or to obtain a waiver to operate by V-sat with Japanese scientific ocean drilling community help.

Recommendation 338-05: Good publicity helps whole new Chikyu/IODP program, ORTF encourages CDEX to develop and maintain up-to-date website (information provider), and to conduct several different types of outreach, such as for science, operation, engineering. And it may include to oil & gas industry journals.

Routing: CDEX, JAMSTEC, CIB

Background: CDEX used to maintain very good real-time Chikyu operation website. Its importance should not be undervalued.

Recommendation 338-06: ORTF encourages CDEX to communicate to Industry (especially oil & gas frontier exploration), and to seek collaborations and funds.

Routing: CDEX, JAMSTEC, CIB

Background: For new IODP, it is important for CDEX/JAMSTEC to make and clarify new Chikyu business and operation model.

Operations

Recommendation 338-07: To avoid negative impact on science and perceived time losses during operation, ORTF recommends CDEX to discuss and evaluate new technologies with scientists and engineering expertise at the expedition planning stage. ORTF also suggests CDEX to coordinate such discussion and meetings through EPM and if necessary, PMT (Project Management Team).

Routing: CDEX

Background: CDEX introduced RWD (Reaming While Drilling) technology to save drilling operation time by running bit, LWD and under-reamer simultaneously. The result was marginal. RWD impact on cuttings observations and measurements were exceeding CDEX operators' evaluations/pre-study and unacceptable by Science Party. Also, the pre-study results were not informed to Co-Chiefs properly.

Recommendation 338-08: As part of riser operation contingency planning, ORTF suggests that termination of the expedition should be one of the contingencies.

Routing: CDEX, JAMSTEC, CIB

Background: In this expedition, due to damaging riser system at the early stage, the entire on-board party faced very long contingent time. And it was more than

planned/prepared contingency options, if expedition were conducted time-orientated manner.

Significant differences exist between a Chikyu riser drilling expedition and a JR riserless drilling expedition. CDEX needs to develop a new Chikyu riser drilling expedition style, such as target driven etc, and inform/educate science community about all the different aspects of the new riser drilling approach.

Recommendation 338-09: ORTF recommends CDEX to address the accommodation and laboratory ventilation system issues immediately.

Routing: CDEX, JAMSTEC

Background: Ventilating fans and ducts in accommodation and laboratory had been often loud, interfering with conversations and sleeping. It was also noted that the fans (ventilation system whole) were very dusty. By inquiring to Ship operator, there is no regular maintenance and cleaning plan for the system. This is very high/serious health risk and may cause total operation shutdown.

Recommendation 338-10: New technology and deeper drilling/coring do require greater drilling mud pump capacity. ORTF suggests that consideration should be give to installing additional drilling mud pump capacity on Chikyu, which will also serve as back up to existing pump operations.

Routing: CDEX, JAMSTEC, CIB

Background: Newly introduced technology: RWD (Reaming While Drilling) required high flow-rate & pressure on mud pumps, and needed to use all three pumps on Chikyu. Therefore, if a pump failed, the operation had to be stopped. And there is a space for fourth mud pump on Chikyu.

Recommendation 338-11: ORTF encourages CDEX to build lessons learned from Expedition 338 operation into future risk assessment and operation procedures.

Routing: CDEX, JAMSTEC

Background: Chikyu operation efficiency and effectiveness have been improving during the last few years, but there are some opportunities to do more, especially operational risk assessment by using gained experiences.

Recommendation 338-12: ORTF believes that PMT concept is valuable, should be continued in new program.

Routing: CDEX, JAMSTEC, CIB

Background: The projects that required long duration (multiple science parties) and/or multiple expeditions (stage approach) needed to have a project oversight function. The current NanTroSEIZE PMT is suited and functioned well.

Recommendation 338-13: ORTF recommends CDEX to create/identify contingency planning communication flow and decision making flow to control/facilitate several inputs such as scientific demand and operation feasibilities from different groups.

Routing: CDEX

Background: These functions exist on Chikyu and in CDEX, yet need to be documented for consistent procedural implementations.

Laboratory

Recommendation 338-14: ORTF strongly recommends CDEX to conduct regular specific safety training in each laboratory and to emphasize importance of immediate incident reporting to lab technicians and scientists.

Routing: CDEX

Background: There was a safety incident in the geochemical lab that was potentially serious, fortunately nobody was injured. Investigation of the event by EPM identified multiple breakdowns in communication and protocol related to equipment operations and the incident reporting.

Recommendation 338-15: ORTF recommends CDEX to continue lab technicians' training and up-date and expand lab facilities based on scientific demand.

Routing: CDEX, JAMSTEC, CIB

Background: Thin section preparation during this expedition was limited to five sections per day, which often became a limiting factor for sedimentologists and structure geologists to properly describe the formation. Unless solved, this problem will become more apparent in deeper drilling and/or hardrock expeditions.