

IODP Operations Review Task Force Meeting

Expedition 323
Bering Sea Paleooceanography

September 15th-16th, 2010
TAMU, College Station
TX, USA

Expedition 323 Task Force Members

Co-Chief Scientists

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Greg Myers – Ocean Leadership

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MEETING FORMAT

The IODP-MI Operations Review Task Force met on September 15th – 16th at Texas A&M University (TAMU), College Station (USA) to review the operational aspects of IODP Expedition 323 (Bering Sea Paleooceanography). The review concentrated on lessons learned from the expedition with an emphasis on what should be done differently in the future, while taking note of topics specific to Expedition 323 and items which had been or were in the process of being addressed. The Task Force review was based upon confidential reports submitted by the U.S. Implementing Organization (USIO) and the Expedition 323 Co-Chief scientists, as well as on expedition daily and weekly reports available on-line.

The meeting began with oral presentations by the Co-Chief Scientists (Christina Ravelo and Kozo Takahashi) and the Expedition Program Manager (EPM: Carlos Alvarez-Zarikian), who summarized the Co-Chief Scientists report and USIO reports, respectively. The Co-Chief scientists presented their recommendations. Following these oral presentations, the Task Force identified specific topics for discussion from the pre-expedition, expedition, and post-expedition phases, including the post-expedition sampling. On the second day of the meeting, the Task Force reviewed the recommendations and came to a consensus on each one. These recommendations are presented in this report.

EXPEDITION SUMMARY

Expedition 323: July 5th – September 4th, 2009

Co-Chief Scientists: Christina Ravelo, Kozo Takahashi

Staff Scientist: Carlos Alvarez-Zarikian

USIO Operations Superintendent: Stephen Midgley

Expedition 323 (Bering Sea Paleooceanography) cored 5741 m of sediment (97.4% recovery) at seven sites ranging from 818 to 3174 m water depth in three areas of the Bering Sea: Umnak Plateau (proximal to the entrance of the modern Alaskan Stream into the Bering Sea); Bowers Ridge (in the open waters of the Bering Sea proximal to the glacial Alaskan Stream entry); and the Bering Sea shelf region (proximal to the limit of modern sea ice extent). Sites were selected to optimize characterization of past vertical water mass distribution and circulation. Four deep holes were drilled, ranging in depth from 600 to 745 m below seafloor and spanning 1.9 to 5 Ma in age. Older basement rocks (1.2 Ma) were recovered at one site (U1342).

JOIDES Resolution was never granted permission to drill the planned sites in the Russian EEZ. The science objectives were largely met by drilling the sites outside the Russian EEZ. The primary coring objectives of the Bering Sea program for the seven sites in U.S. territorial waters were all achieved.

All recovered cores were processed in order to describe physical, chemical and sedimentological properties and biostratigraphy in the ship laboratories. All primary

shipboard data were obtained and uploaded in the LIMS database. The downhole logging objectives were successfully achieved as planned in the Scientific Prospectus. All cores were stored in Japanese Core Repository, Kochi Core Center (KCC) after the expedition.

See http://iodp.tamu.edu/scienceops/expeditions/bering_sea.html for more details regarding the background and objectives, the preliminary scientific results, and conclusions of Expedition 323.

The Co-Chief scientists included in their discussion two topics specific to Expedition 323. First, there were more problems than usual in staffing the expedition due the delays during the scheduling. The original scheduling, was followed by cancellation of the expedition and de-invitation of the scientists, followed then by rescheduling. Second, the Bering Sea expedition was only the third expedition after the *JOIDES Resolution*'s refit, which included complete replacement of the laboratories and most science systems, and it was the first expedition with very high core recovery. The short history of operation of the vessel's systems combined with the very high rate of core recovery led to problems with some of these systems, which substantially increased the effort required to obtain and upload the data, and impacted the confidence in the quality of some data. These issues have also been addressed during the External Assessment of the *JOIDES Resolution* shipboard systems (27-29 June 2010).

RECOMMENDATIONS OF THE EXPEDITION 323 REVIEW TASK FORCE

Overall, the Expedition 323 Operations Review Task Force found that the Bering Sea Paleoceanography Expedition was a major success. This success resulted from a combination of factors including the refurbishment of the *JOIDES Resolution* and its drilling hardware; the close collaboration and communication between science party and operators; and the professionalism, willingness and the concerted effort shown by all parties to work through issues as they arose at sea and onshore. All parties involved in this operation are to be congratulated on a very successful expedition, especially on the high quality and recovery of an unprecedented number of cores, which the Task Force believes will produce a wealth of scientific knowledge in the years to come.

The Review Task Force identified a few areas of improvement for future operations including pre-expedition planning/preparation, expedition operations, and post-expedition sampling and reporting. Many of the issues discussed during this review were related to newly introduced shipboard science systems (hardware/instrument and software/program). The Review Task Force unanimously stressed the importance of data quality control, and made specific recommendations to assist the operator in solving problems. While the primary focus of this review was on USIO operations during Expedition 323, many recommendations in this report are equally valuable for other IODP operators, IODP management, and to the Science Advisory Structure (especially the Scientific Technology Panel). As such, some recommendations are also directed to these entities.

Pre-Expedition

Recommendation 323-01: ORTF 323 recommends that the staffing schedule of each expedition should be kept as close as possible to the original framework. OTF or its future equivalent should not cancel an expedition, although it may have to re-schedule.

Routing: USIO, OTF, IODP-MI

Background: The expedition which was originally scheduled in 2008 was canceled after multiple delays in scheduling, due to delay of the completion of the *JOIDES Resolution's* renovation in Singapore. The EPM, the PMOs and the Co-Chief Scientists had to spend more time than usual with one simple expedition.

Recommendation 323-02: ORTF 323 recommends that the IO acts immediately when the shipboard party identifies laboratory needs that can be met at low cost.

Routing: USIO

Background: During Expedition 323, the science party requested some laboratory equipment (e.g., mechanical stages for the microscopes) which was needed on ship. The requested item could be provided at low cost (i.e., < \$1000.-) but was not yet provided ready a year after the expedition.

Recommendation 323-03: ORTF 323 recommends that the IO provides pre-cruise training of the shipboard database system and shipboard software for data entry (e.g. for core-description and micropaleontological data entry) to the shipboard scientists so they are able to familiarize themselves before the expedition with LIMS and other software. We note that the IO has made some progress since Expedition 323, but we urge the IO to implement an online, interactive self-training module that can be accessed by the scientific party as soon as they accept the invitation to join the expedition. An equivalent training package is already implemented by ICDP and the other IOs.

Routing: USIO, STP

Background: Many shipboard scientists had difficulty using the *JOIDES Resolution's* new database system (LIMS) and core-description and microfossil data input software (DescLogik). There was inadequate training of shipboard scientists prior to the expedition, particularly because the systems were new, and software was still being developed, and this was the first high recovery expedition.

Expedition

Recommendation 323-04: ORTF 323 recommends urgently that a clear, organized and living system is developed to document past and current problems for all shipboard science systems. It is imperative that there is detailed documentation for each science system (hardware/instrument and software/program) of problems as they occur and their solutions. There likewise should be documentation of problems that have been identified but not solved, as well as routine maintenance, calibration and performance of the equipment.

Routing: USIO, STP

Background: The science party experienced difficulties in their use of the completely new laboratory structure, data acquisition, database and data extraction software systems of the *JOIDES Resolution* after its renovation. The expedition started after an interval of transit during which no expedition activities had occurred, so that there was no cross-over with the previous IODP expedition. Therefore, the science party and onboard USIO staff had limited information about the recent performance of the science systems

during the previous expedition.

Recommendation 323-05: ORTF 323 recommends that QA/QC protocols be made available in shipboard manuals. Procedures should be implemented routinely for all shipboard measurements and collected data. Calibrations should be performed regularly. Suspect data should be flagged immediately, and QA/QC reports should be completed before the end of each expedition. Data currently in the database and considered possibly suspect should be flagged and investigated as soon as possible.

Routing: USIO, STP

Background: At the beginning of the expedition, there were several data quality issues in the new shipboard laboratories, in part because of insufficient calibration. Scientists couldn't provide consistently reliable results from those measurements because of lack of established QA/QC protocols.

Recommendation 323-06: ORTF 323 recognizes the importance of a fully functional stratigraphic correlator/splicer software program that is fully compatible with the IODP database. We understand that the present software is a third-party development, and recommend ending this status, so that the IO will in the future fully support this software and its integration, and will provide training to technicians to ensure continuity between successive expeditions.

Routing: USIO, STP

Background: There was limited information and support for the onboard third-party stratigraphic correlator/splicer software. This third-party correlator software had bugs and some splice tables had to be refined repeatedly during the expedition and also post-expedition.

Post-Expedition

Recommendation 323-07: In order to ensure optimum sampling parties, ORTF 323 recommends:

- To implement and enforce deadlines for sample requests
- To ensure that sufficient (>2), fully trained staff are available to generate the template for the sampling plan
- To enhance communication and cross-training among curatorial staff at all three repositories (as needed)
- To ensure that the sampling plan is ready in time for the sampling party, with set priorities in case all sampling cannot be conducted during the sampling party.

Routing: IOs

Background: There were approximately 56,000 samples requested and two onshore sampling parties were performed at Kochi Core Center (KCC) to finish all sampling. The first sampling party was held in late November – early December, 2009, and 2nd sampling party was held in February, 2010. Curatorial staff of KCC had taken remaining 15,000 samples until April, 2010. Delay in the finalization of the sampling plan during complicated communications among USIO, KCC, and science party caused multiple delays in the first sampling party. The sampling prioritization was also late, and some scientists changed their sample requests at the last minute during the sampling party.

Recommendation 323-08: ORTF 323 recognizes the importance of the teacher-at-sea and other outreach activities on drilling expeditions. In order to properly evaluate the

effectiveness of the present outreach/education programs, a formal and external assessment process (including a cost-benefit analysis) should become an ongoing component of these programs.

Routing: USIO, IODP-MI, PMOs

Background: The teacher-at-sea program by USIO and USSSP was active during Expedition 323, and a high school teacher was onboard. This program helped to produce outreach material and provided real-time communication with land. However, there is no documentation of the impact of the teacher-at-sea's work and its possible more long time results (e.g., curriculum development), especially as compared to other models/mechanisms for outreach.

Recommendation 323-09: ORTF 323 recommends that the IODP-MI provide the template/instructions for writing the ORTF report to the IO's and the Co-Chief scientists at the beginning of each expedition, with a clear statement of the deadline for submitting the report.

Routing: IODP-MI

Background: IODP-MI didn't provide the template/instructions for writing the ORTF report to the IO's and the Co-Chiefs until a year after the expedition.