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

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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 and 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.

Employment (1999-2017 Cohorts)

- 57% of 617 alumni located through online presence.

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.

PSSS Alumni Leadership

Name Organization Cohort Position

Sarah Noble NASA Headquarters 1999 Program Scientist
Christopher Rence 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
Vassilis Angelopoulos U.C.L.A. 2001 Full Professor and NASA THEMIS mission PI
Ahmed Chouhan U. Texas El Paso 2001 Mechanical Engineering Department Chair
Angel Shaffer National Academy of Sciences 2003 Space Studies Board Program Officer
Joel Horowitz Stanford University 2004 Mars 2020 PFS Instrument Deputy PI
Katy Pfiman Space Science Institute 2004 Executive Director
Kris Zarchy Honeywell Robotics 2008 Vice-President and Director of Exploration Technology
Setha Eidge JPL 2011 Investigation Scientific Europa Mission
Jimray Bednarek Princeton U. 2012 Lead Graduate Student for New Horizons Student Dust Counter Instrument (JHU Colorado)
Natalya Brinimer Accion Systems 2013 Co-Founder and CEO
Jeske Palo NASA Johnson Space Center 2016 Astronaut Candidate

Name Organization Cohort Position

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).

2011 Planetary Science Workforce Survey:
(sources: Bagnal 2011)

PSSS attendance (1999-2017) generally tracks PhDs earned in relevant fields for largest underserved/underrepresented minority groups.

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.

http://psss.jpl.nasa.gov