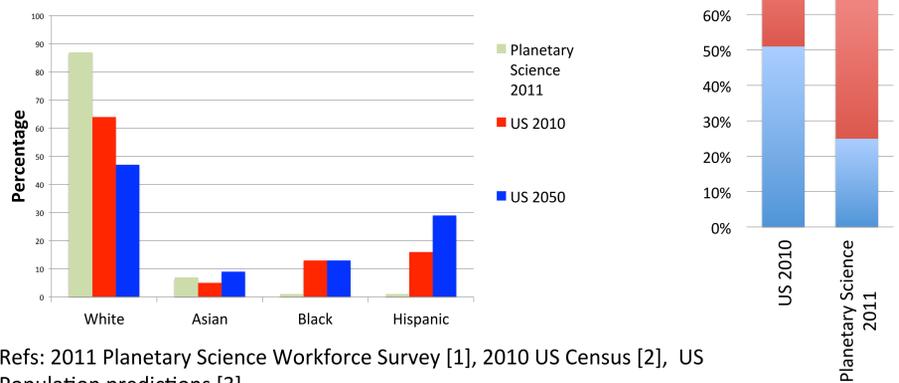


# Women of Color in the Planetary Science Workforce: General participation and membership within spacecraft mission teams

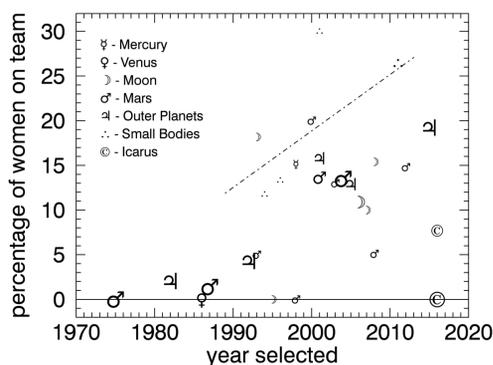
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## Demographics of the Planetary Science workforce do not match US demographics



Refs: 2011 Planetary Science Workforce Survey [1], 2010 US Census [2], US Population predictions [3]

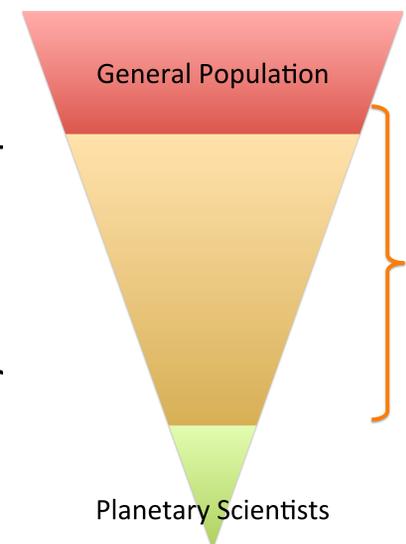
## Women on science teams of Planetary robotic missions



- Since 2001, percentage of women on missions has remained flat (best fit slope = -0.07), despite an increase in the number of women in planetary science [4,5]
- 2001-2016, average percentage of women on teams 15.8%
- Of the 15.8% of women on teams, most are white women

## Planetary Scientist Pipeline

	Men	Women
White	1661	1772
Latinx	382	396
Black	355	368
Asian	146	152
Other	62	65



	Men	Women
White	1661	554
Latinx	19	6
Black	19	6
Asian	134	45
Other	76	26

Numbers of planetary scientists are calculated based on [1]: Used total number of scientists contacted, response rate, and percentage that self-identify as planetary scientists to calculate 2525 total planetary scientists. Determined total numbers in each demographic based on reported percentages and assuming that percentage of women is constant across racial lines (percentages shown at left). Our own count of Black and Latinx planetary scientists shows that men do not significantly outnumber women as they do for white scientists. However, our count does agree that there are small numbers of planetary scientist from both groups.

## What's going into the pipeline?

Assumptions:

1. Demographics of the group going into the pipeline matches the 2010 US census distribution
2. Number of white men going in = number coming out.

**What percentage of each group makes it from the US population, through the pipeline, to become planetary scientists?**

	Success rate men	Success rate women
White	100%	32%
Latinx	5%	1.5%
Black	5%	1.5%
Asian	92%	30%
Other	n/a	n/a

**Women of Color (not including Asian women) are the most underrepresented group in science, being more underrepresented than white women by a factor of 10.**

**The representation of other racial identities, such as indigenous peoples, were so low that they were not included in this analysis, a testament to gross underrepresentation in the field.**

## Example barriers to Entry

- Assumption of a “meritocracy” system, and a related assumption that that well qualified minorities fail to make it in science because they are not good candidates [6,7]
- “Color-blind” approaches to mentoring of diverse students is less effective [8] and, along with a lack of racially-diverse role models, can be detrimental.
- A lack of diversity within the mentor-population enhances the emotional and “service” labor requested from those present (and this work is undervalued) [9].

Note that references [6-7, 9] focus only the impact of gender – however, all of these barriers may more strongly affect women of color and/or be compounded by race.

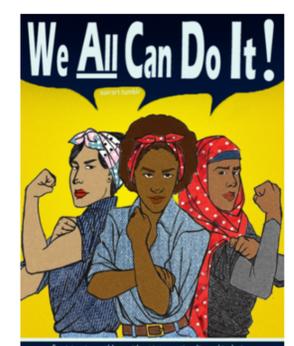
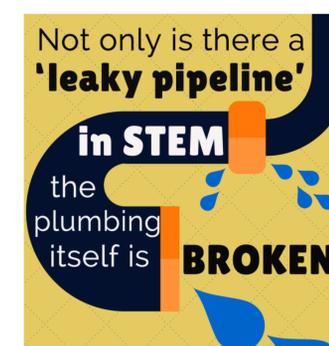
## Conclusions

The planetary science workforce is not nearly as diverse as the society from which membership is drawn and the majority of our funding comes. There is clearly a pipeline problem and then barriers for success for women in planetary science – *and in particular, for women of color.*

- Asian Americans are represented in planetary science at rates comparable to white women, but may still be poorly represented on spacecraft science teams
- Women of Color (not including Asian women) are the most underrepresented group in science.
- White women are much closer in representation to white men than to women of color
  - For every 3 white men that make it through the pipeline there is 1 white women.
  - For every 10 white women that make it through there are only 1-2 women of color.
- **More than 95% of potentially talented women of color are being left behind and kept out of the planetary science community.**
- **The low numbers of women of color in the field directly affects the number of women of color on spacecraft science teams.**
- **Purely gender-focused efforts are unlikely to sufficiently help women of color remain in the field.**

## Recommendations

- Future demographic studies of the Planetary Science workforce should consider and report race and gender simultaneously to determine the role of intersectionality on participation in planetary science.
- **Recruitment and retention efforts need to focus on the groups that are the most underrepresented in planetary science: racial minority groups.**
- More studies are needed into the barriers to equal representation along the entire pipeline, including within planetary science.



References: [1] White, et al. 2011 ([http://jasp.colorado.edu/home/mop/files/2015/08/Rep\\_ort.pdf](http://jasp.colorado.edu/home/mop/files/2015/08/Rep_ort.pdf)), [2] 2010 US Census Brief (<http://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf>), [3] Passel, J. S. and Cohn D. (2008) US Population Projections: 2005- 2050, (<http://assets.pewresearch.org/wp-content/uploads/sites/3/2010/10/85.pdf>), [4] Rathbun, J. A., et al. (2015) DPS, 312.01 [5] Rathbun, J. A. (2016) DPS, 332.01 [6] Leslie S.-J. et al., 2015, Science, 347(6219), 262-265. [7] Nielsen, M.W., 2016. Sci & Pub. Pol., 43(3), 386-399. [8] McCoy, D.L., et al., 2015. J. Diversity Higher Ed., 8(4), 225-242. [9] Guarino, C.M. & V. Borden, 2017, Res. in Higher Ed., 58(6), 672-684.