

SUPPLEMENTARY MATERIALS FOR

OCEANOGRAPHY'S DIVERSITY DEFICIT

IDENTIFYING AND ADDRESSING CHALLENGES FOR MARGINALIZED GROUPS

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SOLUTIONS

We offer a list of actionable solutions for individuals (field leaders, instructors, and principal investigators/mentors), professional societies, funding agencies, and administrations/institutions and note their relevance to the six challenges. At all levels, hiring and including people from diverse groups is a crucial first step.

1. Field Leaders

Field leaders are responsible for creating a fieldwork culture that is safe, inclusive, and accessible for all participants. Mitigate risks to marginalized field scientists by doing the following:

- a. Seek training to address both general safety risks inherent to fieldwork (e.g., first aid), as well as hidden risks that minoritized team members face. (Challenges 5, 6)
 - i. Be aware of resources that improve safety for minoritized groups, including field safety plans, risk maps, and hotlines.
 - ii. Utilize the Fieldwork Wellness Framework to manage risks and increase participation using tools such as codes of conduct, financial plans, and emergency protocols (Nordseth et al., 2023).
 - iii. Provide bystander intervention, workplace climate, and cultural sensitivity training for field crews.
 - iv. Research a region's sociopolitical climate and advise field researchers to limit disclosure of identities to trusted individuals in unsafe environments.
- b. Prepare field sites, including research vessels, for inclusivity and accessibility. (Challenge 6)
 - i. Provide private spaces for changing, lactation, hormone therapy, insulin injections, prayers, etc.
 - ii. Increase field access with long-term accommodations, such as vehicles for transportation to field sites or accessible equipment repositories for field researchers with disabilities (Devitz, 2023).
 - iii. Consider informing local authorities of a field team's research ahead of time to avoid unnecessary and potentially dangerous interactions with law enforcement. Act as a liaison so that minoritized individuals are not the first line of communication with law enforcement.
 - iv. Integrate group needs by allowing space to discuss mental and physical wellness needs and team expectations (Stokes et al., 2019), including offering private meetings to discuss sensitive topics.
- c. Be flexible regarding requirements for field experiments, seasons, and sites. Ensure that individuals can meet requirements without legal, physical, or psychological risk. (Challenges 5, 6)
- d. Address violations of safety—including harassment—with proper emergency, evacuation/termination, and medical plans. (Challenge 6)

2. Instructors

Instructors play a vital role in creating welcoming environments. Instructors can foster a more inclusive environment by doing the following:

- a. Launch targeted local outreach campaigns (e.g., classroom visits, lab open houses, local field trips) to encourage underrepresented individuals to pursue oceanographic careers. (Challenge 4)
- b. Develop lesson plans that reflect diverse contributions from intersectional scientists. (Challenges 1–3)
 - i. Challenge existing stereotypes and highlight diverse oceanographers (The Scientist Spotlights Initiative, <https://scientistspotlights.org/>).
 - ii. Openly acknowledge the racist history of oceanography and science (Cronin et al., 2021; Kitchens and Coop, 2023).
- c. Build relationships with local and international identity groups (e.g., Black Student Union, Black in Marine Science). (Challenge 4)

3. Mentors/Principal Investigators (PIs)

Mentors and PIs have the power to take immediate action and affect substantial change in their communities. Impactful actions include:

- a. The practice of science (Challenge 4)
 - i. Include budget line items for student compensation, conference travel, professional development, and lab training opportunities in grant proposals.
 - ii. Include DEI efforts alongside research successes in annual grant reports.
 - iii. Advocate for recognition of silent work and DEI engagement during personnel reviews and conversations with administrators.
 - iv. Financially and professionally support students, field leaders, and instructors as they undertake DEI initiatives.
 - v. Leverage social capital within professional societies to present challenges and successes of DEI work.
- b. Hiring and retention (Challenges 2, 3)
 - i. Advertise positions widely and share with identity-based organizations and DEI programs.
 - ii. Set clear and collaborative progress goals and, where relevant, probation and tenure expectations to avoid miscommunications and misaligned goals (Macdonald, 2020).
 - iii. Make research experiences more welcoming by using tools such as hiring best practices, codes of conduct, and transparency (McGill et al., 2021).
 - iv. Establish regular check-ins to help monitor a mentee's well-being and build rapport. Be aware of resources that may be available to them.

- v. Consider supporting alternative work styles.

1. Offer flexible working hours for mentees that are participating in religious fasts, taking care of children, living with health conditions, etc.
 2. Implement “floating holidays” where individuals can take days off for significant personal or spiritual obligations.
 3. Allow people to choose which five days of the week to work when possible so that they can meet regular obligations with their communities.
 4. Measure progress against realistic goals rather than judging performance by the number of hours spent in the lab or office.
- vi. Dedicate time during work hours for DEI training and discussion. Consider reading DEI papers (e.g., Chaudhary and Berhe, 2020) with your lab group.
 - vii. Encourage mentees to develop a diverse network of mentors, including peer-mentorship and cohort relationships (Mondisa and McComb, 2015).

4. Professional Societies

Professional societies are the nexus of publishing and networking within oceanography. Potential actions include:

- a. Plan meetings and conferences with safety and accessibility in mind. (Challenge 6)
 - i. Choose hosting locations with safety and accessibility in mind. Consider providing options for remote participation and safety support to in-person attendees.
 - ii. Improve accessibility through closed captioning of live and recorded talks, sign language interpretation, accessibility ramps to reach stages, etc.
- b. Allocate funding for individuals from marginalized communities at varying professional levels. (Challenge 4)
 - i. Provide honoraria for speaker series and DEI events.
 - ii. Reduce or eliminate registration fees for students and individuals from low-income backgrounds and global regions.
- c. Collaborate with diverse organizations and scientists to thoughtfully spotlight the work of marginalized scientists. (Challenge 1,2)
 - i. Give speakers the latitude to decide what aspects of their identity, science, and DEI work they prefer to highlight.
 - ii. Advertise to and invite participation from diverse groups, for example, journal articles dedicated to identity-based organizations.
 - iii. Establish awards and invited talks for members who contribute positively to DEI efforts and mentoring.

5. Funding Agencies

Funding agencies decide who participates in oceanography in the form of grants that support PIs, graduate students, post-docs, undergraduates, interns, and technicians. We recommend that funding agencies:

- a. Publish an overview of funding allocation and encourage third-party analyses. (Challenge 1)
- b. Provide targeted funding to organizations aimed at recruitment and retention of minoritized individuals (e.g., UC-HBCU Initiative, <https://www.ucop.edu/uc-hbcu-initiative/>). (Challenge 4)
- c. Require safety plans for research proposals with field-work requirements (e.g., NSF Safe and Inclusive Working Environment plans). (Challenge 6)
- d. Ensure funding for early-career professionals is commensurate with the local costs of living. (Challenge 4)
 - i. Have clear requirements against unpaid labor and provide sufficient stipends for paid internships.
 - ii. Prioritize proposals that do not utilize unpaid labor, including unpaid internships (Fournier and Bond, 2015; Kreuser et al., 2023).
- e. Allocate funding for accommodations to support individuals with disabilities and other medical needs. (Challenge 4)
- f. Properly acknowledge, value, and require reporting on DEI initiatives performed by funded scientists, and require researchers to share benefits with local communities. (Challenge 2)

6. Administrations/Institutions

Institutions and their administrators have the authority to allocate resources to DEI. We suggest that administrations:

- a. Strategically apply institutional research funding to support PIs of marginalized identities and backgrounds, in recognition of well-documented and widespread gender and racial disparities in STEM funding worldwide (Challenge 1).
- b. Establish and fund DEI committees to provide centralized resources for departments, labs, and individuals. (Challenge 2)
 - i. Institutionalize service work to alleviate the burden of silent work.
 - ii. Include DEI and service work in job descriptions and contracts.
 - iii. Hire trained staff to guide DEI efforts and stay up-to-date with best practices.
 - iv. Include information about local and (inter)national DEI groups and efforts to individuals during onboarding.
- c. Offer financial aid and career assistance (e.g., career fairs and university career centers) for students seeking paid opportunities in the ocean sciences. (Challenge 4)
- d. Formalize DEI training for all members at an institution. (Challenge 1).

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