

APPENDIX C. PLANETARY SCIENCE RESEARCH PROGRAM

NOTICE: March 16, 2021. Text relating to program elements with no due date (NoDD) has been expanded. Additionally, to account for NoDD, the restriction on "duplicate" proposals was updated and a restriction on "resubmissions" of proposals to NoDD programs has also been added. See Sections 2.4 and 3.2 New text is in bold and deleted text is struck through.

C.1 PLANETARY SCIENCE RESEARCH PROGRAM OVERVIEW

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1. Introduction

The Planetary Science Research Program supports investigations to help ascertain the content, origin, and evolution of the Solar System and the potential for life elsewhere, consistent with the strategy for Planetary Science Exploration embodied in the [2020 Science Plan](#). The Planetary Science Research portfolio contains specific program elements aimed at addressing these strategic objectives.

Note that the order of precedence guidelines, described in Section I(g) of the *ROSES Summary of Solicitation*, [NASA Guidebook for Proposers](#), and ROSES instructions, may be superseded or modified by this document (program element C.1) for all covered program elements, and that each individual program element may have its own rules that supersede all of the above.

1.1 Changes from Recent Years

This Planetary Science Research Overview has been substantially revised in recent years. Proposers who have not submitted recently are encouraged to read C.1 in its entirety. Several recent changes to program element C.1 are:

- In ROSES-2021, PSD will run some programs with no due dates: Emerging Worlds (C.2 EW), Exobiology (C.5 EXO), Laboratory Analysis of Returned Sample (C.16 LARS), Planetary Data Archiving, Restoration, and Tools (C.4 PDART), Planetary Instrument Concepts for the Advancement of Solar System Observations (C.12 PICASSO), and Solar System Observations (C.6 SSO), and Solar System Workings (C.3 SSW).
- The Planetary Science Division does not anticipate awarding contracts in response to proposals submitted to any program elements in Appendix C, unless otherwise noted in the individual program elements.
- Section 3.2 regarding the prohibition of duplicate proposals has been substantially revised.
- When a Data Management Plan (DMP) is required, the sufficiency of the DMP will be part of Merit and thus may have a bearing on whether or not the proposal is selected, see [Section 3.7](#). DMP strengths and weaknesses will be factored into the evaluation of intrinsic merit. Section 3.7.1 includes additional updated information regarding DMP: (1) the inclusion of physical astromaterials and biomaterial samples; (2) software/code; (3) a revised method for DMP submission, as part of the main proposal; and (4) the removal of the Early Career Award Program (C.19) from the list of programs that do not require DMPs (i.e., these two programs now require DMPs).
- Program elements supporting the publication of geologic maps have been clarified in [Section 3.9](#).
- Information pertaining to Planetary Major Equipment and Facilities (C.17), Early Career Awards (C.19), and Topical Workshops, Symposia, and Conferences (F.2) has been added in Sections 3.11, 3.12, and 3.13.
- All Data Analysis Programs (DAPs) and the cross-divisional Exoplanets Research Program (F.3 XRP) will be conducted using the dual-anonymous peer review process (DAPR) piloted under ROSES-2020; see Section 3.14.

1.2 Program Elements Covered by this Overview

This document pertains to all of the program elements in Appendix C of ROSES, including the cross-divisional research program element F.4, Habitable Worlds, but not F.3, Exoplanet Research Program.

2. Proposal Submission Processes

Program elements covered by C.1, Planetary Overview, use a variety of submission methods: sometimes nothing is requested or required in advance of the full proposal submission, sometimes a notice of intent (NOI) is requested, sometimes a mandatory NOI or a Step-1 proposal is required for subsequent proposal submission. See below and sections IV(b)vi-viii of the *ROSES Summary of Solicitation* for more information. The submission method being used will be stated in the text of each program element, but it is also indicated in Tables [2](#) and [3](#) (the tables of due dates).

2.1 NOI submission process

An NOI is a brief plain-text summary of what the proposer intends to submit, and may be submitted without endorsement from, or action by, the Authorized Organizational Representative (AOR). For more information see Section IV(b)vi of the *ROSES Summary of Solicitation* and [the "Create and Submit NOI" tutorial on the NSPIRES web page](#). As noted above, sometimes the submission of an NOI is mandatory. Note that NOIs cannot be submitted via Grants.gov, even if the proposal will ultimately be submitted via that system.

2.2 Two-step submission process

To facilitate the early recruitment of a conflict-free review panel and ensure that proposals are submitted to the appropriate program, many program elements covered by program element C.1 will use a two-step proposal submission process (see Section IV(b)vii of the *ROSES Summary of Solicitation*). For program elements using the two-step process, a Step-1 proposal is required and must be submitted electronically by an AOR prior to the separate Step-1 deadline. No budget is required. Only proposers who submit a Step-1 proposal are eligible to submit a full, Step-2 proposal. Such Step-2 proposals must address the same broad scientific goals proposed in the Step-1 proposal. The PI cannot be changed and proposers who want to add funded investigators between the Step-1 and Step-2 proposals must inform the point(s) of contact identified in the summary table of key information and cc sara@nasa.gov at least two weeks in advance of the Step-2 due date. Additions of funded investigators within two weeks of the Step-2 deadline require permission from the NASA point of contact. Submission of a Step-1 proposal does not obligate the proposer to submit a Step-2 (full) proposal later.

The Scientific/Technical/Management (S/T/M) section of a Step-1 proposal is restricted to the 4000-character text box on the NSPIRES web interface cover pages, unless otherwise noted in the program element (e.g., C.17 PMEF). Unless otherwise stated, PDF attachments will not be accepted through NSPIRES for Step-1 proposals submitted to most program elements covered by program element C.1.

A Step-1 proposal must cover the following topics:

- The goals and objectives of the proposed work;

- The approach and methodology to be used to address the goals and/or objectives; and
- The reasons why the work proposed is within the scope of the program element, and why this program element is the most appropriate for the work proposed.

Following the submission of a Step-1 proposal, most proposers will be notified through NSPIRES that the Step-1 proposal has been designated as "encouraged" or "discouraged," at which point the proposer will be able to create a Step-2 proposal. No evaluation of intrinsic merit will be performed on Step-1 proposals. The perceived relevance of the proposed work to the particular program element will be the main factor in deciding whether submission of a Step-2 proposal will be encouraged. Please note that the Step-2 proposal evaluation is independent of the Step-1 designation; i.e., reviewers of a Step-2 proposal do not know whether a proposal was discouraged at Step-1.

In rare cases, for example, when the Step-1 proposal is not compliant with the requirements outlined above, or the proposed work cannot be funded because of NASA, SMD, or Planetary Science Division (PSD) policy, a Step-1 proposal may be declined by the Selection Official. In such a case, a Step-2 proposal cannot be submitted.

2.3 Direct submission process

As mentioned above, some program elements do not request or accept NOIs or Step-1 proposals. In these cases, AORs simply submit the (full) proposal by the published deadline. See Section 3 for additional requirements for a full proposal.

2.4 No Due Date (NoDD) programs [Section updated March 16, 2021]

Several programs within PSD are changing to accept submissions on a rolling basis. No Due Date (NoDD) programs require neither a NOI nor a Step-1 proposal; the full proposals may be submitted at any time during the year. **Though the NSPIRES page for those programs display a "Proposals Due" date, that is simply the end date for the current ROSES, after which proposals may be submitted to the program element with the same name in the next ROSES.**

Review of proposals will also be spread throughout the year and will reflect the rate at which new proposals are submitted. The content of individual proposals is not different for NoDD programs relative to their previous non-NoDD incarnations. Reviews will be carried out by Rolling Evaluation Panels (REPs), which review proposals using similar methodologies to non-NoDD programs.

This year the NoDD program element are:

[C.2 Emerging Worlds \(EW\)](#),

[C.3 Solar System Workings \(SSW\)](#),

[C.4 Planetary Data Archiving, Restoration, and Tools \(PDART\)](#),

[C.5 Exobiology \(ExoBio\)](#),

[C.6 Solar System Observations \(SSO\)](#),

[C.12 Planetary Instrument Concepts for the Advancement of Solar System Observations \(PICASSO\)](#) and

[C.16 Laboratory Analysis of Returned Samples \(LARS\)](#)

See <https://science.nasa.gov/researchers/NoDD> to download the NoDD FAQ and NoDD explanatory document, both which will also be posted on the NSPIRES page of any NoDD program.

When a proposal is submitted to a NoDD program, the ban on duplicate proposals (see Section 3.2) applies for a period of one year from the time the proposal was submitted and, likewise, a proposal submitted to a non-NoDD program may not be submitted to a NoDD program for one year. This is described in further detail in section 3.2. Proposals which are submitted prior to the passage of a full year may be returned without review or held for review at a future time after which that year has passed.

Selections from NoDD programs are anticipated to occur on timescales comparable to their non-NoDD counterparts; the budget for individual programs will be allocated throughout the year so as to not provide any advantage to proposals submitted at any particular time through the year. It is possible that programs will make additional use of the "Selectable" category for proposals, in order to account for uneven distribution of proposal submission over time.

Abstracts for selected proposals and program statistics will continue to be posted on NSPIRES, but program statistics will be modified to reflect proposals submitted/selected over the course of the previous 12 months.

Any new information on NoDD programs will be posted at <https://science.nasa.gov/researchers/NoDD>. There will also be a link there to a FAQ to provide additional detail.

3. Requirements for Full Proposals

"Full" and "Step-2" proposals are synonymous, meaning the proposal that is peer reviewed, with the term "Step-2" used in program elements that use the two-step submission process.

3.1 Full proposal content and formatting

Table 1 of the *ROSES Summary of Solicitation* provides a checklist of required information to be included in full proposals. For program elements using the two-step submission process, proposers may also refer to the PDF entitled "How to Create a Step-2 Proposal" that appears under "Other Documents" on the NSPIRES page for the program of interest.

All proposals submitted to ROSES must strictly conform to the instructions regarding proposal format and content. This includes all formatting rules outlined in Section IV(b)ii of the *ROSES Summary of Solicitation*, unless specifically contradicted within a program Appendix. Any detected violation of these rules is grounds for the proposal to be rejected without review or declined following review, with the concurrence of the Selecting Official.

In previous years, problems with the following aspects of proposal formatting have been noted:

- Length of the Scientific/Technical/Management section: 15 pages, unless otherwise specified in the program element.
- Margins: 1 inch on all sides, with a page size of 8.5 × 11 inches.

- Font: 12-point or larger. The selected font must meet the requirement of having, on average, no more than 15 characters per inch (e.g., Times New Roman and Arial). Proposers may not adjust the character spacing or otherwise condense a font from its default appearance.
- Line spacing: Font and line spacing settings must produce text that contains no more than 5.5 lines per inch. Proposers may not adjust line spacing settings for a selected font below single spaced.
- Figure captions: Captions must follow the same font and spacing rules as the main text.
- Figures and tables: For text within figures and tables, font and spacing rules listed above do not apply, but all text 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.

3.2 ~~Prohibition~~ **Restrictions on Duplicate Proposals and Resubmissions [Section updated March 16, 2021]**

Submission of duplicate proposals **and resubmission of revised proposals** are restricted in the ~~two~~ ways described below. ~~Duplicate Proposals~~ **that violate these restrictions** may be returned without review, **or may be declined following review, regardless of merit.**

If it is unclear if a proposal should be considered a duplicate or resubmitted proposal, proposers should ask the point of contact for the program element to which the proposer plans to submit.

A proposal is considered "duplicate" if it consists of the same, or essentially the same, work as another proposal. **Duplicate proposals have shared objectives, methodology, and key team members (regardless of who is PI). Proposals that share these properties are duplicates, even if they differ in their relevance statements or any materials outside the S/T/M section such as budget, DMP, biographical sketches, current and pending support, etc.**

~~If a second proposal contains substantive changes in areas that are critical to the intrinsic merit evaluation, such as the goals, objectives, or methodology, then it is not considered to be a duplicate proposal. Changes that fall outside the merit evaluation (e.g., budget) and/or minor changes to aspects of the proposal covered by the merit evaluation (e.g., the team) may not be considered substantive.~~

Restriction: A duplicate proposal may not be submitted to the same or another program covered by C.1 in a single ROSES year, nor may it be submitted if the decision to select or decline the original proposal is still pending, regardless of ROSES year.

A "resubmitted" proposal is one that was declined for funding for any reason (with exceptions noted below) by any program covered by C.1 and then submitted again to any program covered by C.1. Revisions may be significant, including methodology, team members, resources to be used, and workplan. However, the goals and objectives are largely the same as in the previous declined proposal.

Restriction: A proposal may not be resubmitted to the same or another program in the same ROSES year or to any NoDD program (see Section 2.4) within one year of the most recent submission.

3.2.1 Exceptions

Proposals declined without review are not considered to be previously submitted. There are no restrictions on resubmitting such proposals.

Proposals that were declined because they were found not to be relevant to the program to which they were submitted may also be resubmitted without restriction. However, such a proposal should not be resubmitted to the same program without revision to address the relevance weaknesses; failure to do so may result in a second rejection without review.

3.2.1 Program Relevance

~~Some proposals may have relevance to more than one program in Appendix C. In these instances, the proposal should be submitted only to the program for which the proposal is most relevant. A duplicate proposal may not be submitted to more than one program within a ROSES year, nor may it be submitted to any program covered by C.1 if it is still pending in another program element regardless of the ROSES years of the two programs. For example, a duplicate of a pending ROSES-2020 proposal may not be submitted in response to ROSES-2021. If it is not clear which program is the most relevant for a given proposal, the proposer should contact the point of contact for the program(s) that are most likely to be relevant for guidance.~~

3.2.2 NoDD Programs

~~Proposals may not be submitted to any NoDD program if they were submitted to any program covered by C.1 within the past year, including both NoDD programs and programs with due dates. This prohibition applies even if the proposal was significantly revised based upon previous review. This is critical for successful implementation of NoDD programs and ensures comparable treatment of proposals submitted to either type of program.~~

3.2.3 Exceptions

~~Proposals returned without review do not count in the context of these restrictions. Additional exceptions may be made for proposals that are found to be not relevant to the program to which they were originally submitted.~~

3.3 Restriction on Funding for Mission-Related Activities

The Planetary Science R&A programs are not intended to provide additional support for mission scientists to carry out activities within the scope of a mission. They are also not intended to augment mission project budgets with the exception of participating scientist/guest investigator programs. If the proposal team contains individuals associated with a mission team (regardless of their role[s] on the proposal or on the mission), and the proposal contains content that might be construed as mission-related, then it must demonstrate that the proposed work is not being used for the above purposes. This applies during all phases of the mission (A through F), unless otherwise

specified in the program element. This demonstration should be included in the S/T/M section of the proposal.

Regardless of whether any members of the proposal team are affiliated with a relevant mission, proposals may be evaluated for the degree of overlap with mission activities. Proposals for work close in scope to a mission's activities may be declined for programmatic reasons.

3.4 Award Durations and Types

The typical award duration is three years. Proposals for less than three years are encouraged for projects that can be completed on shorter timescales. For those program elements that permit longer awards, funding for more than three years must be explicitly justified in the proposal, i.e., to allow the completion of individual tasks that require more than three years. In these cases, the proposal must contain a discussion of why it is impractical or impossible to complete such tasks within three years.

Note that no contracts will be issued for awards made under the program elements covered by program element C.1 unless otherwise noted in the individual program element.

3.5 Use of Mission Data and Astromaterials

Spacecraft mission data to be used in proposed work must be available in the Planetary Data System (PDS), or an equivalent, publicly accessible, archive, at least 30 days prior to the full proposal due date or proposal submission date for proposals submitted to NoDD programs, unless otherwise specified in the program call. Likewise, high-order data products to be used in the proposed work must be in the PDS, equivalent archive, or otherwise in the public domain for 30 days prior to the proposal due date. The calendar of record for data released in the PDS can be found on the PDS Data Release Calendar website.

Astromaterials to be used in proposed work, including all mission-returned samples, meteorites, and cosmic dust, must be publically accessible. Their availability (or imminent availability) for allocation must have been announced in public catalogs at least 30 days prior to the full proposal due date or proposal submission date for proposals submitted to NoDD programs, unless otherwise specified in the program call. The accessibility requirement is satisfied if either the material to be used itself, or in the case of meteorites, a type specimen, has been deposited in a repository that makes the samples available to qualified researchers at US institutions. A sample that meets these requirements would still be considered as accessible, even if allocation of that sample is done by a competitive or peer-reviewed process. Note that meteorites and other astromaterials collected by the proposal team as part of their proposed work are exempt from the requirements of this section, but the proposal must cover sample archiving in its Data Management Plan.

3.6 Discussion of Relevance

All proposals will be evaluated for relevance to the individual program element to which the proposal has been submitted (see Section V(a) of the *ROSES Summary of Solicitation*).

Some program elements covered by this overview require that an explicit relevance statement be placed into a mandatory (4000-character) text box on the cover pages via the NSPIRES web interface. For program elements that require the text box, this required relevance statement is outside of the 15-page S/T/M Section, and does not need to be repeated in that section. This requirement supersedes the default in the [NASA Guidebook for Proposers](#) and the *ROSES Summary of Solicitation*. For these calls, the omission of a relevance statement on the cover pages is sufficient reason for a proposal to be returned without review.

3.7 Data Management Plans and Archiving

3.7.1 *Data Management Plans*

To broaden access to the results of NASA-funded research, proposals submitted to ROSES must include a Data Management Plan (DMP). The guiding philosophy behind this requirement is that all relevant data should be made publicly available (i.e., without fee or restriction of use) at the time of publication, or at the earliest practical time thereafter, in a data repository likely to have stable, long-term support.

Starting in ROSES-2020, the quality of the DMP is considered as part of the evaluation of intrinsic merit. It will be treated as part of the overall management plan of the project.

Individual program elements may provide instructions that supersede and/or amplify the requirements described here. For example, the Planetary Data Archiving, Restoration and Tools (PDART, program element C.4) program element includes the data management discussion in the page-limited S/T/M section of the proposal. The instrument development and Planetary Major Equipment calls (program elements C.12 PICASSO, C.13 MatISSE, C.17 PMEF, and C.20 DALI) do not require DMPs. However, even for those programs, if those awards result in datasets and peer-reviewed publications, the requirements (laid out here and in the *ROSES Summary of Solicitation*) regarding public release still apply.

Proposers requiring a DMP are strongly encouraged to use the PSD DMP template, that may be downloaded as a Word document, or a LaTeX template in the form of a .txt file, from the [SARA web page](#).

DMPs must be placed in a special section of the proposal, entitled "Data Management Plan." All proposals to program elements that require DMPs must contain this section. The DMP may not exceed two pages in length and must immediately follow the references and citations for the S/T/M portion of the proposal. The two-page DMP section does not count against the 15-page limit of the S/T/M section. Formatting requirements for DMPs are the same as for the S/T/M section. When appropriate or required, letters of support from data archives (e.g., Section 3.7.2 of this document) must be included in a Statements of Commitment and Letters of Support, Feasibility and Endorsement section of the proposal (see *ROSES Summary of Solicitation*, Table 1).

The DMP must cover any data needed to validate the scientific conclusions of peer-reviewed publications, particularly data underlying figures, maps, and tables, which must be available electronically at the time of publication, ideally in supplementary material with the article.

The DMP should also cover any physical materials that are planned to be collected, purchased, or produced during the course of the research. These include astromaterials such as meteorites, micrometeorites, and cosmic dust; for astrobiology research, this would include biomaterials produced, analog materials collected or synthesized, or analytical standards developed. The DMP should demonstrate that any such materials with scientific value that are not consumed during the proposed research will be made publicly available. Proposers are also encouraged, but not required, to discuss how other physical materials collected, purchased, or synthesized during the planned research would be made publicly available when it is practical and feasible to do so, and when there is scientific utility in doing so.

For proposals that use non-mission data (e.g., laboratory results, Earth-based observations) that are not publicly available (in the PDS or other archive, in the literature, etc.), the project is expected to make the data available following the DMP guidelines.

"Data" does not include preliminary and other unpublished data, data in pre-publication documents, private communications, or certain other types of information that have been specifically exempted from the DMP requirement.

In the case of a project that would produce no data, as defined above, or only data specifically exempted, the DMP must state that no data preservation or data sharing is needed, but it must also explain why. In a case where no appropriate archive exists for a particular data set, the DMP should discuss alternative methods for making the data publicly available.

The DMP must contain the following elements, as appropriate to the project, in adequate detail for review:

- A description of data types, volume, formats, and (where relevant) standards;
- A description of the schedule for data archiving and sharing;
- A description of the intended repositories for archived data, including mechanisms for public access and distribution;
- A discussion of how the plan enables long-term preservation of data;
- A discussion of roles and responsibilities of team members in accomplishing the DMP. (If funds are required for data management activities, these should be covered in the normal budget and budget justification sections of the proposal.)

The DMP should also cover any other data and software that would enable future research or the replication/reproduction of published results. Software, whether a stand-alone program, an enhancement to existing code, or a module that interfaces with existing codes, created as part of a ROSES award should be made publicly available when it is practical and feasible to do so, and when there is scientific utility in doing so. Stand-alone code that is not straightforward to implement, or whose utility is significantly outweighed by the costs to share it, is not expected to be made available.

SMD expects that the source code, with associated documentation sufficient to enable use of the code, will be made publicly available via the [planetary science section of GitHub](#), (contact sarah.noble-1@nasa.gov for access) or an appropriate community-recognized depository. Archiving software in a public repository does not require the proposer to maintain the code. Awards that derive from proposals that include plans to

post code in GitHub will contain a permissive open-source license reflecting this expectation.

This expectation extends to three types of software, defined as follows:

<u>Short Name</u>	<u>Name</u>	<u>Description</u>	<u>Examples</u>
Libraries	Libraries and toolkits	Generic tools implementing well-known algorithms, providing statistical analysis or visualization, and so on, that are incorporated in other software categories.	Numerical Recipes, NumPy, general FFTs, LAPACK, scikit-learn, AstroPy, GDAL
Analysis software	Analysis, post-processing, or visualization software	Generalized software (not low-level libraries) used to manipulate measurements or model results to visualize or gain understanding.	Stand-alone image processing, topology analysis, vector-field analysis, satellite analysis tools, and so on
Frameworks	Modeling frameworks	Multicomponent software systems that incorporate a variety of models and couple them together in a complex way.	Community Earth System Model (CESM) is a collection of coupled models including atmospheric, oceanographic, sea ice, land surface, and other models

Proposals that do not address each of these items in their DMP, even if determined to be selected or selectable for funding, may not be funded until an adequate DMP is submitted. Funded researchers, research institutions, and NASA centers are responsible for ensuring and demonstrating compliance with the DMPs approved as part of their awards. Awardees who do not fulfill the intent of their DMPs may have continuing funds withheld and this may be considered in the evaluation of future proposals.

3.7.2 Data Archiving in the Planetary Data System (PDS)

For proposals where derived data products will be deposited in the Planetary Data System, these data products must be in PDS4 format. Guidelines for planning for the submission data in this format to the PDS are available on the [Data Standards section of the PDS website](#).

Proposers intending to make use of the PDS should refer to the most recent version of the following documents for information on PDS compliance:

- [Proposer's Archive Guide](#)

- [Standards Reference](#)

Proposers should communicate with the PDS Discipline Node responsible for curating similar data (links to the PDS Discipline Nodes are at <http://pds.nasa.gov/>) to discuss procedures and requirements prior to proposing to a Planetary Science Division ROSES program element. Proposers intending to archive data or products in the PDS must obtain and include confirmation, in the form of a letter of support from the appropriate Discipline Node, that the PDS is willing to accept their submission. This letter must be included in the proposal package and placed in a section for Statements of Commitment and Letters of Support, Feasibility, and Endorsement (see *ROSES Summary of Solicitation*, Table 1).

3.8 Table of Personnel and Work Effort

All proposals must include a Table of Personnel and Work Effort. If the program element allows contracts, and it is anticipated by the proposer that the proposal will result in a contract, this table must be within the budget narrative section. All other proposals should include this table as a separate section before the Budget Justification section, and follow the instructions presented here.

Proposers are strongly encouraged to use the PSD Table of Personnel and Work Effort template, which may be downloaded as a Word document, a LaTeX template, or a pdf from the [SARA webpage](#).

The Table of Personnel and Work Effort must list the names (if known) and titles of every person who will do work on the proposal, regardless of whether that person would receive money, and regardless of their role on the project. It must cover all personnel, including those covered by any sub-awards, sub-contracts, or who work at any NASA center or federal agency that may receive money separately from the main award. The table must have entries covering each proposed award year (do not provide a separate table divided by federal fiscal years) and must distinguish between the effort to be funded by the submitted proposal and non-funded efforts plus those funded separately. All work efforts listed in the table should be made in fractions of a work-year.

Note that this section may not contain any narrative description of tasks to be performed by proposal personnel; such information should be placed in the 15-page Scientific/Technical/ Management section of the proposal.

3.9 Publication of Geologic Maps

Geologic mapping is an investigative process designed to go beyond standard image analyses to determine the geologic history of a region of interest, whether it is local, regional, or global. Thus, geologic maps are key tools to aid in identification of this geologic history. Below are some guidelines about where to propose geologic mapping investigations.

3.9.1 Program Elements Supporting Geologic Mapping

If a geologic map would be created as part of a hypothesis-driven science investigation (i.e., to address specific scientific objectives or questions about a region of interest, as opposed to PDART, see below), and uses data from planetary missions identified in a

Data Analysis Program (DAP), then the proposal should be submitted to the appropriate DAP. For example:

- Pluto and Charon maps: New Frontiers DAP (C.7 NFDAP);
- Lunar maps: Lunar DAP (C.8 LDAP);
- Mars maps: Mars DAP (C.9 MDAP);
- Cassini-based Saturnian satellite maps: Cassini DAP (C.10 CDAP); and
- Dawn-based Vesta or Ceres maps and MESSENGER-based Mercury maps: Discovery DAP (C.11 DDAP).

If a geologic map would be created as part of a hypothesis-driven science investigation using data from missions not covered by a current DAP (e.g., Venus missions), or as part of a comparative planetology science investigation not responsive to a single DAP, then the proposal should be submitted to whichever of the non-DAP research program elements the proposal is most relevant (e.g., Solar System Workings, Emerging Worlds, Habitable Worlds).

If a geologic map would be created without an accompanying hypothesis-driven science investigation, then the mapping proposal should be submitted to PDART (program element C.4).

3.9.2 Maps Published by the U.S. Geological Survey

Proposals that include the publication of a Scientific Investigations Map (SIM) by the U.S. Geological Survey (USGS) should check the relevant box on the proposal cover page and clearly indicate this intention in the Proposal Summary, as well as in the text of the proposal. Investigators who choose to produce a geologic map as a USGS product will be required to follow current guidelines for the production and submission of digital products, including the generation of maps that are compatible with Geographic Information System (GIS) software packages for review, edit, and publication. To support this requirement, the USGS will provide a GIS project that contains the projected, geographically rectified, and scaled mapping base or mosaic, as well as other relevant global- or regional-scale data sets (if available and needed). Investigators selected to publish USGS geologic maps will be expected to (1) provide peer reviews for two geologic maps generated by other planetary mappers during their grant period, and (2) attend the annual Planetary Geologic Mappers Meeting to present their map status to the mapping community and receive updates on current guidelines. Proposers should include travel funding to attend the Planetary Geologic Mappers Meeting, justifiable because of NASA requirements. Further information pertaining to the production of USGS geologic maps (e.g., map bases, scales, extents, formats, guidelines) is available on the [Planetary Geologic Mapping Program website](#), or by contacting Jim Skinner at the USGS (jskinner@usgs.gov).

Investigators who intend to produce a USGS geologic map are required to include a Confirmation of Technical Specification document, obtained from the USGS Map Coordinator, in their Step-2 (full) proposal. This document should identify the (1) latitude/longitude boundaries of the map region, (2) scale of the proposed map, (3) required base map, (4) projection of the base map, and (5) key supplemental data. This document is only a confirmation and does not fulfill any requirement that the mapping effort be described and justified within the 15-page body of the proposal.

Selection of a proposal for funding is contingent upon the inclusion of this document. Investigators are encouraged to contact the USGS early in the proposal preparation process.

3.10 Access to the Antarctic

Some program elements in Appendix C, such as C.3 SSW, allow proposals that would require access to the Antarctic. However, unless otherwise stated, program elements in Appendix C will not fund work in Antarctica.

Proposals to those elements that allow Antarctic fieldwork must include all costs associated with this fieldwork in their proposal budgets. For Antarctic fieldwork supported by the United States Antarctic Program (USAP), such costs include: physical qualification exams; airfare, lodging, and per diem for travel to Christchurch, New Zealand (departure point for Antarctica; seven days in Christchurch should be included as margin for weather-related delays); any required cargo transportation (origin to Pt. Hueneme, California, and return); and any specialty materials or large quantities of stocked materials required in Antarctica. Proposers must also include costs associated with logistics support provided by the USAP via the National Science Foundation (NSF).

To obtain these costs, proposers must complete an Antarctic Logistics Requirements and Field Plan, and return it to Jessie Crain, Antarctic Research Support Manager (jlcrain@nsf.gov). Requirements for this document, and other guidance for conducting field work in the Antarctic, may be found on the [Proposal Preparation Reference Information website](#). Please allow one month for processing to receive the USAP cost estimate.

3.11 Additional Funding for Relevant Instrumentation Construction or Upgrade

The Planetary Major Equipment and Facilities (PMEF) program element (C.17) allows proposals for the purchase or development of new or upgraded non-flight analytical, computational, telescopic, and other instrumentation to be used in investigations in PSD research programs. All new analytical instrumentation requests, as well as requests for upgrades to existing instruments, costing more than \$50,000 must be requested according to the PMEF guidelines in C.17.

Two types of instrumentation requests are permitted: (1) a PMEF request may be made as a special section that is appended to a new research proposal in an eligible program element; or (2) a stand-alone PMEF proposal may be prepared and submitted to a special PMEF proposal deadline. All requests for facility instruments must now be of the second type. See C.17 for details on how to prepare both types of PMEF requests. Program elements eligible for PMEF are listed in C.17.

3.12 Planetary Science Division Early Career Fellowship Program

The Early-Career Fellowship (ECF) Program (C.18) is no longer solicited. Previously named ECF Fellows should contact Melissa Morris (melissa.a.morris@nasa.gov) with any questions concerning this program. The current Early-Career Award (ECA) program is solicited in C.19.

3.13 Topical Workshops

All proposals for topical conferences, workshops, or symposia related to the Planetary Science Division Research and Analysis Program must be submitted in response to program element F.2, Topical Workshops, Symposia, and Conferences. Proposers to F.2 should specifically identify the PSD research program element to which the conference, workshop, or symposium is most closely related, and refer to the goals and objectives of that program element in demonstrating relevance.

3.14 Dual-Anonymous Peer Review (DAPR)

Under ROSES-2021 all PSD DAPs and the cross-divisional XRP (F.3) shall be conducted under the dual-anonymous peer review process (DAPR) piloted under ROSES-2020. This shall include Cassini DAP, Discovery DAP, Lunar DAP, Mars DAP, and New Frontiers DAP. Under this process, not only are proposers unaware of the identity of the reviewers, but the reviewers are not given the identity of the proposers until after the evaluation of intrinsic merit. More information on DAPR can be found at the [SMD DAPR website](#). Specific instructions on how to anonymize proposals will be in both the individual program elements as well as each program's individual NSPIRES page in a document entitled "Guidelines for Anonymized Proposals."

4. Resources Available to Proposers

4.1 Data and Information Resources

4.1.1 *The Planetary Data System (PDS)*

The Planetary Data System (PDS) archives and distributes scientific data from NASA planetary missions, astronomical observations, and laboratory measurements. The archives can be found through the [PDS home page](#). PDS is supported by six science discipline nodes (Atmospheres, Geosciences, Imaging, Planetary Plasma Interactions, Rings, and Small Bodies) distributed around the U.S. Each node houses data from NASA's planetary missions, and documentation necessary to use those data. Data searches and requests can be initiated from the PDS home page or at any of the science discipline node pages accessible there. Guides and tools for using data, preparing an archive, and archiving data can be found in the [PDS Tools section](#). Contact the PDS Operator (pds_operator@jpl.nasa.gov) or the appropriate node's point-of-contact for assistance.

4.1.2 *The National Space Science Data Center (NSSDC)*

The NSSDC archives digital and other data from historic and completed flight missions, and its archives are complementary to those of the PDS. NSSDC data include lunar and planetary photographs, digital planetary images, tabular and experiment data from numerous flight missions, and cartographic products. Investigators are responsible for acquiring the data needed for their proposal. Modest requests for data are free of charge, although charges will be incurred for large-volume requests. Requests from U.S. investigators for data products and information may be made through the Coordinated Request and User Support Office at the NSSDC (nssdc-request@lists.nasa.gov). For more information, see the [NSSDC website](#).

4.1.3 The Lunar and Planetary Institute (LPI)

LPI provides one of the most concentrated and easily accessible collections of data and other information in lunar and planetary science, including extensive digital map and imagery collections, computational tools for the lunar community, and a vast collection of educational products and resources. These resources, along with an extensive range of electronic tools to enhance science activities and effective communication within the planetary science community, can be found on the [LPI website](#).

4.1.4 Planetary Cartography Program

NASA has a long-term agreement with the USGS to provide a variety of cartographic support functions for NASA researchers through its Planetary Cartography Program. This support includes:

- Integrated Software for Imagers and Spectrometers ([ISIS](#));
- Search capability for raw planetary image data ([PILOT](#));
- On-demand production of higher-level data products ([Map Projection On the Web](#));
- Coordination of [IAU approval of nomenclature](#);
- Training in planetary GIS methods [MRCTR GIS Lab](#);
- Production of digital terrain models (DTMs) from Mars Reconnaissance Orbiter (MRO) High Resolution Imaging Science Experiment (HiRISE) stereo data (see details in C.9, Mars DAP).

For cartography support beyond what is provided by the Planetary Cartography Program, the USGS is willing to join proposal teams to produce or assist in the production of specific cartographic tools or products. However, the USGS is required to recoup the full cost of such activities in the proposal budget. Visit the Astrogeology Science Center website or email jhagerty@usgs.gov for further information.

4.2 Astromaterials

NASA's Astromaterials Acquisition and Curation Office at the NASA Johnson Space Center provides access to all NASA-controlled samples of astromaterials, including those returned by the Apollo program and the Genesis and Stardust missions, a subset of particles returned by the Japan Aerospace Exploration Agency (JAXA) Hayabusa mission, interplanetary dust particles collected by high-altitude aircraft, meteorites collected in Antarctica by U.S. field parties, and a variety of space-flown microparticle impact collectors. Peer review of sample requests are provided by the Astromaterials Allocation Review Board (formerly part of CAPTEM). For information on how to obtain any of the specimens in these collections, see [the Astromaterials Acquisition and Curation Office](#) website or contact:

Office of the Curator
Code KT
Johnson Space Center
National Aeronautics and Space Administration
Houston, TX 77058-3696

4.3 Research Facilities

The following facilities are available to supported investigators. If their use is anticipated, this use must be discussed and justified in the submitted proposals (especially note the provision for such discussion in the proposal section entitled Facilities and Equipment).

Note: for any facility required for the proposed effort, the proposal must state which team member has access or provide a letter of support from the facility (or resource) confirming that it is available for the proposed use during the proposed period.

4.3.1 NASA-provided High-End Computational (HEC) Facilities

Those investigators whose research requires high-performance computing should refer to the *Summary of Solicitation*, Section I(e), "NASA-provided High-End Computing Resources." This section describes the opportunity for successful proposers to ROSES to apply for computing time on either of two NASA computing facilities, i.e., at the NASA Goddard Space Flight Center's (GSFC's) Computational and Information Sciences and Technology Office, or at the NASA Ames Research Center's (ARC's) Advanced Supercomputing Division. Proposers needing access to these facilities should follow the instructions in Section I(e) of the ROSES *Summary of Solicitation*. Further information on computing capabilities may be found on the [NASA High-End Computing website](#).

4.3.2 Planetary Aeolian Facility (PAL)

The Planetary Aeolian Facility at the NASA Ames Research Center consists of wind tunnels that can be used to simulate atmosphere-surface interactions on Earth, Mars and Titan. For more information, contact David Williams (David.Williams@asu.edu) or consult the [PAL Guidebook for Proposers](#).

4.3.3 Reflectance Experiment Laboratory (RELAB)

The RELAB facility at Brown University provides a mechanism for researchers to obtain high-quality laboratory spectra of natural or synthetic materials for use in compositional, geologic, and remote sensing applications. RELAB is partially supported by NASA as a multiuser spectroscopy facility, and researchers are invited, but not required, to visit the laboratory in person during sample measurements. Laboratory time and most sample measurements are made available at no charge to investigators funded by NASA. If a proposal to NASA requires acquisition of new spectra via RELAB in the VIS/NIR or mid-IR, then the scope and justification must be provided in the submitted proposal. Data acquired as part of NASA-funded research are made available to the investigator immediately after measurement and are made publicly available three years after measurement. Additional information about this facility, a RELAB user's manual, sample submittal forms, and access to [RELAB website](#). For further information, contact the Science Manager of RELAB, Ralph Milliken (Ralph.Milliken@brown.edu) or the Operations Manager, Takahiro Hiroi (Takahiro.Hiroi@brown.edu).

4.3.4 NASA Ames Vertical Gun Range (AVGR)

The NASA AVGR is a national facility funded by the NASA Science Mission Directorate to enable investigations of impact phenomena and processes. Exploratory or proof-of-concept programs requiring a limited number of experiments can be accommodated at

no cost. More extensive programs are subject to review, to assess feasibility and cost effectiveness. Any need for extensive use of the AVGR should be explicitly described in the proposal. The proposal budget should include an estimate of usage costs. A letter of support from the AVGR is required. For more information, potential users of the AVGR should contact John Karcz (john.s.karcz@nasa.gov).

4.3.5 NASA Venus In-situ Chamber Investigations (VICI)

The NASA Venus In-situ Chamber Investigations (VICI) is a pressure chamber that enables testing of components and small instruments under temperatures and pressures that simulate Venus surface conditions. Lower temperatures and pressures can also be accommodated. Exploratory or proof-of-concept programs requiring a limited number of experiments/tests can be accommodated for minimal cost. Extensive use of the chamber should be described in the proposal and is subject to review by VICI personnel, to assess feasibility and cost effectiveness. Any use of the chamber and its corresponding costs should be included in the proposal budget. A letter of support from the VICI facility is required. For additional information, please contact Natasha Johnson (natasha.m.johnson@nasa.gov).

4.3.6 NASA Glenn Extreme Environment Rig (GEER)

The Glenn Extreme Environment Rig (GEER) is a simulation rig designed to provide an asset to the scientific and engineering communities to perform laboratory experiments and/or technology developments, or instrument/hardware qualifications, in extreme simulated environments. When fully operational, GEER can accurately simulate the temperatures, pressures, and chemistry of the atmospheres of planetary bodies, including the conditions found on the surface of Venus. The chamber is cylindrical, with an interior diameter and length of three feet and four feet, respectively. The chamber is rated for pressures up to 100 bar at 500°C. Eight individually controllable gas streams are available. Interested parties should contact Tibor Kremic (Tibor.Kremic@nasa.gov) for questions regarding status, availability, and any proposal related intentions. Some additional information on the GEER is available on the [GEER website](#).

4.3.7 USGS Astrogeology Science Center (ASC) Digital Terrain Models (DTMs)

The USGS Astrogeology Science Center (ASC) produces high-quality digital terrain models (DTMs) for engineering (e.g. landing site characterization) and science. The ASC can supply individual investigators with high-quality DTMs in support of NASA-selected R&A investigations, replacing the "Photogrammetry Guest Facility" currently operated by ASC. Proposers who wish to use these DTMs must solicit a Confirmation of Technical Specifications Letter from the ASC indicating their ability to produce the requested DTMs and to provide them at no cost to the proposer. This approach is directly analogous to that currently used for the Planetary Geologic Mapping Program. Since ROSES-2020, DTMs will be generated using only HiRISE stereo data, and will thus be most applicable to proposals submitted to the MDAP program; the total number of DTMs generated will necessarily be limited. It is anticipated that the program will expand to additional data sets in future years. Further information pertaining to DTM generation by the USGS is available by visiting the USGS Astrogeology Planetary Photogrammetry Lab's [DTM page](#). Proposers may request further information by

contacting Donna Galuszka at the USGS (MDAP_DTM_REQUEST@usgs.gov) with "MDAP_DTM_REQUEST" in the email subject line.
