LEADERSHIP CONTRIBUTIONS TO PLANETARY EXPLORATION AND AEROSPACE: NASA PLANETARY SCIENCE SUMMER SEMINAR MISSION STUDIES AND ALUMNI 1999-2017

C. J. Budney[1], L. L. Lowes[1], K. L. Mitchell[1], and A. S. Wessen[1]; [1]NASA Jet Propulsion Laboratory.

Planetary Science Summer Seminar (PSSS) Experience

- For 10 weeks prior to JPL session, students select the mission and science goals, and develop a preliminary suite of instrumentation and a science traceability matrix.
- Once at JPL, students participate in a series of Team X project design sessions, during which their mentors aid them in finalizing their mission design and instrument suite, and in making the necessary trade-offs to stay within the cost cap.
- At week's end, students present their Concept Study to a "proposal review board" of JPL scientists an engineers and NASA Headquarters executives, who feed back the strengths and weaknesses of their proposal and mission design.

Project Goals

Indicators of the long-term success of PSSS

- PSSS experience has a positive influence on career choice and on career progress
- PSSS feeds the employment pipeline for NASA, aerospace, and related academia
- PSSS alumni demonstrate leadership potential, ability, and/or experience in fields related to planetary science exploration

Participants

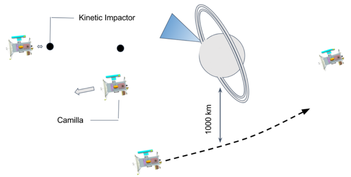
- 15-18 slots available per session
- Strong interest and experience in careers in planetary science/planetary exploration
- Science and engineering PhD candidates or postdocs, or last year engineering MS students not planning to pursue a PhD
- Typical student areas of study/disciplines: planetary science, geoscience, geophysics, environmental science, aerospace engineering, mechanical engineering, materials science
- Participants have come from over 50 different universities
- Selected through competitive review process, based on strength of application and advisor's recommendation letter

Influential PSSS Mission Concept Studies

PSSS student studies can be of interest to the broader community as:

- Point designs in the trade space of potential missions
- Novel selections and usage of science instrumentation

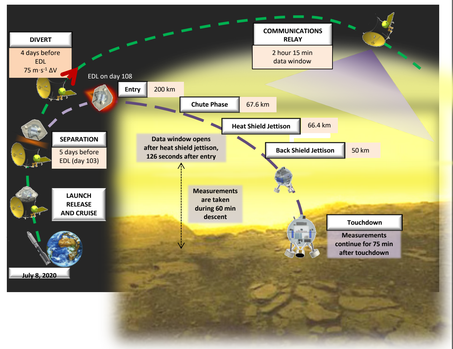
2017: CAMILLA Mission to Centaur Chariklo



Determine if differences in color on Centaurs are a result of the cumulative effect of impacts, coma activity, or other processes, by correlating color to the relative age of the surface.

2012: Venus Atmosphere, Descent, and Environmental Researcher

Student team representatives invited to present concept and instrument selection at 2013 Venus Exploration Analysis Group meeting.



2003: Mars Geophysical Lander

Some of the design elements proposed for MGL have now been realized in NASA's selection of the InSight (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) mission.

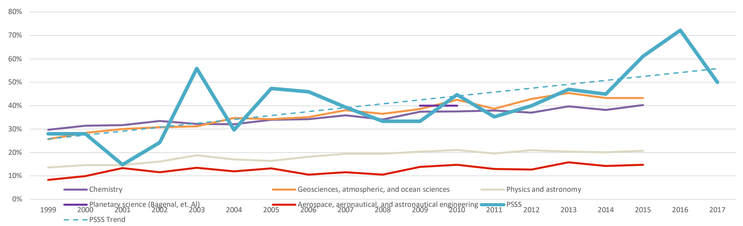
PSSS Alumni Leadership

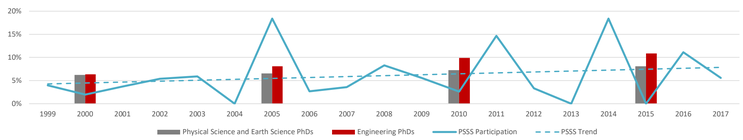
- Samples of PSSS cohorts from alumni employment study
- Fields, positions, and responsibilities run broader than this small list below
- Alumni advisors recommend students for current PSSS sessions

Name	Organization	Cohort	Position
Sarah Noble	NASA Headquarters	1999	Program Scientist
Christopher Ramos	U.S. Department of Energy	1999	Senior Program Manager, National Nuclear Security Administration, Safeguards and Remote Detection
Jill Bauman	NASA Ames Research Center	2000	Deputy Chief Technologist
Vassillis Angelopoulos	UCLA	2001	Full Professor and NASA THEMIS mission PI
Ahsan Choudhuri	U. Texas El Paso	2001	Mechanical Engineering Department Chair
Abigail Sheffer	National Academy of Sciences	2003	Space Studies Board Program Officer
Joel Hurowitz	Stonybrook	2004	Mars 2020 PIXL Instrument Deputy PI
Karly Pitman	Space Science Institute	2004	Executive Director
Kris Zacny	Honeybee Robotics	2008	Vice President and Director of Exploration Technology
Serina Diniega	JPL	2011	Investigation Scientist Europa Mission
Jamey Szalay	Princeton U.	2012	Lead Graduate Student for New Horizons Student Dust Counter Instrument (@U Colorado)
Natalya Brikner Bailey	Accion Systems	2013	Co-Founder and CEO
Jessica Watkins	NASA Johnson Space Center	2016	Astronaut Candidate

Diversity of Participants

Distribution (% of total) of PhDs Earned at Accredited US Institutions, Compared to Participation in PSSS





PSSS tracks and, most recently, exceeds male/female gender balance (2017 attendance was 50% female) of:

(1) PhDs earned in related fields
(Source: 2000-2015 NSF Survey of Doctoral Degrees Earned)

(2) 2011 Planetary Science Workforce Survey: Planetary Science PhD degrees in 2008/09 and 2009/10. 40% awarded to women.
(source: Bagenal 2011)

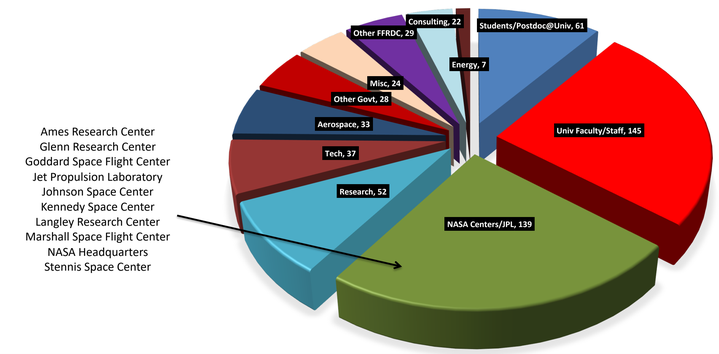
PSSS attendance (1999-2017) generally tracks PhDs earned in relevant fields for largest underserved/underrepresented minority groups
(Source: 2000-2015 NSF Survey of Doctoral Degrees Earned)

Continue to Increase Diversity in Candidate Pool

- Target HBCUs and Minority Serving Institutions with higher population of potentially qualified aerospace engineering graduate students to improve candidate pool.
- Encourage alumni to promote PSSS to their collaborators at underserved institutions.

Employment (1999-2017 Cohorts)

- 577 of 617 alumni located through online presence
- PSSS clearly feeds the employment pipeline for NASA, aerospace, and related academia



http://psss.jpl.nasa.gov