

## SPOTLIGHT

# Navigating a Sea of Obstacles: Ocean Science for People with Disabilities

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## INTRODUCTION

The geoscience community discussion on diversity, equity, and inclusion (DEI) most often focuses on increasing the participation of underrepresented groups based on race, ethnicity, and gender. Disability status is often overlooked, even though people with disabilities are underrepresented in the US STEM workforce by a factor of 3 compared to factors of 1.5 and 1.3 for women and underrepresented minorities, respectively (NCSES, 2023). The unemployment rate (the proportion of the workforce population that is unemployed but actively seeking work) is twice as high for people with disabilities as it is for those without a disability, according to the US Bureau of Labor Statistics (<https://www.bls.gov/news.release/pdf/disabl.pdf>).

Thus, there is an untapped talent pool of individuals who have unique perspectives and experiences to contribute to the STEM enterprise, including ocean science. Why? For many of the same reasons that individuals from other underrepresented groups have been, and continue to be, excluded: lack of supportive infrastructure and misperceptions. Here, we highlight some of the barriers to full inclusion for people with disabilities in ocean science. Although many of these barriers are not unique to ocean science, they are not often discussed within this community. We also provide some resources for students, educators, researchers, and employers to obtain further information. This is not meant to be a complete or exhaustive treatment of the subject—rather an opportunity to ensure that some of the challenges people with disabilities face as they navigate education and careers in ocean science are made more visible, while offering some solutions for breaking down these barriers.

## EXAMPLES OF OBSTACLES FACED BY PEOPLE WITH DISABILITIES IN OCEAN SCIENCE

In this section, we summarize some of the challenges individuals with disabilities must overcome to pursue an education or career in ocean science. Some of them may seem minor in isolation, but as is often discussed in DEI, the accumulation of multiple micro-inequities leads to a feeling of exclusion. Most of the inequities are also experienced by people with disabilities in other STEM disciplines, although there are some issues related to fieldwork that are unique to oceanography.

### PHYSICAL ACCESS

It's not just about getting in the building: in the United States, physical access to classrooms, laboratories, office spaces, and meeting rooms are essential and are required by law under the Americans with Disabilities Act (ADA). However, too often access is only possible through a back door or via a sketchy freight elevator, potentially leaving the people seeking access with feelings of second-class citizenship at their institutions. Sometimes there is reluctance to retrofit a building to provide access through the front entrance that everyone else uses, and where chance meetings can lead to information exchange and new collaborations. Institutions can demonstrate that they value their employees with disabilities by providing equitable access to buildings and other institutional spaces. Adjustable-height lab benches and computer desks represent good universal design and can benefit everyone, not just individuals with disabilities.

### ACCESS TO ELECTRONIC DOCUMENTS

For those who are blind or have low vision, or are otherwise prevented from reading printed text, computer screen readers (text-to-speech software) provide access to journal articles, websites, documents, email, online textbooks, and other information sources. As long as text is not displayed as an image or graphic, screen readers can read it aloud to the user. But screen readers cannot “read” or interpret plots and graphs. Alt-text, or brief descriptions of graphical elements, is necessary for everyone to have access to these essential components of science education and research. There are very simple instructions online for adding alt-text to images in, for example, Microsoft Word and PowerPoint. Exciting advances are being made to automate this process with artificial intelligence, but until they are better developed, document authors need to include alt-text on all images to make sure their documents are accessible to everyone. Making documents available prior to meetings and classes where they will be discussed is also important.

### ACCESSIBLE CONFERENCES

Professional conferences are important venues for education and career development, giving attendees the opportunity to keep up with the latest developments in their field, highlight their work, and develop new and ongoing collaborations. However, people with disabilities face a number of barriers at conferences. For example, back-to-back presentations may be difficult to attend for wheelchair users or others unable to move quickly. Most venues don't have an accessible map of meeting rooms, so blind and low-vision attendees must rely on helpful colleagues or risk missing out because they can't locate a presentation room. Travel and/or meeting assistants are a solution, as long as the cost is borne by the employer or meeting organizers and not the attendee. Similarly, ASL (American Sign Language) interpreters and/or CART (Communication Access Real-Time Translation) interpretation should be provided to the attendee free of charge. Adjustable-height lecterns should be standard (another example of good universal design), and the dais should be accessible to all speakers.

### FIELDWORK

Many ocean scientists carry out their research at sea on vessels of varying size, age, and capability. Until fairly recently, it would be unheard of for people with disabilities to consider going to sea on a research cruise due to the challenges of mobility and safety on a moving platform. This is changing. In 2008, the US National Science Foundation (NSF) asked the University National Oceanographic Laboratory System (UNOLS) Fleet Improvement Committee to generate guidelines for design and refit of the academic fleet in order to make seagoing education and research more accessible to students and scientists with disabilities. ADA compliance is not strictly required because research ships are not classified as passenger vessels by the US Coast Guard; however, NSF recognized the importance of making the fleet as accessible as possible to individuals with disabilities to support full participation in ocean science. Many

of the recommendations of the final report (fourth listing in Additional Resources) also follow good universal design practices. For example, recessed thresholds between compartments make passageways accessible to the mobility-challenged and make movement of heavy equipment through and between compartments easier. Better lighting and open line-of-sight improve visibility and communication for visually- and hearing-impaired cruise participants, and everyone else. Continuous handrails and well-marked steps on ladders improve safe movement between decks for all. The ocean sciences community can learn more about accessible field work from the geology community, which has had an active discussion on increasing participation of people with disabilities in fieldwork in recent years, including capitalizing on virtual participation and high-quality telepresence (e.g., Marshall and Thatcher, 2019).

#### PERCEPTIONS AND STIGMA

Individuals with disabilities in STEM face many of the same challenges related to misperceptions as other historically excluded groups. They may be considered as less intelligent and less capable than their peers based solely on their disability status (“ableism”). As super-minorities in STEM, with very few role models or visible examples of successful ocean scientists with disabilities, students with disabilities may internalize ableism and choose not to pursue a career in ocean science. Some disabilities are not obvious to the casual observer—individuals with disabilities may try to hide their disability for fear of being judged unfairly or rejected. This stigma can prevent people with disabilities from requesting accommodations that they are entitled to and that their employers are, in fact, required to provide, even though employers make accommodations for non-disabled employees all the time for multiple reasons (e.g., flexible work hours, extended tenure clock, parental leave). To overcome this reluctance, employers need to go beyond the standard anti-discrimination statements in job announcements and openly advertise their willingness to make accommodations for people with disabilities. Many employers perceive that accommodations for employees with disabilities will be cost-prohibitive, but this is rarely the case. Institution leaders, funding agencies, human resources departments, mentors, professors, and peers all need to demonstrate that they value people with disabilities in their workplaces by proactively providing support and encouragement that goes beyond compliance.

#### CONCLUSIONS

The barriers to real equity and inclusion for people with disabilities in ocean science are many, but tangible solutions are in fact available for most. In the mid-twentieth century, full participation of women in STEM was largely unimaginable, but over the ensuing decades, policies, and infrastructure (e.g., parental leave programs; affordable, high-quality childcare) and attitudinal and behavioral shifts (shared family responsibilities, greater recognition of accomplishments of women scientists) have moved the needle significantly toward greater meaningful participation of women in science. With a collective community commitment to openly supporting and encouraging people with disabilities in ocean science—moving from compliance to true inclusion—we can achieve the same success. An important first step is to document the level of underrepresentation in ocean science by people with disabilities. Additionally, people with disabilities must always be included in the development of new policies and practices, in the spirit of the well-known disabilities activism phrase “nothing about us without us.”

## ADDITIONAL RESOURCES

### INTERNATIONAL ASSOCIATION FOR GEOSCIENCE DIVERSITY

A 501c3 nonprofit dedicated to improving access and inclusion for people with disabilities in the geosciences (<https://theiagd.org/>)

### JOB ACCOMMODATION NETWORK

The leading source of free, expert, and confidential guidance on workplace accommodations and disability employment issues (<https://askjan.org/>)

### EMPLOYER ASSISTANCE AND RESOURCE NETWORK (EARN)

A source of information and resources to help employers recruit, hire, retain and advance people with disabilities; build inclusive workplace cultures; and meet diversity, equity, inclusion, and accessibility goals (<https://askearn.org>)

### NSF FACILITATION AWARDS FOR SCIENTISTS AND ENGINEERS WITH DISABILITIES (FASD)

(<https://new.nsf.gov/policies/pappg/23-1>)

### UNIVERSITY OF WASHINGTON DISABILITY, OPPORTUNITY, INTERNETWORKING, TECHNOLOGY (DO-IT) CENTER

A center that “promotes awareness and accessibility—in both the classroom and the workplace—to maximize the potential of individuals with disabilities and make our communities more vibrant, diverse, and inclusive” (<https://www.washington.edu/doit/>)

### US DEPARTMENT OF LABOR ON DIVERSITY AND INCLUSION

With respect to people with disabilities (<https://www.dol.gov/agencies/odep/program-areas/employers/diversity-inclusion>)

### DISRUPTING ABILISM AND ADVANCING STEM

A National Leadership Summit that took place in June 2023 (National Academies of Sciences, Engineering and Medicine): “This virtual session focused on the important role of education in preparing students with disabilities as they enter the STEM ecosystem.” Videos and meeting materials are available on the summit web pages. (<https://www.nationalacademies.org/event/06-15-2023/disrupting-ableism-and-advancing-stem-cultivating-accessible-educational-pathways-and-spaces>)

### ADA GUIDELINES FOR UNOLS RESEARCH VESSELS

(<https://www.unols.org/unols-project-american-disabilities-act-ada-guidelines-unols-vessels>)

## REFERENCES

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