



VIEWPOINT

10.1029/2021AV000514

Special Section:

Diversity, Equity, and Inclusion in the Earth and Space Sciences

This article is a companion to Ranganathan et al. (2021), <https://doi.org/10.1029/2021AV000436>.

Correspondence to:

M. G. Hastings,
Meredith_Hastings@brown.edu

Citation:

Hastings, M. G. (2021). Geoscience faculty diversity: We need to make more progress, together. *AGU Advances*, 2, e2021AV000514. <https://doi.org/10.1029/2021AV000514>

Received 9 JUL 2021
Accepted 13 JUL 2021

Peer Review The peer review history for this article is available as a PDF in the Supporting Information.

Geoscience Faculty Diversity: We Need to Make More Progress, Together

Meredith G. Hastings¹
¹Earth, Environmental and Planetary Sciences, Brown University, Providence, RI, USA

Geoscientists are studying some of the most pressing problems for humanity today—from earthquake prediction to sustainable energy resources to the quality of air we breathe to climate change and sea level rise. The lack of a geosciences workforce that is representative of our society grossly limits our science and our ability to meet the challenges of sustaining our population on this planet.

The representation of women in geosciences in the United States has markedly improved in the last several decades. And yet, women still remain underrepresented and underpaid compared to men in the science and engineering workforce (NCSES, 2021). The geosciences are cited as one of the least diverse fields in science, technology, engineering, and mathematics overall, and the gains seen in gender diversity are significant only for white women (Bernard & Cooperdock, 2018; Ranganathan et al., 2021). This has direct and damaging consequences for the current and future health of our nation and our economy.

Ranganathan et al. (2021) is a timely update on the statistical makeup of faculty in the geosciences (Earth, ocean, atmospheric, and planetary sciences). While geoscience faculty are a very small percentage of the overall geoscience workforce in the United States, we have an outsized impact and influence on the undergraduate and graduate students who ultimately enter the workforce. Ranganathan et al. (2021) find that women currently represent up to ~27% of all tenured and tenure-track faculty across 62 highly ranked geoscience programs (an increase from ~20% reported in Glass, 2015). While many geoscience graduate programs are now seeing near parity in the (binary) gender makeup of their graduate programs, the loss of women from the academy following graduate school, and a gendered wage gap postgrad are still rampant. Ranganathan et al. quantify the disproportionate attrition of women at every stage from graduate school to postdoctoral positions to levels of the professoriate. They quantify this, cleverly, using a familiar geochemistry concept of the “fractionation factor” and detailing the statistics within fields in the Earth, ocean, atmospheric, and planetary sciences. At least two National Academy of Sciences reports document a suite of scholarly research, surveys, and testimonies that detail the bias, barriers, and hostile work climates that women scientists face as they attempt to succeed in their careers (NASEM, 2007, 2018). This is also concretely displayed in the recent film *Picture a Scientist* (<https://www.pictureascientist.com/>).

Another recent National Academy of Sciences report (NASEM, 2020) also makes clear that we need to do much more than simply get more women and minoritized scholars into the “leaky pipeline.” This metaphor is a grossly inadequate representation of the obstacles minoritized scholars face in their efforts to succeed in a scientific career (Batchelor et al., 2021; Marín-Spiotta, 2018; Marín-Spiotta et al., 2020). Recent articles written by our own colleagues in the geosciences make clear that the path to a successful career in science, especially for BIPOC scientists, is a vicious obstacle course (e.g., Berhe, 2020; Chaudhary & Berhe, 2020; Dutt, 2020; Morris, 2021; Shepherd, 2020). We know a fair amount about the experiences of people who have succeeded in their science and in their careers despite these conditions; we know very little about the much larger percentage of people whose scientific careers were derailed by these conditions.

So where do we go from here? As scientists, we constantly seek to improve our understanding; challenging our hypotheses with each new discovery to expand our thinking. We can and should do the same when it comes to our institutional structures and our cultural norms that perpetuate bias and barriers. We need to educate ourselves, not just about our science but also about how we can make becoming a scientist a possibility for anyone. We need to seek out and learn from different perspectives and bring that learning into practice within our structures, cultural norms, and hiring practices. As scientists, we critically review each other's work, interrogating data collection methods, and holding interpretations to high standards of reproducibility and understanding. Likewise, we should be open to interrogating our own biases, regularly, and demanding accountability of ourselves and our colleagues to treat people with as much respect as we treat

data. In science, we seek to learn from our mistakes, improving technology, and knowledge capacity; and we need to critically examine the mistakes in the system, learn from them and evolve our culture.

As a woman scientist, I was tenured at Brown by 44. In print, that picture of success does not speak of the obstacles I faced because of my gender. I navigated countless slights, losses of credit for ideas, unfair criticism of my work, harassment and so on. Much of my ability to overcome was the understanding I built through the community of women of the Earth Science Women's Network (ESWN). Today, ESWN is a nonprofit organization led by passionate women scientists who volunteer their time to increase diversity across the geosciences. There are many challenges in a scientific career that can result in success of a few at the expense of many equally talented scholars (NASEM, 2020). ESWN empowers early career scientists through professional development by creating a nurturing, trusting community to support women, in their professional and personal lives. And we created initiatives working for cultural change to eliminate barriers to a more diverse scientific workforce (<https://eswnonline.org/>; <https://geosciencewomen.org/>; <https://serc.carleton.edu/advancegeo/index.html>).

In my own career, I have learned to recognize that not all norms in our community are rules. I have navigated the institutional structures we have in place, and carved out a path that works for me. I have benefited from policies enacted in the last several decades to improve our workplaces for (white) women; and I have benefited from support within the departments that I have worked. To also thrive and not just survive, I had the support of a community of women that inspired and gave me courage when I needed it, making it possible for me to navigate breast cancer as a postdoc and have two children pre-tenure. Making our community a better place for everyone to be will make our science and our scientific enterprise better, and I ask that you join me in these efforts.

References

- Batchelor, R. L., Ali, H., Gardner-Vandy, K. G., Gold, A. U., MacKinnon, J. A., & Asher, P. M. (2021). Reimagining STEM workforce development as a braided river. *Eos*, 102. <https://doi.org/10.1029/2021EO157277>
- Berhe, A. A. (2020). *Amplifying Black voices: The convenient narratives that perpetuate racism (part 2)*. Springer-Nature. Retrieved from <https://www.springernature.com/gp/researchers/the-source/blog/blogposts-life-in-research/amplifying-black-voices-the-convenient-narratives-of-racism-pt2/18415826>
- Bernard, R. E., & Cooperdock, E. H. G. (2018). No progress on diversity in 40 years. *Nature Geoscience*, 11, 292–295. <https://doi.org/10.1038/s41561-018-0116-6>
- Chaudhary, V. B., & Berhe, A. A. (2020). Ten simple rules for building an antiracist lab. *PLoS Computational Biology*. <https://doi.org/10.32942/osf.io/4a9p8>
- Dutt, K. (2020). Race and racism in the geosciences. *Nature Geoscience*, 13(1), 2. <https://doi.org/10.1038/s41561-019-0519-z>
- Glass, J. B. (2015). We are the 20%: Updated statistics on female faculty in Earth Sciences in the U.S. In M. A. Holmes, S. OConnell, & K. Dutt (Eds.), *Women in the geosciences*.
- Marin-Spiotta, E. (2018). Harassment should count as scientific misconduct. *Nature*, 557, 141. <https://doi.org/10.1038/d41586-018-05076-2>
- Marin-Spiotta, E., Barnes, R. T., Berhe, A. A., Hastings, M. G., Mattheis, A., Schneider, B., & Williams, B. M. (2020). Hostile climates are barriers to diversifying the geosciences. *Advances in Geosciences*, 53, 117. <https://doi.org/10.5194/adgeo-53-117-2020>
- Morris, V. R. (2021). Combating racism in the geosciences: Reactions from a Black professor. *AGU Advances*, 2(1), e2020AV000358. <https://doi.org/10.1029/2020av000358>
- National Academy of Sciences, Engineering, and Medicine (NASEM). (2007). *Beyond bias and barriers: Fulfilling the potential of women in academic science and engineering*. The National Academies Press. <https://doi.org/10.17226/11741>
- National Academies of Sciences, Engineering, and Medicine (NASEM). (2018). *Sexual harassment of women: Climate, culture, and consequences in academic sciences, engineering, and medicine*. The National Academies Press. <https://doi.org/10.17226/24994>
- National Academies of Sciences, Engineering, and Medicine (NASEM). (2020). *Re-envisioning promotion and advancement for STEM faculty: Proceedings of a workshop—In brief* (p. 8). The National Academies Press. <https://doi.org/10.17226/25742>
- National Center for Science and Engineering Statistics (NCSES). (2021). *Women, minorities, and Persons with Disabilities in Science and engineering: 2021*. (Special report NSF 21-321). National Science Foundation. Retrieved from <https://ncses.nsf.gov/wmpd>
- Ranganathan, M., Lalk, E., Freese, L. M., Freilich, M. A., Wilcots, J., Duffy, M. L., & Shivamoggi, R. (2021). Trends in the representation of women amongst geoscience faculty from 1999-2020: the long road towards gender parity. <https://doi.org/10.1002/essoar.10506485.1>
- Shepherd, M. (2020). A Black male meteorologist on racial inequity and action from the weather community, *Forbes*. Retrieved from <https://www.forbes.com/sites/marshallshepherd/2020/06/01/major-weather-society-speaks-out-on-racial-inequalityperspective-from-a-black-scientist-in-that-community/?sh=310c1f755bcd>