IODP Operations Review Task Force Meeting

Expedition 330
Louisville Seamount Trail

May 10th – 11th, 2011
British Geological Survey
Edinburgh, UK

EXPEDITION 330 OPERATIONS REVIEW TASK FORCE (ORTF)

PARTICIPANTS

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Mitch Malone	USIO, TAMU, USA
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Jennifer Inwood	University of Leicester, UK
Jamie Allan	NSF, USA
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MEETING FORMAT

The IODP-MI Operations Review Task Force (ORTF) met on May 10th - 11th at the British Geological Survey (BGS), Edinburgh, to review operational aspects of Integrated Ocean Drilling Program (IODP) Expedition 330 Louisville Seamount Trail. The review concentrated on "lessons learned" from the expedition with an emphasis on "what should be done differently in the future". The ORTF review was based upon confidential reports submitted by the U.S. Implementing Organization (USIO) and the Expedition 330 Co-Chief Scientists, as well as the expedition daily and weekly reports available on-line.

The meeting began with oral presentations by the Co-Chief Scientists (Anthony Koppers, Toshitsugu Yamazaki) and the Manager of Science Operations (Mitch Malone), that summarized the Co-Chief Scientists' and USIO reports, respectively. The Co-Chief Scientists also presented their Co-chiefs' joint recommendations. Following the presentations, the external reviewers and IODP-MI personnel had an Executive Session to identify important issues related to this expedition and to formulate draft recommendations. On the second day of the meeting, the ORTF reviewed the draft recommendations from the Executive Session and finalized them. These recommendations are presented in this report.

EXPEDITION SUMMARY

Expedition 330: December 13th 2010 - February 11th 2011
Co-Chief Scientists: Anthony Koppers, Toshitsugu Yamazaki
Expedition Project Managers: Jörg Geldmacher
USIO Operations Superintendent (OSI): Ronald Grout

Integrated Ocean Drilling Program (IODP) Expedition 330 was implemented to address scientific objectives proposed in IODP Proposal 636‐Full3 and 636‐Addendum. The main goal of Expedition 330 was to obtain high‐resolution paleomagnetic and 40Ar/39Ar age data from several Louisville seamounts of similar age to Detroit, Suiko, Nintoku, and Koko Seamounts in the Emperors to test if the Louisville has moved coherently with the Hawaiian hotspot or even completely independently or has remained fixed in the Earth mantle. Additional major objectives were to determine the volcanic history of individual Louisville seamounts and the geochemical evolution of their mantle source between 50 and 80 Ma.

Eight holes at six sites on five different seamounts were drilled during the expedition. Volcanic basement was reached on four seamounts. However, total depths varied widely, with coring reaching a maximum of 522.0 mbsf at Site U1374, to minimum 11.5 mbsf at Site U1375. Some Expedition 330 drill sites were capped with only a thin layer of pelagic ooze between 6.6 and 13.5 m thick, and, if present, these were cored by using a low rotation gravity push technique with the rotary core barrel (RCB) to minimize disturbance. In total, 1114 m of sediment and igneous basement at five seamounts was drilled, and 806 m was recovered (average recovery = 72.4%). However, at Sites U1373 and U1376 no pelagic ooze was present, and the holes needed to be started directly into cobble‐rich hardgrounds.

At Site U1374 on Rigil Guyot, a total of 522 m was drilled, with a record-breaking 87.8% recovery. Most outstandingly, nearly all Expedition 330 core material is characterized by low degrees of alteration, providing us with a large quantity of samples of mostly well-preserved basalt, containing, for example, pristine olivine crystals with melt inclusions, fresh volcanic glass, unaltered plagioclase, carbonate, zeolite and celadonite alteration minerals, various micro- and macrofossils, and, in one case, mantle xenoliths and xenocrysts. The large quantity and excellent quality of the recovered sample material allow the Expedition 330 scientists to address all the scientific objectives of this expedition and beyond.

See http://iodp.tamu.edu/scienceops/expeditions/louisville_seamounts.html for more details regarding the background and objectives, the preliminary scientific results, and conclusions of the Expedition 330.

RECOMMENDATIONS OF THE EXPEDITION 330 ORTF

Overall, the Expedition 330 Operations Review Task Force found that the Louisville Seamount Trail Expedition was a great success. Expedition 330 reached all science objectives and beyond. The scientists were able to obtain all samples required to address expedition science targets successfully. This success resulted from a combination of factors including 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 best core recovery record (73% recovery) on hard-rock expedition. (Average hard-rock recovery in IODP expedition was: 35-53%). The ORTF believes this success will produce a wealth of scientific knowledge in the years to come. ORTF made following Acknowledgement 330-01 for this successful expedition.

> **Acknowledgement 330-01:**
> The ORTF recognize operational and scientific achievements of the Expedition 330 particularly in relation to core recovery and managing scientific objectives. The following five recommendations were formed their experiences for the benefit of future expeditions.

The ORTF also identified several areas for future *JOIDES Resolution* operational improvement, particularly pre-expedition planning/preparation and during-expedition operations. The issues discussed during this review were related to real time data distribution system and core description system on *JOIDES Resolution*.

The Expedition 330 ORTF has formulated five recommendations. Although the primary focus of this review was on the USIO operations during the Expedition 330, many recommendations in this report are equally valuable for other IODP operators, the Science Advisory Structure (SAS), IODP scientists, and some of our recommendations are also directed to those groups.

Recommendation 330-01: Science Party Training and Familiarization
The ORTF endorses that USIO continues to supply training cores from a previous expedition to oncoming scientists to train them in using LIMS and for getting familiar with the core flow and IODP way of describing core (in case researchers sail for the first time). In addition the ORTF recommends shore base training in similar techniques where possible (e.g. ECORD Summer School, J-DESC Core School).

Routing: IOs
Background: During the port-call on Expedition 330, the important science activities were the trainings of all scientists how to use of the onboard LIMS database system, and understanding the "hard rock" core flow, include how to describe the cores, and familiarizing and figuring out how to operate the number of analytical equipment. These training activities continued during the three days transit. For these training, USIO supplied training cores of Emperor Seamount chain from a previous ODP Leg 197 expedition. These relevant materials provided great opportunity to scientists in these trainings.
However, the ORTF understand that not all of IODP expeditions have enough days on port call and on transit to conduct it. The external reviewers pointed out that IOs needs more practical collaboration with existing on-land IODP core training courses to train and support oncoming IODP scientist.

Recommendation 330-02: Data Distribution and Access
The ORTF understand that USIO is already reviewing the recommendations from Co-Chiefs and looking for its solutions on the video distribution system and conference communication facilities. The ORTF suggests that USIO should prioritize the implementations of those systems upgrade by their available funding.

Routing: USIO
Background: During the Expedition 330, Co-Chiefs found that the video distribution system in all scientific labs on *JOIDES resolution* do not provide very useful information include current ship location and drilling operation statuses while in progress. USIO reported that information is only distributed to the bridge and the drilling operation area of *JOIDES resolution.* And, the current video distribution system in scientific labs does not have enough resolution to display that information on the screen because of video encoding feature of video distribution system. USIO is currently reviewing requirements from Co-Chiefs and looking for solutions.
Co-chiefs also pointed out that they had a problem with computer network connectivity in the conference room when accessing LIMS database and LIMSpeak. The root cause of this problem was unidentified but USIO speculates this is related to wireless access in the conference room to the ship network and to the database. USIO commented that the database access should be possible without any difficulty in the conference.

Recommendation 330-03: Orientation Information

To achieve the desired objectives in future science plan, the ORTF recommends that IODP should undertake a review of all IODP downhole operations at a program level in conjunction with the IOs to determine appropriate technology and protocols that scientists requiring to IODP. For example, the Expedition 330 scientists had difficulty on determining downhole instruments orientation at logging operation.

Routing: IOs, STP

Background: On Expedition 330, scientists had difficulty with determining the initial orientation of the Third Party Göttingen Borehole Magnetometer (GBM) tool. At each deployment of the GBM, the initial orientation of the tool string relative to the Earth's rotation axis was determined by aligning the GBM with the *JOIDES Resolution* and then determining the ship's heading using a GPS system. Together with the recorded rotation history of the GBM (by optical-gyro in the GBM), the data then can be reoriented (post-expedition) and translated into geographic coordinates, allowing for the in situ determination of inclinations and declinations in the seamount formation.

However, to get the correct azimuth/heading of the ship with respect to the Earth's spin axis was a challenge, as scientists did not want to rely on the azimuth/heading data from the onboard GPS of the *JODIES* Resolution. The USIO aided scientists in locating and setting up a differential GPS system on the ship in order to achieve their desired accuracy for orientation information.

External reviewers understand the needs and importance of measuring orientation information during IODP downhole operations. And, also the deployment during IODP operations of a system that would allow cores to be orientated is a long-held desire by IODP scientists. STP has been discussing the introduction of such a system in IODP for long time. External reviewers pointed out that various systems have been already developed, and are currently available to record orientation information at downhole operations.

Recommendation 330-04: Measurements for Operational Decisions

For future hard-rock expeditions, the ORTF recommends if Co-Chiefs need any special measurements and workflow for supporting their real time operational decisions at expedition, USIO and Co-Chiefs should identify it early enough so the request to be able to implement and tested prior to departure.

Routing: USIO, Co-Chiefs

Background: Co-Chiefs had some problems at Expedition 330 with using systems that they wanted to use for real time support their operational decisions.

Co-Chiefs found that drilling progresses and some operational data were hard for them to follow by using Rig Instrumentation System (RIS) on *JOIDES Resolution* and affected to their real time operational decisions.

Co-Chiefs also reported when they are trying to spudding at site with thin sediment covered or no sediment covered condition, they had difficulty on surveying better sites by using Underwater TV on *JOIDES Resolution* because it didn't have enough image quality on

sighting sea floor.
However, problems of those systems were not identified and tested prior to departure.

Recommendation 330-05: Graphical Interface of DESCLogik
The ORTF recommends to USIO that DESCLogik graphical interface provided for core annotation and data entry into the LIMS database should be high priority development and implementation.

Routing: USIO
Background: During the Expedition 330, the scientists had problem on data entry with DESCLogik because of its complex and tricky graphical interface. Co-Chief reported only the tabular data entry really works at the moment, but it was the least appropriate way (and also the slowest way) of entering data. It was difficult to enter data in long rows in a data table (which also is far away from the eye of the describer). It has been a long standing practice in DSDP-ODP and IODP to describe the core by "drawing" by hand or by "annotation" of a core photo. Due of this graphical interface difficulty, scientists decided to annotate the core first by hand writing onto printed out images of each core sections, then scanned the image to computer and enter the written data on images into DESCLogik separately.