

## B.12 HELIOPHYSICS DATA ENVIRONMENT ENHANCEMENTS

**NOTICE: Resident Archives are no longer being offered; the data from missions is now flowing directly to Final Archives. The Data Upgrades portion of the HDEE will be offered this year. In addition, a special Data Upgrade program targeted specifically at Heliophysics relevant CubeSats datasets is offered. The Value-Added Enhancement projects program is no longer being offered as part of HDEE but is offered in the new ROSES element B.20, Heliophysics Tools and Methods (HTM), aimed at furthering the use of Python in Heliophysics.**

**All proposers are to use the standard Heliophysics template for Current and Pending Support for the PI and all Co-Is, regardless of time commitment. See**

**<https://science.nasa.gov/researchers/templates-heliophysics-division-appendix-b-roses-proposals>.**

**Data Management Plans are not required, as those contents are covered by the requirement for an Archive and Dissemination Plan, see Section 2.2.**

**This Program is accepting proposals at any time. See Section 3.2 for details.**

### 1. Scope of Program

The Heliophysics Data Environment Enhancements (HDEE) program encompasses the data environment needs throughout Heliophysics, including Solar, Heliospheric, Magnetosphere, and Ionosphere/Thermosphere/Mesosphere (ITM).

As part of a mission-oriented agency, the Heliophysics Research Program preferentially seeks to fund those efforts that directly impact NASA missions or interpretation of their data. Projects involving data from other U.S. agencies or institutions that are judged to be highly beneficial to NASA Heliophysics (HP) research are included in the scope for this program, if not available in a suitable form from their host's institution.

The specific context of this call is provided by the *NASA Heliophysics Science Data Management Policy* which may be found at:

[https://hpde.gsfc.nasa.gov/Heliophysics\\_Data\\_Policy\\_v1.2\\_2016Oct04.html](https://hpde.gsfc.nasa.gov/Heliophysics_Data_Policy_v1.2_2016Oct04.html).

HDEE is a component of the Heliophysics Research Program and proposers interested in this program element are encouraged to see the overview of the Heliophysics Research Program in B.1 the Heliophysics Research Program Overview for Heliophysics-specific requirements. Common default requirements for all ROSES proposals are found in the *ROSES Summary of Solicitation* and the [Proposer's Guidebook](#) but those may be superseded by instructions in a program element like this one. The order of precedence is the following: ROSES Element B.12 (this document) takes precedence followed by B.1, followed by the *ROSES Summary of Solicitation*, and finally the *Proposer's Guidebook*. Proposers should be familiar with all these resources.

## 2. Heliophysics Data Environment Enhancements

This call solicits proposals designed to upgrade existing Heliophysics data products to improve the quality, utility, and accessibility of datasets relevant to Heliophysics research. The basic building blocks of the NASA Heliophysics Data Environment (HPDE) are well- documented, carefully calibrated, and easily used data products, typically the result of the reduction of numbers from spacecraft telemetry to the physical quantities that enter the equations we use to model space plasmas. This call solicits proposals (Data Upgrades) to upgrade datasets that are of continuing value but that do not currently fit easily into the HPDE. Resident Archives will no longer be supported; these are no longer needed as the data from current missions is flowing directly to Final Archives.

[The NASA Heliophysics Science Data Management Policy](#) gives further information about the HPDE, where the data will be preserved and served for the long-term. The Final Archive for Space Physics data is the [NASA Space Physics Data Facility \(SPDF\)](#) while Solar data are handled by [NASA's Solar Data Analysis Center \(SDAC\)](#).

Most HP data products are now described in terms of the Space Physics Archive Search and Extract (SPASE) Data Model (see <http://www.spase-group.org/> for information on SPASE and <http://heliophysicsdata.gsfc.nasa.gov> for a "public face" to the registry); use of SPASE is now a requirement for this call. Investigators undertaking data projects under this call should determine what product(s) will require SPASE descriptions and, as needed, contact the SPASE group via [https://hpde.gsfc.nasa.gov/spase\\_metadata.html](https://hpde.gsfc.nasa.gov/spase_metadata.html) for providing SPASE descriptions.

A major goal of Data Upgrade proposals will be to put data in uniform, sustainable formats. For solar physics data, this should be Flexible Image Transport System (FITS), and for space physics data Common Data Format (CDF) is the format of choice. Some Ionosphere, Thermosphere, Mesosphere (ITM) data are closely allied to Earth Sciences, and thus, NetCDF is appropriate.

Possible upgrades include, translating datasets into more readily accessible formats, improving the data quality, and improving metadata. Note that the term "dataset" as used here can apply only to data products derived directly from HP research relevant instruments, this includes so called "Level 4" data products that often present the most useful datasets from a mission but that were not part of the original mission's data delivery obligation. Excluded are higher-level datasets derived from the results of research analyses, data assimilation, and modeling; delivery of those data products are covered by the Archive and Dissemination Plans of the projects that produced them.

### 2.1 Programmatic Considerations

Proposals must discuss the relationship of the proposed effort to the present, as well as anticipated, state of knowledge in the field, to the relevant datasets that should be available from any related planned missions, and to any related NASA community research efforts.

This call includes two types of Data Upgrade programs – Open Data Upgrade (ODU) and Special Data Upgrade (SDU), both of which will accept submissions throughout the

year (no deadline). The rules for open proposal submissions are outlined in B.1 and in Section 3.2.

Submitting a proposal to this program element implies that if an award is made, a copy of any data product will be made public, including via one of the two discipline archives - The Space Physics Data Facility (SPDF), or the Solar Data Analysis Center (SDAC).

Proposers to this program element are not required to provide a data management plan. Instead, that is superseded by the requirement for the Archive and Dissemination Plan, see Section 2.2.

## 2.2 Data Upgrades Proposals

Funding is intended to support small, short-term (typically one year) awards to improve the quality, utility, and accessibility of datasets relevant to Heliophysics research.

Priority will be given to those proposals from data providers of NASA-sponsored datasets, but other data relevant to HP research will be considered.

A proposal for a Data Upgrade must include explicit subheadings as given in each of the bulleted points below, in the order below, with a discussion of each topic indicated (explicitly note if not applicable):

- *Products to be Produced:* A clear description of the products to be produced, including the time span covered; the physical quantities to be included with their temporal and/or spatial resolution; and the format(s), coordinate system(s), and processing level(s) (e.g., calibrated in physical units or not, the former being far preferable).
- *Scientific Utility:* An argument for why the datasets involved were scientifically useful in the past and for how the proposed upgrade will make them more useful in the future. Specific research projects should be mentioned, along with an assessment of whether these will bring qualitatively new insights. This should be supported by, e.g., refereed publications or other citations and uses by people outside the PI team. A justification that merely stated: "This work supports long-term data projects" without specific examples would be inadequate. A better justification might be: "The following three groups are awaiting this data product to be able to do these cutting-edge scientific studies ..."
- *Method of Production:* How the upgrade will be produced, including a presentation of relevant algorithms.
- *Demonstration of Improvement:* A demonstration that the proposed upgrade represents a significant improvement in the quality and/or utility of the data, its format, and/or its accessibility. "Before and after" graphs are especially helpful, and the validation of techniques and results (including, e.g., error bars) must be discussed.
- *Current Data Status:* The current status of the data and a demonstration that the data can still be retrieved from their current storage medium. Examples of the improved product are expected; if these are not available, specific arguments that these can be produced will be needed.
- *Data Volume:* A statement of the current data volume, the expected data volume after processing, and the fraction of the data expected to be recovered.

- *Metadata Plan*: A plan for providing required metadata and ancillary data and descriptions needed for independent scientific usability. A plan for providing SPASE descriptions of products, usually in conjunction the SPASE group or a NASA HP data center (SPDF or SDAC), should be included.
- *Archive and Dissemination Plan*: A clear discussion of how the resource will be placed in an HP Data Archive for general access or otherwise made easily available, and a description of the documentation to be provided of the dataset as required for scientific use.
- *Need for Resources*: A discussion that demonstrates that the requested resources are necessary and sufficient for success in achieving the proposed upgrade. A good resource discussion will include: how many hours of what specific level of support person are required and why; what can or cannot be automated and why; and what level of science support is needed in terms of FTEs.

The discussion of each of these points may be brief, but each point must be clearly addressed.

#### 2.2.1 *Open Data Upgrade Proposals*

The ODU program is ongoing and is intended to be solicited every year. It is targeted specifically for data upgrades for data quality upgrades to existing HPDE holdings, and for delivery of higher-level data products that were not part of a mission's original data management plan.

- Must address the subheadings as given in Section 2.2
- Are open to all HP research relevant satellite instrument datasets
- Currently non-public datasets are eligible if the end-product of the project becomes an openly accessible dataset.
- Excludes data from currently operating NASA missions.

#### 2.2.2 *Special Data Upgrade Proposals*

The SDU program is time-limited and will be used to target specific HP research data that has not received sufficient support in the past that could enable these data to be brought up to the quality required for hosting in the HPDE. This call for proposals seeks SDU proposals for HP research relevant CubeSat data; this would typically involve NASA or NSF sponsored research CubeSats.

- Must address the subheadings as given in Section 2.2
- Open to all HP research relevant CubeSat instrument datasets
- Includes data from past CubeSat missions and operating CubeSat missions
- The CubeSat mission needs to have demonstrated that it collected scientifically useful longer-term datasets (months not days).

### 3. Proposal Preparation and Submission

#### 3.1 General Considerations

Within the proposing team, the PI (or Science PI), and Co-Investigators (Co-Is) must each have specific and defined tasks in the project, and the tasks must be essential to the completion of the project. Unfunded team members who are performing tasks that

are essential to completion of the project are unfunded Co-Is and must show outside support for their effort. Proposals may be declared noncompliant based if they are outside the scope of the HDEE program (see Section 1 above) or if they fail to meet submission guidelines specified below.

### 3.2 Proposal Submission and Content

Proposals to this program element may be submitted at any time without any preliminary statement such as a Notice of Intent or Step-1 proposal. Certain restrictions related to duplicate proposals and resubmissions are described below. The NSPIRES page for this program element displays a "Proposals Due" date, but that is simply the end date for the current HDEE, after which proposals may be submitted to the next HDEE. Programs such as this one with No Due Date (NoDD) will evaluate proposals throughout the year with a roughly quarterly cadence, see Section 4.

While proposals can be submitted at any time, proposals will be evaluated at an approximate quarterly cadence and will cover the period up to 11:59 pm Eastern time on March 29, 2023. Proposals after that date must be submitted to the HDEE program element in ROSES-2023.

Specifically, for the rolling submissions in this program element:

- A PI may at most submit two distinct (different) proposals in any given calendar year.
- A PI may resubmit the same or slightly modified proposal at most once in any given calendar year.
- A proposal with more than 50% new content is counted as a new proposal and not a resubmitted proposal.

A (maximum) of 6 pages is allowed for the Science/Technical/Management Section of all proposals to this program element. The proposal must be submitted via NSPIRES or Grants.gov by the organization's Authorized Organizational Representative (AOR). A budget and other specified information is required.

The process for preparation and submission of the 6-page proposals is the same as that for any other ROSES proposal. Guidelines for content and formatting proposals are specified in the [NASA Guidebook for Proposers](#) and the *ROSES Summary of Solicitation*. Proposals must adhere to formatting requirements (e.g., margins, font sizes, line spacing).

Proposals must include the following within the Scientific/Technical/ Management section: clear descriptions of (1) specific Heliophysics scientific problems that could be addressed with the upgraded data in conjunction with other HP resources, (2) the importance of the problems, and (3) the details of the technical approach to providing the promised data. Proposals must be clear on how data will be made to conform to the Heliophysics Data Policy. The answers to the above points should arise naturally in following the required format in Section 2.2.

## 4. Evaluation

Compliant proposals will be evaluated according to the three criteria as defined in the *NASA Guidebook for Proposers*: intrinsic scientific and technical merit, relevance (to

this program element), and cost reasonableness, as clarified below.

The evaluation of scientific and technical merit will include:

- Compelling nature and scientific priority of science goals enabled by the Data Upgrade, including the importance of the problem within the broad field of Heliophysics; the unique value of the investigation to enable scientific progress in the context of current understanding in the field, and the importance of carrying out the Upgrade now.
- Appropriateness and feasibility of the methodology, including the appropriateness of the selected algorithms for completing the investigation and the feasibility of the methodology for ensuring success.

Based primarily on these two factors within merit, the evaluation will consider the overall potential science impact and probable success of the investigation.

Relevance will be judged by whether the proposal addresses the goals and objectives of a Data Upgrade.

Cost reasonableness will include assessing the amount of work to be accomplished versus the amount of time proposed.

Approximate dates for the evaluations will be May 2022, August 2022, November 2022, February 2023, and May 2023.

#### 5. Available Funds

It is anticipated that approximately \$750K will be made available to support ~ 10 new selections for 1-year duration ODU and SDU each year, with a median award value of \$75K. Smaller efforts should request lower funds, while larger efforts need to specifically justify their larger requests. Investigations in the range of \$50K – \$100K are anticipated. Proposals are expected to be for one year, with a second year possible with strong justification.

#### 6. Summary of Key Information

Expected program budget for one-year awards	\$750K, see Section 5
Number of new awards pending adequate proposals of merit	~8-12, see Section 5
Maximum duration of awards	2 years, see Section 5
Due date for proposals	Proposals may be submitted at any time until 11:59 pm Eastern time on March 29, 2023
Planning date for start of investigation	~ 4 months after proposal submission. Evaluation quarterly, see Section 4.
Page limit for the central Science-Technical-Management section of proposal	6 pages.

Relevance	This program is relevant to the Heliophysics 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 <i>ROSES Summary of Solicitation</i> .
General requirements for content of proposals	See Section 2.2 of this program element, Table 1 of <i>the ROSES Summary of Solicitation</i> and, finally, Section 3 of the <a href="#">NASA Guidebook for Proposers</a> .
Detailed instructions for the submission of proposals	See <a href="#">NSPIRES Online Help</a> , Sections 3.22-4.4 of the <a href="#">NASA Guidebook for Proposers</a> and Section IV(b) of <i>the ROSES Summary of Solicitation</i> .
Submission medium	Electronic proposal submission is required; no hard copy is permitted.
Web site for submission of proposals via NSPIRES	<a href="http://nspires.nasaprs.com/">http://nspires.nasaprs.com/</a> (help desk available at <a href="mailto:nspires-help@nasaprs.com">nspires-help@nasaprs.com</a> or (202) 479-9376)
Web site for submission of proposals via Grants.gov	<a href="http://grants.gov">http://grants.gov</a> (help desk available at <a href="mailto:support@grants.gov">support@grants.gov</a> or (800) 518-4726)
Funding opportunity number for downloading an application package from Grants.gov	NNH22ZDA001N-HDEE
Points of contact concerning this program element.	Reinhard Friedel, Telephone: (202) 281-6360 Email: <a href="mailto:reinhard.h.friedel@nasa.gov">reinhard.h.friedel@nasa.gov</a>  and  D. Aaron Roberts Telephone: (301) 286-5606 Email: <a href="mailto:aaron.roberts@nasa.gov">aaron.roberts@nasa.gov</a>