Post-Workshop Report for:

Establishing Early-Career Scientific Ocean Drilling Learning Communities

August 8th-10th, 2023
International Ocean Discovery Program (IODP) Gulf Coast Repository, College Station, TX,
USA

Workshop Committee:
Brittany Hupp (George Mason University)
Lucien Nana Yobo (Texas A&M University)
John Ajayi (University of Connecticut)
Raquel Bryant (Wesleyan University)
Shamar Chin (University of Iowa)
Mohammed Hashim (Woods Hole Oceanographic Institution)
Christopher Kinsley (Berkeley Geochronology Center)

Figure 1. *Group photograph of in-person workshop participants in College Station, Texas at the Gulf Coast Repository. Photo courtesy of L. Nana Yobo.*

1. Executive Summary

Forty-two early career researchers (ECRs) from US institutions convened August 8th-10th, 2023 online and in-person in College Station, Texas at the IODP Gulf Coast Repository (GCR) for a hybrid workshop called "Establishing Early-Career Scientific Ocean Drilling (SciOD) Learning Communities". The workshop had four objectives: (1) Encourage expansive participation by specifically targeting individuals and audiences from institutions that have not been involved in SciOD; (2) Provide hands-on activities and training to leverage existing core repository archives; (3) Create, share, and archive key workshop materials and products especially as they pertain to professional development and SciOD-related opportunities; and (4) Model and steward radical earth-learning environments by creating space to discuss the entangled histories, realities, and futures of SciOD.

Participants ranged from undergraduates to associate professors and included individuals with minimal to no previous experience in SciOD, or from backgrounds, demographic groups, and institutions (e.g., two-year colleges, US Navy) that have typically been excluded from SciOD. Workshop organizers led discussions and panels on their experiences and opportunities within the current International Ocean Discovery Program (IODP). Participants completed exercises, led by staff from IODP's *JOIDES Resolution* (JR) Science Operator and the Gulf Coast Repository (GCR), that strengthened skills in accessing SciOD databases and legacy samples. All recorded presentations and participant-created resource guides were shared with the virtual and in-person attendees, and efforts to establish an accessible, long-term archive for these materials are underway.

In addition to providing training and insights into the history of the SciOD program, we also held an interdisciplinary panel discussion on "Ethics of Working with the Archive" that featured perspectives from the geosciences, data sciences, humanities, and anthropology. The workshop concluded with a group discussion amongst all participants, organizers, and speakers in which we imagined what a more inclusive and accessible future program could look like. This workshop and associated discussions have served as a blueprint to develop our vision of cultivating a more equitable and inclusive culture for the next generation of SciOD scientists, which participants have communicated through a series of post-workshop products including a Drilling Dispatch blog post, a web-published community letter to the National Academy of Sciences 2025-2035 Decadal Survey for Ocean Sciences Committee, and a manuscript co-authored by the workshop steering committee and participants, which is currently under review.

2. Workshop Motivation

For over five decades, through scientific ocean drilling (SciOD), scientists have sought to explore Earth's past climate, improve climatic models, assess future ocean health, discover the deep biosphere, and advance our understanding of natural hazards (Becker et al., 2019). While this multifaceted and interdisciplinary approach is an advantage, participation in SciOD and related opportunities has historically been limited to a narrow community who already understand how to

navigate the program. To address this issue, we proposed a workshop designed to provide mentorship, skill-sharing, and community-building for students and early career researchers to establish resilient, diverse, and inclusive SciOD learning communities for the future. The workshop encouraged broad participation to expand knowledge of and access to SciOD opportunities by specifically soliciting applications from those who are new to SciOD, including participants from across all demographics, experience levels, geographic locations, and career areas.

With the recent decision of the National Science Foundation to retire the US-based drilling vessel, the *JOIDES* Resolution, and not renew involvement in the next iteration of IODP, we invited early career researchers to reimagine the traditional pathways to participating in SciOD research and related activities. Training the next generation of SciOD leaders necessitates broad participation. The workshop posited that establishing SciOD learning communities would be critical for the vitality of SciOD now and into the future. How might we move from the current system towards one that incorporates near-peer-mentoring, community-building, and a focus on archival material, with a participation model that includes leadership roles for students and early-career scientists?

To establish these communities, the objectives of the Establishing Early-Career Scientific Ocean Drilling Learning Communities workshop were to:
1) Encourage expansive participation by specifically targeting individuals and audiences from institutions that have not been involved in SciOD;
2) Provide hands-on activities and training to leverage existing core repository archives;
3) Create, share, and archive key workshop materials and products especially as they pertain to professional development and SciOD-related opportunities;
4) Model and steward radical earth-learning environments by creating space to discuss the entangled histories, realities, and futures of SciOD.

3. Recruitment and Assessment of Applicants

The workshop application was broadly advertised via the USSSP webpage, IODP Biweekly Newsletter, social media (e.g., Twitter, Facebook groups), and relevant community listservs. Additionally, targeted invitations for applications were sent out to existing programs focused on diversifying the geosciences (e.g., the HBCU STEM to Geoscience Pipeline (HS2GP)), primarily undergraduate institutions, two-year colleges, and minority-serving institutions. Lastly, the workshop committee distributed information about the workshop and the application process to department administrators, professors, listservs, and other community contacts. In the end, this approach attracted a diverse applicant pool of workshop participants. We received 56 applications and made 42 invitations to participate (including the workshop steering committee and invited speakers). Application questions are listed in **Appendix 1** and the rubric used to evaluate applicants is shown in **Appendix 2**. Each application was evaluated by at least two workshop committee members. All applications were randomized and personal information (i.e., name) was

removed prior to evaluation by the workshop committee. The rubric approach resulted in a ranked list of applicants, where the first 25 in-person participation slots were offered to the top candidates, with an additional 8 invitations extended to applicants to virtually participate. Participants ranged from undergraduates to associate professors and included individuals with minimal to no previous experience in SciOD, or from backgrounds, demographic groups, and institutions that have typically been excluded from SciOD. The intentional approach to advertising and evaluating applicants allowed us to meeting the first objective of our workshop: to encourage expansive participation by specifically targeting individuals and audiences from institutions that have not been involved in SciOD

4. Workshop Structure, Schedule, and Logistics

Workshop Structure and Schedule

The workshop structure was designed to provide time for skill development, exposure to SciOD opportunities, community building, and discussion. Below we provide an outline of the activities conducted each day of the workshop as well as a description of the pre-workshop homework. Prior to the workshop we asked participants to engage with at least two of the four media products to provide insight into the history of scientific ocean drilling and prime them for topics addressed throughout the workshop. The pre-homework media products included:

- A podcast/video episode, *Exploring the Earth Under the Sea: Over 50 Years of Scientific Seafloor Drilling*
- An excerpt from *Undrowned: Black Feminist Lessons from Marine Mammals*
- Becker, K., J.A. Austin Jr., N. Exon, S. Humphris, M. Kastner, J.A. McKenzie, K.G. Miller, K. Suyehiro, and A. Taira. 2019. Fifty years of scientific ocean drilling. Oceanography 32(1):17–21, https://doi.org/10.5670/oceanog.2019.110.
- Bontempi, P. 2022. An ambitious vision for the future of scientific ocean drilling. Eos, 103, https://doi.org/10.1029/2022EO220019. Published on 7 January 2022.

Day 1: August 8th, 2023

8:30-9:15 am: Breakfast & Check-In
9:15-10:00 am: Welcome & Introductions
10:00-10:45 am: **Unearthing the Past to Inform the Future: IODP History, Past and Present**; *Speaker:* Angela Slagle (Lamont Doherty Earth Observatory, United States Science Support Program)

> *Description:* Session introduced participants to the overarching structure and history of IODP, addressed topics such as general history of IODP and precursor programs, structure of IODP in the US and internationally, the goals and objectives (i.e., Science Framework) of IODP, and the current status and uncertain future of an international SciOD program.

10:45-11:00 am: Break & Mindful Movement

11:00 am -12:30 pm: **Panel 1: Early Career Experiences in IODP Expeditions: Sailing & Onshore**; *Speakers:* Christopher Kinsley (Berkeley Geochronology Center), Lucien Nana Yobo (Texas A&M University), Alexandra Villa (University of Wisconsin-Madison), Matthew Jones (United States Geological Survey), Maya Pincus (United States Science Support Program), Jason Coenen (University of Nebraska-Lincoln)

>*Description:* The panel helped participants understand the various roles available to early career researchers when they participate in IODP expeditions, both offshore and onshore, while also sharing firsthand perspectives of ECRs who have previously participated in expeditions. Also, participants had the opportunity to ask questions from the panelists.

12:30-1:30 pm: Lunch

1:30-2:15 pm: **Opportunities for Early Career Researchers in IODP**; *Speaker:* Mohammed Hashim (Woods Hole Oceanographic Institute)

>*Description:* This session addressed other opportunities, in addition to participating in expeditions, available to ECRs beyond participating in expeditions such as the Schlanger Fellowship, workshops, and training schools (e.g., GLASS, ECORD Geophysical Properties Summer School), and how to apply/be aware of these opportunities.

2:15-3:30 pm: Concurrent Breakout Sessions

- For student participants: **Applying to Student Opportunities in IODP**; *In-person Leaders:* Mohammed Hashim & Alexandra Villa; *Online Leaders:* Christopher Kinsley & Shamar Chin (University of Iowa)
  >*Description:* Breakout session focused on answering questions and starting to draft applications to other IODP opportunities.
- For postdocs, faculty, & research scientists: **Mentoring the Next Generation of SciOD Researchers**; *Leaders:* Lucien Nana Yobo; *Online Leaders:* Raquel Bryant (Wesleyan University) & Brittany Hupp (George Mason University)
  >*Description:* Breakout session focused on an open discussion of approaches to mentoring and passing SciOD-related skills to the next generation.

3:30-3:45 pm: Break & Mindful Movement

3:45-5:00 pm: **Lightning Talks: A Sampling of IODP Research**; *Speakers:* Christopher Kinsley, Lucien Nana Yobo, Mohammed Hashim, Shamar Chin, Angela Slagle, Emily Estes (IODP JOIDES Resolution Science Operator), Maya Pincus

>*Description:* A series of ~5-minute talks highlighting a wide range of SciOD research being conducted by ECRs.

5:00 pm: Return to Hotel, End of Day (Participants on their own for dinner)

Figure 2. *Workshop participants listen to the Associate Director of the U.S. Science Support Program, Angela Slagle, give a talk on the history and structure of IODP, past and present during Day 1 of the workshop. Photo courtesy of M. Hashim.*

Day 2: August 9th, 2023

8:30-9:15 am: Breakfast & Check-In

9:15-10:45 am: **Introduction to the IODP Archives: Accessing Legacy Data and Requesting Samples**; *Speakers:* Michelle Penkrot (IODP Gulf Coast Repository), Emily Estes, Trevor Williams (IODP JOIDES Resolution Science Operator), Peter Blum (IODP JOIDES Resolution Science Operator)

> *Description:* Gulf Coast Repository and JOIDES Resolution Science Operator staff conducted a series of short informative talks covering 1) an introduction to the IODP sample curation scheme and precursor programs, 2) the types of IODP publications that exist (e.g., Data Reports), 3) Accessing IODP Data (LIMS database, JANUS database, & logging data), and 4) how to request IODP samples.

10:45-11:00 am: Break & Mindful Movement

11:00 am -12:30 pm: **Accessing Legacy Samples and Opportunities Breakout Group Exercise & Mini-Presentations**

> *Description:* Participants formed small groups (4-5 people per group) and tasked with identifying a few research questions that they could address using IODP publications and databases. After workshopping for ~1 hour, each group gave a short presentation on their initial findings. The objective of this session was to provide the participants a hands-on experience using the publications and databases, while having access to the experts who curate that data.

12:30-1:30 pm: Lunch

1:30-3:30 pm: Concurrent Breakout Sessions

- *In-Person:* **Core Repository Resources, Tour, and Sampling Considerations;** *Speakers:* Michelle Penkrot, Emily Estes, Trevor Williams, Peter Blum

  Description: In-person participants received a tour of the Gulf Coast Repository, an introduction to the resources available for use at the GCR (e.g., XRF core scanning), and had a small lesson/discussion on sampling considerations with different types of core material with examples from the repository.

- *Virtual:* **Co-creation of Training Resources in Canva;** *Leader:* Raquel Bryant

  Description: Remote participants did not participate in the GCR tour, but rather worked together to create instructional sheets in Canva that address some of the topics covered thus far throughout the workshop (e.g., a directional workflow with hyperlinks illustrating how to access legacy data) that were shared with all participants at the end of the session.

3:30-3:45 pm: Break & Mindful Movement

3:45-5:00 pm: **Participation in Scientific Ocean Drilling, 2024 and beyond**; *Speaker:* Trevor Williams

Description: This session discussed more in depth the uncertain future of SciOD in the US and other SciOD opportunities that exist beyond IODP.

5:00 pm: Return to Hotel

7:00 pm: Group Dinner at Texas A&M Halbouty Geoscience Building

Figure 3. Workshop participants listen to Gulf Coast Repository Curator Michelle Penkrot give instruction on the sample curation scheme used by IODP and precursor programs and how to request legacy samples during Day 2 of the workshop. Photo courtesy of M. Hashim.

<u>*Day 3: August 10th, 2023*</u>

8:30-9:15 am: Breakfast & Check-In

9:15-10:30 am: **Panel 2: Ethics of Working with the Archive**; *Speakers:* Benjamin Keisling (University of Texas-Austin), Andrea Thomer (University of Arizona), Melissa Stoner (University of California-Berkeley)

> *Description:* Panel featured experts from the geosciences, data sciences, humanities, and anthropology to discuss how to ethically interact with archived data and samples, and consider best practices for data sharing (e.g., FAIR data practices) and approaches to ethically collecting and cataloging new samples.

10:45-11:00 am: Break & Mindful Movement

11:00 am -12:30 pm: **Group Discussion (Participants & Speakers): Imagining the Possible Futures of IODP**

> *Description:* This open group discussion provided space for participants and speakers to discuss ideas for a future SciOD program, with emphasis on broadening participation and maximizing usage of archived materials. Recommendations described in section 6 of this document summarize the key points discussed during this and other conversations during the workshop.

12:30-1:30 pm: Lunch

1:30 pm: End of Day, Participants Depart from College Station, TX

1:30-3:00 pm: *Optional:* SciOD Age Model Development

Workshop Logistics

Workshop participants stayed at the Aloft College Station Hotel for the duration of the workshop. Breakfast and lunch were provided at the workshop each day, with one group dinner hosted at the Texas A&M Geoscience Department Building. Other participant dinners were covered via per diem. Out of state participants flew to the Houston Airport where rental vans were acquired, allowing for participants to carpool between the hotel and GCR each day.

5. Summary of Post-Workshop Outcomes

Several products were produced either during or shortly following the workshop; these products align with the workshop goals of 1) co-creating and archiving training resources and 2) providing a space to discuss and reimagine a future SciOD program. Some of the products inspired by this workshop include:

- A google drive folder including presentation slides and resources from the workshop, shared with all workshop participants.
- A "From the field" USSSP blog post in the September 2023 Drilling Dispatch featuring anecdotes from a few of our workshop participants.

- A [web-published community letter](#) written to the National Academy of Sciences Committee for the 2025-2035 Decadal Survey of Ocean Sciences for the National Science Foundation.
- A manuscript entitled "A Vision for a New Scientific Ocean Drilling Program: Perspectives from US-based Early Career Researchers" authored by the workshop steering committee and all workshop participants, currently under review for publication in the journal *Oceanography*. By including all workshop participants as authors, we aim to 1) respect their intellectual contribution to the key points of the paper and 2) further integrate this population of early career researchers into SciOD.

In addition to these products, a post-workshop survey highlighted a positive learning and networking experience for several of the participants, and provided evidence that our workshop met the outlined objectives. Below we provide a few anonymous anecdotes from the post-workshop survey:
- I appreciated learning more about the hopeful future of IODP and ways to still be involved. I wanted to attend this workshop to learn more about what opportunities I would have in the near future and this workshop did an incredible job in providing me with that information and was a great space to network.
- That there are multiple ways to engage in IODP besides going on a cruise: there are opportunities like workshops, short courses, meetings, and even cruises abroad.
- I found all the information to be very helpful. The presentation on ethics was particularly useful. All the presenters did an excellent job touting on all the critical info - Thank you!
- The information regarding future possibilities to get involved in the program were the most useful as someone who has not cruised on an IODP expedition and may not get the opportunity to in the near future. Learning how to look through databases was also a helpful start, and in the future it would be great to go more into detail on mining data as this will be a crucial skill for paleoceanography. Being added to the listservs for new opportunities and networking with new people was and will continue to be a huge takeaway from the experience as well.

From the survey responses, it was evident that 1) the direct training into accessing legacy samples, data, and publications, 2) the discussion of ethical considerations when working with archived materials, and 3) the networking and exposure to other SciOD opportunities were the key highlights of the workshop. However, from the survey responses we also found that a subsequent iteration of this workshop would benefit from more time devoted to practicing accessing legacy samples, data, and publications.

6. Recommendations for a Future SciOD Program

Discussions throughout the workshop lead to identification of a list of recommendations to be incorporated into the next iteration of a scientific ocean drilling program. Note that these recommendations are taken verbatim from a manuscript (Hupp et al.) currently under review. Motivated by the NSF's recent decision to not renew operations of the JOIDES Resolution and the ending of U.S. involvement in an international SciOD program in 2024, we describe high-priority actions that we deem critical for maintaining a strong US contingent of SciOD research infrastructure and for developing a new program centered in access, justice, equity, diversity, and inclusion (AJEDI) principles (Fig. 4). While our recommendations are specific to challenges and opportunities related to SciOD, the essence of each recommendation is consistent with prior discussions of strategies to diversify communities in scientific fields more broadly (e.g., Tsui, 2007; Johnson and Harrison Okoro, 2016; Johnson et al., 2016; Behl et al., 2021; Carrera et al., 2023).

1. Invest in Accessible Training Opportunities

The shipboard duties of SciOD expeditions provide important international and intergenerational training opportunities for ECR. Drillships serve as important platforms through which ECRs network with scientists globally while gaining valuable experiences (Koppers et al., 2019; Benningfield, 2023). In the absence of other mechanisms to facilitate such knowledge dissemination, these skills will be lost. To avert the potential crisis that will arise due to the loss of critical skills, skill-specific workshops and short-courses should be hosted to pass along skill sets often developed during expeditions. Examples of previous workshops which have provided training for early-career scientists include the ECORD-funded summer school for downhole logging and the workshop described herein. However, many more learning opportunities would need to be developed to address the breadth of science that is conducted on board a SciOD vessel and through SciOD research. Accordingly, the new coordinating office for U.S. scientific ocean drilling activities must allocate funding for workshops and short courses. Also, as mentioned earlier, navigating various past SciOD program databases, reports, and publications can be difficult, especially for students and ECRs from PUI, MSI, and non-research-intensive institutions. Early career researchers from majority SciOD institutions have benefited from the experiences of scientists who have sailed and participated in various expeditions, making it relatively easier for them to navigate SciOD opportunities as well as legacy data and resources for their research (e.g., Schlanger Fellowship). As the importance of accessing legacy data and samples increases in the near future, we recommend establishing regular workshops providing instructions and guided practice in how to navigate past SciOD databases, reports, and sample request platforms. Currently, workshops are initiated through community member proposals to various funding sources and often occur only once, unless subsequent funding is re-pursued and the workshop is reorganized by another team (e.g., the 2016, 2019, and 2023 USSSP-funded ECR-focused workshops). However, if we are to ensure equitable access to archived data and materials, this specific type of workshop focused on training interested individuals that are new to SciOD to

navigate program resources, opportunities, and the archive, should be regularly offered, broadly advertised, and become part of a new program structure. Furthermore, greater investment in training opportunities supports broader participation of ECR who would not have been able to sail due to caretaking responsibilities, disability, or otherwise (Giles et al., 2020; Nousek-McGregor et al., 2023). By decentering sailing participation as a key criterion for SciOD community membership and providing broadly accessible training opportunities, the program can attract a wider range of scientists. Lastly, heavy investment in abundant, accessible training opportunities is needed to not only broaden participation, but to also avoid enhancing existing biases in access to experience and generational knowledge.

2. *Prioritize New Funding Streams to Support SciOD-focused Research at All Levels*

One of the critical consequences of the discontinuation of the current SciOD program is the uncertainty of future SciOD science funding. Participation in IODP and past SciOD program expeditions provided samples, data, and post-expedition research and salary funding for participants to establish a foundation on which larger funding (e.g., NSF grants) could be pursued. In the absence of these resources, principal investigators and ECRs will face greater difficulties in acquiring larger amounts of funding to support themselves and their SciOD research. Therefore, we recommend establishing a new parallel seed funding similar to the participation (post-expedition) awards for work related to archived material and legacy data, and establish a new fund to support visits to the existing core repositories to sample legacy cores and use repository instruments. The new funding stream would significantly support students and ECR from non-SciOD institutions who do not typically have the resources and support that tenured professors from large research institutions have. Lastly, in addition to the existing Schlanger Fellowship that supports PhD student dissertation work, a smaller research grants program should be created for small projects to foster participation by graduate and undergraduate students in SciOD.

3. *Enhance Stewardship of Legacy Samples to Broaden Access and Utility*

To best facilitate the increased handling of archive sample requests and collection procedures through the repositories, the SciOD program needs to maintain a full staff of curators and technicians that can streamline this process. Securing permanent positions for these critical staff places value in their role as mentors to ECR, maintains decades of institutional knowledge, and supports the broader access of legacy cores and data to the broader community. A full staff of software developers and programmers is also essential to the SciOD program as they maintain the applications and databases that are leveraged when submitting a sample request, accessing legacy data, etc. Further emphasis should be put on improved policies for returning samples, including an obligation to report how returned samples have been treated or processed. This information is needed by other researchers who wish to reuse returned samples. We also suggest an amnesty policy encouraging the return of samples (e.g., from retired/late-career scientists). Additionally, requests for new samples should also be accompanied with results/status updates of what has been done with previously received samples from the repository. These approaches will help to

Figure 4. *Workshop participants checking out the core repository (left) and examining a few example cores (right) when discussing sampling considerations. Photos courtesy of R. Castillo.*

minimize sample hoarding and encourage greater usage of archived samples by a broader user base.

4.   Facilitate Opportunities for Further Characterization of Understudied Archive Materials

Currently, there are many archived cores from older SciOD expeditions that have been minimally sampled. These cores likely do not contain areas of high-sampling priority or critical geological intervals (e.g., the Paleocene Eocene Thermal Maximum), however their potential utility is relatively unknown, as the foundational research needed to further interrogate these cores is lacking (e.g., limited biostratigraphic framework or age model). A new funding stream should be established to support an interdisciplinary cohort of ECR and mentors to participate in a legacy core sampling party, mimicking the organization of post-expedition sampling parties. These parties would focus on cores that have been minimally sampled to conduct the foundational research needed to characterize their utility and provide the opportunity to use the repository instruments (e.g., XRF core scanner) to generate new data. With cores dating back over five decades, there are ample opportunities to reevaluate these older records using new techniques and approaches. Finally, a SciOD program mechanism will also be needed to support publishing the foundational data needed to further interrogate understudied archival cores, such as the current IODP Data Reports.

5. Integrate Cultural Experts and Ethical Training to Pursue Convergent SciOD Research

The methodology of SciOD is inherently extractive and often disregards the complex human history of potential drilling locations (e.g., near island-based indigenous communities or in the waters of the Middle Passage). As scientists we often ignore these connections which negatively impacts our ability to broaden participation in SciOD and maximize the societal impact of our work. As such, we insist that the next program prioritizes incorporating cultural advisors and local community members into the drilling proposal process (e.g., Ryan-Davis and Scalice, 2022), and invite social scientists to develop a framework for working with archived materials that were collected without local societal considerations. Participation of local scientists in expeditions should continue to be prioritized in expeditions outside of US waters.

We propose a new requirement in the SciOD expedition participant proposal where scientists are required to incorporate a component of Education or Outreach in their science plans, similar to a "Broader Impacts" section required in other federal funding opportunities, and that other types of scholars (e.g., humanists, artists, critical theorists) could sail in order to pursue convergent research and build on the interdisciplinary nature of SciOD. The success of our workshop panel on the "Ethics of Working with the Archive" (identified as a highlight of the activities in our post-workshop survey) demonstrates that the up-and-coming generation of Earth scientists are invested in convergent and ethical SciOD research projects.
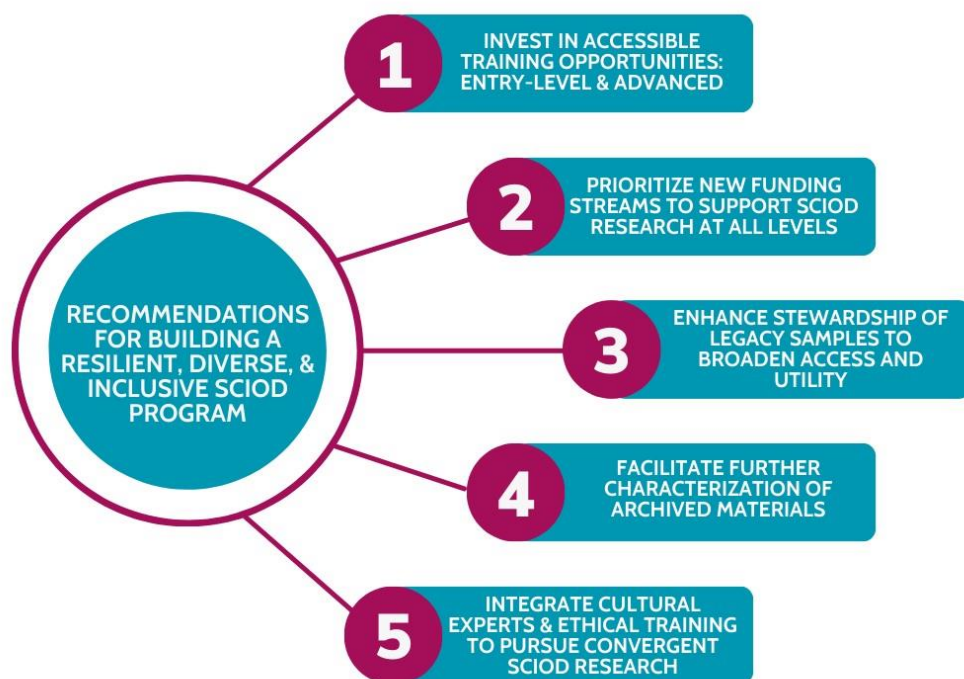

Figure 5. Summary of recommendations for building a new SciOD program centered in AJEDI principles and broadening participation. From Hupp et al., in review.

6. Recommendations to Departments and Individuals: Maintain and Expand Commitment to SciOD Education

To maximize the impact of SciOD, we offer suggestions for ways that individuals and communities can advocate and embed the values of SciOD in their local spheres of influence. During the hiatus, it is important that Earth and ocean science classrooms at all levels incorporate SciOD science into their learning activities since it serves as an example of using ocean-based research to reveal the intricacies of our Earth systems. SciOD has demonstrated its commitment to education, in part by sailing dozens of educators over the years through IODP expeditions and School of Rock transits. Classrooms, both K-12 and university-level, can take advantage of existing education materials in many ways. For example, Reconstructing Earth's Climate History: Inquiry-based Exercises for Lab and Class (St. John et al., 2012) is a university-level textbook that uses IODP data to teach about the Earth and ocean. Educators can also request core replicas that can be powerful teaching tools (Maruéjol et al., 2018) or assign students to watch SciOD documentaries and shorter educational videos (e.g., IODP Expedition 342, The Documentary!). These educational interventions will work to keep SciOD relevant and showcase the types of materials and data available for study and research. Through a program hiatus, it is essential to maintain the interconnectedness of IODP and ocean education to maintain and broaden the reach of SciOD.

7. List of Participants

Amy Hagen, Virginia Polytechnic Institute and State University
Angela Slagle, Lamont Doherty Earth Observatory, Columbia University
Aruggoda Kapuge Isuri Umejya Kapuge, University of Delaware
Boyang Zhao, Brown University
Brianna Hoegler, Brown University
Brittany Hupp, George Mason University
Bumsoo Kim, Brown University
Cecilia Lopez-Gamundi, University of Miami
Chelsea Mcdonald, Texas A&M University
Christopher Kinsley, Berkeley Geochronology Center
Chukwuma Mgbenu, Missouri University of Science and Technology
Chuyan Wan, Northwestern University
Daniel Holguin-Caldera, Wesleyan University
David Malcolm, University of North Carolina at Chapel Hill
Emma Morris, Lamar University
Emma Robertson, Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research & Ludwig Maximilian University of Munich
Erdoo Mongol, Missouri University of Science and Technology
Gael Ndi, Texas A&M University
Jasmin Naher, University of Connecticut

Jason Coenen, University of Nebraska-Lincoln

John Ajayi, University of Connecticut

Karena Gill, West Virginia University

Kayla Tozier, University of New Hampshire

Kelly Fenton-Samuels, Wesleyan University

Kusali Gamage, Austin Community College

Lindsay Moon, Commander Naval Surface Force Atlantic, United States Navy

Lucien Nana Yobo, Texas A&M University

M. René Castillo, The Ohio State University

Maya Pincus, Lamont Doherty Earth Observatory, Columbia University

Md Upal Shahriar, University of Houston

Mohammed Hashim, Woods Hole Oceanographic Institution

Oluomachi Onuoha, University of Connecticut

Raquel Bryant, Wesleyan University

Ruth Aronoff, Furman University

Samina Anee, Utah State University

Shamar Chin, University of Iowa

Shannon Doherty, University of Alaska Fairbanks

Therra Wilbrandt, Indiana University-Purdue University Indianapolis

Zhiyang Li, Texas A&M International University

References

Becker, K., J.A. Austin Jr., N. Exon, S. Humphris, M. Kastner, J.A. McKenzie, K.G. Miller, K. Suyehiro, and A. Taira. 2019. Fifty years of scientific ocean drilling. *Oceanography* 32(1):17–21, https://doi.org/10.5670/oceanog.2019.110.

Behl, M., S. Cooper, C. Garza, S. Kolesar, S. Legg, J. Lewis, L. White, and B. Jones. 2021. Changing the Culture of Coastal, Ocean, and Marine Sciences: Strategies for Individual and Collective Actions. *Oceanography*, 34(3) https://doi.org/10.5670/oceanog.2021.307.

Benningfield, D. 2023. There is no JOIDES in Mudville. *Eos*. 104, https://doi.org/10.1029/2023EO230439. Published on 15 November 2023.

Carrera, A., T. Luckie, and E. H. G. Cooperdock. 2023. Extreme underrepresentation of first-generation college students in the geosciences: An intersectional issue. *Journal of Geoscience Education*, 1–12, https://doi.org/10.1080/10899995.2023.2187233.

Koppers, A.A.P., C. Escutia, F. Inagaki, H. Pälike, D.M. Saffer, and D. Thomas. 2019. Introduction to the special issue on scientific ocean drilling: Looking to the future. *Oceanography* 32(1):14–15, https://doi.org/10.5670/oceanog.2019.108.

Johnson, A., and M. Harrison Okoro. 2016. How to Recruit and Retain Underrepresented Minorities. *American Scientist*, 104(2):76, https://doi.org/10.1511/2016.119.76.

Johnson, A., Huggans, M., Siegfried, D. and L. Braxton. 2016. Strategies for Increasing

Diversity in the Ocean Science Workforce Through Mentoring. *Oceanography*, 29(1):46–54, https://doi.org/10.5670/oceanog.2016.11.

Maruéjol, P., Cotterill, C., Prange, U. and Bérenguer, J.L., 2018, April. Core replicas help discover the Earth under the sea. In EGU General Assembly Conference Abstracts (p. 13416).

Ryan-Davis, J., and Scalice, D. 2022. Co-creating ethical practices and approaches for fieldwork. *AGU Advances*. 3, e2022AV000762. https://doi.org/10.1029/2022AV000762

St. John, K.S., Leckie, R.M., Pound, K., Jones, M. and Krissek, L., 2012. Reconstructing Earth's climate history: inquiry-based exercises for lab and class. John Wiley & Sons.

Tsui, L., 2007. Effective strategies to increase diversity in STEM fields: A review of the research literature. The Journal of Negro Education, 76(4):555-581

Appendix 1. Workshop Application Questions.

The application was administered as a google form, with an open application period of ~1 month, and included the following text and questions:

Establishing Early-Career Scientific Ocean Drilling Learning Communities - August 8th-10th, 2023
Deadline to Apply: June 29th, 2023

The organizing committee welcomes applications from students, faculty, researchers, and educators interested in cultivating and sustaining early-career scientific ocean drilling (SciOD) learning communities.

The objectives of this workshop are to:
> 1. Encourage expansive participation by specifically targeting individuals and audiences from institutions that have not been involved in SciOD;
> 2. Provide hands-on activities and training to leverage existing core repository archives;
> 3. Create, share, and archive key workshop materials and products especially as they pertain to professional development and SciOD-related opportunities;
> 4. Model and steward radical earth-learning environments by creating space to discuss the entangled histories, realities, and futures of SciOD.

This workshop was conceived of by early-career researchers who participated in the June 2022 Scientific Ocean Drilling IMPACT workshop that strove to chart the future course of science communication and outreach for scientific ocean drilling. As such, we encourage applications from those who are new to SciOD and participants from across many demographics, experience levels, geographic locations, and career areas.

Thank you for applying!

1. Name (pronouns):
2. Institution/Organization/Affiliation:
3. Position (mark only one oval):
   - o   Undergraduate Student
   - o   Graduate Student
   - o   Postdoctoral Fellow/Researcher
   - o   Assistant Professor
   - o   Associate/Full Professor
   - o   Research Scientist
   - o   Teacher
   - o   Volunteer
   - o   Associate/Professional

- o Administrator
- o Other: _____

4. Please indicate your preferences in regards to your participation mode. Although we encourage in-person participation, in line with our stated goals to recruit communities traditionally excluded from SciOD, we are working to establish a partial hybrid participation plan for folks that might not be willing, able or interested in traveling to College Station, TX. Check all that apply.
- o My preference is to participate in-person
- o My preference is to participate through the hybrid option (virtually)
- o My preference is to participate in-person, but I would consider participating virtually if I
- o became unable to travel
- o I can only participate virtually and would not be able to participate in-person
- o No preference
- o Other:_____

Experiences

5. Educational Experiences: Please narrate up to five educational experiences. Please include the highest degree you have obtained, the year, institution, and subject. Other educational experiences may include any classes or coursework, trainings, workshops or academic conferences you may have attended that are related to any of the workshop goals/theme.

6. Research Experiences: Please narrate up to five research experiences you have had related to the workshop theme/goals. If you have not had any formal research experiences, tell us about which topics related to the workshop theme/goals are most interesting to you and why.

7. Synergistic activities: Please narrate up to five other activities that you are involved with that may or may not be directly related to the workshop theme/goals. These might include outreach, advocacy, activism, community organizing, art, music, other hobbies or anything else!

Please respond to one of the following prompts (#8 or #9) in 500 words or less.

8. What is your vision for scientific ocean drilling (SciOD) and its role in society over the next 50 years? Specifically, how do you envision the SciOD community transforming in the wake of the recent non-renewal announcement from the NSF? In some ways, this "catastrophic" event has encouraged community members to (re)imagine the past, present, and future of SciOD in order to interrogate who is served by the current paradigm, who is excluded, and to identify new areas for growth.

9. Please describe your interest in attending this workshop and in particular speak to what you hope to gain from engaging with early-career, SciOD learning communities. How do you plan to

incorporate what you learn from this workshop experience into your ongoing or future research, educational, and synergistic activities?

Demographic Information (optional)
These questions are optional and will not be used to evaluate applications in any way. Instead, they will be used to evaluate our effectiveness in encouraging expansive participation.

10. How did you hear about this opportunity?

11. Describe your gender identity.

12. Describe your racial and/or ethnic identity.

Appendix 2. Applicant Evaluation Rubric

<u>**IODP Workshop Application Review Rubric (1-5 scale)**</u>

Apply the following rubric to the applicant pool. Highest weighted score is 25. Note: If the applicant narrated >5 experiences for the educational, research, and synergistic activities section, please just read the first five of each category. Similarly, if the applicant completed both personal statement prompts, please only read the first one (about their vision for the future of SciOD).

In order of weight/importance:

- Category 1) Stage in education and/or previous experience with SciOD or related research fields can lead to maximum impact because they are a student, early in their career, at a transitional point in their career, and/or have potential to be a mentor (multiply value by 2.5). Relevant questions: position/institution, educational experience, research experience.

- Category 2) Uniqueness factor; participant has an interesting and compelling vision for SciOD, brings a new/interdisciplinary perspective, or has a non-traditional pathway into SciOD and/or STEM (multiply value by 1.5): Relevant questions: synergistic activities, personal statement.

- Category 3) SciOD literacy (new-to-SciOD participants with demonstrated SciOD interest, or SciOD veterans with interests or skills in fields that enable them to share information about SciOD with others and especially communities typically disconnected from SciOD). Relevant questions: Research experience, synergistic activities, personal statement.

	5 points	4 points	3 points	2 points	1 point
Cat. 1	Community member, educator/teacher, undergraduate student, graduate student, postdoc, or early career (<10 years since terminal degree) scientist **with no formal research experience in SciOD or related fields**	Community member, educator/teacher, undergraduate student, graduate student, postdoc, or early career (<10 years since terminal degree) scientist **with little to some research experience** in SciOD or related fields	Mid-career scientists (>10 years since terminal degree) **with or without formal research experience in SciOD or related fields but demonstrated mentor potential**	Community member, educator/teacher, undergraduate student, graduate student, postdoc, or early career (<10 years since terminal degree) scientist **with many research experiences** in SciOD or related fields	Mid-career scientists and established scientists with many formal research experiences in SciOD and little to no evidence of mentor potential
Cat. 2	Applicant has something quite unique about them including in terms of their vision for the future of SciOD, their scholarly perspective, or their journey into science.	Applicant has something notable about them related to their unique, interdisciplinary perspective or strong vision for the future of SciOD.	Applicant has something notable about them, but no strong vision for the future of SciOD.	Nothing unique about the applicant pops out.	Applicant does not seem like a good match for this workshop.
Cat. 3	Applicant has limited to no experience with SciOD but demonstrates two or more of the following: a strong interest in becoming a SciOD researcher, connections with communities typically disconnected from SciOD, or the potential to be a voice of SciOD awareness.	Applicant has limited to some experience with SciOD and demonstrates at least one of the following: a strong interest in becoming a SciOD researcher, connections with communities typically disconnected from SciOD, or the potential to be a voice of SciOD awareness.	Applicant has some to lots of experience with SciOD and demonstrates two or more of the following: a strong interest in continuing SciOD research, connections with communities typically disconnected from SciOD, or the potential to be a voice of SciOD awareness.	Applicant has lots of experience with SciOD and demonstrates at least one of the following: a strong interest in continuing SciOD research, connections with communities typically disconnected from SciOD, or the potential to be a voice of SciOD awareness.	Applicant has lots of experience with SciOD but does not demonstrate any of the following: a strong interest in becoming a SciOD researcher, connections with communities typically disconnected from SciOD, or the potential to be a voice of SciOD awareness.