NAS Committee on NASA Planetary Science Division R&A Programs: Lunar Community Input

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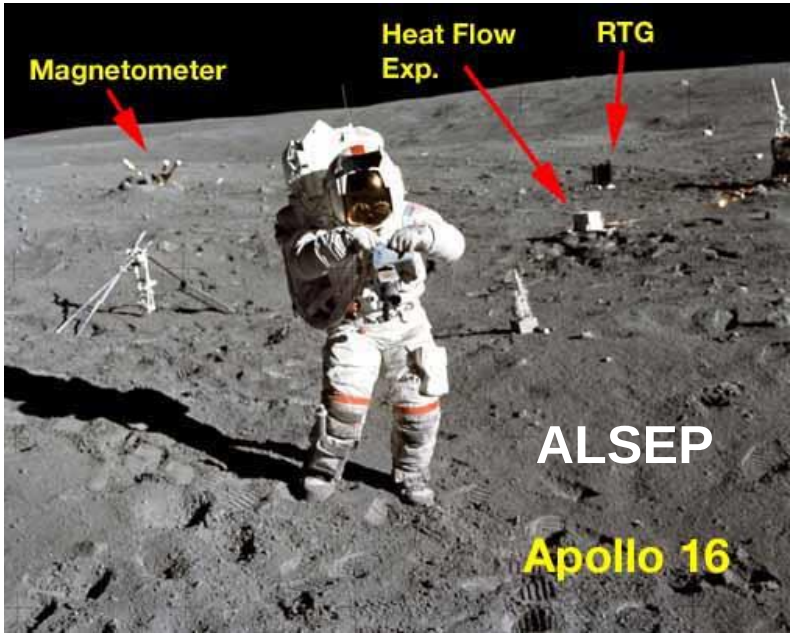
LEAG community survey
Email input
PSS survey on PI labs

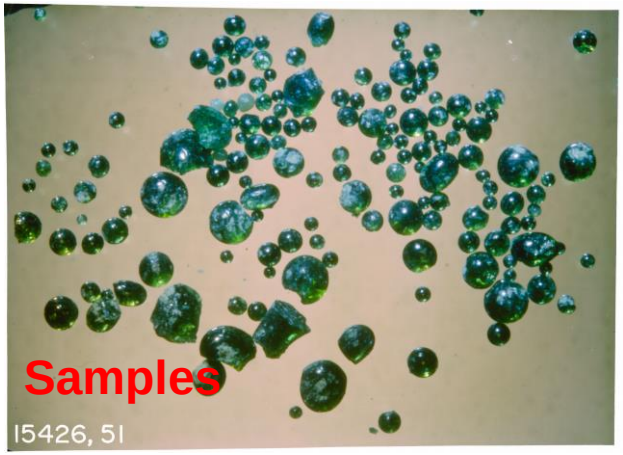
Missions to the Moon

Mission	Launch Date	End Date
Clementine	*25 Jan. 1994*	*5 May 1994*
Lunar Propsector	*7 Jan. 1998*	*31 July 1999*
SMART-1	27 Sept. 2003	3 Sept. 2006
Kaguya (SELENE)	14 Sept. 2007	10 June 2009
Chang'E 1	24 Oct. 2009	1 Mar. 2010
Chandrayaan-1	22 Oct. 2008	31 Aug. 2009
LRO	17 June 2009	STILL ACTIVE
LCROSS	17 June 2009	9 Oct. 2009
ARTEMIS	20 July 2009*	STILL ACTIVE
Chang'E 2	1 Oct. 2010	8 June 2011
GRAIL	10 Sept. 2011	17 Dec. 2011
LADEE	6 Sept. 2013	17 Apr. 2014
Chang'E 3	1 Dec. 2013	STILL ACTIVE

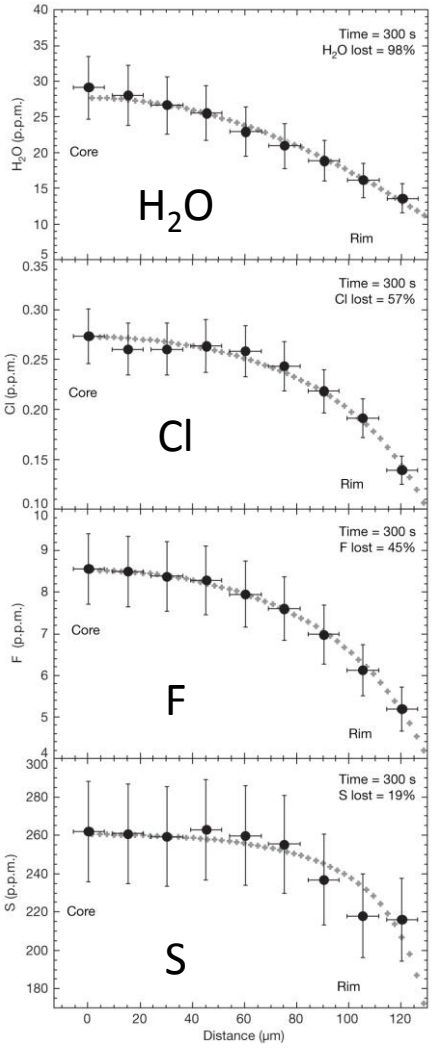
* Actual launch date = 17 Feb. 2007 as part of THEMIS mission. Date represents start of operations once three satellites arrived at the Moon

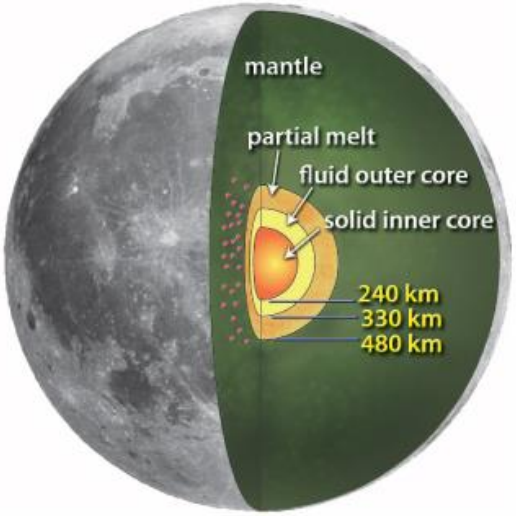
Apollo





Saal et al. (2008 Nature 454, 192-195)





Weber et al. (2011) *Science* 331, 309-312.

Lunar Meteorites

LAP-02205

Survey Questions

Compiled from NAS guidelines and LEAG Executive Committee input

Are the PSD R&A program elements appropriately linked to the NASA Strategic Objective for Planetary Science and the Planetary Science Division Science Goals, as articulated in the 2014 NASA Science Plan?

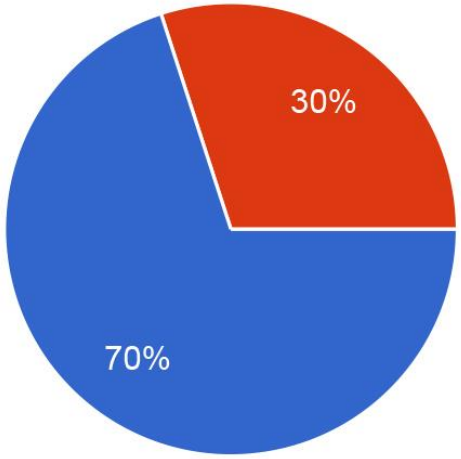
Do the PSD R&A program elements encompass the range and scope of activities needed to support the NASA Strategic Objective for Planetary Science and the Planetary Science Division Science Goals, as articulated in the 2014 NASA Science Plan?

Is the current R&A program balanced with respect to target bodies, processes and techniques?

Are the PSD R&A program elements appropriately structured to develop the broad base of knowledge and broad range of activities needed to interpret and maximize the scientific return from existing missions?

Are there any deficiencies/weaknesses in the current PSD R&A program elements that would hinder the development of new spaceflight missions and/or maximize the science return of existing missions?

1. Are the PSD R&A program elements appropriately linked to the NASA Strategic Objective for Planetary Science and the Planetary Science Division Science Goals, as articulated in the 2014 NASA Science Plan?

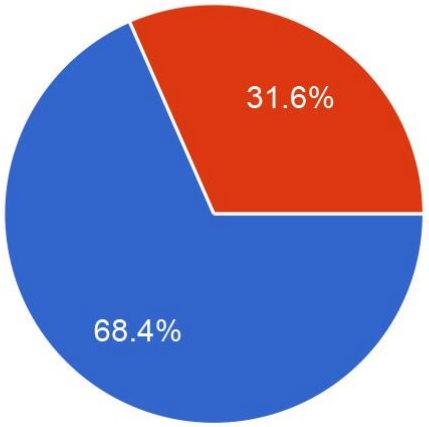


Yes	70%
No	30%

- Field based or analog investigations, as well as sample studies, have seen a decrease in funding – what PSTAR says it will fund does not appear to translate to what gets funded.
- Until ROSES 2016, the LDAP call explicitly denied significant amounts of modeling/experimental work to be submitted to the program, which meant that any lunar-related modeling/experimental work would have to be proposed to SSW. Shoveling these types of investigations into SSW is not appropriate. This is severely limiting the opportunity to fund any research that is not based on recent mission data. In times of limited recent mission data from an object, this will kill any study on that object.

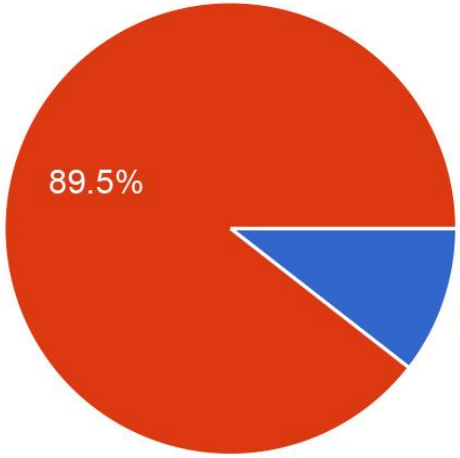
2. Do the PSD R&A program elements encompass the range and scope of activities needed to support the NASA Strategic Objective for Planetary Science and the Planetary Science Division Science Goals, as articulated in the 2014 NASA Science Plan?

Yes	**68.4%**
No	**31.6%**



- Development of fundamental planetary data spatial infrastructure (i.e., cartographic) products is also not sufficiently supported, which means such products are often not done.
- Some programs encompass such a broad range of topics that it becomes impossible to find qualified, non-conflicted reviewers to adequately assess proposals. SSW in particular is like a giant trash-can of proposed investigations that don't fit within other programs, compounding the problem of obtaining objective, knowledgeable reviews.
- The 5 major programs need to be separated into sub-programs (such as planetary interior processes; planetary surface processes; planetary atmospheric processes). Calls will be more spread out throughout the year, giving program officers more flexibility in building qualified review panels and giving proposers the ability to stagger funding opportunities/submissions.

3. Is the current R&A program balanced with respect to target bodies, processes and techniques?



Yes	10.5%
No	89.5%

- There is excessive programmatic emphasis on astrobiology, exobiology, and exoplanet studies to the detriment of traditional planetary science. Proposals relevant to astrobiology have at least 3 different avenues for funding opportunities, while, for example, geophysicists and sample geochemists appear to have only 1 opportunity/yr.
- Non-astrobiologists must submit several proposals at once, while astrobiologists can stagger submissions (and funding cycles, upon selection) throughout the ROSES year allowing for better quality proposals to be submitted. Stacking many proposals on top of each other reduces the quality of submitted proposals.

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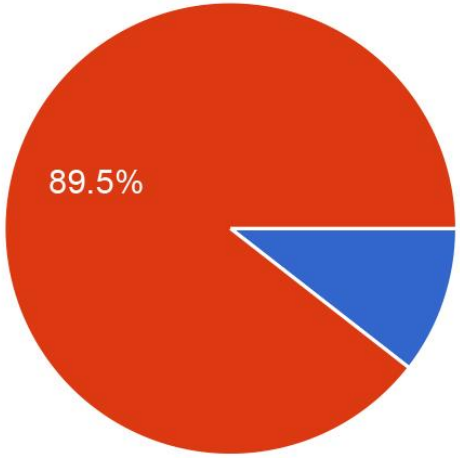
No	89.5%

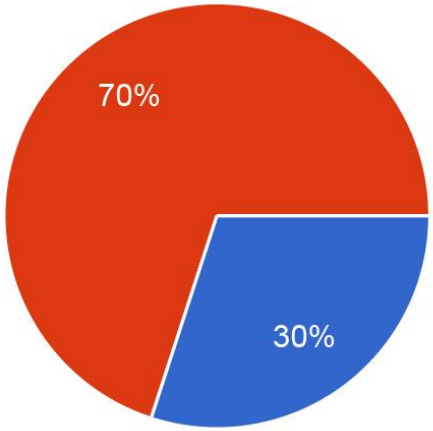


- Significant de-emphasis on sample science and increased emphasis on life-related pursuits is embodied in these changes to R&A programs.
- There is too much emphasis on Mars at the expense other planetary science.

- The development of processing algorithms and tools/software for planetary data processing, and the development of necessary (and what use to be routinely produced) controlled global/regional cartographic products is not being sufficiently supported.
- There should be a theoretical modeling focused program – such proposals should not be crammed into SSW.
- It seems strange that the "LARS" program and "LDAP" program do not allow for proposals analyzing Apollo data and returned samples. Can this be instituted?

4. Are the PSD R&A program elements appropriately structured to develop the broad base of knowledge and broad range of activities needed to interpret and maximize the scientific return from existing missions?

Yes	30%
No	70%



- Some of the R&A programs are too big/broad:
  - Certain specialties have been diluted (e.g., sample science/analysis, cartographic products) seem to have been de-emphasized across the R&A spectrum.
  - Sample science requires labs, usually at PI institutions – see PSS survey on PI-led Labs.

- Sample Science is intensive in instrumentation and associated technique development, and typically requires highly specialized expertise that does not easily translate to and from other fields. This type of expertise, once lost, cannot be easily replaced.

- Finding truly qualified and "non-conflicted" panelists and external reviewers has become difficult resulting in evaluations that are confusing, unhelpful, and in some cases, wrong (e.g., mixed signals are being presented when reviews from DAPs come back with weaknesses that say the proposed work did not include modeling, though modeling is not supposed to be included in many of the DAPs.

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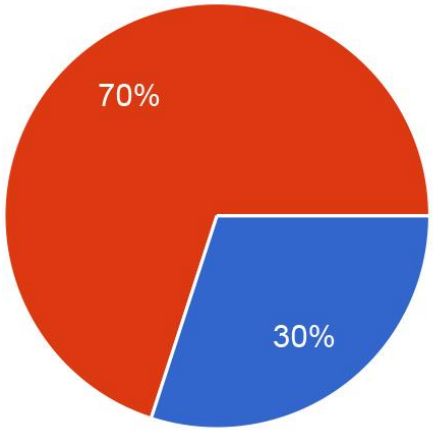
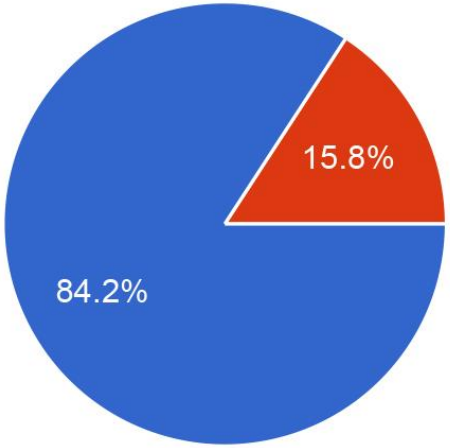


- Modern missions often require revised theoretical work, new software, or laboratory studies much more than data processing. The DAPs generally don't allow this and they must all compete under SSW. They should be part of the individual bodies DAP programs.

- The limitation of specific missions in the DAPs is severely hindering progress (such as in the L-DAP program where Apollo data and samples are not eligible for funding). New missions often reveal ideas that need to be tested with old data or Apollo samples.
- There is now no place for focused, "single-body" research programs outside of the data analysis programs, which preclude laboratory studies.

5. Are there any deficiencies/weaknesses in the current PSD R&A program elements that would hinder the development of new spaceflight missions and/or maximize the science return of existing missions?

Yes	84.2%
No	15.8%



- Having the PSTAR deadline at the end of the summer, a peak time for field-work activities, is not optimal!
- The MatISSE and PICASSO programs are welcomed.

- Scheduling of the R&A programs needs to be reconsidered to account for the reality of the science endeavors included in those proposal deadlines. While NASA champions a multi-planet/interdisciplinary approach, this is not supported in the current scheduling of ROSES programs. For example, having LDAP and MDAP deadlines on the same day presents a direct contradiction to this multi-planet concept, requiring that two proposals (minimum), be prepared simultaneously for those who work on both.
- The amount of detail required in a proposal seems to be a subjective element that is a moving target. Is the default stance “the PI knows what he/she is doing”?

5. Are there any deficiencies/weaknesses in the current PSD R&A program elements that would hinder the development of new spaceflight missions and/or maximize the science return of existing missions?

Yes	84.2%
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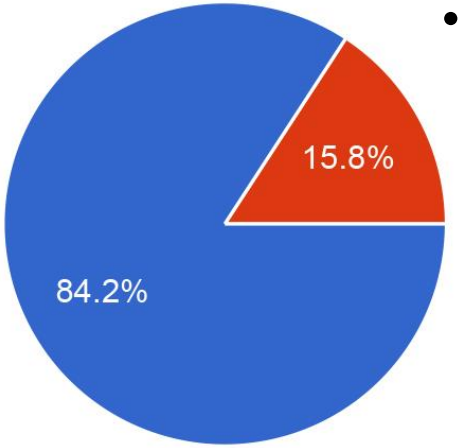

- The clear de-emphasis on sample science appears inconsistent with the characterization of the 2010s as the "Decade of Sample Return". NASA currently has just one sample return mission, OSIRIS-REx, in development (but is involved in Hyabusa 2).

- The development of processing algorithms and tools for planetary data processing, and the development of necessary (and what use to be routinely produced) controlled cartographic products is not being sufficiently supported. These types of products were always deemed critical for past missions and routinely developed when any new planetary dataset was obtained. The lack of such tools and products hinders “the development of new spaceflight missions and/or maximize the science return of existing missions”.
- Obtaining qualified reviewers that produce objective, constructive proposal reviews is a deficiency.

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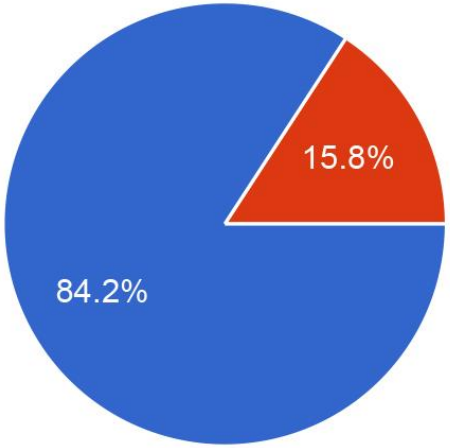

- The current lack of focus on theoretical modeling, laboratory work, and new software development is severely hindering our ability to understand new data and apply it to future mission studies and design.

- Urgent need for PSD to begin aligning prospective lunar ***surface*** science with emerging commercial lander missions. It is strongly suggest that PSD and ESMD look for topical areas of alignment that would support both engineering interest and science. ISRU technology development for volatiles is a prime example.
- Early Career Fellowship guidelines are confusing and do not give explicit instructions. They make it difficult for qualified early career people to apply for this.
- Can there an early career research program to allow EC folks to get seed data for full proposals? Makes them more competitive.

Planetary Science Subcommittee Survey

US Planetary Scientists: Is Your Laboratory Adequately Supported?

The Planetary Science Subcommittee (PSS) perceives that laboratories supporting Planetary Science Division (PSD) research may be underfunded, and that support for laboratory technical staff is difficult to obtain.

PSS is conducting a survey of laboratories that will be used to inform discussions with PSD about the planetary community's capabilities and challenges, and to help formulate potential solutions.

Please take the online survey at: http://tinyurl.com/psslabs

61 responses, 52 of which are presently supported by PSD, but not in terms of technical support.

- Major innovations in analytical techniques have come out of NASA-funded programs driven by the need to analyze rare and precious samples. This has only been possible because of stable support for University-based laboratories. Viable funding mechanisms need to be found so that the analytical Cosmochemistry community can sustain the process of supporting and maintaining the complex laboratory activities.
- The development of state-of-the-art instrumentation and high precision, high sensitivity analytical techniques often takes many years of dedicated effort and thus requires a basic continuity in funding. Such facilities require highly trained personnel and operating budgets that are significantly higher than average grants for specific science investigations by individual PIs.
- State-of-the-art laboratory facilities require technical personnel and these positions cannot be regarded as ephemeral. They are critical for a sound and productive laboratory-based research program.
- It is wholly unrealistic to include technical support in NASA grants. Grants exceed >$100k/yr for a PhD student, alone. There is strong pressure to make grants cost-competitive and this means that technical support gets reduced to preserve student/post doc labor. The tenuous nature of supporting staff on 3-year grants (particularly at the realistic 25 - 30 % level per grant) makes it difficult to retain good professional researchers and technicians. This is exacerbated by dilution of opportunities for sample research after the reorganization

- The consolidation of COS/OSS/LASER/EXO for lab work means that we are always competing with ourselves for selection. The ROI for proposals is approaching zero.
- Without a commitment from NASA for sustained support and further development of laboratory infrastructure, competitive advantage and young talent will move overseas, and the specialized skills and capabilities are either greatly diminished or lost. The loss of national capability and leadership of the field by the choking-off of the pipeline for training the next generation in technical excellence must not be unintended consequences of reorganization of research programs and the new funding models of PSD.
- Labs are starting to accept Chinese PhD students paid by a CSC fellowship from the Chinese government. Under the terms of this fellowship, the student has to go back to China for 2 years after completing his/her PhD. Those students, who will be trained in the US, may never return to the US after going back to China.
- University labs do not have - and cannot build up - any reserves that would enable us to go though funding gaps.
- **A dedicated pot of money for laboratory technical support staff would be most welcome, especially as we work to acquire new and more complicated instrumentation that requires constant support and supervision of graduate students.**

Questions?