

## A.41 CITIZEN SCIENCE FOR EARTH SYSTEMS PROGRAM

**NOTICE: Amended June 12 2020. This Amendment releases the final text for this program element. Mandatory Notices of Intent are due August 4, 2020 and proposals are due September 11 2020.**

### 1. Scope of the Program

#### 1.1 Overview

The primary goal of the [Citizen Science for Earth Systems Program](#) (CSESP) is to develop and implement capabilities to augment and enhance NASA scientific data and capacity through voluntary observations, interpretations, or other direct participation by members of the general public to advance understanding of the Earth as a system. The program complements NASA's capability of observing Earth globally from space, air, land, and water by engaging the public in NASA's strategic goals in Earth Science (see <https://science.nasa.gov/about-us/science-strategy>).

The program aims to advance the use of citizen science in scientific research about Earth by directly supporting citizen science activities, as well as by deploying technology to further citizen science research. This program element is a follow on to the [2016 CSESP ROSES Program element](#) for which the funded projects are described on the [Citizen Science for Earth Systems Program](#) page. While much of the focus of the original program element has remained, the new program element also includes an option to propose to analyze and interpret legacy NASA-supported citizen science data. For the purposes of this program element, NASA citizen science data means data that were collected by citizen scientists and that were derived from a NASA-funded citizen science project, or citizen science data hosted directly on a NASA data system, or citizen science data that are directly used to calibrate or validate NASA Earth observation data.

For the purpose of 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 citizen and/or professional scientists, interpreting results, making new discoveries, and/or developing or deploying technologies and applications. Crowdsourcing, another frequently used term describing voluntary contributions, is included under citizen science in this program element.

All proposals must demonstrate clear linkages between citizen science and NASA observation systems to advance NASA's Earth science (see <https://science.nasa.gov/earth-science/big-questions>). Projects that demonstrate value in adding or enhancing crowdsourcing in scientific workflows are encouraged. Calibration and validation, augmentation, or enhancement to significantly increase the quality, resolution, scope, or extent of remotely sensed data are all possible focal areas. Combination of remotely sensed data with other data sources in concert with a citizen science effort to dramatically advance an area of Earth science is also welcome.

This program element directly supports NASA's response to Section 402 of the [American Innovation and Competitiveness Act of 2017](#), which encourages and grants

authority for citizen science activities and enumerates the benefits including: "accelerating scientific research, increasing cost effectiveness to maximize the return on taxpayer dollars, addressing societal needs, providing hands-on learning in STEM, and connecting members of the public directly to Federal science agency missions and to each other".

## 1.2 Scientific Focus

The Citizen Science for Earth Systems Program is using this program element to promote the use of citizen science, crowdsourcing, and the data they generate in concert with NASA Earth observation data and applications to dramatically advance Earth science. 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. For example, massive field-based training data sets gathered by citizen scientists can increase the level of effective resolution in model-based predictions produced by certain remote sensing applications such that the resulting dataset can be used to answer new and important questions that could not previously be resolved. See further details on NASA's Earth Science data at <https://earthdata.nasa.gov/> and NASA's Earth observing satellites at <https://eosps.nasa.gov/content/all-missions/>.

## 1.3 Award Type, Duration and Budget

NASA anticipates making awards for two types of projects (Types 1 and 2, as described in Section 2). NASA anticipates that awards to non-governmental organizations will be grants. Approximately \$3M total is available to fund a total of approximately eight to twelve projects of both types for 18 months. Pending the outcome of an independent review of the Type 1 projects as they approach their 18-month maturation, two to five may have their funding augmented to continue with full implementation for an additional three years. Approximately \$2M per year is available across all of those continuing projects for the additional three years. Projects based on existing NASA-enabled citizen science data (Type 2) are expected to be complete in 18 months and will not be part of the down-selection for an implementation phase.

## 2. Types of Proposals

This program element aims to use citizen science and crowdsourcing platforms or techniques to advance our scientific knowledge of the Earth system and to complement the research currently conducted using NASA's Earth-observing satellites. To address this aim, this program element requests two types of proposals as defined below.

### 2.1 Type 1 Proposals: Citizen Science Research Gathering New Data

NASA will support development of new research projects or significant enhancement or refocusing of existing projects that use citizen science to advance scientific understanding of the Earth system. Projects must use citizen science or crowdsourcing platforms or techniques to advance our scientific knowledge of the Earth system and to complement the research currently conducted using NASA's Earth-observing systems.

These proposals are for collection of new data and may aim to address real-world problems at the local, regional, continental, or global scales; to complement NASA

observation systems by increasing temporal or spatial sampling; to contribute to the validation of NASA data products derived from satellite observations; to dramatically enhance the quality and quantity of data collected by individual NASA-focused citizen scientists; to achieve a combination of the above; or to implement other innovative methods to enhance the utility of NASA's observation systems from space, air, land, and water. These proposals will be for projects with an 18-month pilot phase to be followed by a three-year implementation phase for those projects that successfully pass a continuation review. The descriptions of the work and budget required for the two phases should be clearly separated in the proposal because there will be a down-selection near the end of the pilot phase to determine the subset of projects that receive funding to move on to the implementation phase. During the first year of funding for Type 1 projects, NASA will provide explicit instructions for a report to be filed by a deadline shortly after the first year of funding. Selection for the implementation phase will be primarily based on an evaluation of this report by an external review panel. Failure to submit the report by the due date will result in automatic elimination from consideration for the implementation phase.

Areas of investigation can include any of the Earth Science [focus areas: Atmospheric Composition, Weather and Atmospheric Dynamics, Climate Variability and Change, Water and Energy Cycle, Carbon Cycle and Ecosystems, or Earth Surface and Interior.](#)

These projects could include crowdsourced observations using instrumentation with established specifications, analysis of citizen science data or joint analysis by incorporating NASA satellite-based data products, or development of user interface applications, algorithms, and websites to increase the efficiency and accuracy of crowdsourced data. However, in contrast to Type 2 proposals, new data provided by actively participating citizen scientists must be the primary data source highlighted in the project.

Proposals must address all aspects of recruitment and retention of citizen scientists, as well as commit to open sharing of the data collected through NASA-approved data and information systems throughout the project. Data from projects selected for continuation to full implementation will be archived at a NASA-approved data center, following best practices for assurance of data quality (see the recommendations and standards outlined in the [NASA ESDS Citizen Science Data Working Group White Paper](#)).

## 2.2 Type 2 Proposals: Proposals for Reuse, Enhancement, or Characterization of Existing NASA Citizen Science Data

Proposals for reuse, enhancement, or characterization of existing NASA citizen science data can be in any Earth science subject area but may not include collection of new data. For the purposes of this program element, NASA citizen science data means data that were collected by citizen scientists as a primary funded deliverable in a NASA-funded citizen science project, citizen science data hosted directly on a NASA data system, or citizen science data that are currently used to calibrate or validate NASA Earth observation data. All data used in these projects should come from sources where participants were aware of and agreed to submit their data as part of a citizen science project (for example, data from The Global Learning and Observations to Benefit the Environment [GLOBE] Program [www.globe.gov](http://www.globe.gov) and [previously funded CSESP](#)

[projects](#)). Non-participatory citizen science (e.g., using movement data from mobile phones or mining Flickr images without individual informed participation) or simply using a dataset that was not created using citizen science is out of scope for this program element. Proposers must demonstrate that citizen scientists were aware of potential uses of the data they contributed, and explain how the intended research conforms with community norms for using citizen science data. These proposals will be for projects with an entire length of 18 months and should include well-defined final deliverables at the end of that period. There is no pilot phase and these projects are not eligible for continued funding from this program element beyond their full 18 month implementation.

### 3. Proposal Preparation and Submission

A Notice of Intent (NOI) is required for all submissions.

The general information provided in Section IV of the *ROSES-2020 Summary of Solicitation* about proposal preparation and submission applies to this program element. Accompanying the cover page will be a "Program-specific Questionnaire," where the proposer must specify the type of proposal being submitted, the scientific focus, and the relevant current or future NASA Earth-observing satellite(s).

All proposals must be responsive to the [Science Mission Directorate Policy on Citizen Science](#), which specifies a data management plan and a sunset plan. Proposals should describe a strategy for monitoring data quality and consistency throughout the lifetime of the project. Proposals must commit to the use of open-source formats and metadata standards to increase interoperability with other Earth observation data. See: [NASA ESDS Citizen Science Data Working Group White Paper](#) by the NASA Citizen Science Data Working group (CSDWG) as well as NASA recommended standards (<https://earthdata.nasa.gov/user-resources/standards-and-references>).

Data, results, and other information created for this proposal are subject to NASA's Earth Science Data and Information Policy (<http://science.nasa.gov/earth-science/earth-science-data/data-information-policy/>). All data will be released, along with the source code for algorithm software, coefficients, and ancillary data used to generate products. Data and results will be archived at a NASA-approved repository.

All resulting software, along with source code, will be released as open-source software. If deemed appropriate by NASA, release will be facilitated through <https://github.com/nasa> and is subject to the NASA Earth Science Alternate Data Rights language to be included in cooperative agreements for projects selected (<http://science.nasa.gov/earth-science/earth-science-data/data-information-policy/data-rights-related-issues/>).

All proposals should include funding for participation by a team member in [The Citizen Science for Earth Science Data Working Group](#) including time for regular teleconferences and other participation. This resource estimate should include travel and time for at least one face-to-face meeting per year.

### 4. Proposal Evaluation Criteria

Proposals will be evaluated vs. the three standard criteria: intrinsic merit, relevance, and cost as defined in the [NASA Guidebook for Proposers](#). The general information

provided in Section VI of [ROSES-2020 Summary of Solicitation](#) about the proposal review and selection process applies to this program element. Additionally, the direct connection between NASA Earth observation systems and citizen science, as well as responsiveness to the proposal requirements (e.g., described in Section 2 of this program element) will be used in the assessment of relevance.

#### 5. Summary of Key Information

Expected total program budget for new awards	~ \$3M for all proposals selected for the initial 18 months; then ~\$2M per year total for the Type 1 proposals selected for continuation.
Number of new awards pending adequate proposals of merit	~8-13 proposals for the initial 18 months, the proportion of each type determined by the proportion and quality of proposals submitted. After the initial 18-month period, ~2-5 Type 1 proposals will be selected for the three-year continuation period.
Maximum duration of awards	18 months for the initial selection of both Type-1 and Type-2 projects, with the potential for an additional three years for Type 1 projects selected for continuation (See Section 2)
Due date for mandatory Notice of Intent to propose (NOI)	See Tables <a href="#">2</a> and <a href="#">3</a> of this ROSES NRA
Due date for Proposals	See Tables <a href="#">2</a> and <a href="#">3</a> 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 pp; see also Table 1 in the <a href="#">ROSES Summary of Solicitation</a> .
Relevance	This program is relevant to the Earth Science questions and goals in <a href="#">the NASA Science Plan</a> . Proposals that are relevant to this program are, by definition, relevant to NASA.
General information and overview of this solicitation	See the <a href="#">ROSES Summary of Solicitation</a>
General requirements for content of proposals	See <a href="#">A.1 Earth Science Research Overview</a> and Section IV and Table 1 of <a href="#">the ROSES Summary of Solicitation</a>
Detailed instructions for the submission of proposals	See <a href="https://nspires.nasaprs.com/tutorials/">https://nspires.nasaprs.com/tutorials/</a> and Section IV(b) of <a href="#">the ROSES Summary of Solicitation</a>
Submission medium	Electronic proposal submission is required; no hardcopy is required.
Web site for submission of 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 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	NNH20ZDA001N-CSESP
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