B.21 HELIOPHYSICS CITIZEN SCIENCE INVESTIGATIONS

NOTICE: Amended September 26, 2023. This amendment releases the final text for this program element, which had been listed as "TBD." This program element will use a two-step submission process, see Section 2.2. Step-1 proposals are due November 15, 2023, and Step-2 proposals are due January 26, 2024.

This program element is participating in the Inclusion Plan Pilot Program, see Section 2.4.2. This Inclusion Plan will not be part of the adjectival ratings nor selection recommendations for this opportunity.

All proposers are strongly encouraged to use the standard Heliophysics template for Current and Pending Support for the PI and all Co-Is, regardless of time commitment, and the Open Science Data Management Template. These templates can be found at https://science.nasa.gov/researchers/templates-heliophysic-division-appendix-b-roses-proposals.

1. Scope of Program

1.1 Overview

The Heliophysics Citizen Science Investigations (H-CSI) program supports medium-scale citizen science projects during the Heliophysics Big Year and beyond, enabling science during the concurrence of multiple solar and heliophysics events. More information on Heliophysics Citizen Science and the Heliophysics Big Year can be found at https://science.nasa.gov/heliophysics/programs/citizen-science.

H-CSI will expand participation of citizen scientists in NASA heliophysics research, bringing unprecedented statistical power and new insights not realistically achievable by other means. The approximately 1-year time interval from September 2023 to December 2024, designated the Heliophysics Big Year, encompasses two solar eclipses across North America in 2023 and 2024 and the arrival of solar cycle maximum. This call solicits investigations which will develop and implement capabilities to augment and enhance NASA scientific data, knowledge, and capacity through voluntary observations, interpretations, or other direct participation by members of the general public centered on these heliophysics events and other heliophysics science.

For this program element, citizen science is defined as efforts or projects that use voluntary public participation in the scientific endeavor, including – but not limited to – formulating research questions, conducting experiments, collecting and analyzing data collected by members of the community and/or professional scientists, interpreting results, making new discoveries, and/or developing or deploying technologies and applications.

H-CSI is a component of the Heliophysics Research Program and proposers interested in this program element are encouraged to see B.1, The Heliophysics Research Program Overview for Heliophysics-specific requirements. Common requirements for all ROSES elements and proposals are found in the *ROSES-2023 Summary of Solicitation* and the *2023 Proposer's Guide*. The order of precedence for proposers is the following: ROSES Element B.21 (this document) takes precedence followed by B.1, The

Heliophysics Research Program Overview, followed by the ROSES *Summary of Solicitation* and, finally, the *Proposer's Guide*. Proposers should be familiar with all of these resources. Additional citizen science resources can be found at https://science.nasa.gov/citizenscience.

1.2 Solicited Investigations

The Heliophysics Division is soliciting this program element to strategically promote the use of citizen science and the data produced by these projects to dramatically advance Heliophysics. H-CSI solicits medium-scale citizen science investigations, which are mature enough to produce science results and achieve proposed project goals within a maximum 3-year period of performance. Citizen science investigations at an early phase that require seed funding are to be proposed to the cross-disciplinary ROSES element F.9 Citizen Science Seed Funding Program (CSSFP) program. Investigations previously funded through CSSFP or a similar program are welcome to submit proposals to H-CSI, though previous seed funding is not a requirement if scientific readiness can be justified.

1.2.1 *Science Focus*

This program element solicits proposals for up to three-year scientific research projects that are enabled by citizen science activities. All proposals must demonstrate clear linkages between the citizen science project and advancing NASA's Heliophysics science goals. Proposed citizen science projects may include, but are not limited to:

- Heliophysics Big Year-focused topics; e.g., solar max and/or associated space weather, and data analysis from solar eclipse research;
- Combination of Heliophysics mission and ground-based data with other data sources in concert with a citizen science effort to dramatically advance an area of Heliophysics science;
- Projects that gather or produce new data; particularly those that can uniquely be contributed by citizen scientists;
- Calibration and validation, augmentation, or enhancement to significantly increase the quality, resolution, scope, or extent of existing spacecraft and ground-based data;
- Cross-disciplinary science;
- Projects that demonstrate value in adding or enhancing crowdsourcing, a process of utilizing a crowd of voluntary online participants to accomplish a task, in scientific workflows.

Citizen scientist projects can have a high impact by significantly extending the scope and quality of satellite-based observations to answer important scientific questions that cannot otherwise be addressed. Any existing data used in the proposed investigation must be in a publicly accessible archive at least 30 days prior to the Step-2 proposal due date (see Section 1.7 of B.1, The Heliophysics Research Program Overview). Details on NASA's Heliophysics data and missions are available at the following links: NASA's Heliophysics data and NASA's Heliophysics missions.

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.

The work carried out for this program must be in support of the Heliophysics strategic goals and objectives in NASA's 2018 *Strategic Plan* and Chapter 4.1 of the NASA *2020-2024 Science Plan* (both at https://science.nasa.gov/about-us/science-strategy), as well as the NASA Heliophysics Citizen Science strategy: https://science.nasa.gov/heliophysics/programs/citizen-science. The recommended priorities of the Heliophysics community are also discussed in the National Research Council Decadal Strategy for Solar and Space Physics report, *Solar and Space Physics: A Science for a Technological Society* (http://www.nap.edu/catalog/13060/solar-and-space-physics-a-science-for-a-technological-society). The decadal mid-term assessment includes several references to citizen science which has emerged largely since the prior decadal.

2. Submission and Evaluation Guidelines

2.1 General Considerations

An individual may be Principal Investigator (PI) of one and only one proposal to this program element. 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.

Proposals may be declared noncompliant if they are outside the scope of the H-CSI program (see Section 1 above) or if they fail to meet formatting or submission guidelines specified below (Sections 2.2-2.4).

2.2 Two-Step Submission Process

Proposal submission for H-CSI will use a two-step proposal submission process. Use of the two-step process increases the notice provided to potential reviewers. The overall description of a two-step process can be found in Section IV(b)vii of the ROSES-2023 *Summary of Solicitation*. In the two-step process a Step-1 proposal is required.

Both Step-1 and Step-2 proposals must be submitted electronically via NSPIRES by the organization's Authorized Organizational Representative (AOR) by the proposal due date (see Table 2 and Table 3 of ROSES). No budget or other elements are required for a Step-1 proposal. Only proposers who submit a Step-1 proposal are eligible to submit a Step-2 proposal. All Step-1 proposals will be reviewed for compliance; all compliant proposals submitted to these calls will be "invited" to submit a Step-2 proposal.

Because potential reviewers are solicited based on the Step-1 proposal, there are limits to changes that may be made between the Step-1 and Step-2 proposals: 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. 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. Significant changes in a Step-2 proposal that could impact the review may result in a proposal being declared non-compliant.

2.3 Step-1 Proposal Content

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

The Step-1 proposal shall include the following information:

- The science goals and objectives to be addressed by the proposal;
- A brief statement of the methodology to be used, including what data, models, and analysis will be used for completing the investigation; and
- A brief statement of the relevance of the problem to the Heliophysics overarching goal or specific objectives as described in B.1.

In addition, outside of the 4000-character Proposal Summary text box 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 an NSPIRES cover page question at the time of submission of the Step-1 proposal. Submission of the Step-1 proposal does not obligate the offerors to submit a Step-2 proposal later.

2.4 Step-2 Proposal Content

The process for preparation and submission of proposals is described in Section IV(b)ii of the *ROSES-2023 Summary of Solicitation*. Proposals must adhere to formatting requirements (e.g., margins, font sizes, line spacing). Proposals are restricted to fifteen (15) pages for the Scientific/Technical/Management (S/T/M) section and must include the following content 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 citizen science 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; Discussion of the methodology should include, to the extent practicable:
    - the utilization of existing platforms and/or existing enthusiast communities to maximize collective impact; and/or
    - the development of new platforms and/or building of new communities.
- The relevance of the proposed work to the Heliophysics overarching goal or specific objectives as described in B.1;
- 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. Postdoctoral fellows and students need not be named.

- A sunset plan that ensures:
  - Citizen scientist volunteers are informed about the results when the project is completed and are provided opportunities to be retained as part of the larger NASA citizen science community. Communication with participants is also recommended for crowdsourcing.
  - Inactive websites include a statement: “This site is no longer actively updated.” and provide a link to the project’s results and publications and a link to at least one other relevant NASA citizen science project.

2.4.1 *Open Science Data Management Plan*

All proposals must include an Open Science Data Management Plan (OSDMP) of up to 2 pages immediately following the references and citations for the S/T/M Section. The required content for the OSDMP is described in Section 1.6 of B.1, The Heliophysics Research Program Overview and Section II.c of the *ROSES-2023 Summary of Solicitation*. Proposals must describe a strategy for monitoring data quality and consistency throughout the lifetime of the project including beta testing the project on a group of citizen scientist volunteers before launch to ensure data quality and positive participant experience. Proposed work must commit to the use of open-source formats and metadata standards to increase interoperability with other Heliophysics observation data. Additional details and context can be found in the following resources: the *Heliophysics Science Data Management Policy*, *NASA ESDS Citizen Science Data Working* Group White Paper by the NASA Citizen Science Data Working group, and the *NASA Citizen Science Program Handbook*. See https://science.nasa.gov/researchers/templates-heliophysic-division-appendix-b-roses-proposals for the OSDMP template.

2.4.2 *Inclusion Plan*

An Inclusion Plan, not to exceed two pages must be included in all proposals immediately following the OSDMP. See Section IV(e)(ii) of the *ROSES-2023 Summary of Solicitation* for detailed guidance.

2.4.3 *Current and Pending Support*

Superseding the ROSES default, a Current and Pending Support statement must be included for the PI and all Co-Is, regardless of committed time to the project.

2.4.4 *Budget*

The budget narrative and details in the peer reviewed proposal should be redacted, i.e., not include salary, fringe, or overhead; see Section IV.(b)iii of the *ROSES-2023 Summary of Solicitation*. The NSPIRES cover page budget and separately uploaded total budget must be complete, not redacted.

Budgets may include funds for at least one team representative to participate annually in the annual SMD "Building the NASA Citizen Science Community" meeting. Budgets may not include salary for citizen scientists/volunteers. However, since training and communicating with volunteers is a necessary component of a citizen science project,

projects should include resources for accomplishing these tasks. For example, funds may be used for the development of training programs, website content, graphic design, newsletters, or tutorials. Other forms of compensation to citizen scientists such as honoraria, meals, prizes, etc. may be allowable if deemed necessary to successfully conduct the project per the government grants rules in the Code of Federal Regulations, chapter 2, part 200 (2 CFR 200).

2.4.5 *Step-2 Evaluation Criteria*

Compliant Step-2 proposals will be evaluated according to the three standard criteria (Relevance, Intrinsic Merit, and Cost Reasonableness) as defined in Appendix D of the *NASA Proposer's Guide* and as specified in Section V(a) of the ROSES-2023 *Summary of Solicitation*.

In addition to the standard evaluation factors given in Appendix D of the *NASA Proposer's Guide,* the evaluation of intrinsic merit will include:

- The extent to which the team has the expertise needed to foster broad participation, communication, and dissemination of results (e.g., two-way communication between volunteers and NASA-funded scientists, with scientists giving feedback to and receiving feedback from the volunteers).
- The effective utilization of existing platforms and/or existing enthusiast communities to maximize collective impact; and/or development of new platforms and/or building of new communities.

3. Available Funds

It is expected that there will be approximately ~$0.7M available in Fiscal Year (FY) 2024 to support new Heliophysics Citizen Science Investigations selected through this program element. Annual funding is expected to fall into the ~$120-160K range per investigation.

4. Award Types

The Heliophysics CSI program will award funds through three vehicles: (1) Federal assistance (grants and cooperative agreements), (2) interagency transfers, and (3) awards to NASA Centers. The Heliophysics CSI program is not expected to award contracts as it would not be appropriate for the nature of the work solicited.

5. Summary of Key Information

Expected program budget for first year of new awards	$700K, see Section 3.
Number of new awards pending adequate proposals of merit	~5
Maximum duration of awards	3 years
Due date for Step-1 proposals	See Tables 2 and 3 of this ROSES NRA
Due date for full Step-2 proposals	See Tables 2 and 3 of this ROSES NRA

Planning date for start of investigation	6 months after proposal due date.
Page limit for the central Science-Technical-Management section of proposal	15 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 ROSES-2023 Summary of Solicitation*.
General requirements for content of proposals	See Section 2.4 of this program element, Table 1 of ROSES-2023 and Section IV of *the ROSES-2023 Summary of Solicitation*, and Section 3 of the *Proposer's Guide*.
Detailed instructions for the submission of proposals	See NSPIRES Online Help Sections 3.22-4.4 of the *NASA Proposer's Guide* 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
Web site for submission of Step 1 and Step-2 proposal via Grants.gov	https://grants.gov/ (help desk available at support@grants.gov or (800) 518-4726)
Funding opportunity number for downloading an application package from Grants.gov	NNH23ZDA001N-HCSI
Program Officer/Points of Contact concerning this program element, both of whom share this mailing address: Heliophysics Division Science Mission Directorate NASA Headquarters Washington, DC 20546-0001	Susanna Finn Telephone: (202) 390-7575 Email: susanna.c.finn@nasa.gov Janet Kozyra Telephone: (202) 358-1258 Email: janet.kozyra@nasa.gov