B.17 INTERDISCIPLINARY SCIENCE FOR ECLIPSE 2021

NOTICE: Clarified March 9, 2021. Based on the 2020-21 Antarctic season cancellations and the likelihood of similar cancellations for the 2021-2022 season, proposers should not assume that NSF will provide access to the Antarctic for the 2021-2022 field season. See Section 1.1.1. New text is in bold.

Amended February 18, 2021. This amendment presents a new program element in ROSES-2021. Step-1 Proposals are due April 7, 2021 and Step-2 proposals are due May 19, 2021.

Proposals should include accommodations for COVID-related travel requirements and delays as we are still in the midst of the COVID epidemic. Prior to making any awards, the COVID situation will be assessed, and may result in no selections.

1. Scope of the Program

The purpose of the Interdisciplinary Science for Eclipse (ISE) program element is to support development of new research or enhancement of existing research, applied to the 2021 total solar eclipse visible from the southern hemisphere on December 4th, 2021. This total solar eclipse will be visible from Antarctica and Southern Ocean. This eclipse will be logistically challenging, as the path of totality will only make landfall in Antarctica. Totality will last about two minutes. This eclipse will be unusual as the path of the total eclipse will move from east to west across Antarctica, while most eclipse paths move from west to east. This reversal is only possible in polar regions.

NASA is seeking proposals that would utilize the unique opportunity presented by the solar eclipse to study any relevant Heliophysics research topic, for example, a topic focused on the Sun or on the Ionosphere-Thermosphere-Mesophere system. All proposals must demonstrate links to the 2021 solar eclipse. This program element supports scientific research and development and deployment of existing and/or new technology. Building on existing partnerships and the use of interdisciplinary or citizen science approaches is encouraged.

ISE is a component of the Heliophysics Research Program and proposers interested in this program element should read B.1, the Heliophysics Research Program Overview for Heliophysics-specific requirements. Defaults for all ROSES elements are found in the ROSES *Summary of Solicitation* and for all NASA solicitations in the *Guidebook for Proposers*. The order of precedence is the following: This document (B.17) followed by B.1, followed by the ROSES *Summary of Solicitation* and last the *Guidebook for Proposers*. Proposers should review all of these resources to ensure compliance with Program requirements.

Use of interdisciplinary and/or citizen science approaches are encouraged.

1.1 Solicited Investigations

The ISE initiative is using this program element to take advantage of this approximately 2 minutes of totality visible from Antarctica and Southern Ocean to promote traditional

science, citizen science, and crowdsourcing platforms or techniques, applied to the study of any Heliophysics topic relevant to the solar eclipse.

Regardless of the scientific focus, the type of proposals, or sources of data, proposals may aim to address eclipse science at the local, regional, continental, or global scales. These approaches could complement NASA spacecraft observations by providing increased temporal or spatial sampling, or contribute to the validation of NASA data products derived from spacecraft observations, or use other innovative ways and/or a combination of the above to enhance the utility of NASA's observation systems from space, air, and land during this unique opportunity.

An important goal of the ISE initiative is to promote observations related to the study of the solar eclipse. This initiative is especially interested in receiving interdisciplinary proposals in the context of Heliophysics research objectives. Preference is given to proposals that include both collection of data and application of these data to utilize the solar eclipse for the study of any relevant Heliophysics research topic.

Proposals should not simply explain how the measurement could be used, but, to be considered interdisciplinary, should actually include tasks that use the resulting data to, for example, improve models, guide observations, or other relevant tasks. This broad goal can be achieved using "traditional" science and/or citizen science approaches. For more information on citizen science, see Section 1.9 of B.1 The Heliophysics Research Program Overview.

Due to shortness of time, no new hardware is being solicited in this call. Modification of existing hardware to take advantage of this particular eclipse will be considered.

Possible areas of interest include, but are not limited to:

- Contributing to any relevant eclipse-related science (e.g., of the inner corona, ionospheric, thermospheric, and mesospheric investigations using the eclipse as a point response function);
- Viewing eclipse-induced changes in the atmosphere and/or atmospheric response under the shadow of the Moon;
- Observations and/or *in-situ* measurements using spaceborne, airborne or seaborne assets to observe the eclipse or conduct any relevant eclipse-related science.

1.1.1 *Antarctic Logistics* [Added March 9, 2021]

Based on the 2020-21 Antarctic season cancellations and the likelihood of similar cancellations for the 2021-2022 season, proposers should not assume that NSF will provide access to the Antarctic for the 2021-2022 field season. Proposers that require Antarctic access must arrange the logistics, describe them in the proposal, and budget accordingly.

2. Submission and Evaluation Guidelines

2.1 General Considerations

Each Principal Investigator (PI) is allowed to submit one and only one proposal to this program element. Within the proposing team, the PI, 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. Proposals may be declared noncompliant based on either the Step-1 or Step-2 proposal if they are outside the scope of the ISE program (see Section 1 above) or if they fail to meet submission guidelines specified below (Section 2.2-2.4).

2.2 Two-Step Submission Process

To provide adequate notice to potential reviewers, this program uses the "binding" two-step proposal submission process described in Section IV(b)vii of the *ROSES Summary of Solicitation*. See also Section 1.3 of B.1 the Heliophysics Research Program Overview. Those who are not familiar with the two-step process may refer to the "How to Submit a Step-1 Proposal" PDF under "Other documents" on the NSPIRES page for this program element.

In the two-step process a Step-1 proposal is required. Potential reviewers are solicited based on the Step-1 proposals. The proposal team members may not be changed between the Step-1 and Step-2 proposals, unless prior approval is obtained from the Program Officer of the element. The title and broad science goals of the proposal may not be changed such that they would significantly affect the scientific or technical expertise required to properly evaluate a proposal. Changes in a proposal that alter the title and/or broad science goals will result in a proposal being declared non-compliant.

2.3 Step-1 Proposals

A Step-1 proposal is required and must be submitted electronically by the Step-1 due date given in Tables 2 and 3 of ROSES. The Step-1 proposal must be submitted by the organization's 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 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.

2.3.1 *Step-1 Proposal Content*

The Step-1 proposal is restricted to the 4000-character Proposal Summary text box on the NSPIRES web interface cover pages. References and any other supporting material are not required, but, if included, must fit within the limit.

The Step-1 proposals must include the following:

- The science goals and objectives to be addressed by the proposal;
- A brief statement of the methodology to be used, including what platform, hardware, data, models, and analysis to be used for completing the investigation;
- A brief statement of the relevance of the problem to the goals of connecting the eclipse to the study of Sun and to the Heliophysics overarching goal and/or the combined objectives described in Section 1 of B.1 The Heliophysics Research Program Overview.

No PDF attachment is required or permitted for Step-1 proposal submission. Proposers will be invited by NSPIRES when they are able to submit their Step-2 proposals.

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 in response to NSPIRES cover page questions at the time of submission of the Step-1 proposal.

2.4 Step-2 Proposals

To be eligible, the 10-page (maximum) Step-2 proposal must be submitted electronically by the Step-2 due date (see Tables 2 and 3 of ROSES). The Step-2 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.

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

2.4.1 *Step-2 Proposal Content*

The process for preparation and submission of the Step-2 proposal is the same as that for any other ROSES proposal. Please refer to the "How to create and submit a Step-2 proposal" PDF under "Other documents" on the NSPIRES page for this program element. Guidelines for content and formatting Step-2 full proposals are specified in the *ROSES-2021 Summary of Solicitation*. Proposals must adhere to formatting requirements (e.g., margins, font sizes, line spacing).

The Scientific/Technical/Management section of Step-2 Proposals are restricted to ten (10) pages 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. If applicable, proposers may include reference to published work from the prior Interdisciplinary Science for Eclipse from ROSES-2016;
- The data and methodology to be employed in conducting the proposed research; the proposal must demonstrate (1) that the data are 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 the 2021 eclipse science (Section 1); and
- A general plan of work and estimated schedule, 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. Postdoctoral fellows and students need not 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.

2.4.2 *Step-2 Evaluation Criteria*

Compliant proposals will be evaluated according to the criteria defined in the *Guidebook for Proposers* and as specified in Section V(a) of the *ROSES Summary of Solicitation* . These criteria are Relevance, Merit, and Cost. Clarifications and additions specific to this program element are listed below.

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

- The interdisciplinary nature of the proposals in the context of Heliophysics science objectives, as described in Section 1.1, i.e., preference is given to proposals that include both collection of data and application of these data to utilize the solar eclipse for the study of any relevant Heliophysics topic.
- Extent to which proposals not simply explain how the measurement could be used, but actually include tasks that use the resulting data to, for example, improve models, guide observations, or other relevant tasks.
- 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. The appropriateness of all data utilized to address the proposed science investigation, including where applicable, new missions like Parker Solar Probe, GOLD and/or ICON data, and other supporting space-based or ground-based observations, will be evaluated.

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

Relevance to and priority within the ISE program will be assessed based on whether the proposed work is appropriate for this total solar eclipse and cannot be accomplished in the near term in another way.

The evaluation of cost reasonableness includes 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.

3. Summary of Key Information

Expected annual program budget for new awards	~ $1.0 M
Number of new awards pending adequate proposals of merit	5-10
Maximum duration of awards	1 year
Due date for Step-1 proposal	See Tables 2 and 3 of this ROSES NRA
Due date for Step-2 proposal	See Tables 2 and 3 of this ROSES NRA
Date for start of investigation	No earlier than August 1, 2021.
Page limit for the central Science-Technical-Management section of Step-2 proposal	10 pages. See also Section 2.4.1 and Table 1 of ROSES and Section 3.7 of the *NASA Guidebook for Proposers*

Relevance	This program is relevant to the Science goals of the Heliophysics division stated 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*.
General requirements for content of proposals	See Section 2.4 of this program element, Table 1 and Section IV of *the ROSES Summary of Solicitation*, and Section 3 of the *Guidebook for Proposers*.
Detailed instructions for the submission of proposals	See https://nspires.nasaprs.com/tutorials/ Sections 3.22-4.4 of the *NASA Guidebook for Proposers* and Section IV(b) of *the ROSES Summary of Solicitation*.
Submission medium	Electronic proposal submission is required; no hard copy is permitted.
Web site for submission of Step-1 and Step-2 proposal via NSPIRES	http://nspires.nasaprs.com/ (help desk available at nspires-help@nasaprs.com or (202) 479-9376)
Web site for submission of Step 1 and Step-2 proposal 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	NNH21ZDA001N-ISE
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