NOTICE: Amended on February 8, 2019. This amendment solicits proposals to program element C.15 Planetary Protection Research, which had previously been listed as "not solicited this year". Notices of Intent are requested by April 12, 2019 and proposals are due by May 10, 2019.

This program element requests a Notice of Intent (NOI) in place of a Step-1 proposal. These NOIs will not be evaluated, and therefore no response will be provided to submission of an NOI. NOI and proposal due dates are given in Tables 2 and 3 of ROSES.

Proposals to this program element are subject to a relevance requirement in addition to and that supersedes those detailed in the ROSES Summary of Solicitation, see Section 2.5 of this program element. Proposals that do not fulfill these requirements may be returned without review.

1. Scope of Program

Planetary Protection is the practice of protecting solar system bodies from contamination by Earth life and protecting Earth from possible life forms that may be returned from other solar system bodies. Numerous areas of research in astrobiology/exobiology are improving our understanding of the potential for survival of Earth microbes in extraterrestrial environments, relevant to preventing contamination of other bodies by Earth organisms carried on spacecraft. As we continue to bring extraterrestrial samples back to the Earth system for advanced research and analysis, there is an urgent need to understand and prevent biological contamination of the terrestrial environment. Mission-enabling and capability-driven research is required to improve NASA's understanding of the potential for both forward and backward contamination; and improve methods and technologies for accurate, efficient, and effective minimization of biological contamination for outbound spacecraft and return samples. The Planetary Protection Research (PPR) program solicits research in the following areas (in order of programmatic priority):

- **Identify and provide proof-of-concept on new or improved methods, designs, technologies, techniques, and procedures to support planetary protection requirements for outbound and return sample missions.** Of particular interest are improvements to spacecraft cleaning and sterilization that remain compatible with spacecraft materials and assemblies, prevention of re-contamination and cross-contamination throughout the spacecraft lifecycle, and expansion of materials and commercial-off-the-shelf (COTS) hardware with compatibility to current cleaning and sterilization techniques.

- **Develop or adapt modern molecular analytical methods to rapidly detect, classify, and/or enumerate Earth microbes carried by spacecraft (on surfaces and/or in bulk materials, especially at low densities) before, during, and after assembly and launch processing.** Of particular interest are methods capable of identifying and verifying the functionality of microbes with high potential for surviving spacecraft flight or...
planetary environmental conditions (e.g., anaerobes, psychrophiles, radiation-resistant organisms), methods that can validate and support biological modeling as it relates to biological contamination of spacecraft, and comparison to current NASA planetary protection standard assay techniques.

- Model to understand and predict biological and organic contamination sourcing, transport, survival, and burden level of spacecraft. Of particular interest are mission-enabling models that support mission designers, project managers, and life-detecting science teams in the early stages of the mission lifecycle.
- Model space environmental conditions and spacecraft designs that could permit a decrease in biological contamination of spacecraft during the journey to the target destination with emphasis on reduction of organisms currently surviving under cleanroom conditions. Of particular interest is the radiation environment of deep space and the combined effects of multiple simultaneous stressors, such as a combination of space vacuum and radiation stressors.
- Model planetary environmental conditions and transport processes that could permit mobilization of spacecraft-associated contaminants to locations in which Earth organisms might thrive. Of particular interest are the subsurface environments of icy bodies, such as Europa and Enceladus, and Mars Special Regions.
- Characterize the limits of life in laboratory simulations of relevant planetary environments or in appropriate Earth analogs. Of particular interest are studies on the potential and dynamics of organism survival and reproduction in conditions present on the surface or subsurface of Mars (e.g., gullies and ice-rich environments), or on Europa and other icy satellites – potentially in the presence of a heat source brought from Earth.

It should be noted that the evolving planetary protection requirements of NASA’s programs may affect the priorities for funding among these areas.

2. Programmatic Information

2.1 General Information

Proposers are strongly advised to read C.1 The Planetary Science Division Research Program Overview, for information on the new mandatory data management plans.

2.2 Program Exclusions

Proposals are sought for new projects in planetary protection that are not within the scope of the Exobiology (see C.5), Planetary Data Archiving, Restoration, and Tools (see C.7), Planetary Instrument Concepts for the Advancement of Solar System Observations (see C.12), Maturation of Instruments for Solar System Exploration (see C.13), Planetary Science and Technology Through Analog Research (see C.14), Laboratory Analysis of Returned Samples (see C.16), or Habitable Worlds (see E.4) programs. Proposals submitted in response to this program element should be for new work that is not currently supported by NASA or for successor proposals that seek to extend to their next logical phase those tasks performing research in PPR program that are currently funded, but whose periods of performance will expire this year.
2.3 Pilot Studies
Proposals for one to two-year pilot studies to demonstrate or develop a new method, design, technology, technique, or procedure or a new application of an established method, design, technology, technique, or procedure are encouraged.

2.4 Additional Funding for Relevant Instrumentation Construction or Upgrade
Proposers to PPR are eligible to request funds for major equipment under the Planetary Major Equipment and Facilities (PMEF) program. See program element C.17 for information on how to append a PMEF request to a regular PPR proposal or submit a stand-alone PMEF proposal to supplement an existing PPR award.

2.5 Relevance Statement Requirement
Proposals must discuss relevance to this program element in a (4000-character max) text box on the cover pages via the NSPIRES web interface for this program element. This section is outside of the 15-page Scientific/Technical/Management Section and the relocation of the relevance discussion does not decrease that 15-page limit. This requirement supersedes the NASA Guidebook for Proposers and the ROSES Summary of Solicitation, and the omission of this section is sufficient reason for a proposal to be returned without review.

The relevance discussion must explicitly refer to this program element and the section of the solicitation to which the proposal is responsive. If the proposed work is close in scope to research covered by any other program element, this discussion must also justify why it is more relevant to this program element than that other program element. This discussion may not be used to address the proposal’s intrinsic merit, budget justification, or any other factor that remains in the 15-page main body, or any other section, of the proposal.

2.6 Duration of Awards
Typical proposals to PPR seek three years of funding or fewer. Periods of performance from one to four years may be proposed, as appropriate, to the nature of the contemplated research. Please refer to section 3.3 of C.1, the Planetary Science Research Program Overview, for instructions on submitting requests for more than three years. The appropriateness of the proposed funding period will be reviewed and adjustments may be requested. Programmatic balance may limit the opportunities for funding in some areas.

2.7 Topical Workshops, Symposia, and Conferences
The PPR program does not accept proposals for topical conferences, workshops, or symposia; such proposals may be submitted in response to program element E.2 Topical Workshops, Symposia, and Conferences. Proposers should specifically identify the PPR program as the relevant SMD program element and refer to the goals and objectives of the PPR program in demonstrating relevance.

2.8 Early Career Award
The PPR program is an Early Career Award (ECA)-participating program element. Details about the ECA will be announced with the ROSES-19 solicitation. For now,
proposers may refer to the draft text released for community comment. Interested proposers should check the early career box on the NSPIRES cover page when preparing their proposal.

2.9 Research Coordination Networks (RCNs)

PIs of proposals selected for funding from this program element that cover a research topic related to the newly established Research Coordination Networks are eligible to elect to become members of the Steering Committees of these RCNs (For more information, see: https://astrobiology.nasa.gov/news/astrobiology-program-faqs/). Relevance to an RCN is not an evaluation criterion for proposals to this program element, and eligibility for participation in an RCN does not indicate that additional research funding will be provided. The currently active RCNs are:

- NExSS: a research coordination network that brings together scientists from many disciplines to investigate the diversity of exoplanets and to learn how their history, geology, and climate interact to create the conditions for life. (For more information see https://nexss.info/.)
- NfoLD: a research coordination network that brings together scientists from many disciplines to investigate life detection research, including biosignature creation and preservation, as well as related technology development. For more information see https://nfold.org.

Information about the additional RCNs that are being established can be found here: https://astrobiology.nasa.gov/news/how-many-astrobiology-research-coordination-networks-will-be-established/

3. Resources: Information, Data, and Facilities

3.1 Limits on Use of Mission Data

Proposals to this program element must follow the rules for use of mission data given in section 3.4 of C.1, the Planetary Science Research Program Overview. If the data to be analyzed have issues that might represent an obstacle to analysis, the proposers must demonstrate clearly and satisfactorily how such potential difficulties will be overcome.

3.2 Facilities and Data Sources Available to Proposers

Refer to section 4 of C.1, the Planetary Science Research Program Overview, for a detailed list of the data and astromaterials resources, and facilities available to proposers to this program element, and how to use them. If their use is anticipated, this should be discussed and justified in the submitted proposals (especially note the provision for such discussion in the proposal section entitled Facilities and Equipment). Also note that, per the directions in the NASA Guidebook for Proposers, a letter of support may be required from any facility required for the proposed effort.

3.3 Data Management Plans (DMPs)

Proposals submitted to this program element must include a Data Management Plan (see C.1, Section 3.6), and since samples are an important component of planetary protection research, please discuss both data and sample management as part of the Data Management Plan. This must be placed in a special section, not to exceed two
pages in length, immediately following the References and Citations section for the Scientific/Technical/Management portion of the proposal. The two-page DMP section does not count against the 15-page limit of the S/T/M section.

3.4 Geologic Maps

Proposers who plan investigations involving geologic mapping should consult C.1, Section 3.8, for guidance on submission and requirements for publication of U.S. Geological Survey (USGS) maps. The scientific goal of such a geologic map product should be clearly explained and justified.

4. Proposal Submission Process

This program element requests a Notice of Intent (NOI) by the due date given in Tables 2 and 3 of this NRA. An NOI is not required to submit a full proposal and is submitted by the PI, not the organization’s AOR. Proposals are due by the date given in Tables 2 and 3 of this NRA.

Proposals must follow all formatting requirements that are described in program element C.1 and in the NASA Guidebook for Proposers. Violation of these rules is sufficient grounds for a proposal to be rejected.

5. Summary of Key Information

| Expected program budget for first year of new awards | ~ $500K |
| Number of new awards pending adequate proposals of merit | ~ 3 |
| Maximum duration of awards | 4 years; shorter-term proposals are encouraged. |
| Due date for NOIs | See Tables 2 and 3 of this ROSES NRA. |
| Due date for proposals | See Tables 2 and 3 of this ROSES NRA. |
| Planning date for start of investigation | ~6 months after proposal due date. |
| Page limit for the central Science/Technical/Management section of proposal | 15 pp; see also Table 1 of ROSES and the NASA Guidebook for Proposers. |

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

Please see ROSES Summary of Solicitation Section I(g) Order of Precedence and the NASA Guidebook for Proposers.
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