

**Outer Planets Assessment/Analysis Group
September 16–17, 2010 Meeting
Boulder, CO**

The Outer Planets Assessment Group is a NASA-supported forum for scientists and engineers and other interested parties to discuss exploration of the outer solar system and to enhance communication between the outer planets community and NASA.

OPAG met this last fall for two days (attendance ~65), with a major emphasis on the structure, requirements, and unique aspects of the Announcement of Opportunity (AO) for the Europa Jupiter System Mission (EJSM) – the next large, flagship-class mission to the Outer Solar System, and whose first portion could be released as early as the spring of 2011.

Presentations were heard as follows:

September 16, 2010

Outer Planets Program Update
Curt Niebur, NASA Headquarters

PSS Report
William McKinnon, Washington University

PSD "SR&T" Study
Ron Greeley, Arizona State University

EJSM Joint SDT Report
Ron Greeley, Arizona State University

EJSM AO Overview
Curt Niebur, NASA Headquarters

EJSM AO Steps 1 & 2
Curt Niebur, NASA Headquarters

JEO Project Interactions
Bill Mateer, JPL

PSD Technology Review
Tibor Kremic, NASA GRC

Planetary Sociology
Janet Vertesi, Princeton

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Science Team Structure
Curt Niebur, NASA Headquarters

PSD Update
Jim Green, NASA Headquarters

Draft AO Policies and Plans
Curt Niebur, NASA Headquarters

Planetary Protection
Cassie Conley, NASA Headquarters

Juno Update
Fran Bagenal, UC Boulder

NAI Icy satellites Environments Focus Group
Pat Beauchamp (JPL)

Astro 2010
William McKinnon, Washington University

Japan's Decadal Survey
Robert Pappalardo, Jet Propulsion Laboratory

NASA Balloon Opportunities
Eliot Young, Southwest Research Institute

Given the emphasis on the EJSM mission at the meeting, and the importance of renewed exploration of the Jupiter system to the Outer Planets Research community, our topmost finding concerns this mission.

1) Europa Jupiter System Mission

OPAG strongly supports the joint NASA-ESA mission to the Jupiter system, and urges a timely entry into phase A for the NASA component of EJSM, the Jupiter Europa Orbiter (JEO). OPAG awaits the release of the new Decadal Survey for Planetary Science in March of 2011, and looks forward to the possible release of the Announcement of Opportunity (AO) for JEO instrumentation.

Furthermore, OPAG lauds the substantial work of the of the NASA-ESA Joint Science Definition Team (JSDT) for the Europa Jupiter System Mission, and is especially pleased to see the recent release of the JSDT report.

The EJSM, chosen programmatically by NASA as the result of two competitive scientific, technical, management, and cost review cycles, is OPAG's number one priority for a major new undertaking. Europa is a world of fundamental planetological and astrobiological interest and importance. Nevertheless, OPAG recognizes that any major new undertaking in an era of tight fiscal constraints will not be easy. OPAG will meet the week after the announced release date for the Decadal Survey (March 7, 2011) to consider the details, and to begin to align and adjust its priorities and goals to be consonant with the overall priorities of the Decadal and with the emerging fiscal picture at NASA. Decadal priorities may also include possible Outer Planets missions in the recommended New Frontiers mission set. The scientific importance of continuing to explore the Outer Solar System — as with EJSM — remains paramount.

2) Plutonium-238 Shortage

As in previous OPAG findings, we reiterate the central importance of radioisotope power systems to deep space exploration, especially since Russian sales of the isotope were halted in 2009 (see the NRC McNutt et al. report *Radioisotope Power Systems: An Imperative for Maintaining U.S. Leadership in Space Exploration*).

OPAG continues to express its deep concern over the dwindling Pu-238 supply, and strongly encourages all relevant governmental agencies to explore ways to produce or otherwise make available sufficient plutonium for future outer planets (and other, e.g., astrophysics) missions. OPAG in particular supports PSD efforts to have DOE restart PU-238 production with funds as they are made available.

3) Future Missions Planning and Funding

Curt Niebur (NASA HQ) presented a discussion about a “Future Missions” funding wedge, and listed some possible ideas for the form it might take. OPAG agreed that there is certainly a need for some activities to support future missions. These include focused technology development, focused mission studies, and planetary environment model definition (e.g., radiation models, wind models). The “focus” should be aligned with the findings of the Planetary Science Decadal survey. OPAG found that some other activities may also enhance the efficiency of future missions, for example, a focused effort in astrodynamics that is responsive to future missions identified by the Decadal Survey. Such a “future funding” wedge would be most effective if it at least portions were competed.

Should funding appear for “Future Outer Planets Missions,” OPAG wishes to be kept informed so that it may provide appropriate and useful input to NASA.

4) Supporting Research and Technology (SR&T) Study

OPAG heard from Ron Greeley (ASU) a detailed discussion of the PSS Supporting Research and Technology study. SR&T activities are obviously critical in enabling the strategic goals of the Planetary Science Division (PSD) to be met. PSS has initiated a study of the SR&T and related activities to assess program relevance and effectiveness, and to suggest possible improvements in program management. The study results will lead to recommendations to the PSD Director through the NAC Science Committee in late summer 2011. Input was sought from the broader planetary science community in the fall of 2010, with presentations at major planetary meetings (e.g., DPS).

OPAG supports this important activity. Some anecdotal testimony was offered from the floor that indicated that the level of funding for scientific analysis (e.g., number of post-docs & graduate students per instrument teams) has declined and that the pressure on Data Analysis Programs has increased.

OPAG encourages the PSS SR&T working group, as part of its overall valuable work, to evaluate the funding of scientific research funded via missions – and how it may have changed over time (e.g., from Voyager to Galileo to Cassini). OPAG also reiterates (from the findings of the January 2010 meeting) its recommendation that the SR&T Working Group evaluate the role of Co-Is/Interdisciplinary Scientists/Participating Scientists on long-duration missions (such as Cassini) and provide recommendations for future long-duration missions such as the next Outer Planets Flagship.

5) Planetary Science Technology Review Panel

OPAG heard a report from the PSTR Panel chair, Tibor Kremic. Technology development and strategy are clearly key to future exploration of the Outer Solar System. OPAG prepared an extensive white paper for the Decadal Survey on Outer Solar System technology needs (P. Beauchamp, lead author). The goal of this activity is to assist PSD in developing a coordinated and integrated technology development plan that will better utilize technology resources.

OPAG strongly supports the work of the Planetary Science Review Panel, and welcomes its interim report and recommendations, and looks forward to its final report this year, after the Planetary Decadal Survey is released.

6) Outer Planets Research Program (OPR)

The Outer Planets Research program (OPR) is a critically important funding source that supports diverse scientific investigations that contribute to the understanding of the outer Solar System, including the giant planets, their satellites, and smaller solid bodies including comets, asteroids, and the Kuiper belt. The program includes both data analysis from NASA missions and fundamental research. This program is heavily over-subscribed, with 2009 seeing 126 proposals submitted and an 18% selection rate, and similar rates for the previous 4 years. There has clearly been strong and sustained proposal pressure from the community.

OPAG encourages NASA to adjust R&A funding to increase the OPR program's selection rate. This will permit continued high quality work to be accomplished, while reducing the burden of proposing and review.

7) Planetary Protection in the Outer Solar System

OPAG heard a detailed discussion of past and present studies of planetary protection, especially as it relates to Europa, the Juno mission, and EJSM (Cassie Conley, NASA HQ). The first meeting of NRC's Committee on Planetary Protection Standards for Icy Bodies in the Outer Solar System will be held in January 2011.

In light of greatly increased understanding of Europa and its environment (e.g., in the Space Science Series book *Europa*), OPAG supports responsible reevaluation of the planetary protection requirements for Europa exploration.

8) Data Release and Validation from EJSM

Although seemingly a ways off, there was an extensive discussion of the data release policies for EJSM/JEO, as these need to be established early, and there was no shortage of opinions.

To summarize the discussion, most agreed that a ≤ 6 month data validation period (as measured by release to PDS) would be acceptable, provided sufficient resources are available. For the Europa orbital campaigns, however, demands on science and mission operations would be such that longer data validation periods will likely be necessary, but probably no longer than 9 to 12 months. If sufficient resources were made available, this data validation period could be shortened. For quick public release, timeliness is the goal:

For data or data sets of special public interest, rapid public release of even raw or non-validated data is highly desirable, and OPAG recommends that this should be a factor in instrument selection.

9) Sociology of the JEO Team

OPAG heard an extensive presentation by Janet Vertesi (Princeton) on “planetary mission sociology,” based on her study of and interviews with the MER and Cassini teams. An extensive and animated discussion followed.

OPAG supports studies of planetary mission sociological dynamics. Given the likely duration and complexity of any future Outer Planets flagship mission, OPAG supports PSD efforts to have the EJSM/JEO mission team embrace “1) collaboration, 2) openness, and 3) service” as keys to maximizing mission success.

10) Outer Solar System Science on the International Space Station (ISS)

As discussed by Ron Greeley (ASU), PSS has been asked to provide input as to potential utilization of the ISS by Planetary Science. As has been articulated previously (such as in the 2003 NRC Report *Factors Affecting the Utilization of the International Space Station for Research in the Biological and Physical Sciences*), there are some but limited *planetary science* activities that that could be done on the ISS (for example, low-spatial resolution UV imaging).

OPAG notes that ISS science activities (Outer Planets related or not) would likely incur substantial costs, and recommends that any such future activities be prioritized within the broader context of the results of the Planetary Decadal Survey.

The next OPAG meeting will be held March 17-18 in the Metro DC area.