

# White paper on the value of Participating Scientist programs to NASA: Progress report to PSS

September 30, 2016

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1: Lunar and Planetary Institute; 2: University of Colorado;  
3. Jet Propulsion Laboratory; 4. United States Geological Survey;  
5. University of Maryland; 6. University of Tennessee;  
7. University of Notre Dame; 8. Georgia Institute of Technology; 9.  
University of Redlands/Planetary Science Institute;  
10: Princeton University

# Motivation

- Originated at OPAG due to concern about possible inconsistencies in how PS programs are offered and implemented, and that their value to the science community and NASA may not be fully appreciated
- This led to an OPAG finding:  
*“We encourage NASA to consider broader use of participating scientist programs and early career mission support. At NASA’s request OPAG (working with other AGs) will lead a white paper providing more detailed information to NASA about the importance and effectiveness of such programs.”*
- Other Analysis Groups learned about this effort, and asked to be involved in the white paper

# Who we are representing

- OPAG: Louise Prockter, Michael Aye, Michael Bland, Carol Paty, Julie Rathbun (SC), Britney Schmidt (SC)
- VEXAG: Kevin Baines (also OPAG SC)
- MEPAG: Jeff Johnson (C), Serina Diniega
- CAPTEM: Hap McSween (C)
- LEAG: Clive Neal (C)
- SBAG: Lori Feaga (SC), Dave Blewett

Our team includes social scientists who are expert in data analysis: Janet Vertesi, David Schwartz, Meghan Wheeler

C = Chair; SC = Steering committee

# Charge

## **Evaluate Participating Scientist programs**

- Assess value added to NASA missions
- Understand uniformities and significant differences, and gather lessons learned
- Investigate how to maximize the usefulness of the programs

## **Write white paper of findings and recommendations and deliver to AG leadership and the community**

- Results will likely be passed on to NASA via AGs/PSS

# Approach (1)

## **Phase 1** (now complete)

- A survey was formulated containing questions for existing/past Participating Scientists and/or anyone who has an interest in, or opinion about, these programs
- The survey was divided into three parts:
  - Questions for past or current PSs (or Guest Investigators)
  - Questions for the entire community
  - Demographic information
- The survey was distributed to the community via:
  - LPI newsletter
  - PSI newsletter
  - AG mailing lists

# Approach (2)

## **Phase 2** (in progress)

- A separate survey was formulated containing questions for existing/past Principal Investigators and/or Project Scientists
- Input to this survey was solicited from identified mission leaders via email, phone, and in-person requests

# Phase 1 questions

## (Past/present PSs and community)

1. A) On which mission were you a Participating Scientist? (And don't forget to include your identifier – see above, if you are submitting data on more than one PS experience.)

Your answer

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1. B) How many years past PhD were you when selected as PS?

- 0-3yrs
- 3-6yrs
- 7-10yrs
- 10-20yrs
- 20+yrs

1. C) At which point in the mission were you appointed as a Participating Scientist?

- before launch (if you know the mission phase, please select it below)
- Phase A
- Phase B
- Phase C
- Phase D
- during cruise (within Phase E)
- during the primary mission but after arrival at the primary target (also within Phase E)
- during the extended mission (also within Phase E)

1. D) How long did you remain on the project as a PS? Please describe how long your funding/PS position lasted, also whether you were kept on the team as an unfunded PS after this time period, or whether you were made a funded Co-I.

Your answer

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## 1. E) Activities as PS:

If you have comments about any of these yes/no answers, please put them into the following comment box (1.F).

	Yes	No
Did you have an opportunity to participate in mission operations?	<input type="radio"/>	<input type="radio"/>
Were you invited to request/plan specific observations?	<input type="radio"/>	<input type="radio"/>
Or, did you have to pull your science from observations that the core team planned without PS interaction?		
After an initial time period, did you feel integrated into the science team? For example, did you actively participate in science telecons and team meetings?		
Were you required to re-propose to stay on the team as a PS after the original performance period ended?		
Was the funding support you received as a PS adequate?		

## 1. F) comments about items in (1.E)

Your answer

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## 1. G) What was most valuable to you about your PS experience?

Your answer

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## 1. H) What do you think could have improved your PS experience?

Your answer

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## 1. I) How many times have you been selected for a PS position?

- 1
- 2
- 3+

## Part 2: PERCEPTIONS ABOUT PS PROGRAMS

(If you are sharing about more than one PS experience and have already filled the full survey out once, be sure you included your identifier at the end of question 1.A and then skip Parts 2 and 3 on your second/etc. submission.)

**2. A) Is it likely you would apply to be a PS on future mission projects? (Please answer regardless of whether you have been a PS already.)**

- Yes
- No

**2. B) What do you think is the value of a PS program for NASA?**

Your answer

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**2. C) Do you think that a PS program should be included in all directed SMD missions (that is, non-competed; directed to a NASA center), or should this be decided on a case-by-case basis? Please give a reason for your answer.**

Your answer

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**2. D) Do you think that a PS program should be part of competed, PI-led missions such as Discovery and New Frontiers? Please give a reason for your answer.**

Your answer

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### Part 3: OTHER INFORMATION

3. A) How many years past PhD are you now? (If "other", please specify: e.g., no PhD but active in the planetary field)

- Pre-PhD
- 0-3yrs
- 3-6yrs
- 7-10yrs
- 10-20yrs
- 20+yrs
- Other : \_\_\_\_\_

3. B) Please tell us about your current professional role. Do you consider yourself to be primarily:

- A faculty professor at a University or college
- A soft-money researcher at a University or college
- A researcher working at an institution that is primarily a mission or instrument provider, (e.g., JPL, GSFC, APL, etc.)
- A researcher working elsewhere – non-profit (e.g., PSI, SETI, etc.)
- A researcher working elsewhere – for-profit company
- A postdoc
- A graduate student
- Other : \_\_\_\_\_

3. C) Any other comments, relevant to this study?

Your answer \_\_\_\_\_

# Phase 2 questions (mission leadership)

## **Did you have Participating Scientists on your mission(s)?**

If yes:

- At what stage in the mission was it decided that there would be a PS program (e.g., at the proposal stage, after selection, etc.)? How much input did you have into this decision?
- When were the PS's brought on board?
- With hindsight, do you feel that was the right time? ? If not, when would have been a better time?
- Do you feel it was challenging to incorporate the Participating Scientists into your mission team? If so, why? (And if, with hindsight, you have any suggestions on what could have been done better – by you, by the mission team, by NASA HQ, etc. – please share.)
- Do you feel the Participating Scientists brought additional value to your mission? Please give some examples to support your answer.
- If you were PI of a new mission now, what might you do differently with respect to a Participating Scientist program?

If no:

- What was the main reason for this (e.g., lack of appropriate finances, mission was too short to warrant them, just didn't see the need)?
- With hindsight, do you wish you had included Participating Scientists onto your mission?

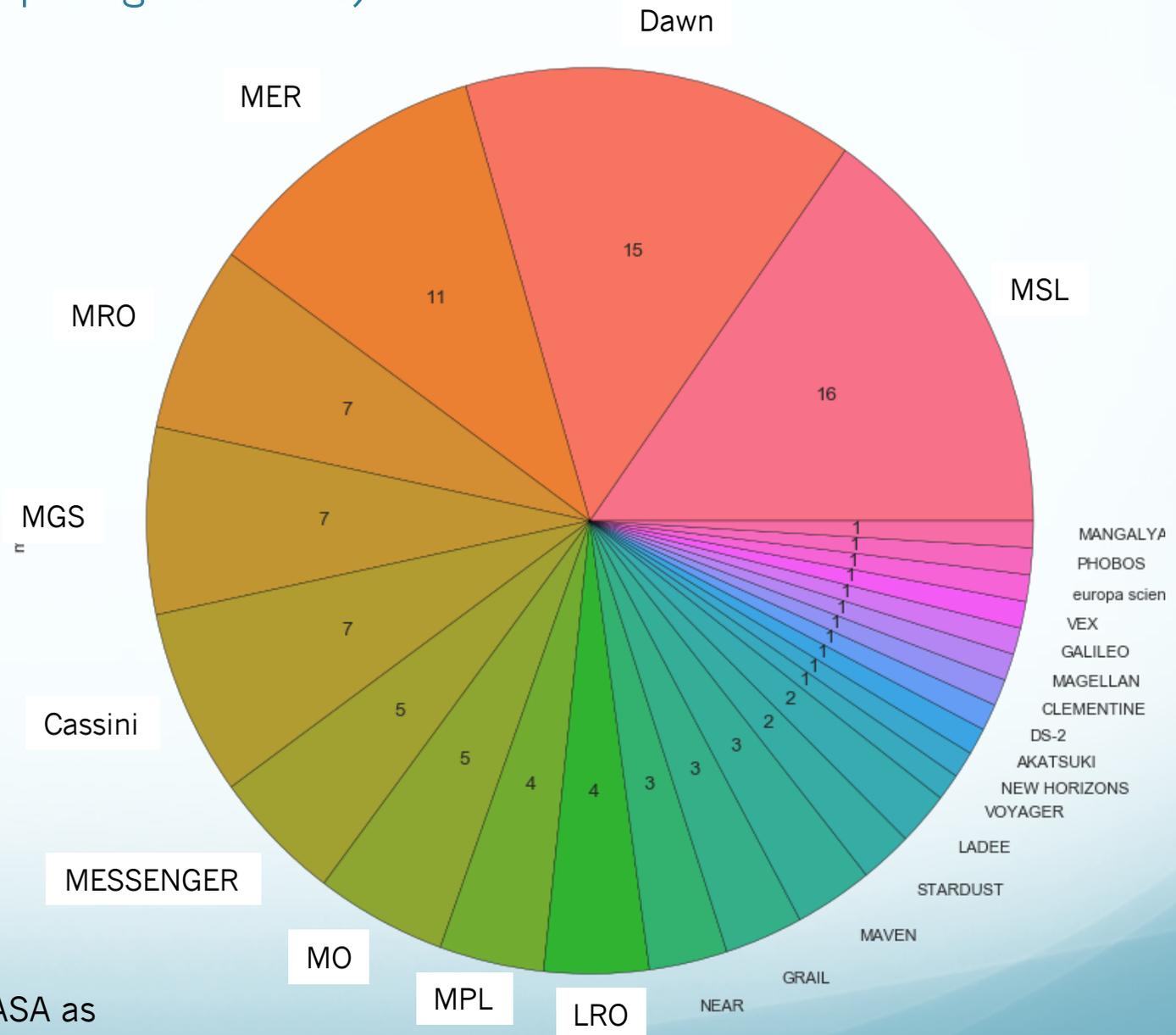
Is there anything else you would like to tell us?

# Preliminary results

- We received ~ 200 responses to the community survey, of which ~120 were self-identified current or former Participating Scientists or Guest Investigators
  - These included some responses for missions which were unsuccessful (in some cases PS responses were included)
- Our results were analyzed by social scientist Janet Vertesi's group at Princeton, who have experience in analyzing qualitative interview data
  - They were able to pull out a number of major themes from the responses
  - Some of these will be presented here
- Results from Principal Investigator/Project Scientist survey are trickling in

# Respondents by mission

(Current or former Participating Scientists)



This chart includes all respondents to Part 1; some were not actually funded by NASA as Participating scientists or Guest Investigators  
About 110 responses were included in Part 1 of the study

# What is the value of PS programs?

## **Respondents noted several benefits to NASA, including:**

- Intellectual diversity
- Expertise throughout the mission timeline
- Increased science return
- Workforce development

## **They also commented on the personal value of the programs, including:**

- Collaboration
- Data access
- Unique experience of mission team involvement
- Personal career development
- Development of skills for future mission leadership

# PS programs and diversity

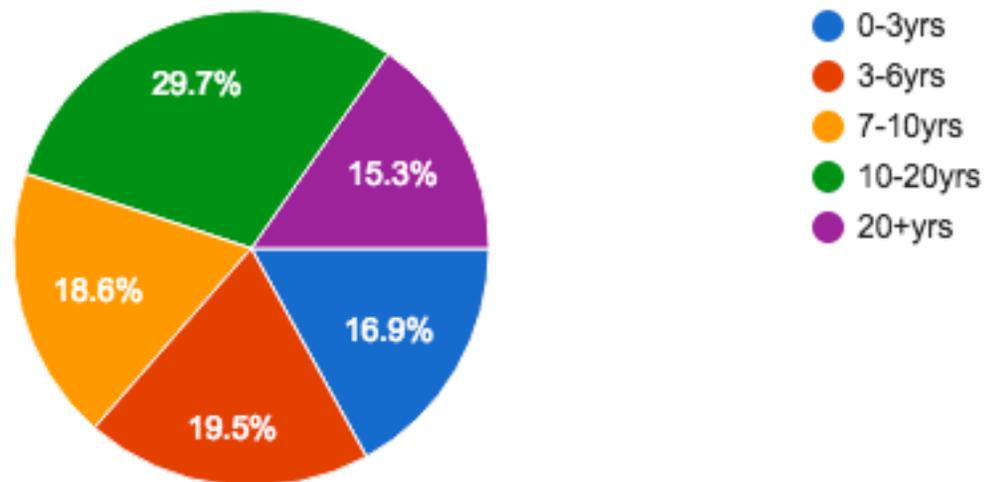
- There is a widely shared perception among respondents that mission leadership can be an “old-boys’ club”
  - Perceived inability for younger scientists and scientists from underrepresented groups to break into missions and leadership positions
- Many participants emphasize the value to science that pulling in a diverse cross-section of the community provides
  - Intellectual and demographic diversity were noted as a way to foster innovative ideas and push the boundaries of research
  - PS programs widely perceived as a pathway of entry into a scientific research environment for outside or younger scientists, underrepresented groups, and the international planetary community

# Participating Scientists by seniority

PS programs draw from all career levels:

- Over half of the respondents were early-career researchers when selected, i.e., within 10 years of their Ph.D

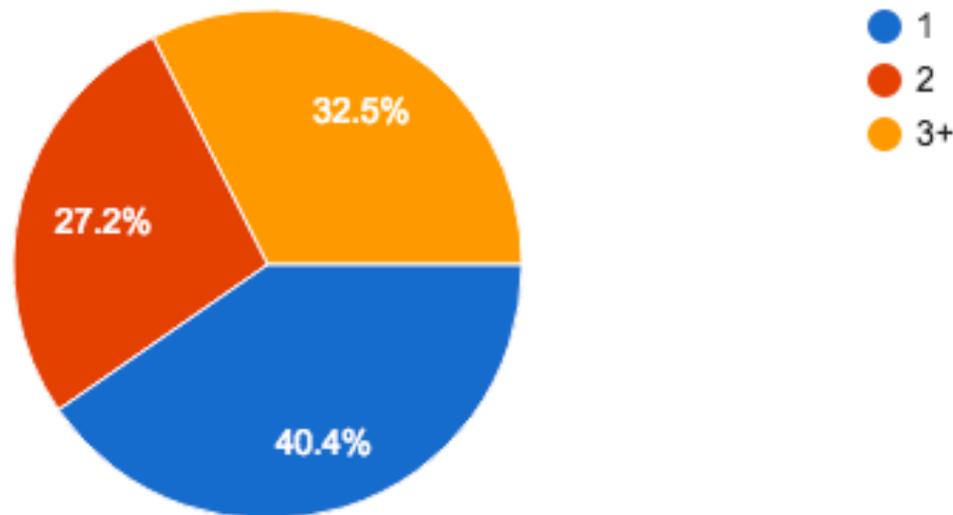
1. B) How many years past PhD were you when selected as PS? (118 responses)



# Multiple PS service

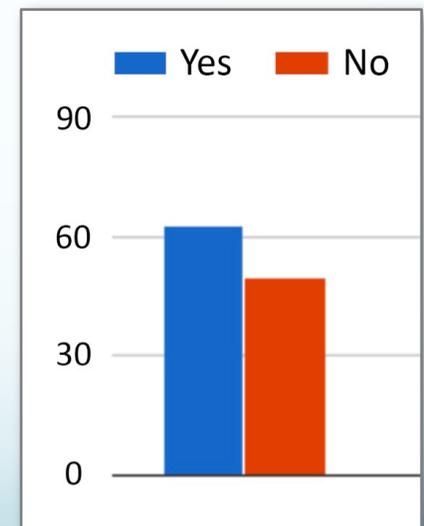
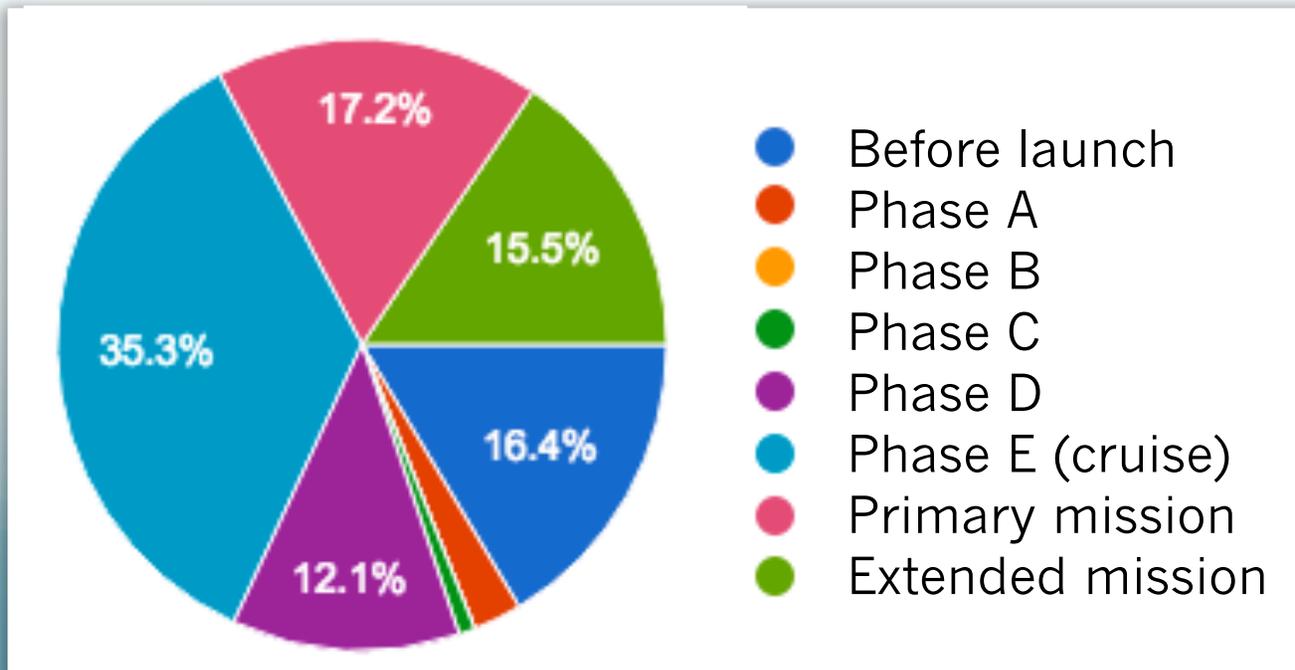
Over half of the respondents have been selected as PSs more than once, bringing increased experience (and therefore additional value) to the mission team

1. I) How many times have you been selected for a PS position? (114 responses)



# Timing of PS additions

- PS's may be joining instrument teams and/or a larger science team that has already been together for many years – this may preclude their involvement in decisions, learning, and team building
- In many cases, participants noted that earlier involvement in the mission timeline would have been beneficial, enabling training and greater involvement in mission operations and planning
- However, longer missions may also benefit from PS additions during Phase E



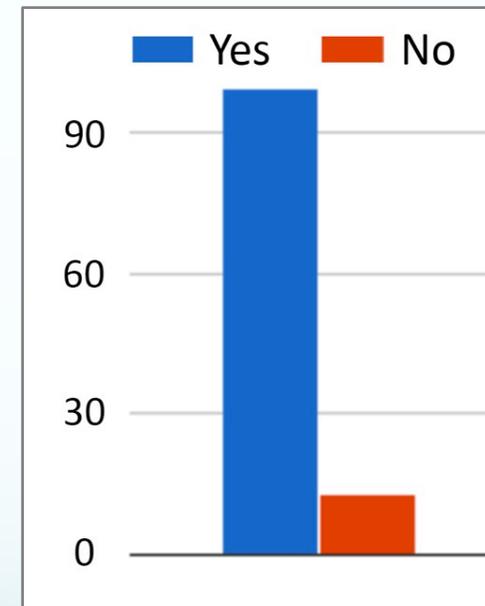
**Did you have an opportunity to participate in mission operations?**

# Integration into teams

While most respondents did eventually feel integrated into the team, several noted that this is an area that could be improved. Issues noted include:

- PI leadership
- Onboarding issues
- The re-proposal process
- Involvement in planning processes
- Assigned tasks that were not part of their original proposal
- Lack of buy-in from Project for PS science

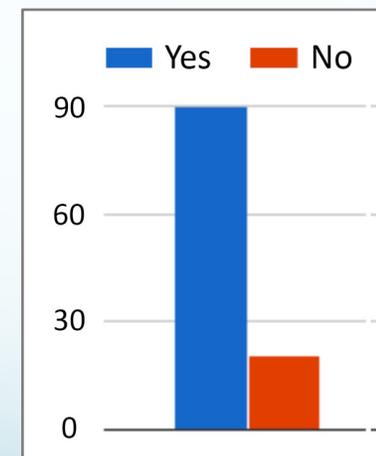
*Some PS's were eventually promoted to the team as Co-Is*



**After an initial time period, did you feel integrated into the team?**

# PS funding

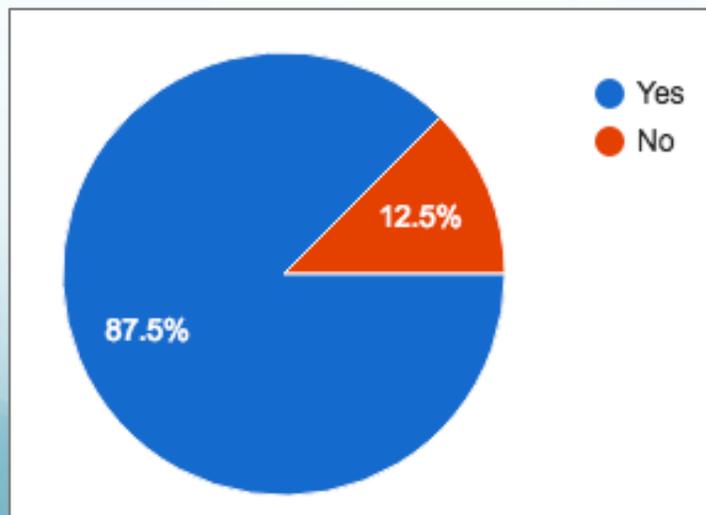
- Respondents acknowledged the realities of limited funding allotted for their positions
  - 90% responded having adequate funding over a wide range of funding timescales (<1 yr to 10+ yrs); 3 yrs average
- However, they also noted a lack of transparency and communication into the timing surrounding funding, including:
  - Uncertainty as to how long a PS position would continue
  - PSs sometimes had to scale back or abandon parts of their science plans
  - Re-proposing made some PSs feel like “temporary” team members and, as such, less integrated into the team



**Did you have to re-propose for funding after the original performance period ended?**

# Summary

- The overwhelming message from the survey respondents is that PS programs provide significant value in terms of science return and in enhancing diversity among teams
- More consistency in timing and approach could make these programs even more effective and useful to NASA



**Is it likely you would apply to be a PS on a future mission project?**

# Very preliminary mission leadership input on PSs

- Participating Scientists add value to missions
  - May considerably increase the science return
  - May add value by assisting with targeting or creating new data products

*“After instrument teams are integrated and the mission matured during development, it becomes clear where the gaps in expertise and experience are”*

*“Key to success seems to be the selection of scientists who could indeed ‘participate’ in the mission and instrument teams, as opposed to simply analyze data.”*

- Mission leaders (including instrument PIs) may be protective of their teams, and may find addition of PSs disruptive
- Mission leaders prefer to have input into the selection of PSs

# Preliminary recommendations

- Participating scientist programs bring **significant value** to NASA and to the scientific community, and **should be included on every planetary mission**, whether competed or directed
- Expectations for timing and funding of Participating Scientists should be made clear to (or agreed with) mission leadership and the planetary community early on
  - Consider including PS requirements in the AO for competed missions
  - If a PS program is not included on a mission, this decision should be discussed with the planetary community, e.g., via the PSS
- PSs should be brought onto a mission as early as feasible, bearing in mind the trade between cost and integration issues
- PSs who are selected later in a mission (e.g., missions with a long cruise phase) should be given assistance with team integration and training
- Funding and expectations for PSs should be clearly communicated, wherever possible

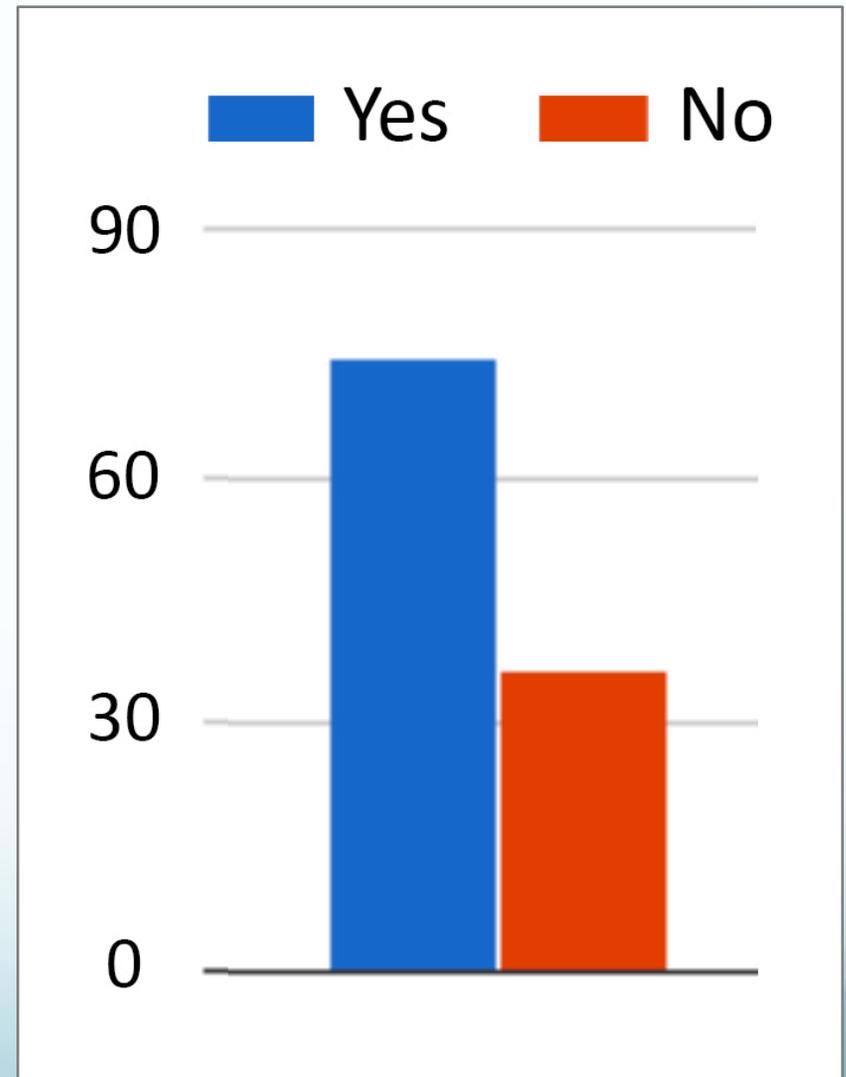
# Next steps

- Results from the survey for Principal Investigators and Project Scientists are coming in, and should be complete within the next 3-4 weeks.
- Additional brief summary presentations will be given at MEPAG, LEAG, and VEXAG
- A poster showing results will be presented at DPS
  - It will be presented alongside Rathbun et al. participation of women on robotic spacecraft teams paper, which includes PSs
- White paper, including recommendations, will be completed by the end of 2016
  - Will be made widely available to AGs and the whole community (e.g., via newsletters, AG webpages etc.)

# Backup

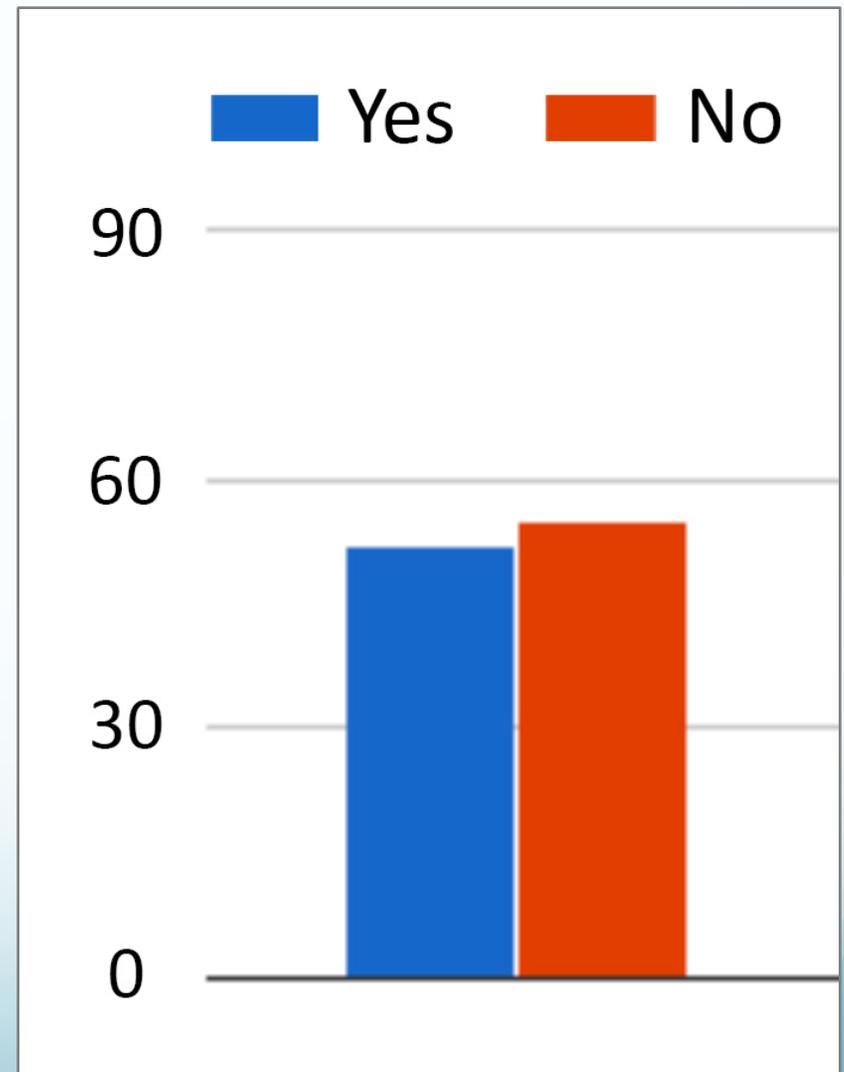
# Participating Scientist activities

Were you invited to request/plan specific observations/observing conditions in order to address your scientific focus?



# Participating Scientist activities

...or did you have to pull your science from observations that the core team planned without PS interaction?

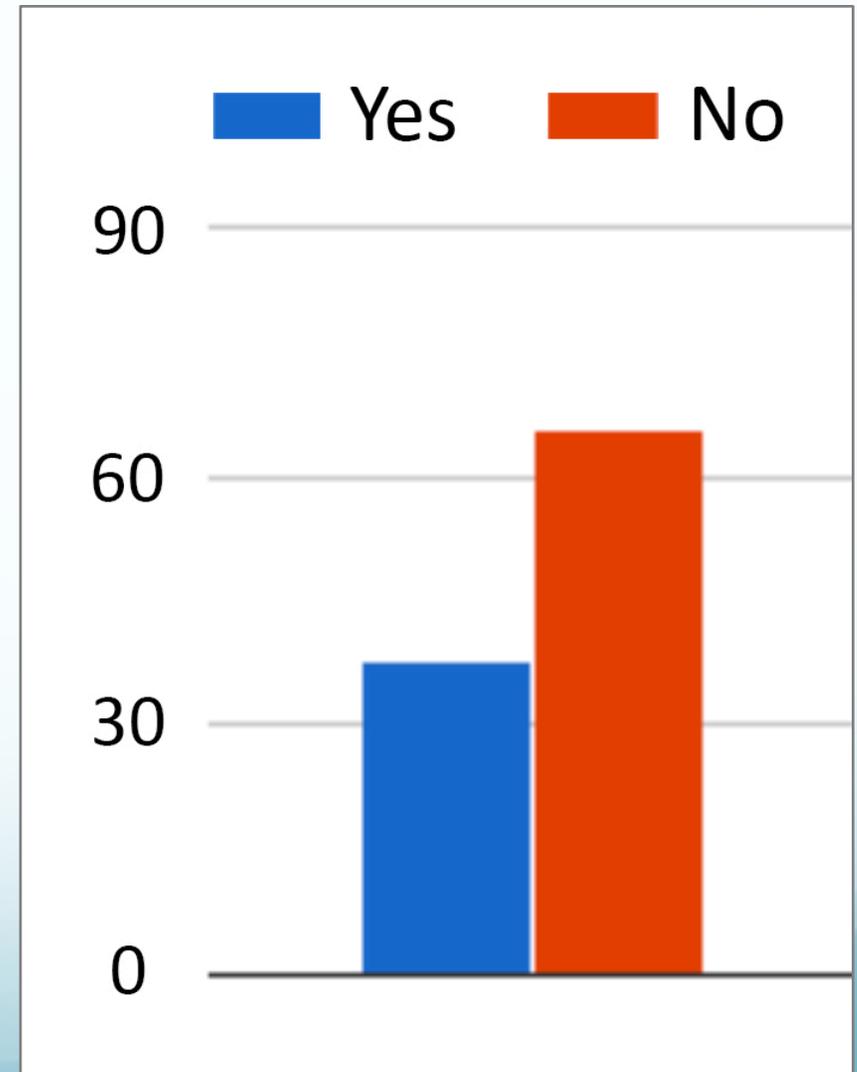


# Participating Scientist activities

Did you transition from a PS to a Co-Investigator on the team?

*Some respondents transitioned to funded, or unfunded Co-I status*

*Even unfunded continuation of mission participation was deemed to be valuable*



# Survey

<https://docs.google.com/forms/d/1S-QzqQX6hgdl709VL5MMEBZbjHzti4Z8dHbvpLPLwOk/viewform>