

**Call for Proposals**  
**2020 Planetary Mission Senior Review Science Evaluation**  
**February 28, 2020 -- Final**  
**April 16, 2020 -- Revised v2**  
**June 1, 2020 -- Revised v3**  
**October 9, 2020 -- Revised v4**

**I. Overview**

The Planetary Science Division (PSD) conducts periodic Senior Reviews to evaluate extended mission proposals. In the past, these reviews were held every two years. Now, in accordance with new guidance, the Senior Review cadence is every three years. NASA conducted a Planetary Mission Senior Review (PMSR) of six operating missions in May 2019. Several missions were exempt from the 2019 review either because they were still in their prime- or extended-mission science phase, or they were before their estimated completion date of download of science data from the spacecraft. As a result, PSD intends to conduct a gap-filler PMSR in 2020 to resynchronize these missions with our now normal three-year cadence of review.

PSD will hold its next PMSR in late 2020 to evaluate proposals for extended missions planning to operate in FY21 through FY22. Missions that have arrived at a target destination by the end of FY19, and which plan to complete prime operations and downlink before the end of FY20, will be subject to this review. Missions that do not meet these criteria, or have been previously approved through their end of mission, may be subject to the 2022 PMSR. This draft guideline narrative, and the final guideline narrative, will be posted on the Lunar and Planetary Institute (LPI) website at <http://www.lpi.usra.edu/>.

A presentation based upon the “Memorandum For The Record: Plan For The 2020 Planetary Mission Senior Review” was given to the Science Mission Directorate (SMD) Senior Leadership on Tuesday, December 17, 2019. Upon the recommendation of the Planetary Science Division (PSD) Division Director (DD), and the concurrence of the SMD Associate Administrator (AA), the 2020 PMSR will assess the science merits and performance of the following two missions:

- Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSight)
  - Extended mission proposal to cover period FY21-22, plus closeout in FY23.
- Juno
  - Extended mission proposal to cover period FY21 through end-of-life, as per PSD Division Director, to account for expected mission degradation due to ongoing exposure to Jupiter’s electromagnetic environment. For budgetary planning purposes, the mission should assume end-of-life in FY25.

There are two missions that are not subject to this special PMSR. These missions are:

- New Horizons – Extended Mission–1 ends in 2021, but maintenance of the Deep Space Network (DSN) Canberra 70m station delays completion of data downlink until late 2022. New Horizons will be given an extension through September 2022 and will be subject to the 2022 PMSR.
- OSIRIS-REx – Prime mission ends late 2023 with sample return to Earth, and will be subject to the 2022 PMSR.

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PSD will contract with Arctic Slope Technical Services (ASTS) and NASA Research and Education Support Services (NRESS) for the review process. This includes the use of the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES, <http://nspires.nasaprs.com/external/>) for proposal submission, and the assembly of Subject Matter Experts (SMEs) for the two PMSR 2020 panels. The SME membership will consist of leading authorities with relevant expertise in science, engineering, mission operations and data archiving drawn from government, academia, independent researchers, and industry. To ensure a fair review, each mission may provide NASA with a list of up to three ‘blacklist’ reviewers they believe could be biased.

Each of the two missions subject to the PMSR will submit proposals describing up to three options for extended mission operation (as described in Section III, below). Submitted proposals will be evaluated for scientific merit and technical capability by the independent SME panels, which will provide written questions to the mission teams after proposal submission. The mission teams will answer these questions at an oral review.

### **II. New Mission Requirements**

A coordinated cross-divisional effort in 2019 within SMD through its Strategic Data Management Working Group (SDMWG) resulted in the addition of several new requirements on all missions. These requirements are documented in the “Strategy for Data Management and Computing for Groundbreaking Science 2019-2024” and other documents. As applicable to the PMSR, the new requirements are as follows:

1. The project must archive all science data to NASA’s Planetary Data System (PDS).
2. The proposal must include a plan to place new mission science analysis code and algorithms developed for the proposed investigations into an open repository (SDMWG Recommendation 2a-2b).
3. The proposal must include an up-to-date Project Data Management Plan (PDMP).
4. The proposal must include a plan to maintain security updates and patches on its mission operations and ground data system. If the mission uses any components of NASA’s Advanced Multi-Mission Operations System (AMMOS), the flight project must accept security updates and patches for those components as issued by the AMMOS Program Office, Multi-Mission Ground Systems Services (MGSS) Office.

### **III. Budget Guidelines and Mission Options**

Through interaction between the mission and NASA PSD, three sets of funding scenarios will be set. These scenarios will be defined as follows:

1. High. Acquire high-quality science data in an extended mission consistent with the spacecraft and mission team’s capabilities and operations during the nominal mission.
2. Medium. Acquire data at a level between that of High and Low.
3. Low. Acquire data consistent with the lowest combination of science and budget for a minimally viable science mission.

Missions should work with their assigned NASA PSD program executive and program scientist to set these funding levels and the associated science content of each of the scenarios. Each proposal must address at least the Medium and Low scenarios; the High scenario is optional.

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For missions that terminate during the extended-mission timeframe, missions should assume up to six months of funding for science evaluation and closeout at the end of the final approved mission extension. The budget to support this closeout should be included in the proposal.

### **IV. Proposal Content**

The proposal is to focus on updates to the mission in the extended phase, emphasizing the science, assuming the current state of spacecraft and instrumental health and predicted degradations.

Each proposal is limited to 40 pages, on 8.5" x 11" paper, with 1" margins. Multiple-page foldouts are counted as multiple pages. Font for the main text and captions must be 12-point or larger. For text within figures and tables, the font size must be judged to be legible to reviewers without magnification above 100%. Expository text necessary for the proposal may not be located solely in figures or tables, or their captions.

- Title Page (not in page limit)
- Table of Contents (not in page limit)
- Executive Summary
- Current Mission Status
- Historical Accomplishments (including table in Appendix A, Table 1).
  - Missions should provide evidence of completion of their mission Level 1 requirements for the prior prime or extended phase, or an explanation of requirements still to be completed.
- Proposed Mission Objectives
  - Science Objectives
    - Importance of mission instruments to achieving the objective(s)
    - Opportunities for acquiring scientifically unique data sets
    - Degree to which this proposed mission extension advances the scientific objectives of the Decadal Survey(s)
  - Programmatic Objectives
    - Relevance or benefit to other NASA missions, or other NASA operational or programmatic priorities, if applicable
- Technical Plan to Meet Objectives
- Science Traceability Matrix
  - Science goals and objectives, associated measurements, relevant instruments, and mission constraints. Matrix or Matrices must clearly distinguish between High, Medium, and Low scenarios.
- Management Plan
  - Project Organization and roles of key personnel
  - Deliverables
  - Schedule
  - Risk Analysis and implications for operations and science
- Summary of past archiving and performance with the PDS
- Summary of data usage by the broader community, including PDS or other usage statistics
- Open Source Code/Algorithm Plan
- Mission Operations and Ground Data System Maintenance Plan
- Personnel Development Plan (\*)
- Budget, including separate science and operations totals. Budgets must clearly distinguish between High, Medium, and Low scenarios.

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An appendix (no page limit) should be included, consisting of:

- Acronym List
- References
- List of publications where primary author is on project team, with table listing total publication counts per year
- List of publications from those outside the team, *i.e.*, the primary author is not on the team, with table listing total publication counts per year
- Project Data Management Plan (PDMP)
  - The PDMP should follow the same format as each mission's current PDMP: "Juno Science Data Management and Archive Plan" (26-Aug-2009), or "InSight Archive Generation, and Transfer Plan" (16-Aug-2017). The PDMP should be updated to reflect each mission's current status and practices, and describe data management through proposed mission closeout.
- 'No Odyssey' backup plan (InSight only, 5-page limit)

*(\*) The Planetary Science Division has a strong interest in developing the leadership and management skills of scientists who aspire to be candidates as Principal Investigators, Project Scientists, or instrument PIs on future missions. Given the long duration of most planetary missions and the infrequent opportunities, it is highly desirable that developmental and experiential activities for such persons be incorporated into the planning and decision processes for extended missions. To support that goal, the proposals for extended missions are encouraged to include plans for providing experience and developing skills for one or more aspiring mission Principal Investigators and/or Project Scientists to prepare them to potentially lead future missions. The proposing PI is expected to act as a mentor for those individuals and/or identify other appropriately experienced individuals to act in that role.*

### **IVb. Proposal Content - Exclusions**

In 2015, SMD changed how it structures education, communication, and public outreach activities: education partners are selected through a Science Education Cooperative Agreement Notice and communication activities are now split from education and public outreach. The new policy is described in "Policy and Requirements for SMD Communications for Flight Missions (SPD-26)." Missions that are granted extensions under this PMSR may be subjected to a separate SMD Education review at a later date. Education and Communications plan are not being evaluated as part of the PMSR. Information on education and communications contained in the PMSR Call for Proposals are intended as a "heads up" in anticipation of that review.

### **V. Oral Presentation**

The presentation for each mission will be structured as follows:

- 15 minutes for extended mission proposal overview
- 5 minutes for updates since submission of the proposal
- 60 minutes to respond to SME panel written questions
- 30 minutes for SME panel deliberation (Flight Project not present)
- 30 minutes for additional oral Q&A as needed

The review will be restricted in attendance and not open to the public. The review is not intended to provide a full oral presentation of the proposal contents.

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The mission teams must supply NASA with a complete list of presenters in advance of the presentation.

### **VI. Schedule**

The following schedule is planned for the 2020 PMSR (all dates 2020):

- |  |  |
|--|--|
| ● Draft Call for Proposals issued:                             | January 30   |
| ● Comments due from Project Offices for missions under review: | February 21  |
| ● Distribution of Final Call for Proposals:                    | February 28 (original)<br>April 16 (revised v2)<br>June 1 (revised v3) |
| ● Projects provide list of presenters to PSD:                  | July 31 *  |
| ● Proposal submissions to NRESS:                               | September 30   |
| ● Questions from panels to Project Offices:                    | October 30   |
| ● Oral presentations:  | Week of November 16  |
| ● Panel findings due to PSD:                                   | December 1   |
| ● NASA response and direction to Projects:                     | December 18  |

\* Changes to the list of presenters may be made after this date with concurrence of PSD.

### **VII. Evaluation Criteria**

Proposal evaluations will be used with other inputs by PSD management to optimize the mission portfolio to balance science return and programmatic value with available budget. The proposal must be consistent with the operational capability of the spacecraft and instruments. Any science degradation due to spacecraft/instrument degradation should be described in order for the panel to accurately evaluate the science merit of the proposed tasks. The criteria will be assessed against each budget option proposed.

Proposals will be evaluated based on factors related to both the proposed extended mission plan, and the performance of the mission and team in the previous cycle. The specific evaluation criteria to be used are as follows.

#### **Primary Criteria:**

- Scientific impact of the mission's proposed investigations
- Scientific productivity of the mission team
- Responsiveness of the mission to PSD and NASA goals as described in the 'decadal surveys' in effect at the time of mission selection through present; i.e., "New Frontiers in the Solar System: An Integrated Exploration Strategy" (2003) and/or "Vision and Voyages for Planetary Science in the Decade 2013-2022."
- Capability of spacecraft and instrument suite to achieve proposed science.
  - This review will not evaluate operational capability of the spacecraft, but assumes that the current capabilities will persist through the end of the review period of performance, except for known limitations (e.g., fuel, instrument degradation).
- Past performance in archiving data to the Planetary Data System (PDS).

#### **Secondary Criteria:**

- Extent to which the science community beyond the mission science team utilizes data and conducts research.

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- Cost reasonableness and realism
  - Quantitative “science per dollar” is not an evaluation criterion; however, the qualitative science “value” (e.g., “high”, “low”) will be assessed by the review panel based on the science merit criteria.
- Opportunities for promoting new personnel within the mission team (e.g., transition for aspiring PI/PS).
- Plan to place new mission science analysis code and algorithms into an open repository.
- Plan to implement security updates and patches, including those issued by NASA’s Advanced Multi-Mission Operations System (AMMOS) for all AMMOS components used by the flight project.

### **VIII. Communications Plan**

The “Memorandum For The Record: Plan For The 2020 Planetary Mission Senior Review,” the 2020 PMSR ToR, and the Call for Proposals will be posted on the Lunar and Planetary Institute (LPI) website.

All decisions will be briefed to the SMD Associate Administrator and others, as appropriate based on the decisions made, before direction is provided to missions.

The Planetary Science Division Director will issue direction to each mission. For those missions that are granted mission extensions, a plan and budget will be approved for the extended mission period, with preliminary direction for future years. The missions will be provided with a Letter of Direction containing decisions and directions. The mission’s SME evaluation will be attached.

The PMSR final report will be posted on the LPI website. The individual SME evaluations of each mission may be posted at the discretion of the Division Director. The final report and SME evaluation will be given to each mission in advance of their public posting.

The Planetary Science Division Director will approve a white paper on "NASA's Response to the 2020 Planetary Mission Senior Review." The NASA response will be posted on the LPI website.

If any missions are proposed for termination, a communication plan will be established with Agency leadership, the Office of Communications, the Office of Legislative Affairs, and other stakeholders.

For questions during the proposal process, please contact PMSR Program Executive William Knopf at William.knopf-1@nasa.gov or (202) 358-0742.

### **XI. Additional guidance for InSight mission**

The InSight mission currently relies on NASA’s Mars Odyssey for data relay. The mission should nominally assume that Mars Odyssey will be available as a relay asset during the extended mission. However, the mission may include a ‘No Odyssey’ backup plan to describe the changes to the science, operations, and budget in the event that Odyssey is not available.

### **X. Referenced Documents**

1. W. Knopf. “Memorandum For The Record: Plan For The 2020 Planetary Mission Senior Review.” Presentation to the NASA SMAC, 17-Dec-2019.

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2. NASA Strategic Data Management Working Group. "Strategy for Data Management and Computing for Groundbreaking Science 2019-2024". 17-Dec-2019.
3. National Academy of Sciences. "New Frontiers in the Solar System: An Integrated Exploration Strategy." 2003.
4. National Academy of Sciences. "Vision and Voyages for Planetary Science in the Decade 2013-2022." March 2011.
5. K. Erickson. "Policy and Requirements for SMD Communications for Flight Missions." SMD SPD-26.

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Appendix A: Format for tables of Accomplishments and Objectives

Table 1. Historical Accomplishments and Extended Mission Science Objectives

#	Objective	Accomplished	New to Extended Mission	Comments
1		Y/N	Y/N	
2				
3				

This table should include science objectives from the nominal mission and from the proposed extended mission.

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Changes from Draft (January 30, 2020) to Final (February 28, 2020):

- Clarified requirements for page limits and font.
- Changed timeline so that missions that end in FY22 may finish closeout in FY23.
- List of presenters may now be changed after submission, with concurrence from NASA.
- Evaluation criteria are separated into Primary and Secondary categories.
- In-person review date shifted one week earlier, to avoid possible conflict with Mars 2020 launch window.
- Removed language relating to archiving of real-time data.
- Science objectives may address goals in decadal survey in effect at time of mission selection, in addition to current decadal survey.
- Requirement to place code and algorithms into an open repository only applies to newly developed science code.
- Requirements for PDMP updated from placeholder.
- Minor changes to Table of Accomplishments and Objectives.
- Minor wording and formatting changes.

Changes from Final (February 28, 2020) to Revised v2 (April 16, 2020):

- Updated calendar as per revised proposal deadline.
- Minor wording changes.

Changes from Revised v2 (May 29, 2020) to Revised v3 (June 1, 2020):

- Rewrote section III Budget Guidelines and Mission Options.
- Added section XI with guidance for Mars InSight / Odyssey relay planning.
- Minor changes to other portions of document to reflect above changes.

Changes from Revised v3 (June 1, 2020) to Revised v4 (October 9, 2020)

- Changed deadline for delivery of panel findings to NASA.