OPAG Responses to AO RFI
RPS-Related Submissions

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Lessons Learned from Recent Planetary Science Division Announcements of Opportunity NNH13ZDA014L

- In anticipation of the next AOs for the Discovery and New Frontiers Programs, NASA seeks information from the scientific and mission management community on perceptions of the distinctive features of the three recent AOs.

- The issue addressed may be common to all of the AOs, some of them, or relevant to only one of them.

- There is no limit on the number of responses that an individual or institution may submit.
Lessons Learned from Recent Planetary Science Division Announcements of Opportunity NNH13ZDA014L

- The response must contain the following information:
  - Name of submitter and contact information (institutional affiliation, email address);
  - A clear and concise statement of the issue addressed;
  - An articulate and compelling rationale for why the chosen issue would be significant to a wide range of proposers;
  - A discussion of the impact of not resolving the issue;
  - Suggested pathway(s) to resolve the issue; and,
  - A discussion of the potential impacts of the suggested solution(s).
RPS Issues
Summary

- Continued Support of ASRGs
- Mitigate Cost of RPS Systems
- Incentive Improvements for Technology Infusion
Continued Support of ASRGs

THE CONCERN (1 of 2):

• OPAG strongly endorses NASA’s desire (as stated by J. Green) to offer ASRGs as GFE in the next Discovery AO. Although future prospects have changed in a number of ways for NASA planetary science, we believe that encouraging use of ASRGs remains very much in the best interest of both NASA and OPAG and other planetary science advisory groups.

• The use of ASRGs in the next Discovery opportunity could be the best and only chance for a NASA mission to be active in outer Solar System before 2030 or later, ending the radio silence from the outer Solar System expected to begin in 2017 with the end of the Cassini and Juno missions.
Continued Support of ASRGs

THE CONCERN (2 of 2):

- A major part of the rationale for ASRGs was the scarcity of Pu-238 (Vision and Voyages, p. 307). The scarcity of Pu-238 may be considered less critical today than in 2011. However, we consider continued support for ASRGs to remain critically important because:

  - Decadal Survey recommended missions depend heavily on ASRGs, and waiting 8 years for the next Decadal Survey before proceeding with new mission concepts is undesirable.
  - ASRGs are considerably less massive per watt than traditional RTGs. Mass is a major cost constraint, key to success in Discovery, especially when the destination is distant. Mass has multiple cost multipliers: the mass of the system itself is one element, but that also drives up the dry mass of the supporting structures, the propellant mass needed, and the launch vehicle capability that is required. Lower mass spacecraft can take more direct routes to their destinations, reducing cruise time and cost, eliminating special maneuvers like planetary gravity assists, and extra thermal challenges such as use of Venus for a gravity assist, or the public relations challenge of using Earth for a gravity assist with a nuclear payload. A number of mission concepts proposed in Discovery 2010 and in the 2011 Decadal studies are not viable without ASRGs, because alternates such as MMRTGs are too heavy and expensive.
  - There seems to be uncertainty about the availability and power density of old stocks of Pu-238, and about the cost of producing new Pu-238. ASRGs certainly provide NASA with much more flexibility in dealing with this challenge, even if it might not be as compelling as it seemed a few years ago.
Continued Support of ASRGs

SUGGESTED SOLUTIONS:

- Continue to fully support and encourage the use of ASRGs for the next Discovery AO.
- In other words, we fully support NASA’s current plan, and urge that it not be weakened.
Continued Support of ASRGs

**IMPACT OF NOT RESOLVING ISSUE:**

- If an ASRG mission is not flown soon, paving the way for future ASRG missions, there is little hope for a new mission start to the outer Solar System via Discovery or New Frontiers in the next decade (and perhaps beyond), except perhaps a solar powered mission to Jupiter.

- Exploration of the outer Solar System will depend largely on the vanishing Flagship class of missions.

**POTENTIAL IMPACT OF THE SUGGESTED SOLUTION:**

- Use of ASRGs on the next Discovery mission (to any destination), will blaze the trail for many potential exciting low-cost PI-led missions, especially to the target rich outer Solar System.
Mitigate High Cost of RPS Systems

THE CONCERN:

- There are many potential planetary missions that require use of Radio-isotope Power Systems (RPS), including all that would venture beyond Jupiter.

- The cost of such power systems severely limits what can be proposed under the Discovery program, and impacts New Frontiers as well.
Mitigate High Cost of RPS Systems

SUGGESTED SOLUTIONS:

- In the Discovery and New Frontiers programs, supply any allowed RPS (e.g. ASRG or eMMRTG) as Government Furnished Equipment, along with associated costs such as those for NEPA.
Mitigate High Cost of RPS Systems

IMPACT OF NOT RESOLVING ISSUE:

- Without affordable RPS systems, exploration beyond Jupiter will be limited to Flagship-class missions and some New Frontiers missions.

POTENTIAL IMPACTS OF THE SUGGESTED SOLUTION:

- Providing radio-isotope power systems and associated costs as GFE will enable Discovery-class missions to the outermost solar system, and will increase the reach of the New Frontiers program.

- To maximize the presence of the outer solar system in competed missions, it is therefore important to offset the costs of any allowed RPS.
Incentive Improvements for Technology Infusion

THE CONCERN:

- OPAG supports incorporating NASA-developed technologies into mission concepts, as they can significantly expand the horizons and capabilities of NASA mission programs.

- Currently, however, incentives for NASA-developed technology do not work as planned.
  - The technology incentives offered need to be sufficient to offset increased system costs and any perceived increased risk and cost risk of incorporating newly-developed technologies.
  - Technologies offered must be at the requisite TRLs in time to support the timelines of the missions being solicited.
  - The use of NASA-developed technologies should be considered if the proposal demonstrates that its use is appropriate and improves the mission, with or without requiring the technology be enabling.
Incentive Improvements for Technology Infusion

SUGGESTED SOLUTIONS:

- Ensure that incentives cover increased cost and risk
- To mitigate risk concerns, require and demonstrate that NASA-developed technologies offered in the AO are at TRL levels equal to if not greater than those the proposers must demonstrate for any components of the proposed spacecraft.
- Relax the requirement that the technology be enabling for non-nuclear new technology
Incentive Improvements for Technology Infusion

IMPACT OF NOT RESOLVING ISSUE:

• Lack of technology development and demonstration is leading to significant delays in the availability of new technologies.

• The requirement that the new technology be enabling limits their use to missions that are already at the edge of what's feasible and may make it more likely that such missions are perceived as being too risky for selection.

• If the technology incentives are not ready, then significant time will be wasted by the community in preparing and reviewing proposals.
Incentive Improvements for Technology Infusion

POTENTIAL IMPACTS OF SUGGESTED SOLUTIONS:

• More opportunities for demonstration of NASA-developed technologies, especially with the current limited cadence of mission opportunities.

• More rapid availability of new technologies to NASA and the community.