The State of the Profession in Solar and Space Physics

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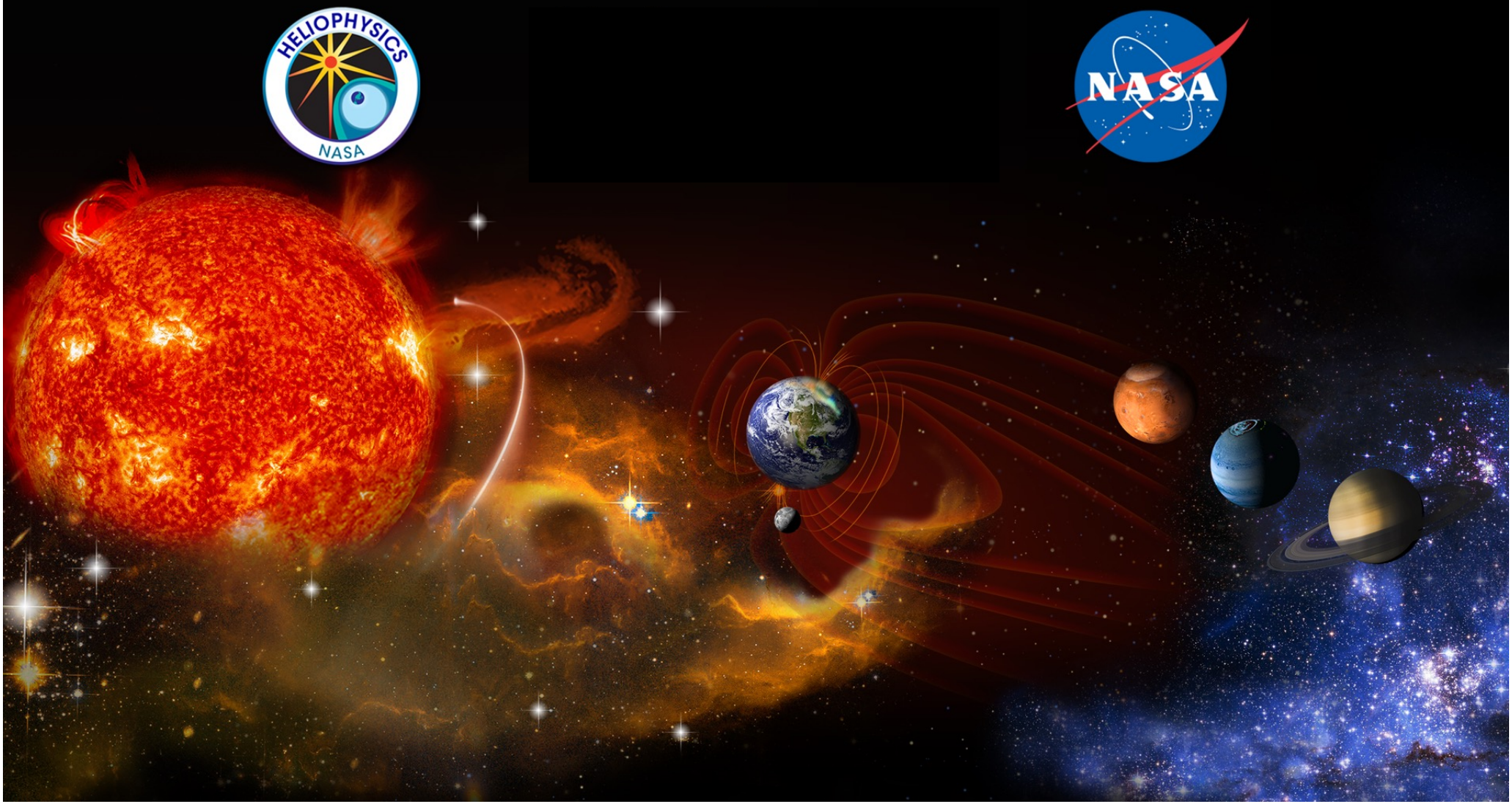


1: State of the Profession in Decadal Survey

- What was done last DS?
- Examples from Astro and Planetary Decadals – to be published in next months
- Volunteer for the Helio SoP panel/writing group?

What was done last DS?

For Reference: Last Decadal: Education & Workforce Working Group

The Working Group identified the following specific Questions organized around four broad themes (workforce, the community, University programs, and K12 Education) to address to help develop the strategic recommendations:

Solar & space physics workforce:

- What is the current state of the profession?
  (Numbers, employment type, demographic trends, university programs)
- What are key issues that impact future workforce production?
- What are the best strategies for improving space science and engineering education and the production of space scientists and engineers?

Federal Agencies, Science Community, and Professional Societies:

- What are their most powerful and important roles in support of education and workforce vitality in solar & space physics…now and in the next decade?

University programs and summer schools:

- What is the current state?
- What are strategically important future directions? (related to degree programs, student research opportunities, textbooks & curriculum, courses, and instruction.)

K-12 and Informal Education:

- What are relevant and important trends for solar &space physics? (e.g. education standards, teacher education, science centers)

National Academy Committee on Solar & Space Physics
20 October 2020

Cherilynn Morrow, Ramon Lopez, Mark Moldwin

What was done last DS?

Research Efforts Related to the Solar and Space Physics Workforce carried out by a satellite Education & Workforce committee to the 2013-2023 Decadal co-chaired by Morrow & Moldwin

(1) Developed a **community-wide database** of members and programs to determine the size of the community

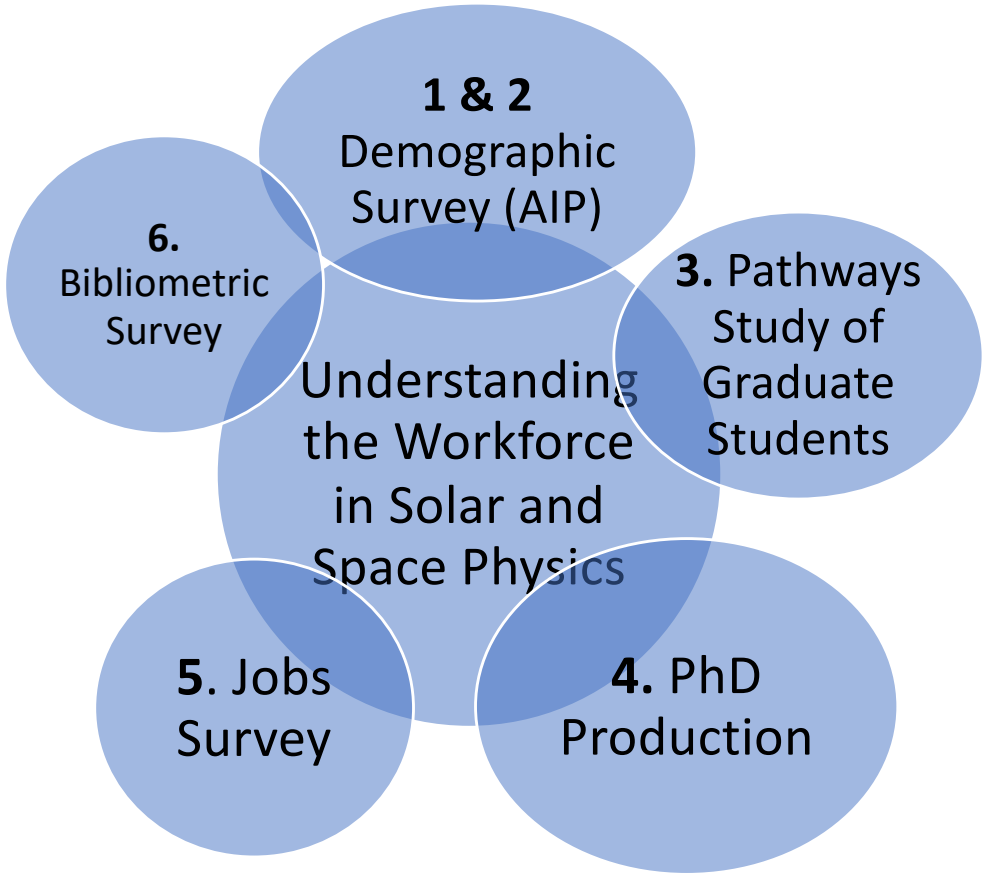
(2) Developed and deployed the **FIRST comprehensive demographic survey** of the community with the American Institute of Physics (**AIP**)

(3) Pathways Study of **graduate students** (both online survey and within focus groups at SHINE and GEM meetings) to determine their pathways into the field from K-12 to undergraduate to grad school (AGU presentation);

(4) a **PhD survey** to determine the number of PhDs graduated each year, which institution, what sub-discipline;

(5) a **job-advertisement study** to determine the number of positions advertised each year; and

(6) a **bibliometric survey** of the number of papers in each of the 3 main sub-disciplines (Solar and heliospheric, magnetospheric and ionosphere/thermosphere) published each year over the last decade.



What was done last DS?

References

Moldwin, M. B., J. Torrence, L. A. Moldwin, *and* **C. Morrow** *(*2013*),* Is there an appropriate balance between the number of solar and space physics PhDs and the jobs available?*, Space Weather,* 11*,* 445–448*, doi:*10.1002/swe.20075

Moldwin, M. B.*, and* **C. Morrow** *(*2016*),* Research Career Persistence for Solar and Space Physics PhD*,* Space Weather*,* 14*,* 384–390*, doi:*10.1002/2016SW001382.

Thielen, Joanna, Sara M. Samuel, Jake Carlson, **Mark Moldwin** (2017), Developing and Teaching a Two-Credit Data Management Course for Graduate Students in Climate and Space Sciences, Issues in Science and Technology Librarianship, DOI:10.5062/F42Z13HQ

Michael Dennin, Zachary D. Schultz, Andrew Feig, Noah Finkelstein, Andrea Follmer Greenhoot, Michael Hildreth, Adam K. Leibovich, James D. Martin, **Mark B. Moldwin**, Diane K. O'Dowd, Lynmarie A. Posey, Tobin L. Smith, and Emily R. Miller (2017), Aligning Practice to Policies: Changing the Culture to Recognize and Reward Teaching at Research Universities, doi: 10.1187/cbe.17-02-0032 *CBE Life Sci Educ vol. 16 no. 4 es5*

Moldwin, M. B., & Liemohn, M. W. (2018). High-citation papers in space physics: examination of gender, country, and paper characteristics. *Journal of Geophysical Research: Space Physics*, 123, 2557– 2565. https://doi.org/10.1002/2018JA025291

2: Demographics of the Profession

Planetary Workforce Surveys – 2011 & 2020
https://lasp.colorado.edu/home/mop/resources/planetary-science-workforce-survey/

Solar, Space & Upper Atmospheric Physics Workforce Survey – 2011
https://deepblue.lib.umich.edu/handle/2027.42/166102

American Institute of Physics' Statistical Division does a very careful job contacting – and following up – with people on various mailing lists

~2300 PhD scientists in US active in Solar & Space Physics

Source	Total Names	Unique Names
AGU SPA	2,327	1,792
AAS SPD	443	198
SWW	288	163
NSF PIs	338	75
		2,228
(plus those) On multiple lists		548
Unique e-mail addresses		2,776
Less bounces		122
Less declines		94
Total requests		2,560
Total responses		1,305
Response rate		51%

Table A1: Name Sources and Response Rate

"We received responses from 1,171 individuals who resided in the US at the time of their response; most of the respondents were men 83%, with 17% women, and white. "

Race and Ethnicity	% of All Respondents	Respondents earning Bachelor's degree...	
		1999 & Earlier	2000 & Later
Asian or Asian American	13	12	24
Black or African American	1	1	2
Hispanic or Latino	2	1	3
White	81	83	69
Other	3	3	2

Table 2: Race and Ethnicity of Respondents

Employment statistics:
8% were grad students.
Education includes university affiliated research institutes (UARI) – APL, LASP, etc.

Employment Sector	% of Respondents
Education	46
NASA	9
FFR&DC	13
Other government agencies	14
Government contractors	5
Industry	5
Self-employed	1
Non-profit	5
Other	2

2: Demographics of the Profession

New S&SP Workforce Survey likely to happen
– soon – to support the DS

- What data would you like to see collected?
- What has changed since 2011?
  - complexity in Qs about gender identity, race/ethnicity?
  - wider range of careers?
  - funding sources?
- Work environments? Social factors?
- .....?? Write a White Paper!

2: Demographics of the Profession

Other sources of demographics data

- Office of the Chief Scientist – analysis of NSPIRES Personal Profile data

https://docs.google.com/presentation/d/10sbVTPorSH4eGRQ-J7AX_OycubDiopc8/edit - slide=id.p1)

- Michael New & staff – analysis of demographics (inferred gender) of leadership of competed missions

https://www.nationalacademies.org/event/06-16-2021/docs/DE434EB902FF6358FD08B572058EF5F4D85D88E56979

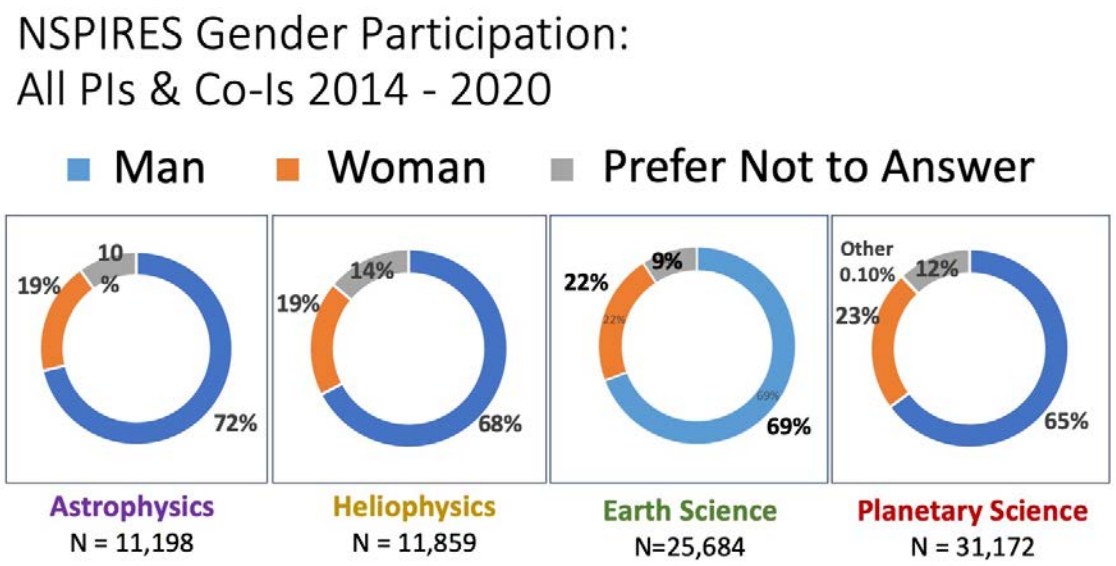
These 2 teams should be invited to present to the SoP panel of the DS

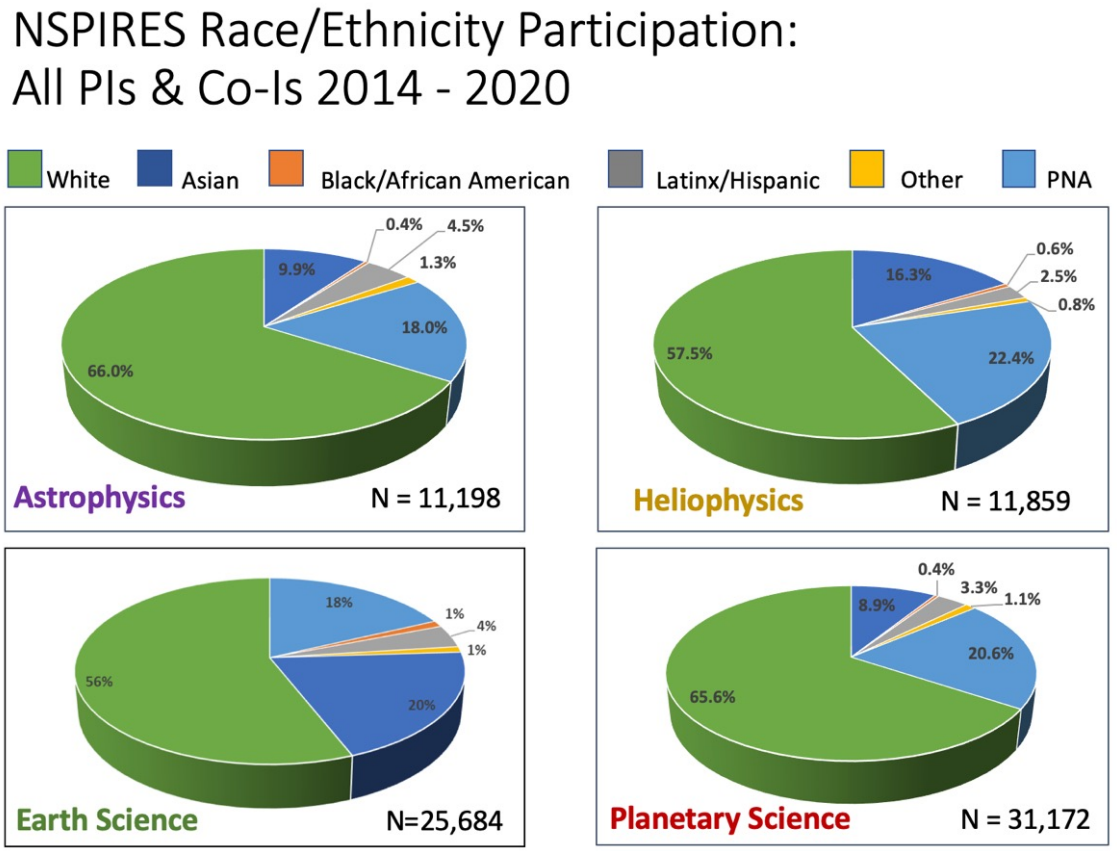
NASA's proposal submission portal NSPIRES

Personal Profile data

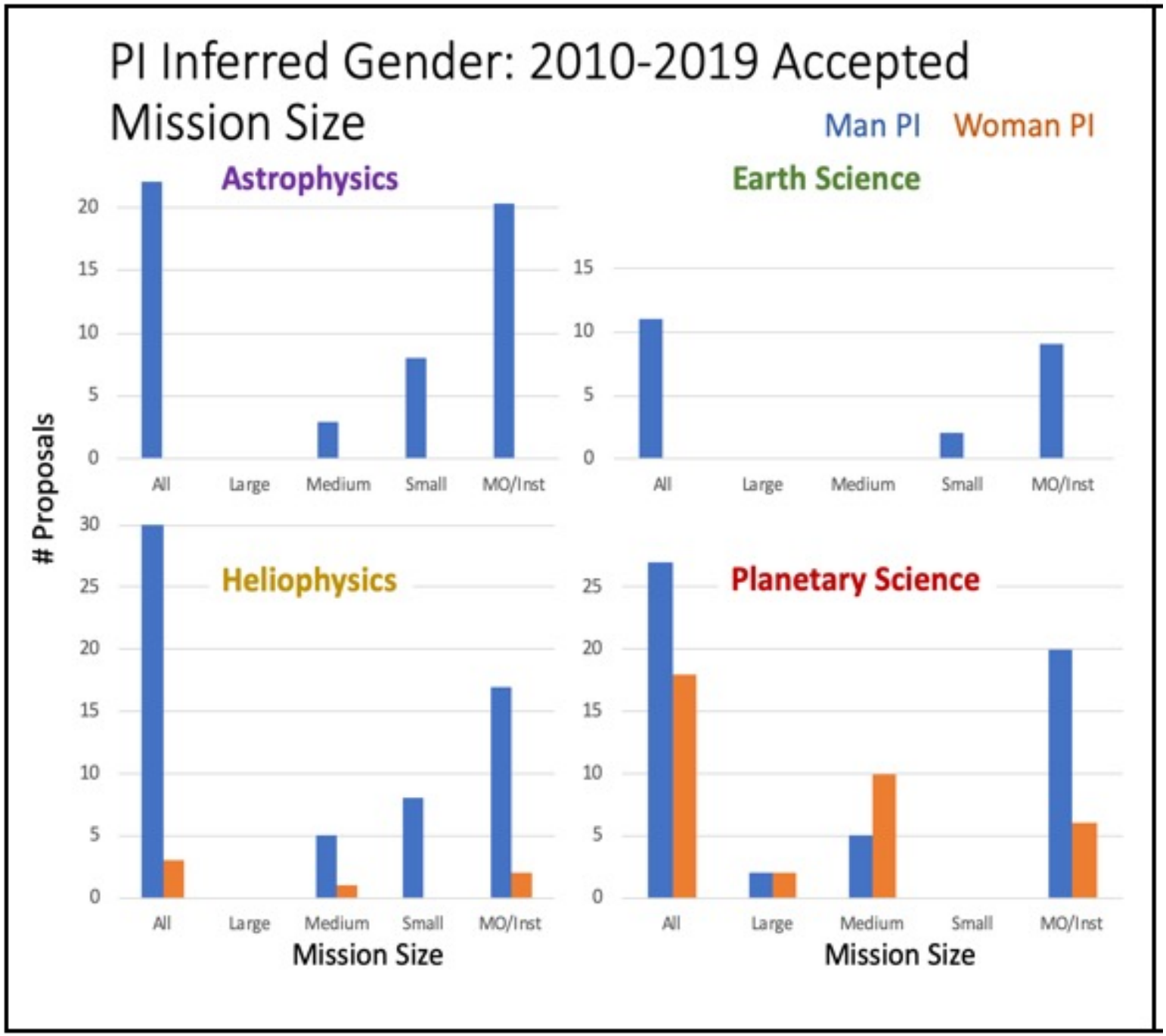
High percentage check Prefer Not to Answer

Encourage people to update?





Leadership of NASA's competed missions



3: White Papers

- Anyone can submit a White Paper on whatever topic they want – freedom of speech!

- To be effective, needs to have a FINDING – statement of situation – that leads to a RECOMMENDATION to NASA that is ACTIONABLE.

- The DS report will have FINDINGS & RECOMMENDATIONS – limited number – that will go into the DS report. NASA will need to show their response over subsequent years.

- The more straightforward, practical your White Paper states an issue and suggested remedial action that could be taken – the more likely the DS will make it a recommendation in their report.

White Papers to Planetary Decadal Survey

Before the start of the Decadal Survey of Planetary Science and Astrobiology, the community was invited to submit White Papers on related topics.

Related to the State of the Profession there were a total of 36 White Papers submitted.

On the gender axis, 52.5% of white paper authors were women, 37.9% were men, and 9.6% were non-binary.

About 28% of papers did not offer substantial evidence or propose recommendations; these were mainly “views” and treated as such. 48% of white papers offered light evidence and did propose recommendations. About 23% of papers offered reliable and substantial evidence; most of these also offered recommendations. 50% of papers mentioned race, 41.7% focused on multiple groups and raised concerns of general interest, 30.6% discussed issues concerning gender, followed by 16.7% on aspects of ability (e.g., disability, neurodiversity), 13.9% on socioeconomic class, specifically the loss of talent from groups that today have little opportunity, and 13.9% on issues of sexual identity and orientation.

White paper contents were categorized into 17 broad topics. These topics concern the work produced by planetary scientists and astrobiologists (e.g., education, grants, tenure) as well as issues concerning quality of life that impact work (e.g., childrearing, service work, awareness of bias, workplace culture). Many of the most concerning issues are at the core of the profession (e.g., grants, collaboration, conferences).

White Papers to Decadal Survey - 1

Principal Author	White Paper Title	**Link**
Alessandra Aloisi	(Un)conscious Bias in the Astronomical Profession: Universal Recommendations to improve Fairness, Inclusiveness, and Representation	https://baas.aas.org/pub/2021n4i010/release/1?readingCollection=7272e5bb
Elizabeth Frank	Normalizing non-academic career paths in planetary science	https://baas.aas.org/pub/2021n4i405/release/1?readingCollection=7272e5bb
Kathleen Vander Kaaden	Creating Inclusive, Supportive, and Safe Environments in Planetary Science for Members of the LGBTQ+ Community	https://baas.aas.org/pub/2021n4i411/release/1?readingCollection=7272e5bb
Matija Cuk	Pathways to Sustainable Planetary Science	https://baas.aas.org/pub/2021n4i419/release/1?readingCollection=7272e5bb
Zahra Khan	Military Work by Space Exploration Organizations: A Barrier to Inclusion and Safe Workspaces for Marginalized Communities	https://baas.aas.org/pub/2021n4i421/release/1?readingCollection=7272e5bb
Christopher Carr	Space Drones: An Opportunity to Include, Engage, Accelerate, and Advance	https://baas.aas.org/pub/2021n4i425/release/1?readingCollection=7272e5bb
Britney Schmidt	Diversity in action: Solutions for a more diverse and inclusive decade of planetary science and astrobiology	https://baas.aas.org/pub/2021n4i426/release/1?readingCollection=7272e5bb
Steven Vance	Addressing Mental Health in Planetary Science	https://baas.aas.org/pub/2021n4i429/release/1?readingCollection=7272e5bb
Julie Rathbun	Who is Missing in Planetary Science?: Strategic Recommendations to Improve the Diversity of the Field	https://baas.aas.org/pub/2021n4i435/release/1?readingCollection=7272e5bb
Moses Milazzo	The Growing Digital Divide and its Negative Impacts on NASA's Future Workforce	https://baas.aas.org/pub/2021n4i436/release/1?readingCollection=7272e5bb
Julie Rathbun	Enabling the Planetary Workforce to do the best science by funding work that is a service to the Profession	https://baas.aas.org/pub/2021n4i437/release/1?readingCollection=7272e5bb
Julie Rathbun	Ensuring Inclusivity in the 2023 Planetary Science and Astrobiology Decadal Survey	https://baas.aas.org/pub/2021n4i438/release/1?readingCollection=7272e5bb
Christina Richey	A Call to Planetary2023 Panels to Implement Actionable Recommendations from Recent National IDEA Studies	https://baas.aas.org/pub/2021n4i441/release/1?readingCollection=7272e5bb
Beck Strauss	Nonbinary Systems: Looking towards the future of gender equity in planetary science	https://baas.aas.org/pub/2021n4i442/release/1?readingCollection=7272e5bb
Edgard Rivera-Valentín	Who is missing in planetary Science?: A demographic study of the planetary science workforce	https://baas.aas.org/pub/2021n4i443/release/1?readingCollection=7272e5bb
Jennifer Piatek	Breaking Down Barriers: Accessibility in Planetary Science	https://baas.aas.org/pub/2021n4i444/release/1?readingCollection=7272e5bb
Christina Richey	Recommendations from the CSWA Survey on Workplace Climate	https://baas.aas.org/pub/2021n4i445/release/1?readingCollection=7272e5bb
Moses Milazzo	DEIA White Papers for Planetary 2023 supported by the Cross-AG EDI Working Group	https://baas.aas.org/pub/2021n4i446/release/1?readingCollection=7272e5bb

White Papers to Decadal Survey - 2

Principal Author	White Paper Title	**Link**
Jacob Richardson	Building Safer and More Inclusive Field Experiences in Support of Planetary Science	https://baas.aas.org/pub/2021n4i447/release/1?readingCollection=7272e5bb
Serina Diniega	Ensuring a safe and equitable workspace: The importance and feasibility of a Code of Conduct, along with clear policies regarding author. & team mem.	https://baas.aas.org/pub/2021n4i448/release/1?readingCollection=7272e5bb
Monica Vidaurri	Absolute Prioritization of Planetary Protection, Ethics, and Avoiding Imperialism in All Future Science Missions: A Policy Perspective	https://baas.aas.org/pub/2021n4i450/release/1?readingCollection=7272e5bb
Christina Richey	Lessons Learned on IDEA from the Astro2020 Decadal Survey	https://baas.aas.org/pub/2021n4i456/release/1?readingCollection=7272e5bb
Matthew Tiscareno	Planetary Nomenclature and Indigenous Communities	https://baas.aas.org/pub/2021n4i462/release/1?readingCollection=7272e5bb
Frank Tavares	Ethical Exploration and the Role of Planetary Protection in Disrupting Colonial Practices	https://baas.aas.org/pub/2021n4i461/release/1?readingCollection=7272e5bb
Matthew Tiscareno	Planetary Nomenclature and Indigenous Communities	https://baas.aas.org/pub/2021n4i462/release/1?readingCollection=7272e5bbb
William Bottke	Tenets of an Effective and Efficient Research and Analysis Program for NASA	https://baas.aas.org/pub/2021n4i463/release/1?readingCollection=7272e5bb
Jani Radebaugh	The Value of a Dual Anonymous System for Reducing Bias in Reviews of Planetary Research and Analysis Proposals and Scientific Papers	https://baas.aas.org/pub/2021n4i464/release/1?readingCollection=7272e5bb
Ingrid Daubar	Extended Missions in Planetary Science: Impacts to Science and the Workforce	https://baas.aas.org/pub/2021n4i465/release/1?readingCollection=7272e5bb
Kathryn Gardner-Vandy	Relationships First and Always: A Guide to Collaborations with Indigenous Communities	https://baas.aas.org/pub/2021n4i471/release/1?readingCollection=7272e5bb
Ryan Watkins	Professional development in the next decade: Supporting opportunities in all career paths and life events	https://baas.aas.org/pub/2021n4i472/release/1?readingCollection=7272e5bb
Amanda Hendrix	Results of the 2020 Planetary Science Workforce Survey Conducted by the AAS-DPS	https://baas.aas.org/pub/2021n4i473/release/1?readingCollection=7272e5bb
Kristen Bennett	The Preventing Harassment in Science Workshop: Summary and Best Practices for Planetary Science and Astrobiology	https://baas.aas.org/pub/2021n4i474/release/1?readingCollection=7272e5bb
Daniella Scalice	Power and Responsibility	https://baas.aas.org/pub/2021n4i493/release/1?readingCollection=7272e5bb
Abbie Grace	Promoting the ‘A’ in SPACE: ‘Arts’ run the places STEM takes us	https://baas.aas.org/pub/2021n4i499/release/1?readingCollection=7272e5bb
Heather Kaluna	Creating Spaces for Indigenous Voices within Planetary Science - Part 1	https://baas.aas.org/pub/2021n4i502/release/1?readingCollection=7272e5bb
Brittany Kamai	Creating Spaces for Indigenous Voices within Planetary Science - Part 2	https://baas.aas.org/pub/2021n4i503/release/1?readingCollection=7272e5bb

White Papers to Decadal Survey

What is being said?

Encoding for where the problem might lay

1. pre-undergraduate education
2. tenure & high-status faculty position/career pipeline
3. childrearing/family-care/work-life balance
4. grants/funding
5. dual-anonymous review process
6. lack of transparency
7. policies
8. ethics
9. authorship
10. service work
11. lack of sense of belonging/support/relationship
12. collaboration
13. lack of training/awareness
14. mentorship/role models
15. science missions/field sites
16. conferences/workshops/course
17. sexual harassment/hostile culture

The top 8 sources authors are pointing to are...