

IODP Operations Review Task Force Meeting

Expedition 324
Shatsky Rise

September 29th - 30th, 2010
TAMU, College Station
TX, USA

Expedition 324 Task Force Members

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Greg Myers – Ocean Leadership

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MEETING FORMAT

The IODP-MI Operations Review Task Force met on September 29th – 30th at Texas A&M University (TAMU), College Station (USA) to review the operational aspects of IODP Expedition 324 (Shatsky Rise). 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 324 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 324 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 (William W. Sager and Takashi Sano) and the Expedition Project Manager (EPM: Jörg Geldmacher), 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. 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 324: September 4th – November 3rd, 2009

Co-Chief Scientists: William W. Sager, Takashi Sano

Expedition Project Manager: Jörg Geldmacher

USIO Operations Superintendent: Ron Grout

Expedition 324 (Shatsky Rise) was the first hard-rock expedition after the *JOIDES Resolution* conversion. Five sites, covering all the main volcanic edifices of Shatsky Rise were cored (923.3 m, 39% recovery with 53% recovery in igneous basement) and four of them were logged. The goal of this expedition was achieved: Igneous basement (basaltic lava flows) was successfully recovered at four sites (cored 470.5 m, 53% recovery), U1346 (on the summit of Shirshov Massif), U1347 (on the east flank of Tamu Massif), U1349 and U1350 (both on the summit and east flank of Ori Massif). Cores from Site U1348 (on the northern flank of Tamu Massif) recovered only a thick sequence (~120 m) of largely highly altered volcanoclastic sediments. Recovered rocks from Sites U1347 and U1350 are fresh enough to be suitable for high-quality radiometric age dating and all planned geochemical/isotopic studies required to achieve the scientific objectives. Although lavas from Sites U1346 and U1349 were moderately to highly altered, it is expected that they will provide reliable age and useful geochemical information after suitable treatment.

The spatial distribution of massive lava flows (predominantly at the southern drill sites) versus packages of pillow basalt (mainly found at the northern sites) led to the interpretation that the individual eruptions became smaller and less effusive from south to north. Paleomagnetic inclinations, implying rapid emplacement of lavas flows at

Tamu Massif in the south but greater time between individual eruptions at Ori Massif to the north, support this view. Shipboard geochemical data reveal that most lava flows are variable evolved tholeiitic basalts. Samples from Sites U1347 and U1350 resemble enriched-type Mid-Ocean Ridge Basalt suggesting a slightly more enriched mantle source (or slightly less degree of melting) than “normal” N-MORB.

In addition, >100 m of sedimentary material was recovered from the five sites on Shatsky Rise, ranging from Early Cretaceous to mid-Cenozoic age and representing a variety of different depositional environments. The high radiolarian component found in many sedimentary units indicates high rates of productivity, probably associated with the position of Shatsky Rise near the paleo-equator during much of the Early to mid-Cretaceous. Directly overlying the basement or in between lava flows, a range of nonpelagic, sedimentary material was recovered, including bioclastic limestones, radiolarian-rich siliciclastics, and thick volcanoclastic sequences. This unexpected diversity of sedimentary lithologies (particular considering that only RCB-drilling was conducted) may help to illuminate the complex history of sedimentation and subsidence at Shatsky Rise, after the main volcanic-edifice building phase had ceased but before fully pelagic sedimentation was initiated. The discovery of shallow-water, and even potentially subaerial, basal sediments at many of the sites, suggests that Shatsky Rise may have been a semi-emergent island chain rather than a purely submarine edifice during the Early to mid-Cretaceous. This finding has important implications for addressing the main objectives of the expedition.

In conclusion, the preliminary shipboard data do not favor any of the two competing theories for the origin of Shatsky Rise (plume versus plate model). However, the recovered material is well-suited to address this question upon detailed, post-expedition investigation.

See http://iodp.tamu.edu/scienceops/expeditions/shatsky_rise.html for more details regarding the background and objectives, the preliminary scientific results, and conclusions of Expedition 324.

RECOMMENDATIONS OF THE EXPEDITION 324 REVIEW TASK FORCE

Overall, the Expedition 324 Operations Review Task Force found that the Shatsky Rise Expedition was a major success. This success resulted from a combination of factors including the refurbishment of the *JOIDES Resolution* and its drilling hardware, close collaboration and communication between science party and operators, and 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 successful expedition, especially on the better recovery record of basement cores (53% recovery) than the previous *JOIDES Resolution*'s hard-rock expedition (previous values were: 35-50%), which the Task Force believes will produce a wealth of scientific knowledge in the years to come. ORTF made following Comment 324-01 for this successful expedition.

Comment 324-01: ORTF 324 found this particular expedition succeeded at relatively high level. The ship board party should be congratulated.

The Review Task Force identified a few areas of improvement for future operations including pre-expedition planning/preparation, expedition operations, and post-expedition reporting. Many of the issues discussed during this review were related to staffing during the pre-expedition planning phase. Although the primary focus of this review was on USIO operations during Expedition 324, many recommendations in this report are equally valuable for other IODP operators, IODP management, and to the Science Advisory Structure. As such, some recommendations are also directed to these entities.

Pre-Expedition

Recommendation 324-01: ORTF 324 recommends that the IODP should push scheduling ahead to provide IOs at least a year for planning and staffing of an expedition.

Routing: OTF, IODP-MI

Background: The USIO and the Co-Chiefs Scientists had 10 months for cruise planning and staffing. The call for applications was issued in October 2008 and the PMOs delivered their nominations to the USIO on February 2009. This less than 1 year short pre-cruise time span inhibited flexibility on shipboard scientist selection which relates to following ORTF Recommendation 324-02.

Recommendation 324-02: ORTF 324 recommends that the all PMOs should provide enough applicants to enable IOs maximum flexibility for scientific staffing.

Routing: PMOs

Background:

Overall staffing went well, but most candidates from PMOs had the same specialty, Igneous Petrologists (including Geochemists) and Paleomagnetists. Co-Chiefs Scientists and the USIO had very narrow flexibility with selecting scientist because not all PMOs provided more than the minimum to fill their allotted number of slots.

Expedition

Recommendation 324-03: ORTF 324 recognizes the importance of using conservative ROP's for the coring operation plan to assure completion of primary science objectives.

Routing: USIO

Background: The RCB was used exclusively during this expedition and the average rate of ROP in basaltic basement was 1.1 m/hr. The initial time estimates assumed an average rate of penetration of 3.0 m/hr, which was the average ROP for ODP Leg 197 (Emperor Seamounts). However, the recovery rate (53%) was better than previous *JOIDES Resolution's* hard rock expedition (35-50%), but this low ROP rate caused some changes in Exp.324 drilling plan.

Comment 324-02: ORTF 324 found that the importance of continue improvement of DESCLogik.

Routing: USIO

Background: The Co-Chiefs Scientists reported that many shipboard scientists had difficulty using the *JOIDES Resolution's* core-description and microfossil data input software (DescLogik) because the systems were new, and software was still being developed. ORTF recognized that the DescLogik has high potentialities in onboard research and that the USIO is continuing effort on improving the system.

Post-Expedition

Recommendation 324-04: ORTF 324 recommends that the IODP-MI needs to re-evaluate the 1 year moratorium, team authorship, and public availability or contents of preliminary report.

Routing: IODP-MI

Background: Expedition Scientists had some problems when they tried to publish preliminary results on journals during the 1 year moratorium. Some journals consider the results published when the Preliminary Report is placed online. In addition, IODP authorship policy conflicts with editorial guideline of EOS. EOS limits authorship to those who actually write a manuscript; project teams cannot be listed as authors. Due to these problems, Expedition 324 preliminary results have not been published in any journals yet at the time of the ORTF meeting.

Recommendation 324-05: ORTF 324 recognizes the importance of encouraging outreach programs to reach more and larger audiences to increase cost effectiveness.

Routing: USIO, IODP-MI, PMOs

Background: A special effort for outreach was made on this expedition to sail two educators with specific agendas. For the first time, a Japanese education officer from the National Museum of Nature and Science in Tokyo (Co-Chief Sano's institution) sailed on a USIO expedition whose mission was to target a general Japanese audience with a particular focus on young female students. The second educator from a US Historical Black College and University (HBCU) sailed to target students from HBCUs. These two outreach effort helped to produce outreach material and provided real-time communication between land and shipboard scientists. However, there was no evaluation of the impact of these kinds of outreach activity and its possible more long-term results, especially as compared to other models/mechanisms for outreach.