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The value of scientific ocean drilling for early career researchers

Early career researchers (ECRs), including those in undergraduate and graduate programmes as well as those at the start of their academic careers, are a critical part of the geoscience workforce seeking to understand Earth's history. This work is especially important for understanding the growing impacts of anthropogenic climate change. However, the recent decommissioning of one of the few ships capable of drilling in the deep ocean, and thereby accessing the full geological archive held in the seafloor, puts the scientific and professional development of many ECRs in marine geosciences at risk. ECRs must continue to be supported as the future of scientific ocean drilling is being charted.

The JOIDES Resolution, or JR for short, is a riserless (capable of drilling in deep water) drill ship the USA leased for over 40 years to access sediments and basement rocks in water depths exceeding 3,000 metres. The JR was used in 192 two-month expeditions to collect cores from far reaches of the world's oceans as part of the International Ocean Discovery Program (IODP) and legacy programmes. These expeditions provided ECR scientists from around the world, selected through an open application process, the opportunity to work side-by-side with peers and senior colleagues on complex Earth system problems. The experience of conducting science with an international team, forming hypotheses, and re-forming ideas in real time as cores are recovered and shipboard discoveries are made was invaluable. Expeditions on such drilling platforms offer unique training opportunities for ECRs, who also gain personal and professional relationships that can form the basis of long-term collaborations as research continues for years afterwards on shore.

Sailing on the JR provided a first-hand experience of the scientific method in a fast-paced, highly supportive environment in which ECRs are treated as equals. In the last iteration of IODP (2013–2024), graduate students and postdoctoral researchers made up approximately half of the onboard researchers. The total number of ECRs that have sailed aboard ocean drilling expeditions as science party members is in the thousands. By directly including up-and-coming scientists as science party members and providing free sample and data access to everyone in the community, IODP removed barriers to entry for both sailing and non-sailing scientists. This culture of openness and inclusivity has supported rapid scientific progress and sets a standard that should be the goal across all Earth science communities.

Despite the benefits, the future of scientific ocean drilling is currently highly uncertain. The most recent iteration of IODP is now over and the JR has been stripped of its instrumentation and is no longer in service. The highly skilled workforce that operated the drilling equipment and many of the scientific technicians required to run an at-sea, state-of-the-art marine laboratory have now moved on to other jobs, likely permanently, given the lack of concrete plans for a replacement vessel. Many of the countries that have previously participated in these programmes are scrambling to maintain some semblance of a deep ocean drilling capacity going forward. However, without a dedicated, expensive riserless drill ship capable of trans-oceanic travel, options and capabilities for recovering important marine sedimentary archives and crystalline basement are severely limited.

The scientific community needs to continue to support ECRs during this transitional period, especially those whose research relies on obtaining fresh deep-sea sediments and basement rocks. Governmental funding agencies that had previously supported the JR need to be pushed towards international re-engagement and investment in sea-going and research opportunities for ECRs. This includes lobbying for ongoing legacy sample and data access, curatorial support, funding for international collaborative research, and financial support for international programmes using other, albeit less capable, ocean drilling vessels and programmes. But for ECR driven deep-sea research in past climate, natural hazards, tectonics, and the biosphere to continue, a new dedicated riserless drill ship is ultimately needed.

It is most evident when working with a variety of cultures and academic backgrounds towards a common goal that science is more than the sum of its parts, both in terms of people and ideas. As we move into the next phase of scientific ocean drilling, international funding agencies and scientific communities must re-engage to support international ECR participation in scientific ocean drilling opportunities and planning the future.

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Competing interests
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