

Summary of 2011 Survey of the Planetary Science Workforce

For full results see <http://lasp.colorado.edu/home/mop/files/2015/08/Report.pdf>

Planetary science is a highly interdisciplinary field. Planetary scientists are trained in many areas of science (from math to physics to geology to atmospheric science to chemistry), work in a variety of types of institutions (government labs, non-profit labs, industries, universities), and belong to different organizations, including the Division of Planetary Science (DPS) of the American Astronomical Society, the American Geophysical Union (AGU), and the Meteoritical Society. As a community, we have little information about the profession. There may be ten to twenty universities producing PhDs in planetary science – but we have no fundamental data such as the number PhDs in planetary science produced each year and the types of career paths the PhDs typically take. While astronomers talk about over-production of PhDs, anecdotal evidence suggests that post-doctoral and even faculty positions are sometimes hard to fill. But there are no concrete numbers. *UNTIL NOW!* This report presents results of a survey conducted by the American Institute of Physics in 2011.

Planetary science is a broad and relatively new research field. Researchers come from a wide range of academic areas (physics, astronomy, geology, chemistry, atmospheric science, etc) and work at diverse types of institutions (universities, NASA labs, non- and for-profit institutions, etc). There is no single professional organization that most planetary scientists belong to or single meeting attended by most planetary scientists. To ascertain basic demographic information about the planetary science workforce the AIP – sponsored by NASA – conducted a survey of PhD scientists working in the US.

Respondents: In the spring of 2011 a survey was sent to 4,252 people on mailing lists of potential planetary scientists. Mailing lists were provided by the Planetary Section of the American Geophysical Union, the Division of Planetary Sciences of the American Astronomical Society and the organizers of the Lunar and Planetary Science Conference. A full description of the mechanics of the survey are provided in Appendix A (page 15) of the report. Responses were received from 2,622 people, a response rate of 62%.

	LPSC	AGU	DPS	All Three
LPSC	1280	345	90	
AGU		264	124	
DPS			358	
All Three				161

Table 1: The 2,622 respondents were associated with the LPSC, AGU and DPS. The numbers in the highlighted cells on the diagonal belonged to that group only, except the bottom right cell that shows 161 respondents belong to all 3 groups. The off-diagonal numbers refer to the number of respondents belonging to two groups. A total of 1,876 were associated with the LPSC; 894 were members of AGU; and, 733 belonged to DPS.

Of the 2,622 respondents, 1,518 (58%) have PhDs and live in the US – the population we targeted for this survey. Within this target population, 1070 considered themselves to be planetary scientists, and of these 707 were working full-time in a job that is primarily in planetary science. The next largest group were 533 people with jobs that are in the enterprise of science and engineering, but not primarily planetary science. Our analysis focuses on these two major groups, 1240 respondents. If one assumes that the response rate of the 741 respondents with a job primarily in planetary science is the same as the 4,252 contacts (62%), then *we estimate the total number of PhDs working in planetary science is about 1200 people in the US.*

Employment: Less than half (48%) of the respondents working in planetary science work at universities. A larger fraction (63%) of respondents with jobs in the enterprise of science and engineering (S&E) work at universities, perhaps spending more time on teaching or administration than research. Overall, about 11% of respondents are employed in NASA labs, 16% are at federally-funded research and development centers, 12% are employed by non-profit organizations, and 9% by industry.

8/12/2015

Education: The most common field of study for bachelor's degrees was physics (37% of respondents), followed by geology/geophysics (21%). Chemistry, astronomy and engineering were each less than 10%. While only ~2% of respondents reported their bachelor's degree in planetary science, it is the most commonly named field for doctorates. Overall, about 30% of the respondents earned their doctorate in planetary science, and over 90% of these self-identify as planetary scientists. The profiles for the field of doctorate for the three different groups of respondents are very different and are shown in Figure 6 of the full report. Respondents were asked to rate the preparation they received in their doctoral program in a variety of areas. While the academic areas generally received good ratings, skills in collaboration, programming and teaching were generally poorly rated. Respondents also gave poor ratings for how well they were prepared for managing people, non-academic careers and in public outreach. The most common areas in which respondents report that more training would have helped their career are proposal writing and teaching. After PhD, 79% of respondents either completed a period (median 3 years) as a post-doc or are currently in post-doc positions. There seems to be a tendency for more recent PhDs to be more likely to have done a post-doc (pages 3-4 of the full report).

Funding: The survey shows how the planetary science research community is heavily dependent on external funding. About 90% of respondents reported that they had submitted proposal as primary author and 83% report receiving funding for their research from outside their home institution. Most of those receiving external funds get their support from NASA. 53% of respondents report that all of their external funds come from NASA. Only 4% report their external funds come entirely from NSF while 15% report a combination of NASA and NSF.

Participation in NASA activities: About 66% of the respondents had served on a NASA review panel, and 26% on an NSF review panel. About half of those responding reported some participation in advisory/working/assessment groups. Similarly, over half of those responding to questions about their involvement in NASA missions said they had been involved in some way with a NASA mission. On the other hand, only ~10% had been involved in proposing instruments for a NASA flight mission.

Demographics: Planetary science is similar to other physical sciences with very low (~10%) representation of ethnic minorities. One respondent in four (25%) was female. This is consistent with the percentage of PhDs in astronomy (34% in 2010, rising from 12% in the early 1980s) and somewhat higher than in physics (19% in 2008). Studies of the academic pipeline in physics, astronomy and other STEM fields show that women do not apply for faculty positions in proportion to the fraction of PhDs awarded to women*. As reported in the companion survey of planetary science departments, only 14% of planetary faculty are women. This is well below the 40% of PhDs from these same departments awarded to women over the past 2 years. An important issue to pursue in a follow-up survey may be why women planetary scientists seem to be preferentially employed in non-academic positions.

Two-body problem: Figures 11 and 12 of the report dramatically illustrate the so-called "two-body problem" where there is a stark difference between genders in the academic training and current employment of a spouse or partner. Over 70% of women planetary scientists have a spouse or partner who works in planetary science or another STEM field while 70% of men have a partner or spouse who does not work or works in a non-science field. This significant difference is likely responsible for strong gender contrasts in responses to questions about relocation and having turned down a job offer because of a spouse or partner.

Workforce Production: The survey of 48 academic departments that include planetary science (see <http://lasp.colorado.edu/mop/resources/links/PlanetaryScienceWorkForceSurvey2011/>) indicated that ~65 PhDs in planetary science are awarded per year. The current faculty hiring rate is ~12 positions per year, ~18% of the PhD production rate. This is comparable to the current 230 planetary faculty out of 1200 planetary scientists. Departments also suggested that postdoctoral positions more-or-less match demand. The issue of how well the PhD production rate in planetary sciences matches demands of the non-academic workforce is a topic for future study.

* NRC's *Gender Differences at Critical Transitions in the Careers of Science, Engineering and Mathematics Faculty (2009)*, Co-Chairs Professors Claude Canizares and Sally Shaywitz. The report includes 11 recommendations of actions that institutions and professional societies should take. (http://www.nap.edu/catalog.php?record_id=12062)