C.7 PLANETARY DATA ARCHIVING, RESTORATION, AND TOOLS

NOTICE: This Program Element continues to use a two-step proposal submission process described in Section 2 of Appendix C.1.

1. Scope of Program

1.1 Programmatic Overview

The Planetary Data Archiving, Restoration, and Tools (PDART) program solicits proposals to generate higher-order data products, archive and restore data sets or products, create or consolidate reference databases, generate new reference information, digitize data, and develop or validate software tools.

The objective of this Program Element is to increase the amount and quality of digital information and data products available for planetary science research and exploration, and to produce tools that would enable or enhance future scientific investigations. Although it is expected that a small amount of data analysis, interpretation, or modeling may be performed to validate any generated products, this Program Element does not accept proposals in which the main focus is hypothesis-based science.

For all types of proposals, the products of selected proposals must be made available to the scientific community. Data products must be archived in the NASA Planetary Data System (PDS) or an equivalent archive (see Section 2.2 for a definition of an equivalent archive). All proposals will be evaluated on the perceived impact of the new products, datasets, or tools on future planetary science research and exploration.

Proposers to this Program Element will not provide a data management plan via the NSPIRES cover pages or as a two-page addendum. Instead, that is superseded by instructions in the sections below that place more detailed descriptions into the body of the Scientific/Technical/Management section of proposals.

1.2 Data Product Generation

Proposals to generate higher-order data products than those that currently exist are encouraged. Source data may be derived from NASA or other spaceflight missions, astronomical observations, sample analyses, or other sources. The new data products may include, but are not limited to, cartographic products and calibrated or corrected datasets.

1.3 Data Set Restoration and Archiving

Proposals to archive complete datasets and/or to restore and archive incomplete datasets (e.g., to reextract, rereduce, and/or recalibrate data to fill in fragmentary datasets) will be considered. Such proposals must include: 1) an archiving plan (see Section 4.3); 2) a description of how the data will be obtained; 3) a detailed plan for how the data will be restored, if relevant; and 4) a

description of documentation, calibration data, and related software necessary to read and interpret the original and new datasets.

1.4 Reference Database Creation

Proposals that create or consolidate reference databases useful for planetary science research will be considered. These databases may include, but are not limited to, spectral libraries, chemical and physical properties of materials, and photographic catalogs. The burden is on the proposer to demonstrate the demand for a proposed database and its likelihood of advancing the current state of knowledge or resolving a significant planetary question or problem.

1.5 Generation of New Reference Information

Proposals to make laboratory measurements, conduct experiments, or otherwise generate new reference information that is intended for general use in planetary science will be considered. Examples may include, but are by no means limited to, spectral data, phase diagrams and equations of state, physical laws, optical constants, partition coefficients, and thermodynamic properties of materials. Where the main product of the proposal is a reference dataset, the proposal must include a plan to deposit the data in the NASA PDS or an equivalent archive. The burden is on the proposer to demonstrate the demand for a proposed reference product and its likelihood of advancing the current state of knowledge or resolving a significant planetary question or problem.

1.6 Data Digitization

This Program Element encourages proposals to recover datasets that currently are available only on media not readable by modern computing equipment, or to digitize data that are only available in analog form (e.g., printed matter, photographs, and manuscripts). PDART will consider proposals that include the rental of specialty equipment and/or the hiring of independent expertise to accomplish those tasks. Regardless of the method, the proposal must demonstrate the capability and provide a plan to recover or digitize the data. The burden is on the proposer to demonstrate the demand for the digitized product and its likelihood of advancing the current state of knowledge or resolving a significant planetary question or problem.

1.7 Software Tool Development and Validation

This Program Element supports the development and dissemination of software tools that facilitate the use of existing datasets or that would enable or enhance future science investigations of interest to the Planetary Science Division. PDART does not support extensive application of these tools, but it is expected that the validity of the tools will be demonstrated during the course of the proposed work. Proposals are expected to include a plan to disseminate the tools for use by the planetary community. In addition to any other dissemination mechanisms, investigators developing software tools are required to archive the source code, and all relevant documentation, at NASA's PSD Github site (https://github.com/NASA-Planetary-Science). It is expected that user interfaces and/or executables will be made publically available

at no cost. Accordingly, awards made under this program element will contain a Rights in Data clause reflecting this expectation.

This Program Element does accept proposals to fund the development or enhancement of numerical models, with the expectation that the funded model will be made publicly available. In these instances, the proposal will be judged on 1) how the enhancement would result in an improvement in the results previously produced by this or similar models, and 2) how the enhancement would enable scientific investigations not currently possible with, or improve investigations relative to, models currently in use.

Proposals to develop tools that would enhance the usability of, and access to, the PDS4 file format are particularly encouraged. Of special interest are tools for converting PDS4-formated files into other popular file formats (e.g., FITS, CDF).

2. Programmatic Information

2.1 Relevance Statement Requirement

Step-2 Proposals to this Program Element must discuss relevance in a (4000-character maximum) 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 Section 2.3.5 of 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.

2.2 Merit Evaluation Criterion

As PDART's goals differ from other programs, the review of proposals submitted to this Program Element will include Merit factors not listed in the *NASA Guidebook for Proposers* (Appendix C). In addition to the *Guidebook* criteria, all submitted proposals will be evaluated on the following PDART-specific merit factors:

1. The perceived impact of the new products, datasets, or tools on future planetary science research and exploration. This factor includes an evaluation of the proposal's end products against the state-of-the-art.
2. The uniqueness and/or time criticality of the proposed new products, datasets, or tools. For this factor, historical significance may also be considered.

3. The credibility of the proposed plan for dissemination and archiving. This factor includes both the format that the data products/tools would be in and how they would be made available for the scientific community. For those proposals that would use an archive other than NASA's PDS or Github sites, this factor includes an evaluation of whether the repository is a PDS-equivalent archive (Section 2.2).
4. Any applicable work-specific factors described in Sections 1.2-1.7.

2.3 Definition of a PDS-equivalent archive

Equivalence of an archive to the NASA PDS is defined by a number of factors that cover accessibility, reliability, usability, and other qualities.

Proposed archives are required to have the following features:

1. The Archive shall be managed by someone other than the major data provider. (Independence)
2. The Archive shall be managed for the long-term (25 years at least). (Sustainability)
3. The Archive shall be accessible to the public (lay and scientific) without preapproval. (Open Accessibility)
4. The Archive shall ensure that data are searchable. (Searchability)
5. The Archive shall ensure that data are citable. (Citability)
6. The Archive shall be considered by its user community as the "standard" archive for the subfield. (Preeminence)
7. The Archive shall require that data products be submitted in standardized formats and file types. (Standardization)

Proposed archives are preferred to have the following features:

1. Archive should conduct independent peer reviews of data to assess usability and completeness of data packages. (Peer Review)
2. Archive should include documentation for its holdings such as user guides, calibration descriptions, etc. (Documentation).

The following are some examples of PDS-equivalent archives: The HIgh-resolution TRANsmission molecular absorption database (HITRAN), Infrared Processing and Analysis Center (IPAC) Infrared Science Archive (IRSA), NASA Space Science Data Coordinated Archive (NSSDCA), Coordinated Data Analysis Web (CDAWeb). If you are proposing an archive other than PDS or one of those listed here, your proposal must demonstrate that it meets the requirements above.

2.4 Exclusions

PDART does not support scientific investigations whose primary emphasis is data analysis, fundamental theoretical research, or instrument development. Proposers are encouraged to consult C.1 Planetary Science Research Program Overview for the appropriate Program Element to which they should submit.

Proposals whose primary focus is on data to be used in investigations solicited by the Astrophysics, Heliophysics, or Earth Science Divisions are encouraged to consult Appendices D, B, and A respectively for information on the appropriate Program Elements to which they should be submitted.

The PDART element does not fund proposals whose work effort is primarily to acquire new ground- or space-based observations or surveys; such proposals should be submitted to the Solar System Observations program (see C.6).

Proposals for topical conferences, workshops, or symposia related to this Program Element may not be proposed through this solicitation. Proposers are encouraged to pursue such submissions through ROSES-2016 E.2 Topical Workshops, Symposia, and Conferences.

2.5 Duration and Size of Awards

The maximum duration of awards from C.7 is three years (not including no cost extensions). Proposals for funding of less than three years are highly encouraged for projects that can be completed on shorter timescales. The appropriateness of the proposed funding period will be reviewed and adjustments may be requested.

Since this is still a new program with a new scope, the budget and expected number of new awards is somewhat uncertain, as it may depend on the distribution of topics proposed and the number of proposals submitted. As always, the number of new awards will also depend on the available Fiscal Year (FY) 2017 budget.

NASA does not have much historical data to rely on, but the 2015 PDART selections are posted to the spreadsheet on the SARA grant stats web page. The average year-one award size in 2015 was ~$110K, but the award sizes spanned a very wide range, depending on the nature of the work proposed. Proposers are encouraged to request what is actually needed to conduct the proposed work.

2.6 Data Management Plans (DMPs)

Because data archiving is an integral part of PDART and evaluated as part of the merit, a data management plan should be integrated as part of the Science/Technical/Management portion of the proposal, no additional DMP section is required for this Program Element.

3. Proposal Submission Process

This Program Element uses a two-step proposal submission process described in Appendix C.1, §2.

Proposers are reminded that Step-1 proposals are mandatory and must be submitted by the proposing organization

Proposals must follow all formatting requirements that are described Appendix C.1 and in Chapter 2 of the *NASA Guidebook for Proposers*. Note that these requirements have been updated in 2016. Violation of these rules is sufficient ground for a proposal to be rejected.

4. Resources: Information, Data, and Facilities

4.1 Limits on Use of Data

For proposals that generate higher-order data products from NASA mission data or otherwise use such mission data in the development or testing of software, the data to be used in proposed investigations must be available in the Planetary Data System (PDS) or equivalent publicly accessible archive at least 30 days prior to the proposal submission date. Spacecraft data that have not been obtained yet (i.e., future mission data) or those that have not been accepted for distribution in approved archives are not eligible for use in investigations. Regardless of the archive(s) used, 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. This 30-day rule does not apply to unarchived data from missions prior to the creation of the PDS if the dataset in question will be archived to PDS through the proposed project.

Investigators funded by spacecraft missions which wish to apply must clearly demonstrate how the proposed research does not overlap and is not redundant with duties or responsibilities already funded by their respective mission(s). See Appendix C.1, The Planetary Science Division Research Program Overview, for more information.

Proposals to digitize and/or archive data not currently available in a public archive must demonstrate that the data to be used are available (such as a letter of support, if they are owned by a private entity, or a detailed plan to locate and obtain the data from a known repository), in a format suitable for the proposed work, and of sufficient quality to achieve the goals set forth in the proposal. The proposal should further demonstrate a familiarity with the data and an understanding of the work required to prepare the data for future analysis and/or delivery to an appropriate public archive.

4.2 Facilities and Data Sources Available to Proposers

Proposers are advised to read C.1 The Planetary Science Division Research Program Overview, for information on facilities and data sources that are available to supported investigators. 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 Section 2.3 of the *NASA Guidebook for Proposers*, a letter of support may be required from any facility required for the proposed effort.

4.3 Data Archiving and Map Publication

Selected investigations are expected to result in data products that are of broad use to the science community, including maps, data with improved calibrations, etc. PDART requires that such

data be archived in the Planetary Data System (http://pds.nasa.gov/), or an equivalent public archive, by the end of the award period. 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 and to help with discerning the most efficient way to archive your proposed data. Proposers intending to archive data or products in the PDS must obtain and include confirmation from the appropriate Discipline Node that the PDS is willing to accept their submission. It is the proposer's responsibility to conform to PDS standards.

Proposed investigations of any planetary or satellite surface that are intended to result in 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 that intend to produce a USGS geologic map are required to include in their Step-2 (full) proposal a confirmation of technical specification document obtained from the USGS Map Coordinator. Proposers are advised to read C.1, The Planetary Science Division Research Program Overview, for the USGS' information on and requirements for map production and publication.

5. Summary of Key Information

Expected program budget for first year of new awards	~$2-2.4M
Number of new awards pending adequate proposals of merit	See Section 2.5
Maximum duration of awards	3 years
Due date for Step-1 proposals	See Tables 2 and 3 in the *Summary of Solicitation* of this NRA.
Due date for Step-2 proposals	See Tables 2 and 3 in the *Summary of Solicitation* of this NRA.
Planning date for start of investigation	~8 months after proposal due date.
Page limit for the central Science/Technical/Management section of proposal	15 pp; see also Chapter 2 of 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	See the *NASA Guidebook for Proposers* at http://www.hq.nasa.gov/office/procurement/nraguidebook/.

Submission medium	Electronic proposal submission is required; no hard copy is required or permitted. See Section IV of the *ROSES Summary of Solicitation* and Chapter 3 of the *NASA Guidebook for Proposers*.
Web site for submission of proposal 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	NNH16ZDA001N-PDART
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