

## B.2 HELIOPHYSICS SUPPORTING RESEARCH

**NOTICE:** In order to avoid duplication and overlap of proposal opportunities, in particular between Heliophysics Guest Investigators (H-GI) and Heliophysics Supporting Research (H-SR), the expected scope of proposals submitted to this program is significantly increased. See Sections 1 and 2 for details.

Proposals to this program will continue to be taken by the two-step process in which the Notice of Intent is replaced by a required Step-1 proposal submitted by an Authorized Organizational Representative (AOR). Only proposers who submit a Step-1 proposal are eligible to submit a Step-2 (full) proposal. The title, science goals, and investigators may not be changed between the Step-1 and Step-2 proposals. Step-1 proposals will be checked for compliance, but will not be peer reviewed. All Step-1 proposers will be permitted to submit a Step-2 proposal, unless the Step-1 proposal has been determined to be noncompliant with program requirements. See Section 3 for details. Proposals based primarily on Magnetospheric Multiscale (MMS) data analysis would be better suited to B.8 HGI-MMS.

Check for NASA spacecraft mission data compliance as specified in the overview B.1.

### 1. Scope of Program

Heliophysics Supporting Research (SR) awards are research investigations of significant magnitude that employ a combination of scientific techniques. These must include an element of (a) theory, numerical simulation, or modeling, and an element of (b) data analysis and interpretation of NASA-spacecraft observations. Proposing teams must demonstrate the expertise necessary to cover the combination of techniques required. Awards are expected to be in the range of approximately \$200K/year – \$250K/year. The Heliophysics Supporting Research program 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 Appendix B.1 of this ROSES NASA Research Announcement.

#### 1.1 Overview

The Heliophysics Supporting Research program replaces the former supporting research elements of the Geospace Science program and the Solar and Heliospheric Science program entirely. Laboratory Research, Instrument and Technology Development, and Low Cost Access to Space proposals are not solicited with Heliophysics Supporting Research, but instead fall under ROSES Program element B.3 Heliophysics Technology and Instrument Development for Science (H-TIDeS).

Science investigations are solicited with this Heliophysics SR program. These must include an element of a) theory, numerical simulation, or modeling, and an element of b) data analysis and interpretation of current or historical NASA-spacecraft observations, and should address one of the four Heliophysics Decadal Survey goals (listed below). Theory/modeling/simulation proposals must be substantiated with and guided by data. It is expected that proposing teams will

be composed of investigators that cover the necessary expertise that the combination of techniques requires. Innovative ideas and techniques are welcome.

The four high level science goals from the Heliophysics Decadal survey (*Solar and Space Physics: A Science for a Technological Society* [www.nap.edu/catalog.php?record\\_id=13060](http://www.nap.edu/catalog.php?record_id=13060)) are:

1. Determine the origins of the Sun's activity and predict the variations in the space environment;
2. Determine the dynamics and coupling of Earth's magnetosphere, ionosphere, and atmosphere and their response to solar and terrestrial inputs;
3. Determine the interaction of the Sun with the solar system and the interstellar medium;
4. Discover and characterize fundamental processes that occur both within the heliosphere and throughout the universe.

## 1.2 Organizing Science Areas

The Heliophysics Supporting Research program has established four broad categories and 13 science areas for the purpose of organizing the evaluation and peer review. The four categories mirroring the four subdisciplines of Heliophysics are Solar, Heliosphere, Magnetosphere, and Ionosphere-Thermosphere-Mesosphere (ITM). The 13 science areas are listed below; some of these science areas fit within more than one broad category. Each proposal must choose one of the four broad categories and one of the 13 science areas.

1. Solar Interior
2. Solar Transient Events
3. Solar Atmosphere
4. Particle Acceleration, Transport, Modulation in the Heliosphere
5. Heliospheric Plasma Processes, Turbulence, Waves, Composition
6. Interplanetary Coronal Mass Ejections / Magnetic Clouds
7. Outer Heliosphere and the Interstellar Boundary
8. Solar Wind – Magnetosphere Coupling
9. Inner Magnetosphere
10. Magnetosphere – Ionosphere Coupling / Magnetotail
11. Ionosphere – Atmosphere Coupling
12. Neutral Atmosphere
13. Solar Output – Ionosphere/Atmosphere Coupling

System science proposals that touch on more than one of these science areas are encouraged; for the purpose of organizing the review, investigators should choose the one that is most relevant. Proposals addressing the magnetospheres or the ionospheres of other planets are permitted, but must not duplicate proposals sent to other programs.

Note: Do not choose Heliosphere meaning Heliophysics; they are not synonymous. This wastes time and resources to redirect; such misdirected proposals may be returned without review.

## 2. Submission and Evaluation Guidelines

### 2.1 General Considerations

Each Principal Investigator (PI) is allowed to submit one and only one Step-1 proposal to this program element. The expectation is that the Principal Investigator (or science lead) will invest a substantial portion of their time, of the order of 30%, to the investigation. The scope and necessary tasks of the investigation must be of sufficient breadth that, in order to achieve successful completion of the project, on the order of a full FTE per year would be required. Within the proposing team, the 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. Use of Collaborators is discouraged. Proposals may be declared noncompliant based on either the Step-1 or Step-2 proposal if they are outside the scope of the H-SR program (see Section 2.2 below) or if they fail to meet submission guidelines specified below (Section 3).

### 2.2 Limitations and Scope

Proposals outside the scope of Heliophysics Supporting Research include the following:

- Proposals for the same or essentially the same work submitted concurrently to other program elements in Appendix B or E, as specified in B.1 Section 1;
- Work for which the proposing organization (or investigators) are already funded by NASA. Currently funded investigators must show how their new proposed effort is different and not duplicative with current awards;
- Model or tool development and/or new data analysis techniques, where this effort constitutes more than 50% of a three-year effort;
- The routine, long-term gathering of observational data;
- Investigations with the main purpose of supporting ground-based infrastructure and facilities;
- Proposals based primarily on MMS data analysis would be better suited to B.8 HGI-MMS;
- Use of non-NASA data as ancillary data supporting the investigation is allowed, but the proposed investigation should not be focused on such data.

## 3. Two-Step Submission Guidelines

To streamline the proposal process (submission, evaluation, and administration), this program uses a two-step proposal submission process. The overall description of a two-step process can be found in *Section IV. (b) vii* of the *ROSES Summary of Solicitation*.

A Step-1 proposal is required and must be submitted electronically by the Step-1 due date (see below and Tables 2 and 3 in the *ROSES Summary of Solicitation*). The Step-1 proposal must be submitted by the organization Authorized Organizational Representative (AOR). No budget or other elements are required. Only proposers who submit a Step-1 proposal are eligible to submit a full proposal. Step-1 proposals will be checked for compliance, but they will not be evaluated. The Step-1 proposal title, science goals, and investigators (Principal Investigator, Co-Investigators, Collaborators, Consultants, and Other Professionals) cannot be changed between the Step-1 and Step-2 proposals. The expected format and evaluation criteria are described below. Submission of the Step-1 proposal does not obligate the offerors to submit a Step-2 (full) proposal later.

### 3.1 Step-1 Proposal Content

Proposers should refer to the "Instructions for Submitting a Step-1 Proposal" under "Other Documents" on the NSPIRES page for this program. The Step-1 proposal is restricted to the 4000 character Proposal Summary text box on the NSPIRES web interface cover pages.

The Step-1 proposals must include the following:

- The science goals and objectives to be addressed by the proposal;
- The relevance of the problem to one or more of the four Decadal Survey goals.
- A brief statement of the methodology to be used, including what data, models, and analysis will be used for completing the investigation;

The NSPIRES system for proposal submission requires that Step-1 proposals include a summary (i.e., abstract) describing the proposed work as outlined above. The proposal summary is entered directly into a text field in NSPIRES. No PDF attachment is required or permitted for Step-1 proposal submission. All information will be entered within the 4000 character Proposal Summary text box on the NSPIRES web interface cover pages. Proposers will be notified by E-mail when they are able to submit their Step-2 proposals.

Step-1 proposals may be declared noncompliant if they fail to meet submission guidelines specified in Sections 3.2 and 3.3 or if they are outside the scope of the H-SR program, as discussed in Section 1. PIs of noncompliant proposals will not be eligible to submit the associated Step-2 proposal and will receive a letter to this effect.

### 3.2 Step-2 Proposals

A Step-2 (full) proposal must be submitted electronically by the Step-2 due date (see below and Tables 2 and 3 in the *ROSES Summary of Solicitation*). The Step-2 proposal must be submitted via NSPIRES or Grants.gov by the organization Authorized Organizational Representative (AOR). A budget and other specified information is required. The Step-2 proposal title, science goals, and investigators (Principal Investigator, Co-Investigators, Collaborators, Consultants, and Other Professionals) must be the same as those in the Step-1 proposal.

Proposers must have submitted a Step-1 proposal to be eligible to submit a Step-2 proposal. Proposers that received a noncompliant letter are not eligible to submit a Step-2 proposal.

Proposers are strongly encouraged to provide names and contact information of five experts qualified to review their proposal. These experts must not be from the institutions of the PI or Co-Is. This information can be supplied via the SARA web page at

<http://science.nasa.gov/researchers/suggested-reviewers/>.

Proposers are expected to provide mail-in reviews for one to three proposals in this competition. Much of the science expertise lies in the PI/Co-I community, because, increasingly, nearly the entire Heliophysics community proposes. In order to maintain a high caliber review process, it is important to get the additional mail-in reviews to cover all proposals fairly.

### 3.3 Step-2 Proposal Format

The process for preparation and submission of the Step-2 (full) proposals is the same as that for any other ROSES proposal. Guidelines for content and formatting Step-2 full proposals are specified in the *NASA Guidebook for Proposers* and the *ROSES Summary of Solicitation*.

Proposals are restricted to fifteen (15) pages for the Scientific/Technical/Management section and must include the following sections with the preferred order:

- The science objectives and perceived impact of the proposed work to the state of knowledge in the field; references to existing work in the field should be limited to that which is needed to justify the value of the science proposed;
- The data and methodology to be employed in conducting the proposed research; the proposal must demonstrate (1) that the data is appropriate to address the science objectives and (2) that the methodology is both appropriate and feasible to make substantial progress on the science objectives;
- The relevance of the proposed work to one or more of the four high-level science goals from the most recent Heliophysics Decadal survey listed in Section 1.1 must be demonstrated;
- A general plan of work, the management structure for the proposal personnel, and a description of the expected contribution to the proposed effort by the PI and each person as identified in the proposal, whether or not they derive support from the proposed budget. Postdoctorals and students do not need to be named.

Historically, proposals that address a single well-focused compelling science objective with a limited set of specific science questions have been more successful at constructing methodologies that are demonstrably feasible and appropriate, as compared with those that propose to address a large number of science questions or that are directed at an overly-broad science topic.

### 3.4 Step-2 Evaluation Criteria

Step-2 proposals that are not compliant with format requirements may be rejected without review. See Section IV (b) ii of the *ROSES Summary of Solicitation* and the *NASA Guidebook for Proposers* for details. Proposals that have changed the scientific scope from that of their Step-1 proposal may be declared noncompliant.

Compliant proposals will be evaluated according to the criteria specified in Section C.2 of the *NASA Guidebook for Proposers*. These criteria are intrinsic scientific and technical merit, relevance to NASA's objectives, and cost realism/reasonableness.

The evaluation of scientific and technical merit will include the following:

- Compelling nature and scientific priority of the proposed investigation's science goals and objectives, including the importance of the problem within the broad field of Heliophysics; the unique value of the investigation to make scientific progress in the context of current understanding in the field, and the importance of carrying out the investigation now.
- Appropriateness and feasibility of the methodology, including the appropriateness of the selected data, models, and analysis for completing the investigation and the feasibility of the methodology for ensuring scientific success.

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

Relevance to and priority within the H-SR program will be assessed based on criteria discussed in Section 1. Each proposal must demonstrate that the investigation is relevant and of high priority. As requested in the *Guidebook for Proposers*, cost realism/reasonableness will be evaluated based on the amount of work to be accomplished versus the amount of time proposed. Open-ended proposals or those with a large number of science questions to be addressed typically do not fare well in this evaluation. Only necessary Co-Investigators and Collaborators should be included, and their specific tasks and roles in the investigation must be clearly laid out.

#### 4. Available Funds

It is expected that there will be approximately ~\$4M available in Fiscal Year (FY) 2016 to support new Heliophysics SR investigations selected through this program element. Due to the increase in the proposed scope and complexity, annual funding is expected to fall into the ~\$200-250K range per investigation.

#### 5. Award Types

As begun in 2013, the Heliophysics SR program will award funds through three vehicles: (1) grants, (2) interagency transfers, and (3) awards to NASA Centers. The Heliophysics SR program will no longer award contracts. An institution that has received a contract previously can receive funds as a grant by not charging a fee.

#### 6. Summary of Key Information

Expected program budget for first year of new awards	~\$4M
Number of new awards pending adequate proposals of merit	~17-20
Maximum duration of awards	3 years
Due date for Step-1 proposal	See Tables 2 and 3 in the <i>ROSES Summary of Solicitation</i> .
Due date for full proposals	See Tables 2 and 3 in the <i>ROSES Summary of Solicitation</i> .
Planning date for start of investigation	6 months after full proposal due date.
Page limit for the central Science-Technical-Management section of full proposal	15 pp; see also Chapter 2 of the <i>NASA Guidebook for Proposers</i>
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> .

Detailed instructions for the preparation and submission of proposals	See the <i>NASA Guidebook for Proposers</i> at <a href="http://www.hq.nasa.gov/office/procurement/nraguidebook/">http://www.hq.nasa.gov/office/procurement/nraguidebook/</a>
Submission medium	Electronic proposal submission is required; no hard copy is required or permitted. See also Section IV of the <i>ROSES Summary of Solicitation</i> and Chapter 3 of the <i>NASA Guidebook for Proposers</i> .
Web site for submission of Step 1 and Step 2 proposal 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 Step 1 and Step-2 proposal 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	NNH16ZDA001N-HSR
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