

School of Meteorology Demographics
June 2021

The School of Meteorology awarded 1302 degrees (Bachelors, Master, and Doctorate/PhDs) between 1997 and 2019. The report examines the race, ethnicity, and sex distribution of these degrees. The data was retrieved from the publicly available Integrated Postsecondary Education Data System (IPEDS)¹ and from a 2019 NSF Report⁴. We note that this is an assessment of numbers only and is not data on the experiences of historically underrepresented students in SoM.

Definitions

Prior to 2010, race/ethnicity categories in IPEDS included:

White, non-Hispanic

Hispanic or Latino

American Indian or Alaska Native, non-Hispanic

Asian, non-Hispanic

Black or African American, non-Hispanic

Other or unknown race or ethnicity, non-Hispanic

In 2010, the US Census Bureau introduced new racial categories, hence the numbers after 2010 are not directly comparable to those prior to 2010. The IPEDS database post-2010 classifications are limited to the following 9 categories:

White, non-Hispanic

*Hispanic or Latino

*American Indian or Alaska Native, non-Hispanic

Asian, non-Hispanic

*Black or African American, non-Hispanic

*Native Hawaiian or Other Pacific Islander

Two or more races, non-Hispanic

Other or unknown race or ethnicity, non-Hispanic

Temporary visa holder

Following the definitions used by the AGI, here we define Underrepresented Minority (URM)* as “Hispanic or Latino”, “American Indian or Alaska Native, non-Hispanic”, and “Black or African America, non-Hispanic”. AGI also includes Native Hawaiian or Pacific Islander, but no degrees have been awarded to this group from the School of Meteorology. We note that this is likely an underestimate of historically underrepresented populations, especially as some students identifying as two or more races or temporary visa holders may also be historically underrepresented. As such, we also make comparisons with all groups except “White, non-Hispanic”. IPEDS data collects data for sex in male/female binary classifications only and no data is collected on other aspects of identity such as first-generation, differently abled, LGBTQ+, or socio-economic status.

National Context

The 2020 report² from the American Geoscience Institute (AGI) on “Diversity in the Geosciences” summarized education trends by gender, race, and ethnicity in the Geosciences as a whole, of which meteorology is part. The AGI report used the same IPEDS database to show that from 2010 to 2019, Black/African Americans, Hispanic/Latinx, and Native American/Alaska Natives receiving geoscience bachelor’s degrees increased from 9% to 16%, masters 7% to 10%, and doctorates 6% to 7%².

Beane et al 2021³ showed that over the past 20 years there has been improvements made in the nationwide racial and ethnic diversity of undergraduate geoscience degrees more so than graduate degrees. However, they note that this progress is not uniform across institutions and is concentrated at a small number of universities. They note that two-fifths of geoscience programs fail to graduate more than one student from a marginalized group per year.

Despite the limited progress in racial and ethnic diversity, degrees awarded to females in geoscience has increased since the mid-1980s. Across all the geosciences, 44% of undergraduate degrees and 40% of doctorate degrees were awarded to females.

Here we also compare degrees awarded by SoM to *nationwide* Atmospheric Science degrees awarded with data from NSF⁴ available from 2006-2016. Between 2006 and 2016, SoM awarded 5.7% (450) of all bachelor’s degrees, 7.3% (180) of all master’s degrees, and 5.4% (70) of all doctorate degrees in atmospheric science nationwide. Breaking down the degrees awarded by demographic groups (Figures 1-3), we can see that while SoM awarded between 5.4 and 7.3% of total degrees, the fraction of degrees awarded to URMs is much lower, and decreases from bachelors through PhD, with 5% of nationwide bachelor’s degrees awarded to URMs from SoM, 2.8% of masters degrees, and 2% of PhDs. The gap between total degrees awarded and degrees awarded to URM students that grows through academic advancement must be addressed.

Figure 1 also shows that between 2006-2016, 25% (20%) of all bachelors (master) degrees awarded to American Indian or Alaska Native, non-Hispanic students were from SoM. While this an important success, it should be noted that this equates to only 9 (5) degrees.

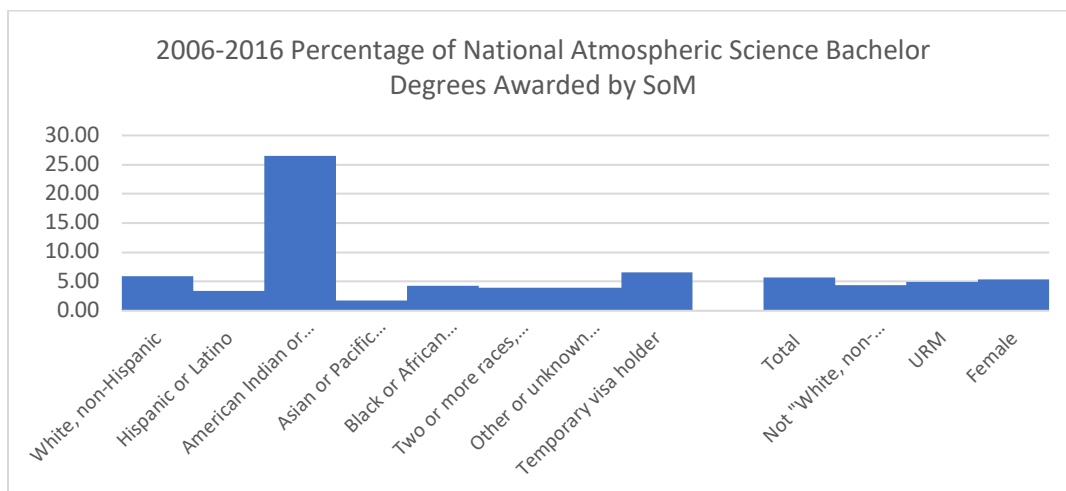


Figure 1: Percentage of national atmospheric science bachelor’s degrees awarded by SoM between 2006 and 2016.

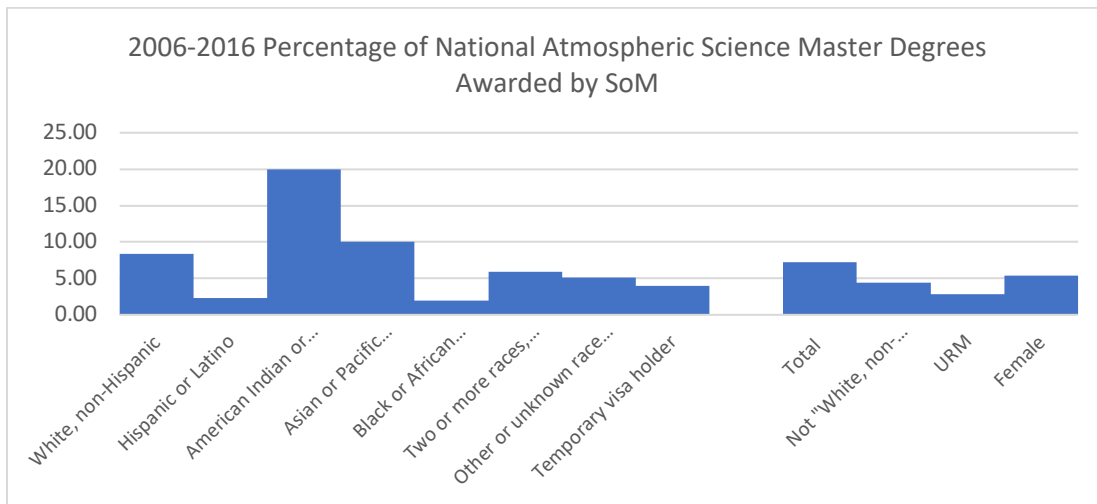


Figure 2: As in Figure 1 but for master's degrees

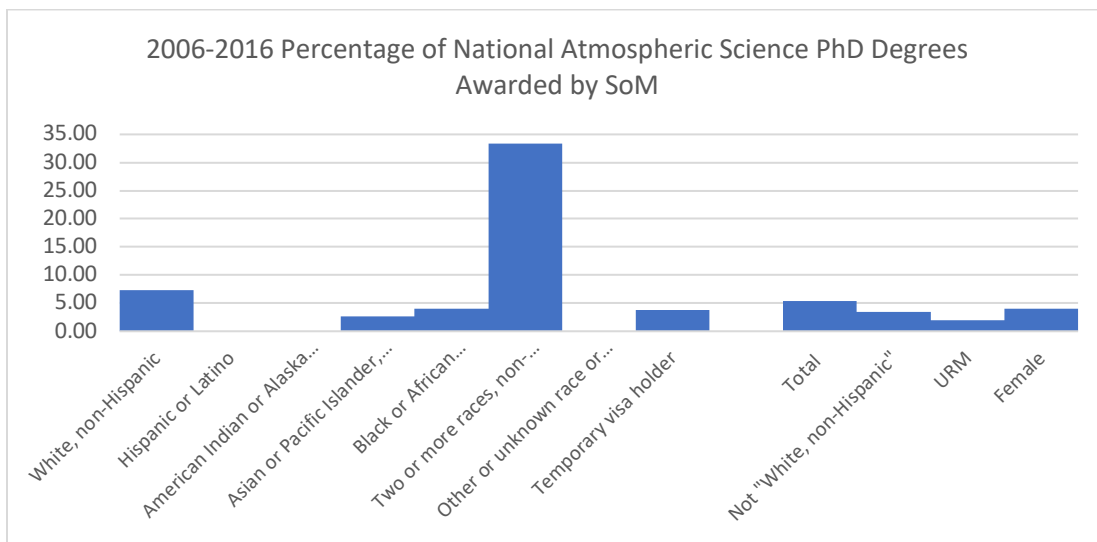


Figure 3: As figure 1 but for PhDs

We can also compare the percentage of degrees awarded to female students nationwide against the percentage of degrees awarded to female students from SoM between the years of 2006 and 2016 (Figure 4). For bachelor's degrees, the percentage awarded to females nationwide has hovered around 34% with no clear upward trend. The percentage of bachelor's degrees awarded to female students from SoM (~32%) has been slightly below the nationwide numbers during 2006-2016 except for two years.

For graduate degrees, the patterns are similar but the gap between nationwide female percentages and SoM female percentages grows between bachelor, master and PhDs, with 34% of PhDs awarded to females nationwide (between 2006 and 2016) and only 23% from SoM in the same period. The SoM data is examined further below.

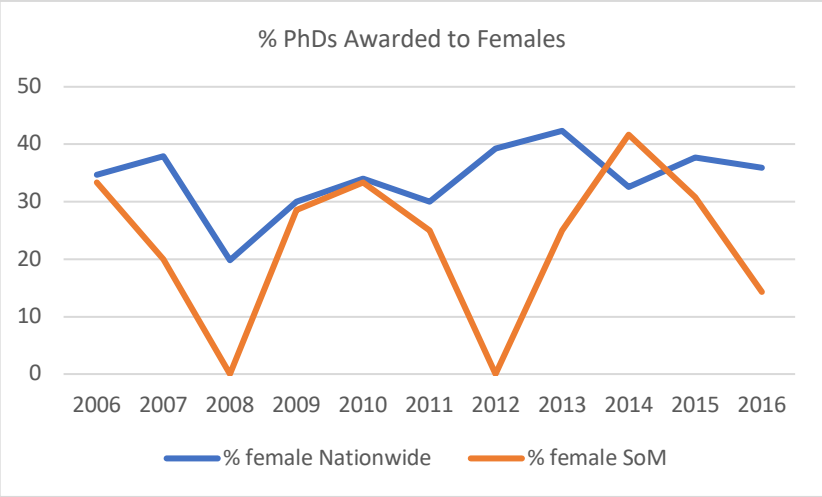
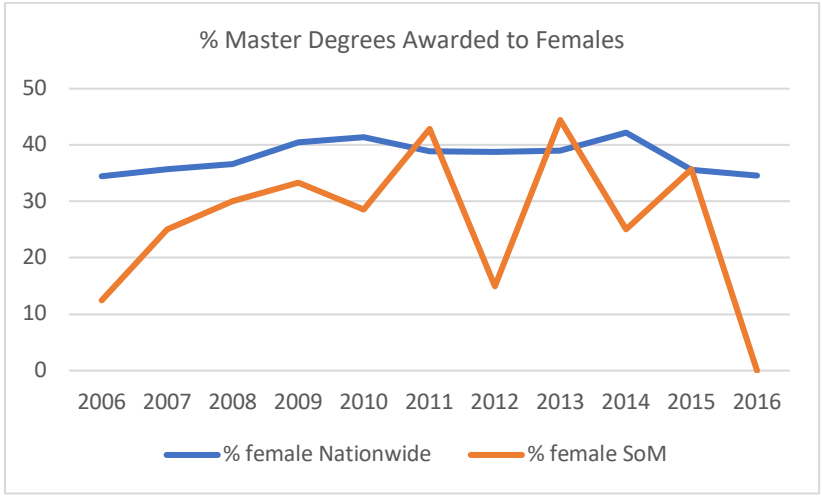
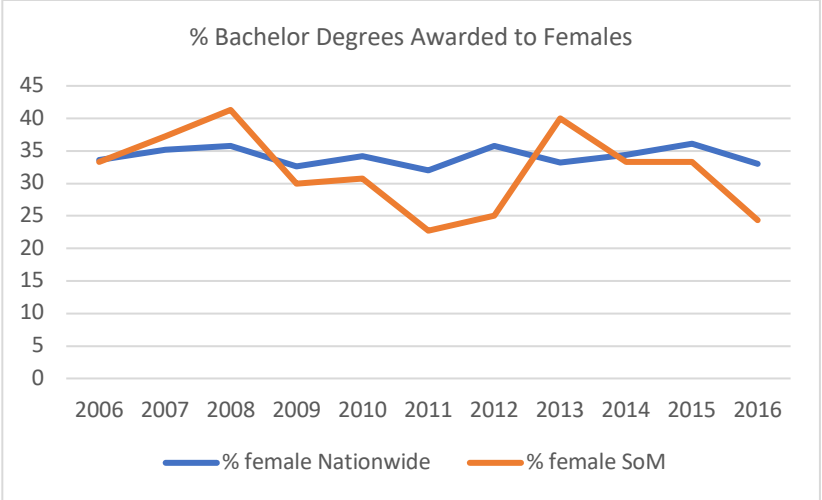


Figure 4: Percentage of degrees awarded to females nationwide and from SoM between 2006 and 2016

Undergraduate Degrees

Between 1997 and 2019, SoM awarded 815 bachelor's degrees (Table 1), of which 68% were awarded to male students, and 89% to white and non-Hispanic students. Only 6.5% were awarded to URMs which is considerably below the geoscience wide numbers, the 7.9% of atmospheric science degrees awarded nationwide, and the population of these groups in Oklahoma (28.5% for 2019).

Table 1: Race/Ethnicity data for bachelor's degrees 1997-2019.

| | Number Degrees | Percent |
|--|-----------------------|----------------|
| White, non-Hispanic | 725 | 89.0 |
| Hispanic or Latino | 22 | 2.7 |
| American Indian or Alaska Native, non-Hispanic | 18 | 2.2 |
| Asian, non-Hispanic | 6 | 0.7 |
| Black or African American, non-Hispanic | 13 | 1.6 |
| Two or more races, non-Hispanic | 8 | 1.0 |
| Other or unknown race or ethnicity, non-Hispanic | 13 | 1.6 |
| Temporary visa holder | 10 | 1.2 |
| TOTAL | 815 | |
| Not "White, non-Hispanic" | 90 | 11.0 |
| URM | 53 | 6.5 |
| Female | 260 | 32 |
| Male | 555 | 68 |

Figure 5 shows the number of bachelor's degrees awarded by year. Total number of degrees increased between 1997 and 2006 but has remained close to 40 degrees per year since, with some year-to-year variability. The number of degrees awarded to not White, non-Hispanic students has never exceeded 9 in a year, and the largest number of degrees awarded to URMs in one year is 6. On average, 2.3 degrees per year have been awarded to URMs.

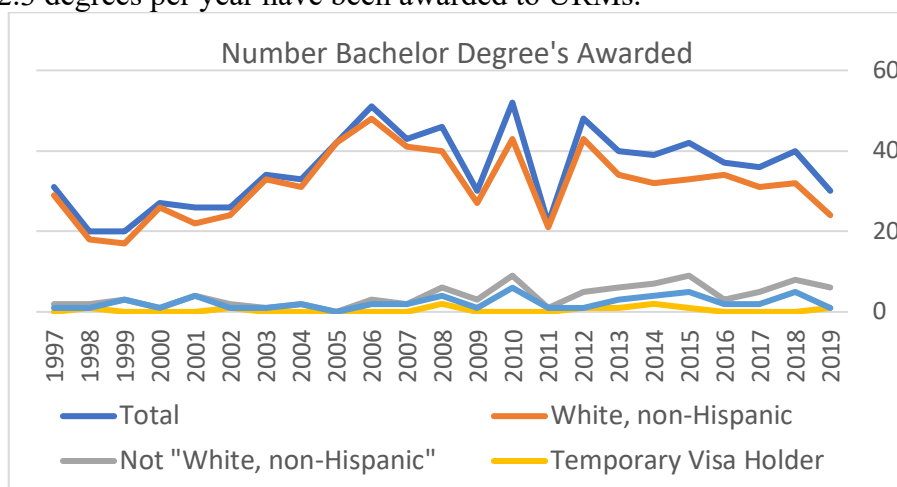


Figure 5: Number of BS Meteorology degrees awarded

Examining the trends in non “White, non-Hispanic” degrees awarded (Figure 6), it is evident that much of the increase has been via larger numbers of students identifying as two or more races, non-Hispanic, and other/unknown, which were available as selections in 2010 and after.

Examining the percentage of degrees awarded only to URMs (Figure 7), it is evident that there has not been the same increasing trend as observed in geosciences, although it appears as if the number of degrees awarded to Hispanic and Latino students is larger in the most recent period, which is consistent with the growth across geoscience. However, it is important to note that the actual number of degrees awarded to these groups is still small. For example, 12% in 2018 was only 5 students.

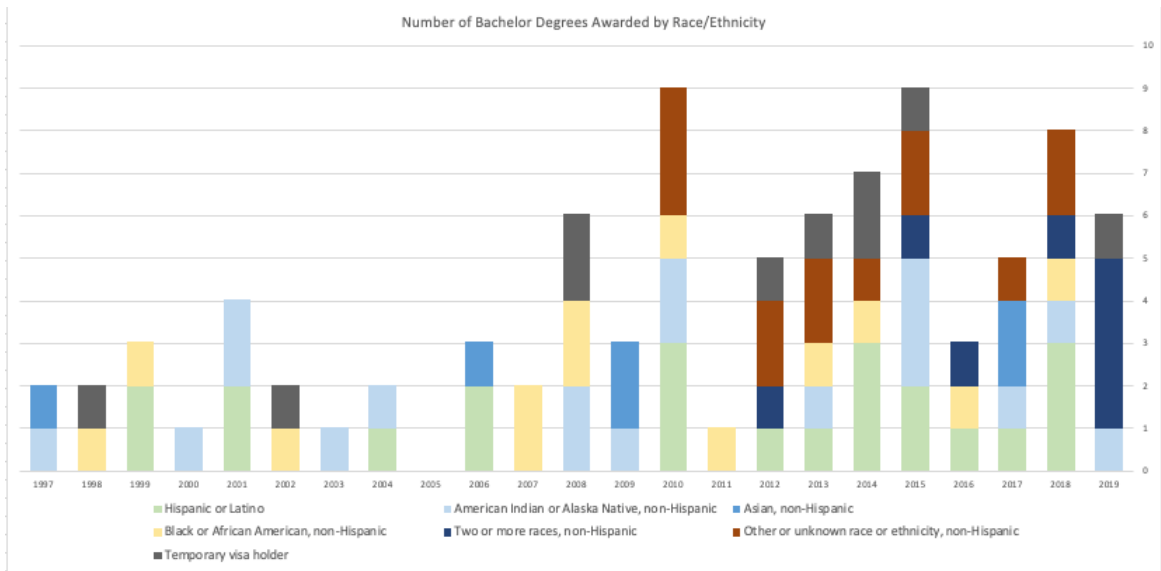


Figure 6: Number of bachelor's degrees Awarded by Race/Ethnicity

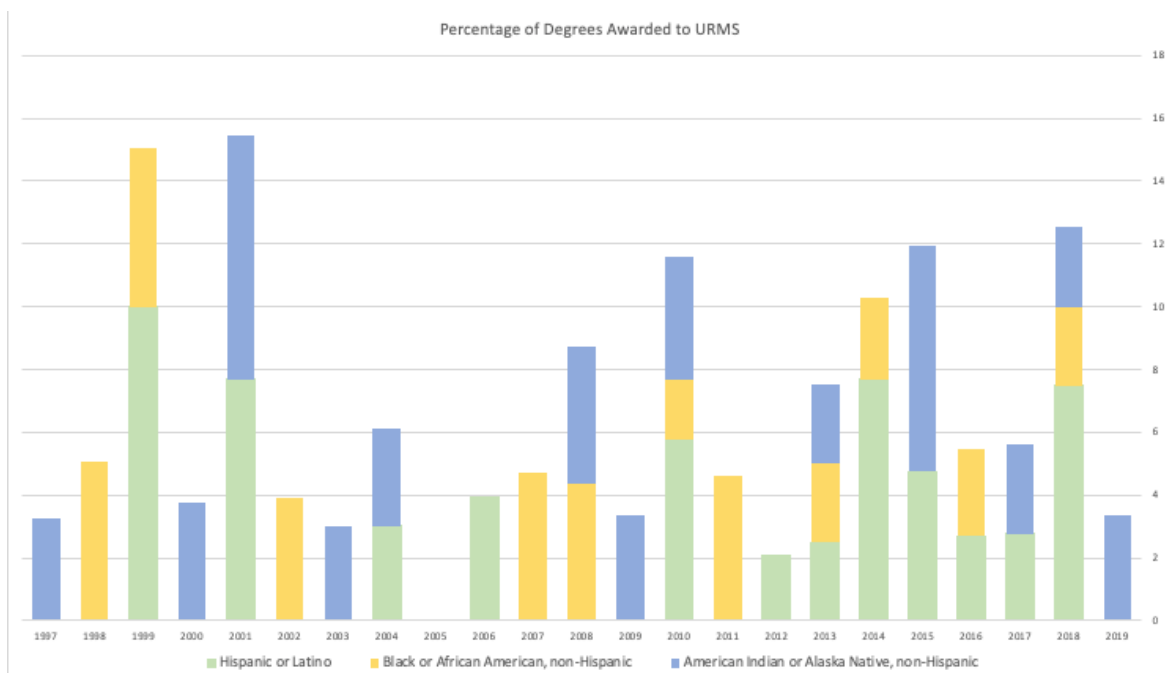


Figure 7: Percentage of bachelor's degrees awarded to URMs

We can further decompose the data to investigate trends in degrees awarded to males and females and intersectional identities (Figure 8 and 9). In contrast to the lack of change in degrees awarded to URMs, the percentage of degrees awarded to females has increased from less than 20% in 1997 to a high of 43% in 2019, which is in line with Geoscience-wide numbers in the same year.

It is evident from this data (Figs. 8 and 9) that despite the increases in female students receiving degrees, the number of female URMs is very low – only 16 degrees awarded in 23 years. No more than 3 degrees have been awarded to a female URM (and 4 to a male URM) in a given year. Zero degrees were awarded to URM females in half of the years (12 of the 23). For male URMs, the numbers are low but more consistent, with zero degrees awarded in 3 years. Due to the small numbers, year-to-year variability in the percentage of degrees in male and female URMs is large.

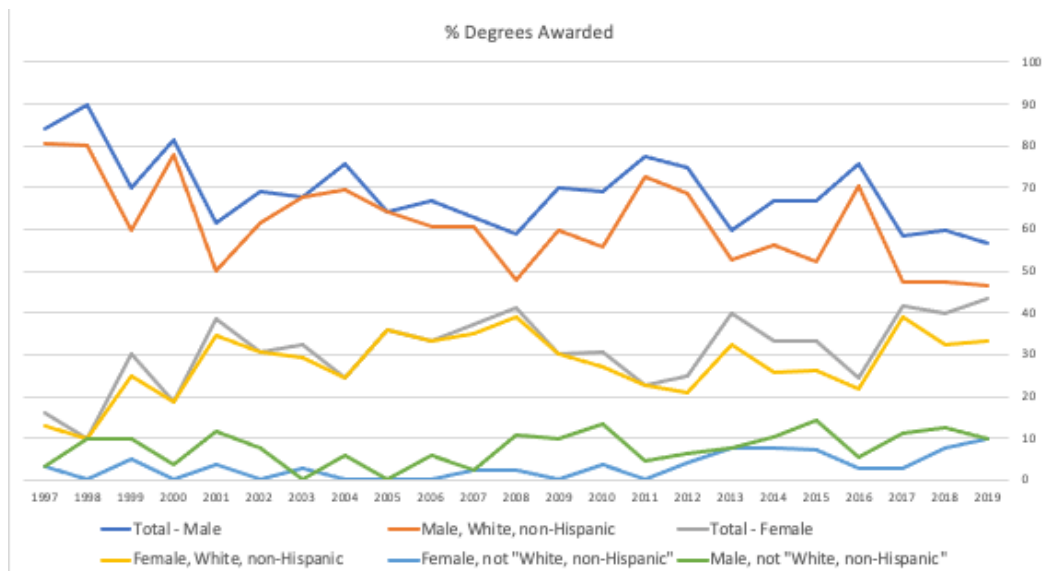


Figure 8: Percentage of bachelor degrees awarded by sex and race/ethnicity

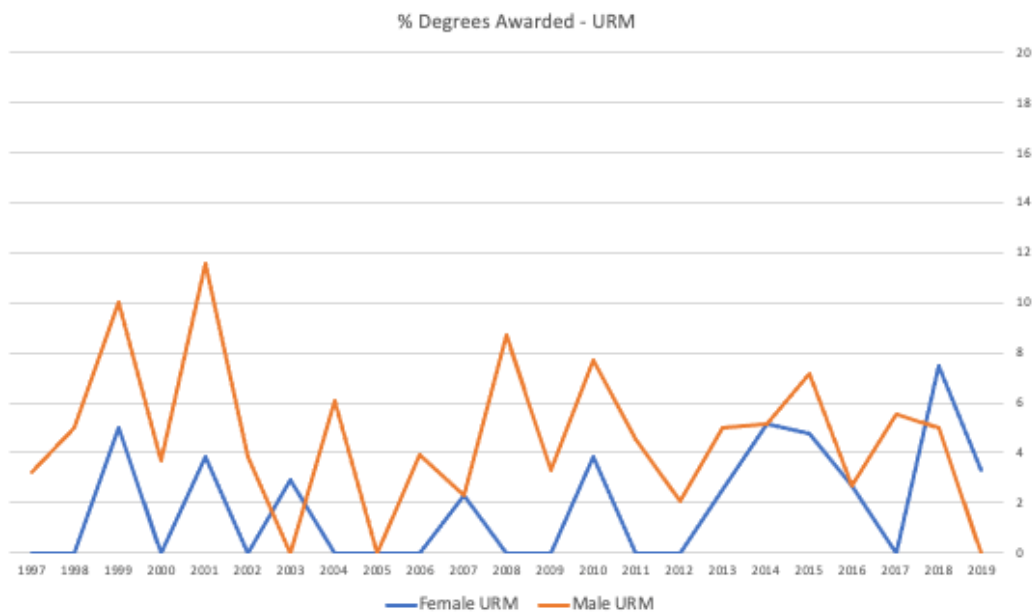


Figure 9: Percentage of bachelor degrees awarded to male and female URMs

Graduate Degrees

Between 1997 and 2019, SoM awarded 349 master's degrees and 138 doctoral degrees (Table 2), of which 73% were awarded to male students, 80% to white and non-Hispanic students, and 14% to temporary visa holders. Only 1.8% of graduate degrees (9 degrees) have been awarded to URM students which is *significantly* below the geoscience wide numbers (masters 7% to 10%, and doctorates 6% to 7% between 2010 and 2019)² and atmospheric science numbers (5.1% between 2006 and 2016)⁴. Due to the extremely low total numbers, drawing conclusions about changes and examining intersectionality is challenging.

Table 2: Race/Ethnicity Data for Graduate Degrees 1997-2019.

| | Master | | Doctoral | |
|--|----------------|---------|----------------|---------|
| | Number Degrees | Percent | Number Degrees | Percent |
| White, non-Hispanic | 293 | 84 | 99 | 72 |
| Hispanic or Latino | 4 | 1.1 | 1 | 17 |
| American Indian or Alaska Native, non-Hispanic | 1 | 0.3 | 0 | 0 |
| Asian, non-Hispanic | 6 | 1.7 | 2 | 1.4 |
| Black or African American, non-Hispanic | 1 | 0.3 | 2 | 1.4 |
| Two or more races, non-Hispanic | 3 | 0.9 | 1 | 0.7 |
| Other or unknown race or ethnicity, non-Hispanic | 5 | 1.4 | 2 | 1.4 |
| Temporary visa holder | 36 | 10.3 | 31 | 22 |
| TOTAL | 349 | | 138 | |
| Not "White, non-Hispanic" | 56 | 16 | 39 | 28 |
| URM | 6 | 1.7 | 3 | 2 |
| | | | | |
| Female | 260 | 28 | 36 | 26 |
| Male | 252 | 72 | 102 | 74 |

Figs. 10 and 11 show the number of graduate degrees awarded by year. The number of master's degrees awarded has fluctuated around an average of ~15 per year but PhDs have increased from approximately 5 per year prior to 2014 to an average of almost 10 per year in 2014 and after. This increase was driven by a larger number of degrees awarded to temporary visa holders. For master's degrees, URM students were awarded degrees in only 5 years and only 3 years for PhDs. Examining the percentage of graduate degrees awarded only to URM students (Figs. 10 and 11), it is evident that there has not been the same increasing trend observed in geosciences as a whole.

It is important to note the lower percentage of graduate degrees awarded to white, non-Hispanic students in comparison to undergraduate degrees (80% vs 89%). This is due to the much higher fraction of temporary visa holders receiving graduate degrees (19.5%) from SoM.

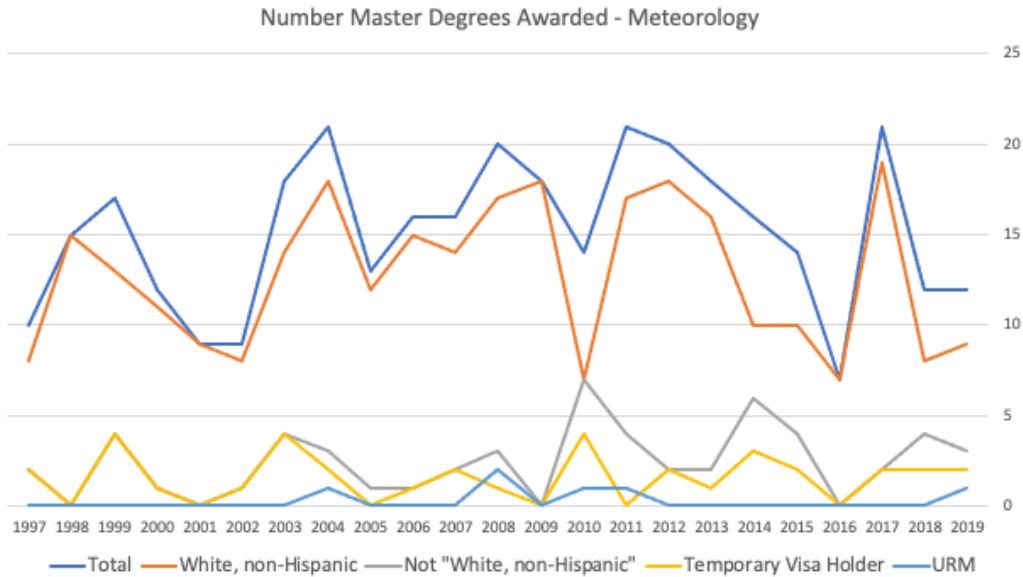


Figure 10: Number of master's degrees awarded per year

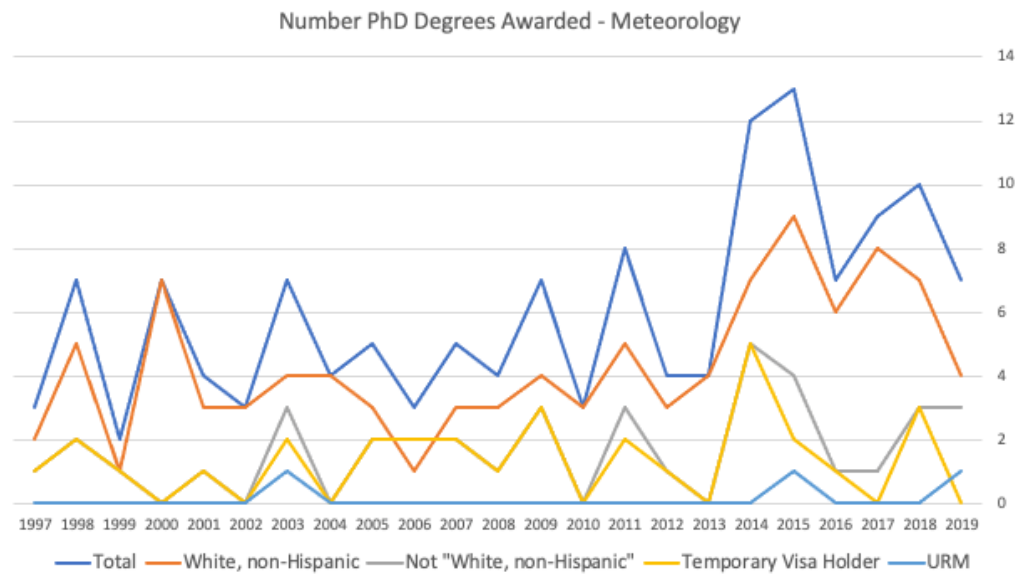


Figure 11: Number of PhDs awarded per year

We can further decompose the data to investigate trends in graduate degrees awarded to males and females and intersectional identities (Figure 12 and 13). In contrast to the lack of change in degrees awarded to URM, the percentage of master (doctorate) degrees awarded to females has increased from 0% (0%) in 1997 to a high of 67% (42%) in 2019. However, excluding these years, there is little trend especially in comparison to the geoscience-wide numbers. Little to no trend in nationwide numbers was also evident between 2006 and 2016 (Figure 4).

Similar to undergraduate degrees, despite the increases in female students receiving degrees, the number of female URMs is very low – only 2 master’s degrees and 1 PhD have been awarded in 23 years. For male URMs – only 4 master’s degrees and 2 PhD have been awarded in 23 years.

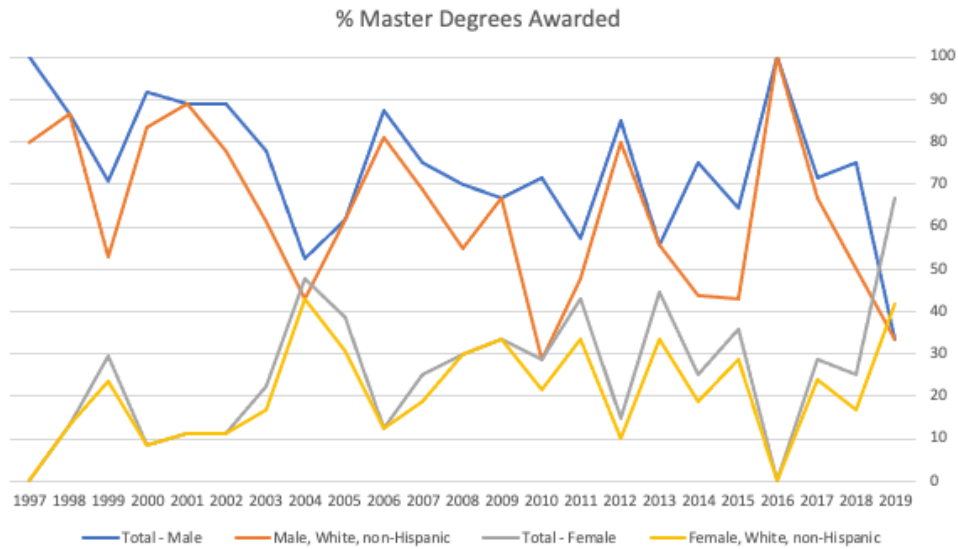


Figure 12: Percent of master’s degrees awarded by sex, race, and ethnicity

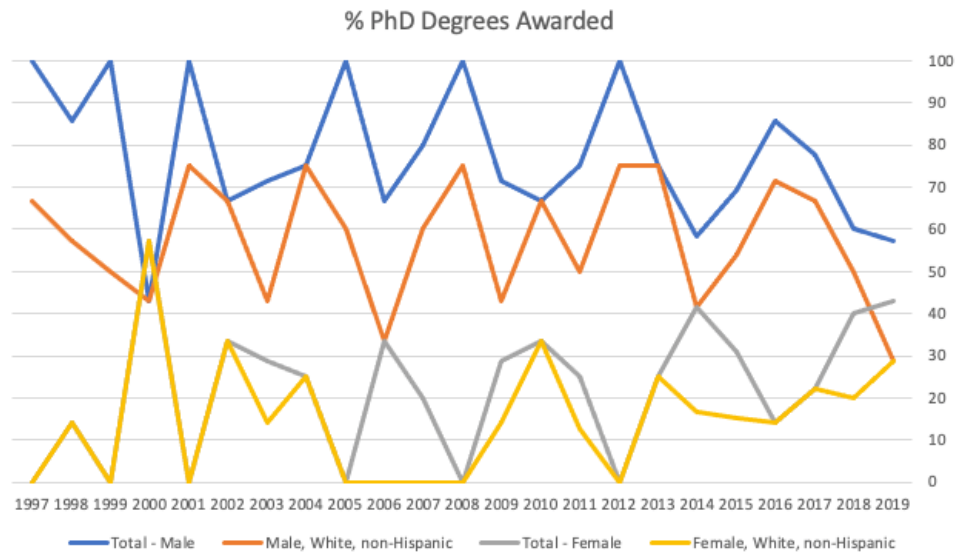


Figure 13: Percent of doctorate degrees awarded by sex, race, and ethnicity

References

¹Data is from the Integrated Postsecondary Education Data System (IPEDS). Numerical degree data by sex, race, and ethnicity with calculated percentages for Atmospheric Sciences and Meteorology (Classification of Public Instruction—CIP—codes 40.04), for 1997 through 2019. IPEDS data are publicly available for download from <https://nces.ed.gov/ipeds/use-the-data> and through an interactive tool https://ncesdata.nsf.gov/builder/ipeds_c.

²American Geosciences Institute (AGI) – Diversity in the Geosciences. Updated 2020. <https://www.americangeosciences.org/geoscience-currents/diversity-geosciences>

³Beane, R.J., Baer, E.M.D., Lockwood, R. *et al.* Uneven increases in racial diversity of US geoscience undergraduates. *Commun Earth Environ* **2**, 126 (2021). <https://doi.org/10.1038/s43247-021-00196-6>

⁴National Science Foundation, National Center for Science and Engineering Statistics. 2019. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2019*. Special Report NSF 19-304. Alexandria, VA. Available at <https://www.nsf.gov/statistics/wmpd>.