

C.30 PLANETARY MISSION CONCEPT STUDIES

NOTICE: Amended March 13, 2019. The wording regarding the evaluation of Merit and Relevance in Section 3.1 Proposal Evaluation, have been updated to remove redundancy and more clearly explain the factors for peer review. New text is in bold and deleted text is struck through. Mandatory NOIs are now due by April 1, 2019, and the due date for 15-page proposals is May 31, 2019.

Amended on February 20, 2019. This amendment creates a new opportunity in ROSES-18 in this program element, C.30 Planetary Mission Concept Studies. Any new information that comes out of or questions sent to the NASA point of contact will be posted in a FAQ on the NSPIRES web page for this program element. ~~Mandatory NOIs are due by March 22, 2019, and the due date for 15-page proposals is May 21, 2019.~~

1. Scope of Program

NASA has started preparations for the 2023 Planetary Science Decadal Survey and one of the tasks of the 2023 Decadal Survey Committee will be to recommend a portfolio of planetary science missions. The Decadal Survey Committee may choose to recommend a portfolio of missions containing a mix of prioritized large- and medium-size mission concepts, or even a program of competed medium-size missions. The Decadal Survey will not be asked to prioritize missions in the Discovery and SIMPLEx Programs. NASA and the community are interested in providing appropriate input to the 2023 Decadal Survey regarding medium/large-size mission concepts.

To this end, NASA is soliciting 15-page proposals to conduct mission concept studies in planetary science. Following review of the proposed mission concept studies, NASA will select a small number of proposals for funded studies. Results of the selected studies will be provided by NASA as input to the 2023 Decadal Survey.

These planetary missions are envisioned to have a cost greater than a Discovery mission cost cap (Discovery FY19 cap cost \$500M Phases A through D) not including launch costs. Proposals for concept studies may envision missions that include contributions from other agencies (national or international), industry, and universities.

Should NASA choose to develop a mission that flows from any selected mission concept study, the responsibility for that mission will be assigned by NASA; there is no expectation that the mission concept study team or participating organizations will necessarily participate in the eventual mission development.

2. Planetary Science Investigation Goals

This program element solicits proposals for mission concept studies that address NASA's planetary science objectives, which are to ascertain the content, origin, and evolution of the Solar System and the potential for life elsewhere. These objectives are discussed in more detail in the 2014 NASA Science Plan available at <https://science.nasa.gov/about-us/science-strategy/>. To further identify relevant topics,

proposers should also refer to the *Vision and Voyages (V&V)* decadal survey report available at <https://www.nap.edu/catalog/13117/vision-and-voyages-for-planetary-science-in-the-decade-2013-2022>, the Committee on Astrobiology and Planetary Sciences (CAPS) report, *Getting Ready for the Next Planetary Science Decadal Survey* available at <https://www.nap.edu/catalog/24843/report-series-committee-on-astrobiology-and-planetary-science-getting-ready> ; as well as the recent Planetary Science Division Mid-Term report, *Visions into Voyages for Planetary Science in the Decade 2013-2022: A Midterm Review*, available at http://sites.nationalacademies.org/ssb/currentprojects/ssb_177619.

In order to advance the objectives outlined in the Science Plan, V&V decadal report, and the CAPS report, proposed investigations may target any body in the Solar System. Proposers are also encouraged to review the list of recent studies provided in the CAPS report. Investigations of Earth, the Sun and extrasolar planets are not solicited in this program element.

3. Programmatic Information

The goal of the Planetary Mission Concept Studies element is to develop scientific, technical, and cost information to be used as input to the 2023 Decadal Survey. The selection of mission concepts will be driven by scientific merit, as well as likely technical feasibility and cost realism of the mission concept that is studied.

Proposers are reminded that, as stated in Section III(a) of the *ROSES Summary of Solicitation*, NASA recognizes and supports the benefits of having diverse and inclusive scientific, engineering, and technology communities and fully expects that such values will be reflected in the composition of all proposal teams as well as peer review panels (science, engineering, and technology), science definition teams, and mission and instrument teams. The characteristics of a successful team include a talented, diverse, multi/inter/trans-disciplinary, and fully integrated team to execute the concept study.

NASA is invested in attracting, developing, and leveraging the full spectrum of intellectual talent in the country.

3.1 Proposal Evaluation

As stated in the [ROSES Summary of Solicitation](#) Section VI (a) and the NASA [Guidebook for Proposers](#) proposals are ordinarily evaluated on three criteria: Intrinsic Merit, Relevance, and Cost.

The evaluation of Merit will include:

- The scientific merit of the science goals of the mission concept proposed for study,
- The scientific merit and quality of the planned study,
- The scope of the proposed concept and its justification as a mission of greater cost and complexity than can be completed within the Discovery cost cap
- The value of the proposed study given any previous or ongoing (e.g., large mission concept) mission concept studies (proposers are encouraged to review the list of recent studies provided in the CAPS report),

- ~~The relevance of~~ **How effectively** the proposed mission architecture(s), instrumentation, and technologies ~~to~~ **would address** the proposed scientific objectives. ~~as well as~~
- The breadth of proposed mission architecture(s), instrumentation, and technologies to be considered as part of the study, and
- The evaluation of the Qualifications, Capabilities, and Experience of Personnel includes: the extent to which the proposed team assembles the broad, deep and diverse mix of expertise and talent needed to enable an objective approach to developing a mission design that meets the science objectives of the proposed mission concept.

The evaluation of relevance will be based on:

- The relevance of the proposed mission concept to the scientific goals of the Planetary Science Division, as described above (Section 2),
- ~~The relevance of the proposed mission architecture(s), instrumentation, and technologies to the proposed scientific objectives as well as the breadth of proposed mission architecture(s), instrumentation, and technologies to be considered as part of the study.~~

The evaluation of cost will be based on the ~~realism and~~ reasonableness of the proposed budget.

A budget for utilizing the NASA Design Laboratories will be held by NASA and will be provided by NASA directly to JPL, GSFC or APL; the cost of these studies should not be included in the proposed budget.

3.2 Proposal Guidelines

The 15-page proposals submitted in response to this solicitation must address the science objectives noted above in Section 2. If a proposed investigation can, without any additional cost or additions, address other science goals in the NASA Science Plan, they may be briefly discussed as secondary science objectives.

As a modification to the components of the Scientific/Technical/Management section of proposals given in Table 1 of the [ROSES Summary of Solicitation](#) and Section 3.7 of the [NASA Guidebook for Proposers](#), submissions to this program element must also include the following additional items in that same section:

1. A clear description of the scientific objectives and how these are met by the proposed science investigation(s), measurements, and capabilities supported by the mission concept and how they relate to NASA's strategic objectives in planetary science. In addition, the relationship of the proposed science investigation to the present state of knowledge in the field, to the current readiness of needed technologies, and to any other relevant missions currently operating or under development, and synergies with current and future missions, should be addressed;
2. A clear description of the current readiness levels for mission critical technologies, especially those not currently under development at NASA, and the rationale supporting the stated readiness levels in the proposal, including, where possible, laboratory or field demonstrations of the technologies;

3. A sound justification for why a mission that is larger than Discovery-size is required to address the science goals;
4. Explicit description of how the mission concept science goals relate to NASA's objectives in Planetary Science.
5. For mission concepts already studied in the past or ongoing, a robust justification of the value of the proposed additional study;
6. A detailed management plan and schedule, including a statement of work to be undertaken over the proposed period of performance.

If studies include proposed contributions to the mission concept from other agencies, industry or academia, they must include at least one Co-Investigator (Co-I) from each institution or agency envisioned as making a contribution. Research conducted by team members affiliated with foreign organizations (e.g., Co-Is at foreign institutions) must be performed on a no exchange of funds basis. See section III(a) of the [ROSES Summary of Solicitation](#).

In recent years, NASA has conducted detailed studies of mission concepts (e.g., refer to section 2). Proposals addressing these areas are required to state very clearly what the value of an additional study will be over those already conducted by NASA.

3.3 Proposal Format

Table 1 within the NASA ROSES solicitation provides a checklist of required information to be included in proposals. All proposals submitted to ROSES must strictly conform to the formatting rules outlined in Section IV(b)ii of the [ROSES Summary of Solicitation](#). Proposals that violate the rules may be rejected without review or declined following review if violations are detected during the evaluation process.

3.4 Additional NASA-funded Services for selected concept studies

3.4.1 *NASA Design Laboratories*

During the concept study's period of performance, study teams may request the technical assistance of the design laboratories at the Jet Propulsion Laboratory (JPL), Goddard Space Flight Center (GSFC), or the Johns Hopkins University Applied Physics Laboratory (JHU APL). These laboratories will provide space system analysis and development of conceptual designs, including:

- design of spacecraft, science instrument(s), and their interface;
- full end-to-end studies of an entire mission concept, including its system/subsystem concepts, requirements, and possible trade-offs;
- focused studies of only part of a proposed mission;
- independent assessments of investigator-provided studies/concepts;
- preliminary cost estimates; and
- new technologies and risk assessments.

Any team contemplating the use of any of these design laboratories should plan for 2-3 weeks laboratory runs and must include that intent in the body of the proposal and specify their preference, for NASA planning purposes. Once the selections are finalized, NASA will work with the study laboratories and identify the final pairing between laboratories and selected proposals. A budget for utilizing these facilities will be held by

NASA and will be provided by NASA directly to JPL, GSFC or APL; the cost of these studies should not be included in the proposed budget. Please direct questions to the point of contact in Section 4, below.

3.5 Reporting to NASA

Periodic status quad charts to NASA will be required of those selected. A template and schedule for the quad chart will be provided by NASA after selections are made.

3.6 Community Workshop and Final Report

The proposal must include plans for presenting findings at a workshop to be held towards the end of the study. Assume for planning purposes that this will occur at a workshop at the March, 2020, meeting of the LPSC. The final concept study report will be made publicly available. The final report should include: science case and measurement(s) requirements, mission concept/architecture and instrument design concept, technologies involved, a technology gap and maturation roadmap that describes how enabling technologies should be developed (including estimated costs and schedules), data handling needs, implementation risks, deployment process and launch vehicle constraints, operations concept, and cost estimate. If the concept requires technology currently below TRL 5, the proposal should estimate the cost to get to TRL 5 and assume that maturation cost would be funded outside of the mission cost. (STMD, MATISSE, IRAD, or equivalent)

3.7 Award Type and Budget

The total budget available for this solicitation is ~\$1M. The planetary Science Division anticipates that it will select ~10 proposals with budgets in the range of ~\$100K - \$150K. NASA has separately budgeted the cost of design laboratory runs and final cost assessment (see Section 3.4).

Consistent with the default guidance in the [Planetary Science Research Program Overview](#), NASA does not anticipate contracts resulting from this program element as it would not be appropriate given the type of work solicited. Awards to non-governmental organizations will be as grants or cooperative agreements, as appropriate. Awards to government governmental organizations will be as inter- or intra- Agency transfers.

4. Summary of Key Information

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| Expected program budget Awards | Up to \$1M |
| Number of new awards pending adequate proposals of merit | ~10 |
| Due date for electronic submission of Mandatory Notice of Intent to propose | See Tables 2 and 3 of this ROSES NRA. |
| Due date for proposals | See Tables 2 and 3 of this ROSES NRA. |
| Anticipated selection date | August 15, 2019 |
| Planning date for start of investigation | October 15, 2019 |
| Anticipated study report due to NASA | June 30, 2020 |
| Page limit for the central Science-Technical- Management section | 15 Pages |

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| Relevance | This program is relevant to the planetary science questions and goals in the NASA Science Plan. Proposals that are relevant to this program are, by definition, relevant to NASA. |
| General information and overview of this solicitation | See the ROSES Summary of Solicitation . |
| Detailed instructions for the preparation and submission of proposals | See Section I(g) Order of Precedence and Table 1 of the <i>ROSES Summary of Solicitation</i> and the NASA Guidebook for Proposers . |
| Submission medium | Electronic proposal submission is required; no hard copy is permitted |
| Web site for submission of proposals via NSPIRES | http://nspires.nasaprs.com (help desk available at nspires-help@nasaprs.com or (202) 479-9376) |
| Web site for submission of proposals via Grants.gov | http://grants.gov (help desk available at support@grants.gov or (800) 518-4726) |
| Funding opportunity number for downloading an application package from Grants.gov | NNH18ZDA001N-PMCS |
| NASA point of contact | Doris Daou Program Scientist Planetary Science Division Science Mission Directorate NASA Headquarters Washington, DC 20546-0001 Telephone: (202) 358-1686 Email: Doris.Daou@nasa.gov |