

MAKING PLANETARY SCIENCE MORE INCLUSIVE: THE DIVISION OF PLANETARY SCIENCES PROFESSIONAL CULTURE AND CLIMATE SUBCOMMITTEE (PCCS). R. Schindhelm¹, J. A. Rathbun², S. Diniega³, S. M. Brooks³, S. M. Hörst⁴, I. J. Daubar⁵, J. Piatek⁶, E. G. Rivera-Valentin⁷, A. Soto⁸, M. S. Tiscareno⁹, C. Thomas¹⁰, ¹Ball Aerospace, ²Planetary Science Institute, ³Jet Propulsion Laboratory, California Institute of Technology, ⁴Johns Hopkins University, ⁵Brown University, ⁶Central Connecticut State University, ⁷Lunar and Planetary Institute, ⁸Southwest Research Institute, ⁹SETI Institute, ¹⁰Northern Arizona University.

Introduction: The American Astronomical Society's (AAS) Division for Planetary Sciences (DPS) Professional Culture and Climate Subcommittee (PCCS) was formed in 2016 in an effort to explore and improve the broad issues surrounding inclusion in planetary science. Its purpose is to shape the professional environment of planetary scientists into one where professional merit is the only criterion that determines each person's success. The PCCS considers and recommends actions the DPS Committee can take to promote a broadly inclusive professional community characterized by respect, honesty, and trust, and one in which people of diverse backgrounds are, and perceive themselves to be, safe, welcomed, and enabled. The charge of the DPS to the PCCS and the 2017 recommendations of the PCCS to the DPS can be found at the PCCS website: <https://dps.aas.org/leadership/climate>. Currently the PCCS is co-chaired by Julie Rathbun and Serina Diniega; other members listed as coauthors and on the website will also be present at this meeting.

The PCCS has worked to promote the importance of diversity, inclusion, and equity considerations to optimize collaboration and communication. At this meeting, we'll share resources regarding actions individuals and groups can take to improve the climate of the profession, their institutions, and within their collaboration groups.

The importance of Diversity, Inclusion, and Equity in planetary science: Research has demonstrated that diverse groups are more innovative, creative, and responsive to complex problems. For example, groups that include people from different backgrounds find more innovative and creative solutions and can outperform homogeneous groups composed of the highest performing individuals [1-4]. Companies with a more diverse and inclusive workforce return higher profits and demonstrate increased innovation [5-7]. Scientific publications with more diverse author groups receive higher citation rates and publish in higher quality journals [8]. Yet, the planetary science workforce is demonstrably not diverse, particularly when compared to the general population in this country [9].

The current status of diversity in Planetary science: We use data collected by the American Physical Society (<https://www.aps.org/programs/education/statistics/>) and the National Science Foundation's National Center for Science and Engineering Statistics

(<https://www.nsf.gov/statistics/about-nces.cfm>) to determine the number of Bachelor's and Doctorate degrees awarded in both Physics and Geology, which are the two primary fields in which planetary scientists earn degrees. We then calculate the percentage of each degree awarded to members of various groups. We examine the percentage going to men, women, white students, Black students, and Hispanic/Latinx students. We compare these percentages to their representation in the US population, such that any ratios substantially greater than unity demonstrate an overrepresentation of that group, while a ratio substantially lower than unity demonstrates an underrepresentation (Figure 1). These data show that Black and Hispanic/Latinx students are the most underrepresented in both fields, and are more underrepresented than women in earning PhDs in both fields.

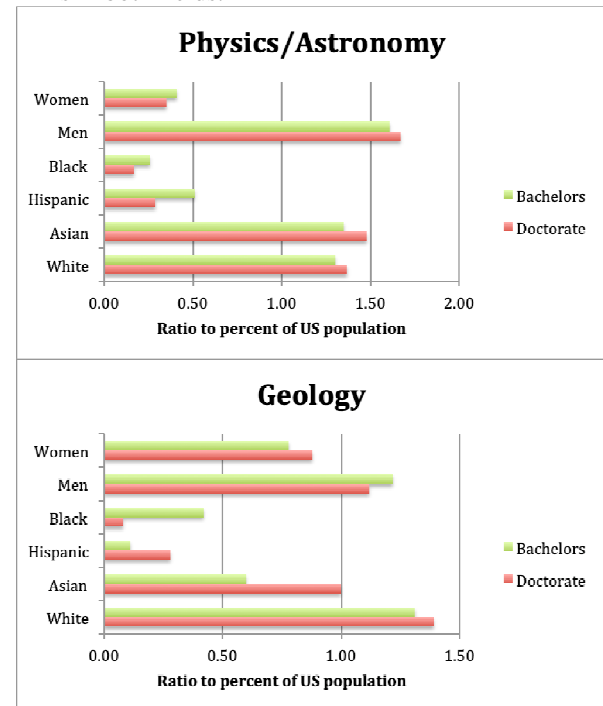


Figure 1: Ratio of percentage of various groups earning degrees to the US population.

In Physics and Astronomy, the percentages of women and men are similar when comparing bachelors and doctorate degrees, suggesting both women and men earn the higher degree at the same rate. In Geology there is better gender parity in doctorate degrees

than bachelors, suggesting that more men finish with just a bachelors degree. However, more women pursue Geology initially than Physics/Astronomy. Furthermore, there are proportionally fewer Black and Hispanic students earning doctorates than bachelors, demonstrating that, not only are these students less likely to earn physics degrees, those who do are less likely to earn higher degrees. The same is true for Black geology students. These differences are NOT due to a lack of interest in the subject [10-11], as for example, black first-year college students indicate an interest in STEM at higher rates than their white peers [12].

We then compared the percentage of these groups in the planetary science field to what would be expected based on the PhD production rates. We combine Physics/Astronomy and Geology PhD recipients according to their ratio among the planetary science community [13] and find that Black and Hispanic/Latinx scientists are even more underrepresented among practicing planetary scientists than expected from the rate at which each group earns PhDs (Figure 2). While some of this can be explained if members of these groups earned even fewer doctorates in the past than present, the number of bachelors and doctorates awarded to Black students has remained flat for at least two decades [14 and AIP statistics].

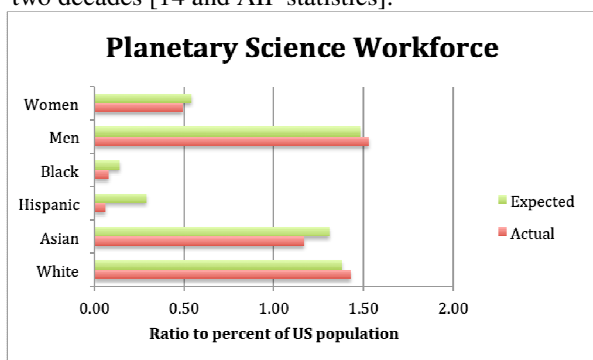


Figure 2: Ratio of the percentage of various groups in the planetary science workforce to the US population compared to the expected population from PhD production.

What does the PCCS do? The PCCS is involved in a range of DPS and community activities. We advise on diversity and inclusion issues at DPS meetings and arrange for a plenary talk on diversity topics. We facilitate implicit bias training for the DPS and prize committees. We make recommendations to the DPS committee, such as arranging bystander intervention training at DPS meetings, including information on inclusive meetings in the DPS meeting guide, collecting demographic information of DPS prize winners, and advocating the DPS take the lead on encouraging the next planetary decadal survey to consider the state

of the planetary science profession. Helping coordinate white papers on equity, diversity, and inclusion for the next planetary decadal survey is a major goal of the PCCS in 2020.

What can you do to help? Some suggestions for actions include (see [15] for more ideas):

1. Learn about issues that affect the members of our community who are also members of underrepresented groups. [Readings include diversity presentations on the DPS PCCS webpage and blogs such as Women in Planetary Science and Astronomy in Color. We also suggest google-searching and reading about unfamiliar social science terms and studies.]
2. Read abstracts and look at posters about diversity issues at this and other conferences.
3. Support plenary talks on diversity issues at conferences and workshops.
4. Attend diversity training at conferences and workshops.
5. Co-author and/or support decadal survey white papers on diversity and workforce issues.
6. Fill out any surveys being used for input into the next decadal survey and convince colleagues to do the same.

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