

IODP Lessons Learned: Operational Challenges

IODP Forum Meeting, Wollongong, Australia, 11 October 2023

The following summary highlights practices followed by IODP operators and the advantages and challenges they have resulted in. Although operational challenges vary by platform (*Chikyu*, *JOIDES Resolution* [JR], mission-specific platforms [MSP]), there are several common elements. Below, we present the processes that worked well and the elements that have been at times challenging to implement.

Practices that work well

Proposal reviews

Proposal reviews by the Science Evaluation Panel (SEP) have been very effective. The interaction between SEP watchdogs (including operator representatives) and proposal PIs has resulted in expeditions with a higher chance of success by helping the operators avoid scheduling proposals with major technical limitations.

Safety reviews

Safety reviews by EPSP have been essential in mitigating risk for JR, MSP, and riserless *Chikyu* expeditions. In addition, the quick response of the panel during operations has made it possible to extend drilling depths and, in a few cases, add new sites during expeditions. This type of panel or review should continue in the future.

Technical Staff

Maintaining a well-trained, stable group of technical staff enhances the success of expeditions.

Publications

Scientists have relied for decades on the consistency in DSDP, ODP, and IODP publications (e.g., IODP *Proceedings* volumes) in terms of how information is disseminated from sample naming conventions to core description terms, depth scale conventions, etc. This also provides a framework for future work on legacy cores. It would be important to continue using these conventions in successor programs.

Post-expedition operator reviews

Post-expedition reviews have been important in highlighting weaknesses and improving processes, regardless of whether they happen for multiple expeditions per fiscal year as in the case of the JR or a single expedition as in the case of MSPs. Incorporating some method to prioritize recommendations is important because funding may limit what can get accomplished.

Elements that can be improved

Ancillary Project Letters (APLs)

APL proposal reviews have not always been able to account for the impact APLs can have on approved proposals or scheduled expeditions. APLs have improved the science in most cases,

but they have also resulted in challenges due to limited time and resources. It has helped when APLs have been approved early in the process by SEP or have been scheduled sufficiently early by Facility Boards so that science objectives, platform/budget needs, and staffing levels can be balanced properly.

Discrepancy in SEP and EPSP expectations

The expectations SEP watchdogs have regarding site positioning are not aligned with how the Environmental Protection and Safety Panel (EPSP) reviews sites, resulting in some confusion and extra effort. Although both panels expect sites to be positioned in a way that the regional geologic context is understood, SEP is stricter about requiring sites to be located at the intersection of crossing seismic profiles. In many cases, to reduce risk, EPSP has moved sites, requiring the submission of one or more addenda. Therefore, safety reviews should be conducted earlier in the process.

Seafloor cables

The impact of seafloor cables on site locations is underestimated during proposal reviews. Often PIs expect the operator to deal with this issue but that can result in late changes to sites and additional safety reviews.

Budget realities

Science objectives were not always fully met due to budget constraints. For example, LWD has been done infrequently in JRSO expeditions, relying on wireline logging that is not as suitable in some environments. In the case of MSPs, different operational scenarios have been provided to account for budget constraints. The operators need to continue to be transparent during the review and scheduling phases.

Clearance and environmental permits

It is becoming harder to secure clearance and environmental permits as large parts of the ocean are claimed by countries as their extended continental shelf (ECS), there are stricter environmental regulations (e.g., New Zealand biofouling rules, Australia, Chile, Namibia) requiring additional environmental review steps, and there are national expectations on the use of genetic material (Nagoya Protocol) and benefit sharing (e.g., Bahamas). These factors can severely limit the ability of operators to secure clearance and need to be made clear at an early stage. It is essential that PIs include scientists from coastal states (e.g., Africa, South America) because it facilitates clearance and is the right thing to do, especially if those countries are not members of a drilling consortium.

Pre-expedition outreach

Outreach to indigenous and environmental groups prior to expeditions can simplify clearance and environmental permits and elevate the visibility scientific ocean drilling expeditions.

Expedition staffing

National priorities are not always aligned with IODP objectives. PMO choices, including balancing their internal needs, have impacted staffing balances and IODP initiatives (e.g.,

including students/early career scientists, gender balance of science parties) and there is little the operators can do to change that. In addition, Co-chief Scientists have flagged the need for more nominations from small PMOs to improve staffing flexibility.

Outreach Officers

In some cases, outreach officers and outcomes have been inconsistent. There have been suggestions (e.g., to the JRSO) to staff permanent outreach officers. This would reduce the learning curve and improve consistency, but it would also result in fewer new ideas, reduced cultural interactions, and less diverse post-expedition products.

Core repositories

Post-expedition shore-based sampling parties require substantial support and scheduling has been a challenge sometimes, especially when several high-recovery paleoceanographic expeditions follow each other. This may not be a concern in the next phase of ocean drilling.

Gulf Coast Repository/Bremen Core Repository

JR/MSP science parties have not been able to fully take advantage of NSF's/ECORD's 2 free months of XRF scanning due to lack of PMO funding and sufficient scientists willing to come to the GCR/BCR. The task has sometimes fallen to staff scientists/technicians to complete.

Evaluating science success

Although this is not an operator task, it is clear the community can do a better job synthesizing results across expeditions. However, most post-expedition papers take at least 4–5 years to be published so this is a long-term task that extends beyond each drilling phase and requires sustainable funding to do properly.