



Obstacles to the recruitment of minorities into the geosciences: A call to action

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INTRODUCTION

In 2008, >85,000 Hispanic, Black (U.S. National Science Foundation [NSF] term), and American Indian/Native Alaskan students, collectively called underrepresented minorities, received bachelor degrees in science, technology, engineering, and mathematics (STEM). Of that number, only 192 Hispanic, 89 Black, and 28 American Indian/Native Alaskan students (NSF, 2010; Fig. 1) earned degrees in geoscience. Between 2000 and 2008, underrepresented minorities earned 16%–17% of STEM degrees and only 5%–7% of geoscience degrees.

The lack of geoscience undergraduates has been attributed to many factors (Velasco and Velasco, 2010), especially pre-college exposure (Levine et al., 2007). Most college-bound students do not study geoscience in high school, and this lack of exposure cuts across ethnic and socioeconomic divisions. Thus, high school non-preparation does not explain the discrepancy in percentages of white students versus minority students earning geoscience degrees.

For more than a decade, NSF program directors have been concerned about the lack of underrepresented minorities in the geosciences. A 2000 NSF workshop (see Prendeville and Elton, 2001) led to the NSF “Opportunities for Enhancing Diversity in the Geosciences” initiative, which provided funds for programs that had the potential to recruit underrepresented minorities into the geosciences.

Successful approaches to recruiting a more diverse geoscience undergraduate population are described in the Dec. 2007 *Journal of Geoscience Education* (v. 55, <http://nagt.org/nagt/jge/abstracts/dec07.html>) and include attention to the geoscience pipeline (Levine et al., 2007). Subsequent articles show that summer research experiences (Hallar et al., 2010) and paired programs with historically Black Colleges and Universities (HBCUs) (Stassun et al., 2010) are effective.

We agree that a multifaceted approach is necessary in order to attract a diverse student body. In 2008, 47% of U.S. births were non-white minorities (Hamilton et al., 2010). These children will begin entering college around 2027; geoscientists need to start attracting them now in order to maintain healthy departments and provide geoscientists to the workforce in the future.

ATTRACTORS TO GEOSCIENCE MAJORS

With little pre-college exposure, what attracts anyone to the geosciences? Holmes and O'Connell (2005) identify three main attractors, accounting for 80% of geoscientists: (1) positive undergraduate experiences, (2) love of the outdoors, and (3) family influences. Here we examine why these attractors may not be working as well for underrepresented minority students and suggest ways geoscientists can be more proactive in their efforts to recruit a representative student body.

Undergraduate Experience

Undergraduate experiences attract most geoscientists to the major. These experiences include becoming excited by a great course in college, a formative relationship with a professor, and interaction within a small, supportive department (Holmes and O'Connell, 2005). An informal survey of members of the National Association for Black Geologists and Geophysicists found that its members were attracted by a positive undergraduate experience (C. Ellis, 2006, personal commun.). This is in keeping with studies showing the influence of interaction with faculty on student self-confidence and academic success (Komarraju et al., 2010).

This type of undergraduate experience is restricted for many underrepresented minorities; HBCUs produce 38% of the black male and 41% of the black female STEM bachelor degrees. Unfortunately, most HBCUs do not offer geoscience, limiting this crucial recruiting path. Between 2000 and 2008, only 66 geoscience bachelor degrees were awarded to HBCU students (NSF, 2010). Tribal Colleges produce <2% of American Indian/Native Alaskan STEM bachelor degrees and none in geoscience. Largely Hispanic-serving institutions award a little over 30% of Hispanic STEM bachelor degrees and about 25% of Hispanic geoscience bachelor degrees, but these institutions are primarily large state schools, where big classes may hamper faculty-student interaction.

Love of the Outdoors

Geoscientists celebrate their connection with the outdoors, but a survey of 620 high school and college students taking a geoscience course in California revealed little outdoor appeal to underrepresented minority students (Whitney et al., 2005). In the same study, underrepresented minority students were less likely than whites to “prefer to work on a science project in an outdoor setting rather than in a research laboratory” and were significantly less likely to respond positively to statements like “I enjoy going hiking, camping or boating.”

Another measure of the enjoyment of outdoor life is visitation to U.S. National Parks. A 1997 Yellowstone National Park visitor survey showed only 1.5% African-Americans and 1% Hispanics present (Wilkinson, 1999). A 2002 survey of visitors to Florida's Everglades National Park and California's Sequoia and King Canyon National Parks found that 90% of the visitors were white (Kelly, 2006). Oprah Winfrey made news in 2010 when she visited Yosemite at the request of a Black park ranger (Oprah, 2010).

The lack of participation by Hispanics in outdoor activities like fishing, canoeing, backpacking, or birdwatching has been noted by marketing agencies (Adams et al., 2010). Their research shows that in the past year, <15% of Hispanic youths had engaged in these kinds of outdoor sports. Because 78% of Hispanic youths rely on their families for leisure activity ideas (Adams et al., 2010), this lack of outdoor tradition is apt to continue.

It is likely, therefore, that underrepresented minorities may find geoscience's emphasis on fieldwork and the outdoors a deterrent to majoring in the discipline.

Recommendation: Let students know that geoscience offers a wide variety of exciting opportunities to work indoors. Scenic vistas may not attract underrepresented minorities as much as images of well-equipped laboratories. Ensure that these are featured on departmental websites and in talks and publications.

Family Influence

Geoscience is an unknown or even negative career path for many people. Snieder and Spiers (2002) and Hoisch and Bowie (2010) found that negative perceptions of the geosciences were common and included low pay and low prestige. Most underrepresented minorities responded negatively to the statement, "My family would be very supportive if I decided to become a geoscientist." White students in the same study were more likely to have greater family support to pursue a geoscience major (Whitney et al., 2005).

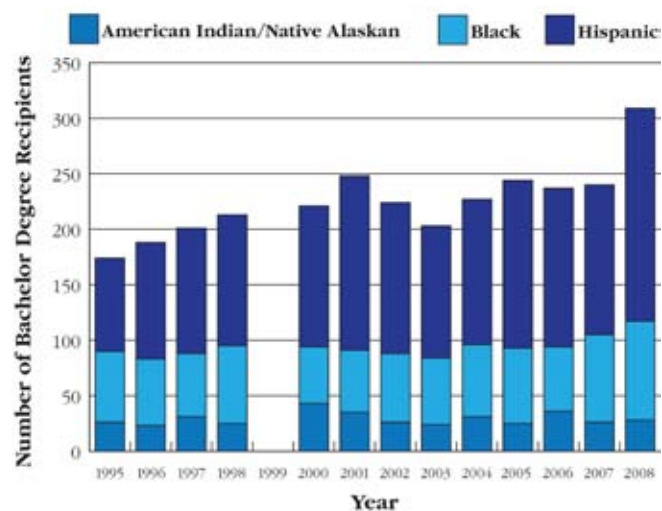


Figure 1. Number of geoscience bachelor degrees awarded to Blacks, Hispanics, and American Indian/Native Alaskans. In 2008, this number was two standard deviations higher than the previous 10-year average (NSF, 2010).

Family influence is crucial. Black and Hispanic students are more likely to be first-generation college students (Horn and Nuñez, 2000). Families have a disproportionate influence on the selection of majors of first-generation college students (Davis, 2010), who tend to select majors that lead to well-paying jobs.

Recommendation: Emphasize geoscience careers (especially of alumni) on department websites to make it easier for students to share this information with family. Images should include geoscientists working in offices and labs, not just in the field. Collin Powell, the first Black Secretary of State and a retired four-star general, majored in geology.

CONCLUSIONS

Geoscientists need to increase exposure to the geosciences and geoscience careers at all educational levels. Precollege, successful afterschool, outdoor, and parent programs can increase awareness and relevance of the geosciences. At the college level, geoscience faculty should (1) extend themselves to underrepresented minority students, (2) provide information about geoscience careers, and (3) provide students with information to help their families endorse geoscience.

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