

NASA ADVISORY COUNCIL

Planetary Sciences Subcommittee

November 5, 2013

Teleconference

MEETING MINUTES

Janet Luhmann, Chair

Jonathan Rall, Executive Secretary

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Zantech IT*

Tuesday, November 5, 2013Welcome, Agenda, Announcements

The Planetary Science Subcommittee (PSS) of the NASA Advisory Committee (NAC) met via teleconference on November 5, 2013. Dr. Jonathan Rall, Executive Secretary of PSS, noted that the agenda had changed slightly from what had been planned, so the session would begin with ethics training, followed by the Government Performance and Results Act (GPRA) Modernization Act (GPRA-MA) review and an update from the Analysis Group (AG) chairs.

Dr. Janet Luhmann, PSS Chair, said that she hoped PSS would be able to have an in-person meeting early in 2014, probably in late February or early March, after the budget roll-out. In addition to the GPRAMA vote, this meeting was to include a discussion of the planned changes to NASA's Planetary Science Division (PSD) Research and Analysis (R&A) program.

Introductions

Dr. Rall asked the attendees both at NASA and participating by teleconference to identify themselves.

Ethics Training

Ms. Katie Spear, representing NASA's Office of General Counsel (OGC), presented the mandatory annual ethics training session to the Subcommittee members.

After the training session, it was noted that PSS had some new members, and there was some confusion about who was actually on the Subcommittee. Dr. Rall explained that several new members were added right before the government shutdown. In addition, while there had been some discussion about not including AG chairs as members, that action had not moved forward, and the AG chairs will indeed be members of PSS. Dr. Rall planned to address that within the next couple of weeks.

PSD Status Update

Dr. James Green, Director of PSD, presented an update on Division activities. He began by discussing the President's Fiscal Year (FY) 2014 budget request. The total sought for FY14 is \$1,217,600,000, down from the FY13 budget of \$1,271,500,000. Projecting ahead, the notional budget goes down again in FY15, but increases thereafter. The FY14 budget includes \$20 million for study of Near-Earth Objects (NEOs) and \$50 million for Department of Energy (DOE) PU-238 infrastructure; these expenditures will be ongoing. An infrastructure review had been recently completed and delivered to NASA. It was about to be discussed in Congress, and Dr. Green planned to provide more information at the next PSS meeting.

Dr. Green reported that the Balloon Rapid Response for ISON (BRRISON) payload suffered an anomaly following its September launch. The Mars Atmosphere and Volatile Evolution (MAVEN) mission was scheduled to launch on November 18. PSD will conduct more comet science over the next year.

Regarding education and public outreach (E/PO) for FY14, it is essential to understand that the government is operating under a continuing resolution (CR), which stipulates that no government unit is to stop or start critical elements. Therefore, NASA's Science Mission Directorate (SMD) can continue planning E/PO activities as in FY13. However, decreases were already planned in accordance with the President's proposed FY14 budget. NASA intends to align with the Committee on Science, Technology, Engineering, and Mathematics Education (CoSTEM) strategic plan.

Dr. Green described a number of recent popular activities, including an art show about Mars at Dulles Airport, PSD and the Curiosity mission each winning two "Webby" awards for their websites, and the "Wave at Saturn" program that took place when the Cassini spacecraft was pointed at Earth from near Saturn.

The Lunar Atmosphere and Dust Environment Explorer (LADEE) was successfully launched from the Wallops Flight Facility on September 6. The mission is doing well, orbiting the moon and going through the commissioning of instruments. The laser communications system is working flawlessly. The mission team has verified that data are moving at high speeds, even through clouds, with a strong signal, which is a great success for this technology. There were over 50 official launch viewing events, and many visitors to Wallops. The launch was shown in Times Square, and millions of people along the east coast saw it live. There was also excellent social media discussion of the event. Even a couple of years ago, the number of people at these launches came to about 400 to 500, and now there are thousands, which offers NASA opportunities to talk about planetary science and keep people aware of it.

Another event, which occurred during the government shutdown, was the last flyby of Earth by the Juno spacecraft on its way to Jupiter. This worked incredibly well and produced great images for testing the cameras and other systems, which helped raise awareness among stakeholders and the public. As noted, MAVEN is set to launch when its window opens in November. New Horizons is also moving forward very well. The mission team put the spacecraft through a series of test maneuvers that went flawlessly, and the team is now preparing for the Pluto flyby in mid-July 2015.

The Wide-field Infrared Survey Explorer (WISE) mission has been reactivated as Near-Earth Objects WISE (NEO-WISE). The WISE mission originated with NASA's Astrophysics Division (APD), and now that that mission has been completed, the Explorer has been transferred to PSD, which put it back into service right before the shutdown. It is almost ready to resume taking data.

NASA announced the Mars 2020 mission at the American Geophysical Union (AGU) meeting in 2012. The science definition team (SDT) has issued a report, and proposals are due in early 2014. The next Discovery Announcement of Opportunity (AO) will be released as soon as the PSD budget allows. There were 57 responses to the Request for Information (RFI), and PSD is now analyzing them. This analysis may lead to a town hall with the community in advance of making strategic decisions about a cost cap, launch vehicle selection, and the like. Dr. John Grunsfeld, SMD Associate Administrator, will make the decision about the next AO.

The last senior review was in 2012, which means that another will occur in 2014. PSD is now putting together guidelines for extended mission proposals. A significant issue is that additional missions will be in the review, including-. Together with Cassini, this will make the competition very tight for both these two large missions and the smaller ones under review. The MESSENGER mission will not be in the review.

As mentioned, there was an anomaly on BRRISON. The balloon reached 90,000 feet, but after an initial viewing, the telescope went beyond its stop and became stuck. The balloon itself worked perfectly. The payload was recovered in excellent shape the next day, so the team can do repairs. PSD and APD are co-funding Comet ISON observations with the Far-ultraviolet Off Rowland-Circle for Imaging and Spectroscopy (FORTIS) mission, which will launch in mid-November. NASA's next Venus mission is the Venus Spectral Rocket Experiment (VeSpR), which will look at that planet's upper atmosphere for evidence of water. NASA has selected nine research teams for the Solar System Exploration Research Virtual Institute (SSERVI), which is jointly funded by PSD and the Human Exploration and Operations Mission Directorate (HEOMD).

R&A Restructuring

Dr. Rall said that the goal of the restructuring is to match the program to the R&A budget in PSD, while also eliminating some of the large oscillations in program areas. This consolidation and restructuring reflects the Decadal Survey (DS) and other advisory sources.

There are two sets of goals. Dr. Green, as Division Director, wants the restructuring to accomplish the following:

- Make the structure of the R&A program explainable to those outside of NASA;
- Make it easy for those outside of NASA to compute the amount of money spent on grants; and,
- Reduce the time between proposal submission and award announcement.

The program officers set the following goals:

- Encourage interdisciplinary research;
- Enable PSD strategic decision-making;
- Be more flexible in responding to changing research priorities; and,
- Reduce overlaps between program elements.

In order to meet these goals, the restructured program will have five new core programs:

- Building New Worlds, focused on the origins of the solar system and evolution;
- How Planetary Systems Work, addressing physical and chemical processes and the major characteristics of the planetary bodies;
- Habitable Worlds, regarding the characteristics and distribution of habitable environments;
- Exobiology and Evolutionary Biology, addressing the origins and evolution of life on Earth; and,
- NEO Observations (NEOO) and Planetary Astronomy, encompassing planetary observations.

PSD hopes to release the restructuring information in time for the 2014 Research Opportunity in Space and Earth Sciences (ROSES) call, which will be paid with FY15 funds. The Division hopes to have a virtual town hall in the first week of December, 2013, before the next AGU meeting.

Discussion

Dr. David Draper asked if the funding would be equal among the five new core programs, also noting that two emphasize life, and that planetary sample research does not seem to be represented well. Dr. Rall explained that funding would not be allocated equally, and there will not be a reduction in the amount of research on returned samples. Dr. Michael New confirmed that the five areas will not have equal funding, and said that a discussion of funding is premature. The core areas are based on the science, rather than a target or community.

Dr. Green explained that the current structure has been mapped to the new structure, and PSD has looked at how each of the 20-some current programs fit into the new structure. It is messy in spots, but it does work. The transition will be discussed at the town hall. Dr. Rall added that the Division is trying to ensure that every area has a program; the goal is to cover everything that is currently done while also reducing duplication. PSD hopes to have PSS input in the initial roll-out. ROSES 2014 will be issued on the normal schedule. One of the intents is to pull all of the Mars activities into the same area. The Data Analysis Programs (DAPs) will remain where they reside now, as will instrument development.

Dr. Julie Castillo-Rogez asked about the timeline for the senior review, and also wanted to know what the individual budget will be in the outer planets line, which contains Cassini, Cassini DAP, and the JUPITER ICy moons Explorer (JUICE) mission. Dr. Green explained that the outer planets area is in the notional budget, and there will be trades between the budget lines as PSD works out program content. He wants PSS input on the senior review, especially regarding how to invest limited dollars in the right missions and activities. The senior review must be complete during FY14 so that it can be implemented in FY15. It will involve a lot of work, but he wants to pull together a senior review quickly. The budget is continually decreasing and will also be constrained, which will necessitate the removal of some content. With the

additional requirements that have come in, such as the \$50 million on PU-238 at DOE, the Division has to be able to do the senior review carefully in order to do it right.

Congress is also requiring that PSD work on the Europa mission, which has a significant amount of money allocated to it despite the decreasing budget. This cannot be revisited under the CR, as PSD must move Europa to the key decision point even though there is no budget horizon for accomplishing the mission. Dr. Green also expects that the government will again face automatic sequestration reductions.

Dr. Luhmann suggested that PSS have another teleconference to discuss the senior review, which Dr. Green endorsed. A December or early January call would be ideal. Dr. Luhmann noted that extended mission costs largely come from operations, and wondered if the operating plans are all finely tuned or if PSD will be emphasizing the need for expediency. Dr. Green explained that those missions that have been through a senior review have a good process of making operations as cost-effective as possible. The Opportunity Rover, for example, has dropped in cost enormously, and it would not be realistic to expect much in the way of further operating cost reductions.

Dr. Louise Prockter asked if there had been any further cost evaluation of the Mars 2020 mission. Dr. Green said that Mars 2020 involves many of the same contractors involved with Curiosity. An extensive lessons learned review will report out soon. Dr. Michael Meyer added that there have been internal independent cost reviews, as well as an external review that is ongoing. Instrument selection and concept review will precede costs analysis.

In response to a question, Dr. Green explained that travel restrictions are still tight despite a couple of small changes. Dr. Lori Glaze added that at Goddard Space Flight Center (GSFC), the international conferences will now be treated the same as the national ones, eliminating the need for a special waiver.

Dr. Draper asked if APD might contribute to exoplanet research that originates with PSD. Dr. Max Bernstein said that it remains to be seen whether the R&A reorganization will affect the cross-divisional programs, which he assumes will continue. As for a possible climate program, Dr. Green said that the goal is to have it in place and included in ROSES 2014.

In order to provide a timeline for the Discovery AO, PSD must be able to identify a budget wedge, and the current budget uncertainties prevent that. However, Dr. Green wants to be ready for a funding wedge to solicit and make a selection. PSD has identified a funding wedge for the Interior Structure from Seismic Investigations, Geodesy and Heat Transport (InSight) mission, which is not yet confirmed. It is moving to a key decision point, and when it passes that, the Division will know both its lifecycle costs and what else is available for the Discovery AO. It is hard for the community to plan, but with the budget decreasing and the need to confirm InSight before moving forward, there will be nothing soon.

Dr. Glaze asked if there are plans to increase communication between basic research science and the effort to get humans to Mars. Dr. Green replied that HEOMD has additional funding in this area, and PSD is taking advantage of that as HEOMD plans to leave low-Earth orbit (LEO). SSERVI is enhanced by HEOMD participation. There is quite a push to work on sending humans to Mars. HEOMD is working to develop the capabilities and the flexibility to have humans at least orbiting Mars in the 2030s and be on the planet by mid-century. The plan for SSERVI is for it to grow. The next call for proposals will be in 3 years, and a lot can happen between now and then.

Regarding the SSERVI review process, Dr. Green said that a number of groups proposed well, but not all former team members made it through; about half of the people are new. The principal investigators (PIs) with institute experience did have a certain advantage, but the teams have had more turnover than is immediately apparent.

GPRMA-MA

Ms. Jennifer Kearns, a Program Analyst within SMD, explained that GPRMA-MA is a tool to improve the efficiency of all Federal agencies. As part of the GPRMA-MA process, NASA's FACA committees and subcommittees provide the required "expert external review" in evaluating the Agency's work. Therefore, PSS was being asked to evaluate how PSD has demonstrated progress in meeting key science objectives in context of the resources invested.

The 2013 GPRMA-MA review was to cover events since the summer of 2012. A result involving the use of older data was permissible. All activities considered must have been fully or partly funded by NASA, and results should have been reported in a peer-reviewed journal or some other noncontroversial, reliable source. PSS was to provide an official vote on each criterion, along with supporting text that identified any particularly noteworthy items.

Dr. Rall described the SMD criteria for GPRMA-MA voting:

- Green – Expectations for the research program fully met in context of resources invested.
- Yellow – Some notable or significant shortfalls, but some worthy scientific advancements achieved.
- Red – Major disappointments or shortfalls in scientific outcomes, uncompensated by other unusually positive results.

PSS members had worked with their core document offline. This document contained representative results but was not comprehensive. Instead, it began with the highest profile results, and PSS input was sought in that regard, especially where something might be missing.

The first objective to be evaluated was "Objective 2.3.1: Inventory solar system objects and identify the processes active in and among them." Representative examples included the following:

- Cassini Finds Tidal Forces Controlling Enceladus' Jets.
- Wild Weather on Saturn's Moon, Titan.
- A Seismograph as Big as Saturn's Rings.
- Acceleration, Reconnection, Turbulence, and Electrodynamics of the Moon's Interaction with the Sun (ARTEMIS) Explores the Interaction of the Solar Wind with the Moon's Surface and Atmosphere.
- MESSENGER Finds Evidence for Water on the Surface of Mercury.
- Deep Impact Flyby Image of Comet Garrard.
- Curiosity: A Lower Upper Bound for Mars Methane.
- Spring on Mars: Dry Ice on Dunes.

Dr. Nancy Chanover suggested including a result from the Dawn mission; Dr. Castillo-Rogez had sent in a Dawn example too late for inclusion in the core document; Dr. Rall said he would insert it. Dr. Lisa Gaddis recommended a result from August 2013 about magmatic water found on the moon.

Because PSS members were participating through different communications modes, Dr. Luhmann said that the votes would be done to assume agreement unless an individual member objected. Dr. Chanover moved that PSS vote green on this objective. As no one came forward to disagree, the vote was declared unanimous for green.

The next objective was 2.3.2: "Improve understanding of how the Sun's family of planets, satellites, and minor bodies originated and evolved." The following were suggested as examples:

- Gravity Recovery and Interior Laboratory (GRAIL) Reveals the Moon's Interior Structure.

- The Thickness and Bulk Density of the Lunar Crust Have Been Determined Utilizing GRAIL Data.
- Mars Climate Evolution.
- Mars Reconnaissance Orbiter Radar Creates 3D Images of Buried Martian Flood Channels.
- The Dual Nature of the Martian Crust: Young Lavas and Old Clastics.
- The Current Martian Cratering Rate.
- Lunar Reconnaissance Orbiter (LRO) Camera Identifies Recent Craters.

Dr. Glaze moved for a vote of green. With no objections stated, it was declared unanimous for green.

Objective 2.3.3: “Improve understanding of the processes that determine the history and future of habitability of environments on Mars and other solar system bodies,” had the following recommendations for examples:

- Water in an Old Martian Meteorite.
- Microbes Survive a Mixed Bag of Mars “Biocidals.”
- Gravitational Force of a Planetary Neighbor Triggers a Climate Catastrophe.
- Curiosity Discovers a Habitable Environment on Mars.
- Opportunity Finds Evidence for Life-Friendly Ancient Conditions on Mars.
- Mapping the Chemistry for Life on Europa.
- Complex Chemistry in Titan’s Lower Atmosphere.

There were no additions to this list. Dr. Draper moved for a vote to rate the objective green. There were no objections, so the vote was considered unanimous.

For Objective 2.3.4: “Improve understanding of the origin and evolution of Earth's life and biosphere to determine if there is or ever has been life elsewhere in the universe,” Dr. Christopher House sent two additional examples. One example addressed a finding from drilling in the Strait of Juan de Fuca, and the other was about the discovery of 3-billion-year-old microstructure fossils in West Australia. Other examples under consideration included the following:

- A Slow Start for Complex Life on Ancient Earth.
- Could Life Exist around Hydrothermal Vents on Europa?
- How Life Can Survive at the Fringes of Habitable Environments.
- Solving Puzzles about Icy Comets Like Wild 2, with Implications for the Origin of Life.

When it was noted that this section had less material than the others, Dr. House offered to find more, such as a finding of evidence for weather on Mars prior to 4 billion years ago, and the active subglacial atmosphere.

Dr. Luhmann moved for a vote of green. There were no objections, and the rating was declared to be green.

The final objective, 2.3.5, was to “[i]dentify and characterize small bodies and the properties of planetary environments that pose a threat to terrestrial life or exploration or provide potentially exploitable resources.” The following accomplishments had been suggested as examples:

- NASA Near Earth Asteroid (NEA) Survey.
- Detailed Characterization of a Potentially Hazardous Asteroid.
- Automated Potential NEA Destinations Assessment.

There was discussion of the Asteroid Redirect and Return Mission (ARRM), but that is not a PSD activity, nor is there a result at this time. It was noted that the comet that hit Russia had led to a great deal of new information about the impact process and low-angle entry, but that will be held for next year due to the timing of publication. Dr. Rall was to investigate the timing of an ion thruster piece.

Dr. Donald Yeomans moved for a vote of green, which passed with no objections and was therefore declared unanimous.

Dr. Rall reviewed the writing and research assignments, and asked that they be sent to him by the end of the day on November 8.

General Discussion

AG Presentations

The first AG update was for the *Outer Planets Analysis Group (OPAG)*, presented by Dr. Castillo-Rogez. She said that the Group is very concerned about the looming gap in missions to the outer solar system. Another concern is the need to extend the Cassini mission so that it can reach Juno in September, 2017. At that point, the mission will likely sustain radiation damage that will prevent it from operating further. OPAG considers it crucial that Cassini get to that point and wants to see a specific line for Cassini in NASA's budget through 2017. OPAG also wants PSD to clarify the senior review process. Dr. Green said that he had the OPAG recommendations and planned to be at their next meeting, scheduled for January. He hoped to have positive things to say.

Dr. Glaze explained that the *Venus Exploration Analysis Group (VEXAG)* had not met for a year but would convene in a couple of weeks at NASA Headquarters. The agenda would include a new draft update of the goals and objectives document, a new roadmap for exploration, and technologies for exploration. The Group also planned to discuss the R&A restructuring. In May, 2014, there will be a workshop on a range of exploration targets.

Dr. Glaze observed that there had apparently been discussions of interest to VEXAG in Russia during the shutdown. Dr. Green explained that there had been plans for a bilateral meeting to discuss programs and how NASA can work with Russia. That meeting did not occur due to the shutdown. However, he recently received a letter from Russia with some opening discussion points, some of which are particularly relevant to Venus, and he would like to have a teleconference to discuss these. He hoped to be able to attend the VEXAG meeting.

Dr. Jeff Plescia discussed the *Lunar Exploration Analysis Group (LEAG)* activities. He noted that there is a lack of a focus on a lunar data analysis program. A lot of the important moon discoveries look like they will be spread over various areas. Dr. Green said that HEOMD has some activities, but PSD is not specifically connected.

Dr. Plescia added that there is a real question as to whether the Mars 2020 mission is the most important thing for PSD to do. Dr. Green explained that the Division is working hard to follow the DS, which advised a balanced program. This is hard to do when some of PSD's foundational activities are crumbling. However, NASA just got LADEE to the moon, there are efforts to get the next Discovery mission together, and ~~the~~ LRO is up. Congress has been supportive of planetary science, but the budget remains an issue. PSD seeks to have a balanced program of Discovery, New Frontiers, outer planets~~sary~~, and flagship missions, in accordance with DS guidance.

Dr. Plescia said that while LEAG understands the constraints involved in dealing with China, there is a perception in the community that if scientists talk to anyone in China, NASA will proactively sanction

them by removing funding. Dr. Green said that he did not know of an instance of that. It is important to be able to communicate with our international counterparts and exchange information. NASA knows that China plans a lunar lander at a time when NASA has LRO and LADEE active, and is looking for ways to communicate information of importance while being consistent with the law. If China lands something on the moon in December, LADEE will be in position to observe changes in the environment and LRO will look at the results of the landing.

Dr. Plescia next asked about the travel issues at NASA, which echo throughout the rest of the community. The process seemed neither explicit nor consistent. Dr. Green said that AG meetings are not conferences and NASA personnel should not be treating them as such. If anyone at the centers or elsewhere has a problem attending the meetings for that reason, they should contact him.

Dr. Nancy Chabot announced that the next meeting of the *Small Bodies Analysis Group (SBAG)* will be January 8-9, 2014, in the Washington, DC, area. The Group is concerned about how to speak with one voice, since there are so many small bodies. Although members largely agree that competed programs are best, the lack of competed mission opportunities is a real concern.

Another concern is that the participating scientist program for Dawn@Ceres will not happen, and no one yet knows where it will fall in the new R&A structure. Dr. Green said that there was no intent to drop that mission, and he would follow up on it. The next issue Dr. Chabot raised had to do with planetary defense, especially regarding a NEO survey telescope and the risks involved in relying on outside entities. SBAG supports a NEO survey telescope. Dr. Green said that he hopes they can address some follow-ons once the budget is passed. Dr. Chabot noted that SBAG was happy to see that NEO-WISE was restarted.

Reporting for the *Mars Exploration Program Analysis Group (MEPAG)*, Dr. Lisa Pratt said that the previous meeting was a virtual one in July, and the Group wanted to have a face-to-face meeting, possibly next spring in coordination with the Mars 2020 landing site workshop. The SDT report came out in June, with an AO in September. Notices are ready to go out and instrument proposals are due in January. The biggest upcoming new activity is to call for a new review of potential habitats on Mars. This will be the first formal review since 2008, and there has been a lot of new data come in since then.

The community needs to be thinking about planetary protection in special regions. Much more is known compared to 5 years ago, which has generated many more questions. Both images and radar results show more and more about the widespread surface and near-surface ice, which tells us about the potential resources. There are also mineral issues regarding deliquescence and the consequences of habitability. Finally, there is now a better understanding of the environmental limits to life on Earth. There has been a lot of rethinking of how to define special regions on Mars, whether it involves ice or liquid water and whether an organism can survive or replicate in that environment. Scientists know more now about how to identify where an indigenous organism might survive.

Finally, Dr. Hap McSween discussed the latest activities and thoughts from the *Curation and Analysis Planning Team for Extraterrestrial Materials (CAPTEM)*. There was concern about the impact sequestration may have had on sample curation and E/PO. In addition, Dr. McSween predicted that the whole materials community will view the restructuring with alarm due to the lack of an heir to the cosmochemistry program. Another concern was the impact of likely delays on the Discovery and New Frontiers AOs.

Dr. McSween said that CAPTEM has always had face-to-face meetings. How the Team deliberates is especially important. Recently, CAPTEM has had three virtual meetings, only one of which was planned. It was a big success, and Dr. McSween thought they could alternate virtual and face-to-face in the future. However, two committees had to meet virtually, and he was not sure how well those meetings went.

There should be some assessment. Finally, the Team was in the process of incorporating the Antarctic meteorite working group into CAPTEM. The working group had been a standalone group since it also reported to the National Science Foundation (NSF) and the Smithsonian. CAPTEM had determined how to fold it in, but was still waiting for lawyers of the three agencies for their input. Dr. Rall said that the astromaterials curation was not affected by the R&A restructuring, as it is a separate line. Cosmochemistry will be captured and maintained.

Findings

Dr. Luhmann proposed the following findings:

1. The R&A program reorganization and transition needs to be communicated as soon as possible so that people can understand what is happening with existing programs and plan their proposals accordingly.
2. In light of the upcoming senior review process, the extended mission competition is becoming especially acute with Curiosity entering that block. Therefore, the senior review process should be revisited in light of extreme budget pressure, and PSS should be involved in planning for that process.
3. The Discovery AO restart looks very challenging in terms of getting a date. The budget environment does not allow a clear path forward, which is a concern.
4. PSS seeks clarification regarding plans for further Europa mission development in the budget environment.
5. Face-to-face meetings are needed for the AGs and PSS.

Dr. Luhmann said that she would write two-sentence descriptions of each finding. Dr. Green said that in regard to the second finding, it may be that a subgroup of PSS can put together their thoughts so that PSD can act quickly with the senior review process. Dr. Rall said that he would see what was possible under FACA. Dr. Luhmann suggested another conference call in early January, with the AGs having their own calls or otherwise asking their communities for ideas.

Adjourn

Dr. Luhmann adjourned the call at 3:30 p.m.

Appendix A Attendees

Subcommittee members

Janet Luhmann, University of California, Berkeley, *Chair, Planetary Science Subcommittee*
Jonathan Rall, NASA, *Executive Secretary*
Julie Castillo-Rogez, Jet Propulsion Laboratory
Nancy Chanover, New Mexico State University
David S. Draper, Johnson Space Center
Lisa Gaddis, U.S. Geological Survey
Lori Glaze, Goddard Space Flight Center
Christopher House, Penn State
Lisa Pratt, Indiana University
Louise Prockter, Johns Hopkins University Applied Physics Laboratory
Anna Louise Reysenbach, Portland State University
Paul Steffes, Georgia Institute of Technology
Jessica Sunshine, University of Maryland
Donald Yeomans, Jet Propulsion Laboratory

NASA attendees

James Green, NASA HQ, *Director, Planetary Science Division*
Nurul Abedin, NASA
Brad Bailey, NASA
Janice Buckner, NASA HQ
Nancy Chabot, NASA Applied Physics Laboratory (APL)
Barbara Cohen, NASA Marshall Space Flight Center (MSFC)
David Desmarais, NASA Ames Research Center (ARC)
David Eisenman, NASA Jet Propulsion Lab (JPL)
Robert Fogel, NASA HQ
Jeff Grossman, NASA HQ
Lindsay Hays, NASA HQ
Jeff Herath, NASA
Jeffery Hollingsworth, NASA ARC
Dana Hurley, NASA APL
Lindley Johnson, NASA HQ
Gordon Johnston, NASA HQ
Jennifer Kearns, NASA HQ
Mike Kelley, NASA HQ
Rachel Klima, NASA APL
William Knopf, NASA HQ
Melissa McGrath, NASA MSFC
Michael Meyer, NASA HQ
Michael New, NASA HQ
Robert Pappalardo, NASA JPL
Mihir Pathak, NASA
Yvonne Pendleton, NASA ARC
Greg Schmidt, NASA ARC
Gregg Vane, NASA JPL
Richard Vondrak, NASA GSFC
Mary Voytek, NASA
David Young, NASA Langley Research Center (LRC)

Non-NASA attendees

Brent Archinal, U.S. Geological Survey
Bill Bottke, Southwest Research Institute
Ben Bussey, Johns Hopkins University
Stephen Clark, Space Flight Now
Dominick Conte, Millennium Space System
Brett Denevi, Johns Hopkins Physics Lab
Cynthia Dinwiddie, Southwest Research Institute
Rich Dissly, Ball Aerospace
Casey Dreier, PSI
Walt Faultoner, Strategic Space Solutions
Jeff Foust, The Space Review
Timothy Glotch, Stoney Brook University
Kristen Griffin, Northrop Grumman
Candy Hansen, Planetary Science Institute
Marchel Holle, SpaceX
Mihaly Horanyi, University of CO
Thomas Kehoe, University of Central FL
Kurt Klaus, Boeing
Zenaida Kotala, UCF
David Kring, LPI
Gregory Lee, Northrop Grumman
Dan Leone, Spacenews
Dan Lester, University of TX
Jim Lochner, USRA
Mackenzie Lystrup, Ball Aerospace
Bill Mackey, Canadian Space Agency
Jonathan Malay, Lockheed Martin
Mark Matthews, Orlando Sentinel
John McCarthy, Orbital Sciences
Hap McSween, University of Tennessee
Joel Parriott, American Astronomical Society
Jeff Plescia, John Hopkins University
Julie Rathbun, PSI
Allison Rose-Sonnesyn, House Science Committee
Doug Ross, Lockheed Martin
John Rummel, East Carolina University
Cass Runyon, College of Charleston
Elizabeth Sheley, Zantech
Marcia Smith, spacepolicyonline.com
Micheline Tabache, ESA
Anne Verbiscer, University of VA
Cathy Weitz, PSI
Sandra Wiseman, Brown University

Appendix B
Membership Roster

Janet Luhmann, Chair
Space Sciences Laboratory
University of California, Berkeley

Jonathan A. R. Rall, Executive Secretary
Planetary Science Division
Science Mission Directorate
NASA

Julie Castillo-Rogez
Jet Propulsion Laboratory

Nancy Chanover
New Mexico State University

David S. Draper
Astromaterials Research and Exploration Science Directorate
NASA Johnson Space Center

Lisa Gaddis
U.S. Geological Survey

Lori Glaze
Goddard Space Flight Center

Christopher House
Penn State

Lisa Pratt
Indiana University

Louise Prockter
Department of Space Physics
Johns Hopkins University Applied Physics Laboratory

Anna-Louise Reysenbach
Department of Biology
Portland State University

Paul Steffes
School of Electrical and Computer Engineering
Georgia Institute of Technology

Jessica Sunshine

Department of Astronomy
University of Maryland

Donald Yeomans
Jet Propulsion Laboratory

Appendix C

Presentations

1. *Ethics Briefing for Special Government Employees Serving on NASA Advisory Committees*, Katie Spear
2. *NASA's Planetary Science Program Overview*, Jim Green
3. *OPAG Outer Solar System Exploration*, Julie Castillo-Rogez
4. *VEXAG Update to PSS*, Lori Glaze
5. *LEAG Issues*, Jeff Plescia
6. *SBAG Support of Decadal Survey Priorities*, Nancy Chabot
7. *MEPAG*, Lisa Pratt
8. *CAPTEM Current Issues of Concern*, Hap McSween

Appendix D**Agenda****Planetary Science Subcommittee Telephonic and Webex Meeting**

11:00	Welcome, Agenda, Announcements	Luhmann, Green, Rall
11:10	Introductions	All
11:15	Ethics Training	Spear
12:15	PSD Status Update	Green
1:00	GPRA-MA	Kearns/Rall
2:00	GPRA-MA General Discussions	All
2:15	Assessment Group updates/General Discussions	All
	OPAG Report	Castillo
	VEXAG Report	Glaze
	LEAG Report	Plescia
	SBAG Report	Chabot
	MEPAG Report	Pratt
	CAPTEM Report	McSween
3:15	Adjourn	