NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

HEADQUARTERS

SCIENCE MISSION DIRECTORATE

RESEARCH OPPORTUNITIES IN SPACE AND EARTH SCIENCES – 2022 (ROSES-2022)

NASA RESEARCH ANNOUNCEMENT (NRA)

SOLICITING BASIC AND APPLIED SCIENCE RESEARCH AND TECHNOLOGY DEVELOPMENT

ANNOUNCEMENT NUMBER: NNH22ZDA001N

CATALOG OF FEDERAL DOMESTIC ASSISTANCE (CFDA) NUMBER: 43.001

OMB APPROVAL NUMBER 2700-0092 (EXPIRES 9/30/2022)

ISSUED: FEBRUARY 14, 2022

KEY DATES

FULL (STEP-2) PROPOSALS DUE

NO EARLIER THAN MAY 16, 2022

THROUGH NO LATER THAN MAY 12, 2023

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Any amendments to the program elements will be indicated as bold and red in Table 2 and Table 3 of this NRA. Potential proposers may receive notification of amendments to ROSES-2022 by signing up for the SMD NSPIRES mailing list and/or by signing up for the ROSES-2022 Blog at https://science.nasa.gov/researchers/sara/grant-solicitations/roses-2022/.

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RESEARCH OPPORTUNITIES IN SPACE AND EARTH SCIENCES (ROSES) – 2022

SUMMARY OF SOLICITATION

I. FUNDING OPPORTUNITY DESCRIPTION

This National Aeronautics and Space Administration (NASA) Research Announcement (NRA), Research Opportunities in Space and Earth Sciences (ROSES) – 2022, solicits basic and applied research in support of NASA's Science Mission Directorate (SMD).

Through this ROSES NRA, NASA encourages the participation of the space and Earth science communities in SMD's research and technology programs. These programs form the foundation of both the basic and applied research that allows NASA's space and Earth science programs to be properly planned and carried through to the successful interpretation of data and its application to the needs of end users. Comments about this NRA are welcome and may be directed to the point of contact for general questions and comments identified in Section VII.

ROSES is an omnibus NRA with many individual "program elements" that together cover the wide range of basic and applied research and technology in space and Earth sciences supported by SMD.

(a) Strategic Objectives of NASA and the Science Mission Directorate

NASA is chartered in the National Aeronautics and Space Act [51 U.S.C. § 20101 et seq.] with, among other objectives, the expansion of human knowledge of the Earth and of phenomena in the atmosphere and space. Working from this Congressional authorization, U.S. National Space Policy directs NASA to advance fundamental scientific knowledge of our Earth system, Solar System, and the Universe. This direction is manifest in the *2018 NASA Strategic Plan*, which includes Strategic Objective 1.1 to understand the Sun, Earth, Solar System, and Universe.

Further insight into the strategic goals and objectives of SMD may be found in the documents available at https://science.nasa.gov/about-us/science-strategy/ including *Science 2019-2024: A Vision for Scientific Excellence* and any more up to date versions of the Science Plan or the NASA Strategic Plan that will be available there.

All program elements in this NRA are relevant to NASA's strategic goals and objectives. Each proposal to this NRA demonstrates the relevance of its proposed research to NASA by being relevant to the particular program element to which it was submitted. Further instructions concerning relevance and the other evaluation criteria are provided in Section V(a).

(b) Research Programs of NASA's Science Mission Directorate

NASA's SMD achieves its strategic objectives in part by supporting a wide variety of research and technology development through this ROSES NRA including:

- flight-based research and technology development projects in The Solar System;
- flight-based research and technology development projects in Earth orbit;
- suborbital-class research and technology development projects (on aircraft, balloons, sounding rockets, various types of cube- and small satellites, and commercial suborbital reusable launch vehicles); and

- surface-based research and technology development activities that support flight missions.

These surface-based investigations include, but are not limited to:

- theory, modeling, and analysis of SMD science data including data from SMD's international and/or interagency partners;
- development of concepts, techniques, and advanced technologies suitable for future SMD space missions;
- development of methods for laboratory analysis of both extraterrestrial samples returned by spacecraft and terrestrial samples that support or otherwise help verify observations from missions;
- determination of atomic and composition parameters needed to analyze space data and returned samples from the Earth or space;
- Earth surface observations and field campaigns that support SMD science missions;
- development of integrated Earth system models;
- development of systems for applying Earth science research data to societal needs; and
- development of applied information systems applicable to SMD objectives and data.

SMD research and technology development activities are organized into five Science Divisions corresponding to the first five appendices of ROSES:

- The Earth Science Research, Applied Sciences, Technology, and Data Systems Programs sponsor integrative research to advance knowledge of and to explore interactions among the major components of the Earth system – continents, oceans, atmosphere, ice, and life – to differentiate natural from human-induced causes of change, to understand and predict the consequences of change, and to apply that knowledge to benefit the lives of people everywhere (Appendix A).
- The Heliophysics Research Program sponsors research to understand the Sun and its interactions with the Earth and the Solar System, including space weather (Appendix B).
- The Planetary Science Research Program sponsors research to explore the Solar System to study its origins and evolution, including the origins of life within it (Appendix C).
- The Astrophysics Research Program sponsors research to explore the Universe beyond from the search for planets to the origin, evolution, structure, and destiny of the Universe itself (Appendix D).
- The Biological and Physical Sciences Research Program sponsors research to understand how biological and physical systems respond to and accommodate spaceflight environments (Appendix E).

Appendices A, B, C, D, and E comprise program elements of these five Science Divisions, respectively. Additionally, Appendix F comprises cross-division program elements relevant to two or more of these science research programs.

Each of these appendices is prefaced with a Division Overview (A.1, B.1, C.1…) that introduces the research program content of that division and lays out default rules that

apply to all program elements within that appendix, if not superseded by individual program elements (the calls for proposals) that make up each appendix.

Each one of these program elements has its own solicited topics, cadence, and due dates, if solicited this year. HTML lists of those program elements and due dates are given in Table 2 (ordered by due date) and Table 3 (ordered by Division/Topic). Each name is hypertext linked to a web page and on the right, at the bottom of the list of "Announcement Documents" a PDF version of that program element may be downloaded.

This "*Summary of Solicitation*" you are reading now lays out rules that, by default, apply to all program elements in ROSES unless superseded by a Division Overview or an individual program element. See Section I(g) for more on the order of precedence.

Proposals in response to this NRA should be submitted to the most relevant science program elements described in Appendices A, B, C, D, E, and F. Table 2 of this ROSES NRA lists these program elements in the order of their calendar deadlines for the submission of proposals, while Table 3 of this ROSES NRA lists program elements by division (e.g., A. Earth Science, B. Heliophysics, etc.), in the order in which they appear in the appendices of this NRA.

Unless a particular program element explicitly mentions contracts, proposers from non-governmental organizations should assume that awards will be made as grants or cooperative agreements, see Section I(a). The "SARA" website at https://sara.nasa.gov has information for the research community, including ROSES FAQs, selection statistics, a blog for changes to ROSES, pages to sign up as a reviewer, and a list of all of the technical points of contact for all of the program elements, to whom technical questions about the contents of a specific program element should be directed.

(c) Flight-Based Research Investigations

Since flight-based research investigations pose distinct challenges and have certain requirements in common, Section VIII is devoted to flight investigations.

(d) Significant Changes from Recent ROSES

(i) Changes from last year

The following significant changes occurred since last year's ROSES solicitation:

- Expansion of the Inclusion Plan pilot program: Last year, three programs required a 2-page "Inclusion Plan", see Section IV(e)ii and the Astrophysics Division White Paper on the Inclusion Plan Pilot Program in ROSES-2021 at https://science.nasa.gov/researchers/sara/library-and-useful-links. This year the following ROSES program elements will require an Inclusion Plan: A.23 ESI, A.28 IDS, B.22 Space Weather Centers of Excellence (SWxCs), D.3 APRA, D.7 SAT, D.12 TCAN, D.13 Pioneers, D.15 LPS, D.16 Astrophysics Decadal Survey Precursor Science (ADSPS), and F.10 PRISM. The assessment of this plan will not change adjectival ratings or selection recommendations.
- Expansion of Dual-Anonymous Peer Review (DAPR): This year the following ROSES program elements are using DAPR: A.18 AuraST/ACMAP, A.26 Earth USPI, A.32 Studies with ICESat-2, B.4 HGIO, B.16 H-ARD, Planetary DAPs C.7-

C.11, D.2 ADAP, Astro Observing programs D.5, D.6, and D.9-D.11, D.16 ADSPS D.17 XRISM, F.3 XRP and F.4 HW. See https://science.nasa.gov/researchers/dual-anonymous-peer-review and Section VI(b) for more information on DAPR,

- Programs to which proposals may be submitted at any time: ROSES now has many program elements that accept proposals at any time without any preliminary statement such as a Notice of Intent or Step-1 proposal. Though the NSPIRES page for those programs display a "Proposals Due" date, that is simply the end date for the current ROSES, after which proposals may be submitted to the program element with the same name in the next ROSES. There are two categories of proposals of this type: 1) No Due Date (NoDD) programs that will review proposals with a cadence that will depend on the rate at which proposals are submitted and 2) programs that will review quarterly. NoDD Programs include: A.24 RRNES, A.51 Applications-Oriented Augmentations for Research and Analysis, C.2 EW, C.3 SSW, C.4 PDAR, C.5 Exobio, C.6 SSO, C.12 PICASSO, C.16 LARS. F.2 TWSC and F.8 SOSS. Quarterly review programs include B.12 HDEE, B.15 HITS, and B.20 HTM. See the text of these program elements, the Research Overviews (A.1, B.1, C.1 etc.) and https://science.nasa.gov/researchers/NoDD for more information.
- Section VIII Flight-Based Research Investigations has been revised for clarity and updated to reflect that: (1) All proposers, not just those from Government Laboratories, may now avail themselves of STMD's Flight Opportunities Program (FOP) contracts to suborbital flight service providers (see Section VIII(c)iii) and (2) Most proposers using Short Duration Orbital Platforms, including CubeSats will use NASA's Launch Service Program rather than the CubeSat Launch Initiative (CSLI) program, see Section VIII(c)v for details.
- Section II(c) Increasing Access to the Results of Federally Funded Research has been expanded and now links to SPD-41: Scientific Information Policy.

There have been many changes to the program elements within ROSES (see the lists of Program Element Appendices above). A non-exhaustive list items of note includes:

- In Appendix A (Earth Science), new program elements include A.36 Agriculture Applied Research Using Earth Observations, A.43 Commercial Smallsat Data Acquisition New Vendor Onramp Evaluation, A.51 Applications-Oriented Augmentations for Research and Analysis, A.52 Coastal Resilience and A.53 FireTech. There is a new Tropospheric Composition call this year in A.19 focused on Airborne and Satellite Investigation of Asian Air Quality, and Interdisciplinary Research in Earth Science returns in A.28 with new topics, including two (Ocean Worlds and Earth-moon connections in a changing climate) that have interdivisional aspects. Moreover, three program elements in Appendix A will evaluate proposals using DAPR: A.18 AuraST/ACMAP, A.26 Earth USPI, A.32 Studies with ICESat-2, see Section V(b) and two programs will participate in the Inclusion Plan pilot program: A.23 ESI and A.28 IDS. Finally, some programs in Appendix A require that proposers use the Earth Science standard templates for the Table of Work Effort and Current and Pending Support at the "SARA" web page at https://science.nasa.gov/researchers/templates-for-earth-science-division-appendix-a-roses-proposals. Any programs that require the use of these templates will say so clearly.

- In Appendix B, there are five new program elements: B.16 Heliophysics AI/ML-Ready Data (H-ARD), B.17 Interdisciplinary Science for Eclipse, B.20 Heliophysics Tools and Methods (HTM), B.21 Heliophysics Citizen Science Investigations (HCSI), and B.22 Space Weather Centers of Excellence (SWxCs). There is also a new "Infrastructure" version of Heliophysics Living with a Star this year in program element B.19.
  B.12 Heliophysics Data Environment Enhancements (HDEE), B.15 Heliophysics Innovation in Technology and Science (HITS), and B.20 HTM will accept proposals at any time and evaluate quarterly. B.4, Heliophysics Guest Investigators-Open (HGIO) and B.16 H-ARD will evaluate proposals using DAPR, see Section V(b), and B.22 SWxCs will participate in the inclusion plan pilot study, see Section IV(e). Finally, all proposals to Appendix B must use the standard Heliophysics template for the Current and Pending Support and use of the DMP template is encouraged. See https://science.nasa.gov/researchers/templates-heliophysic-division-appendix-b-roses-proposals.
- In Appendix C (Planetary Science) new program elements include C.23 Analog Activities to Support Artemis Lunar Operations ("Desert RATS"), C.25 Artemis Geology, and C.27 Preparatory Science Investigations for Europa. C.4 is not soliciting proposals for the development or validation of software tools, so its name has been changed to Planetary Data Archiving and Restoration (PDAR) rather than PDART. SSW Exclusions have been updated, to reflect that SSW now excludes investigations involving archival data from Earth-based observations, as these investigations are now covered by Appendix C.6, Solar System Observations (SSO). C.2 EW, C.3 SSW, C.4 PDART, C.5 ExoBio, C.6 SSO, C.12 PICASSO and C.16 LARS continue to have no due date, they will accept proposals at any time. All of the data analysis programs, i.e., C.7 NFDAP, C.8 LDAP, C.9 MDAP, C.10 CDAP, and C.11 DDAP, will evaluate proposals using DAPR, see Section V(b) and DDAP does not request budgets with the proposal, just cost category (small, medium, or large); budgets will be requested later for selectable proposals. All proposals to Appendix C are strongly encouraged to use the planetary science template for Table of Personnel and Work Effort and proposals requiring a DMP are strongly encouraged to use the PSD DMP template. Both templates may be downloaded from: https://science.nasa.gov/researchers/templates-planetary-science-division-appendix-c-roses-proposals.
- In Appendix D (Astrophysics), new program elements include D.16 Astrophysics Decadal Survey Precursor Science (ADSPS) and D.14 Nancy Grace Roman Space Telescope Research and Support Opportunities and D.17 the X-Ray Imaging and Spectroscopy Mission Guest Scientist, which were deferred from last year. Six programs (D.3 APRA, D.7 SAT, D.12 TCAN, D.13 Pioneers, D.15 LPS and D.16 ADSPS) will require the 2-page "Inclusion Plan", see Section IV(e). Finally, all Astrophysics GO/GI programs D.2 Astrophysics Data Analysis, and D.16 ADSPS will evaluate proposals using DAPR, see Section V(b).
- In Appendix E (Biological and Physical Sciences), E.11 Space Biology: Beyond Low Earth Orbit is new and the base Space Biology call has been split into two parts: E.9 Space Biology: Plant Studies and E.10 Space Biology: Animal Studies.

- Appendix F the Cross-Division Appendix. Adds six new program elements: F.11 SALA PRISM, a second PRISM call for Stand-Alone Location-Agnostic instruments. (The original PRISM call, for particular lunar locations, is program element F.10). F.12 Artemis Deployed Instruments, F.13 Lunar Terrain Vehicle Instruments, F.14 Transform to Open Science Training, F.15 High Priority Open-Source Science and F.16. Supplement for Scientific Software Platforms. Finally, F.10 PRISM will require the 2-page "Inclusion Plan", see Section IV(e) and F.3, Exoplanets continues to evaluate proposals using DAPR, see Section V(b).

Other small changes have been made throughout this document and to program elements. It is the proposer's responsibility to read this entire document and the relevant program element to understand the requirements. Changes that occur after this initial release will be announced by amendments, corrections, or clarifications. Subscribe to the NSPIRES mailing lists (by logging in and checking the appropriate boxes under "Account Management" and "Email Subscriptions") and the ROSES-2022 Blog for such updates.

(ii) Changes made in recent years

The following recent changes may be new to those who have not proposed to ROSES in the last few years:

- The Division of Biological and Physical Sciences (BPS), previously part of the Human Exploration and Operations Mission Directorate (HEOMD), is now part of SMD and the BPS calls for proposals appear in Appendix E. The cross-division programs that, in prior years, were in Appendix E are now in Appendix F
- Unless the program element states otherwise, the sufficiency of the data management plan will be evaluated as part of Merit and will have a bearing on whether or not the proposal is selected, see Section II(c).
- In Appendix C (Planetary Science) the ban on submission of concurrent "duplicate" proposals has changed to a ban on submission of duplicate proposals more than once per year. For more information see Section 3.2 of C.1, the Planetary Science Research Program Overview.
- The requirements regarding letters of resource support from facilities have been modified. Consistent with Section IV(e) Demonstration of Access to Required Facility, for any facility required for the proposed effort, the proposal must state which team member has access or provide a letter of resource support from the facility or resource confirming that it is available for the proposed use during the proposed period.
- The previously separated Budget Narrative and Details sections have been united in a single section, making it consistent with the *Guidebook for Proposers Responding to a NASA Funding Announcement* (hereinafter referred to as the *NASA Guidebook for Proposers* or simply the *Guidebook*).

(e) NASA-Provided High-End Computing (HEC) Resources

SMD provides a specialized computational infrastructure to support its research community, managed on its behalf by NASA's High-End Computing (HEC) program (see the HEC website at https://www.hec.nasa.gov/). Two major computing facilities are

offered: the NASA Center for Climate Simulation (NCCS) at the Goddard Space Flight Center (GSFC), and the NASA Advanced Supercomputing (NAS) facility at the Ames Research Center (ARC).

The HEC program facilities maintain a range of computing systems with significant data storage resources. These offerings are summarized at https://www.hec.nasa.gov/about/overview.html. Augmentation and refreshment of these central systems occur periodically, but the resources continue to be highly constrained. The HEC program also provides assistance in code porting, performance tuning, scientific data visualization, and data transfer.

Any need for computing time and other HEC program resources for the proposed research responding to a ROSES solicitation must be explicitly justified by completing an allocation request form for inclusion with your ROSES proposal (see sections i and ii below). If your proposal is selected by NASA, it is eligible for an allocation of HEC resources.

(i) How to Request HEC Resources

To inform science review panels and program managers of your computational needs and, if your ROSES proposal is selected, establish eligibility to use HEC resources, complete and submit a request in the HEC Request Management System (RMS) at https://request.hec.nasa.gov. The form includes a written justification of how the computational resources would support the investigation as well as a multi-year resource-phasing plan, in annual increments, identifying the computing time and data storage requirements covering the duration of the proposed award period. You should use the "planning date for start of investigation" from the Summary of Key Information for your program element as the start date for your computational project. Note that the project title of the computing resource request must be the same as the title of the proposal. Also, the Principal Investigator on the computing resource request must be the same as the Principal Investigator on the science proposal.

Computing time must be described in the request using Standard Billing Units (SBUs), a common unit of measurement employed by the HEC program for allocating and tracking computing usage across its various architectures. The RMS system has a built-in calculator to help convert processor (CPU) hours to SBUs. SBU Conversion Factors are also available at https://www.hec.nasa.gov/user/policies/sbus.html, or proposers may contact HEC support staff for further assistance calculating SBUs.

For further information or questions about NASA provided High End Computing resources, please visit https://www.nas.nasa.gov/hecc/support/user_support.html for NAS User Support, and https://www.nccs.nasa.gov for NCCS User Services Group.

(ii) Instructions to Upload Request for HEC Resources

Save a PDF copy of your request after submitting it using the button provided in RMS. During your proposal submission in the NSPIRES system:

- Upload the PDF version of your computing time request as a separate file from your proposal; select "Appendix" as the document type when uploading; for

DAPR programs do not combine with the "Expertise and Resources – Not Anonymized" document; submit two separate files of type "Appendix".

- On the NSPIRES Cover Page
  - Check the box indicating that a request for HEC resources is included in the proposal; and
  - Enter the HEC Request Number (specified on the PDF).

This requirement for a separate document supersedes the general ROSES rule that proposals are made up of only two PDF files: the proposal and the Total Budget. For proposals submitted via Grants.gov, the resource request should be attached as an appendix to any appropriate location and the HEC request number should be included on the PSD form provided as part of the application instructions package.

Science peer review panels, as a part of their evaluation of proposals, will be asked to consider whether the computing time requested is an appropriate use of the highly constrained resources dedicated to each program element under this NRA.

Selection of a ROSES proposal does not guarantee that a HEC request will be fully allocated; HEC requests of selected proposals progress to the next step for evaluation by the HEC program (see Section iii below). While some HEC time is guaranteed, allocation may differ from the request given resource constraints.

(iii) Allocation of HEC Resources

If your proposal is selected for funding, your HEC request will be evaluated by the HEC Allocation Authority. The HEC program will then issue letters identifying yearly allocations of HEC resources for the duration of the project, which again, may differ from your request due to limited availability of resources. However, PIs may submit requests to increase or decrease allocations of HEC resources if there are unexpected changes to computational needs. Requests for modifications must be submitted via the RMS. Allocation in full cannot be guaranteed, but SMD will make every attempt to satisfy the needs in the context of the overall set of requirements, resource constraints, and science priorities.

To expedite initiation of new projects where PIs and/or users are foreign nationals (whose accounts will require additional documentation and longer processing due to tightened security requirements), the HEC program may consider providing a minimal allocation to such projects which have been notified of pending funding soon after the PI submits an allocation request in RMS.

All users of NASA HEC Resources must complete mandatory annual NASA Information Technology Security training. Instructions will be provided when allocations are made.

(f) Successor, Renewal, Resubmitted, Multiple and Duplicate Proposals

PIs holding awards from any program element of any prior NRA are welcome to submit "successor" or "renewal" proposals that seek to continue a previously funded line of research if in scope of the current NRA. However, as described in the *NASA Guidebook for Proposers*, such successor proposals will be considered with neither advantage nor disadvantage along with new proposals that are submitted for that same program.

Proposers are welcome to resubmit proposals (or tasks) that were not funded under a prior program element or solicitation. Such submissions will be peer reviewed and considered with neither advantage nor disadvantage along with new proposals.

However, some Appendices and/or program elements in ROSES limit submissions in several ways:

The first limitation on submission bars "multiple" proposals to a given program element. Some program elements in Appendix B (Heliophysics), e.g., B.2 H-SR, will not allow a particular individual to be the PI of more than one proposal to those program elements in the same cycle. In such cases, the first proposal identifying a particular PI will be evaluated, but any subsequent proposal to the same program element that identifies the same PI will not be evaluated or considered.

The second limitation bars concurrent submission of "duplicate" proposals. B.1, the Heliophysics Research Program Overview and D.1 the Astrophysics Research Program Overview both prohibit the submission of proposals that are "the same or essentially the same" proposals already under consideration. In such cases, the first proposal submitted will be evaluated but subsequent duplicate proposals will be returned without review. See Section 1.5 of B.1 and Section 2 of D.1 for more information.

Third, the Planetary Science Division bars submission of duplicate proposals to multiple programs within a single ROSES year, or, in the case of the no due date programs, resubmission of proposals that were previously submitted within the past year. See Section 3.2 of C.1 the Planetary Science Research Program Overview.

(g) Order of Precedence

ROSES has layers of instructions, starting with the default Agency-level *NASA Guidebook for Proposers*, the lowest in the hierarchy of instructions, followed by - in increasing order of precedence - this *Summary of Solicitation* (SoS), the Division Research Program Overviews (e.g., A.1, B.1…) and finally the individual program elements, which are the highest priority (other than statute, of course). Thus, the *NASA Guidebook for Proposers* sets out the most basic information (like the definitions of the evaluation criteria), but it is superseded by this ROSES SoS, which presents default information that applies to all program elements within it (like the OMB Approval Number 2700-0092 and the CFDA Number 43.001 which is not repeated within each program element). This ROSES SoS in turn sets out rules that apply by default to every ROSES program element in it (like redaction of budgets), but any program element or research program overview may supersede this SoS.

In the case of any conflict, the order of precedence is as follows:

1. Statutes, regulations and the *NASA Grant and Cooperative Agreement Manual (GCAM)* take precedence followed by
2. Program elements
3. Division Research Program Overviews (e.g., A.1, B.1…)
4. The *Summary of Solicitation* of the ROSES NRA (i.e., this document)
5. *Guidebook for Proposers Responding to a NASA Funding Announcement*

In other words, unless it is superseded by statute, regulation, do what the program element says. If the program element does not answer your question, do what the

Division Research Program Overview says. If the Overview does not answer your question, then do what this *ROSES Summary of Solicitation* says. If (and only if) none of them tell you what to do, then refer to the default to the instructions in the *NASA Guidebook for Proposers*.

An example where individual program element may supersede the *Guidebook* is "letters of affirmation" (sometimes called letters of endorsement). The *Guidebook* states that letters that endorse the value or merit of a proposal will not be considered in the evaluation of the proposal, but a few individual program elements in ROSES (e.g., F.2 TWSC) do allow such letters of affirmation.

Moreover, this *Summary of Solicitation* may include instructions that are more specific or detailed than the *Guidebook*, and program elements often include instructions that are more specific or detailed than this *Summary of Solicitation* or the *Guidebook*.

An example of a case where individual program element supersedes this *Summary of Solicitation* is in how Relevance is evaluated. Section V(a) lays out a general approach to evaluating relevance, but a few individual program elements (e.g., C.4 and C.5) require explicit statements of relevance through mandatory text boxes on the NSPIRES cover pages.

An example of a case where a research program overview differs from and supersedes this *Summary of Solicitation* are the limits in B.1 and C.1 The Heliophysics and Planetary Science Research Program Overviews vs. the resubmission of proposals to No Due Date (NoDD) programs within a year of the prior submission. For more information see Sections 1.4 of B.1 and Section 3.2 of C.1 The Planetary Science Research Program Overview and https://science.nasa.gov/researchers/NoDD.

Questions about differences between ROSES and the *Guidebook* may be directed to sara@nasa.gov. Questions about a difference between either of those and an individual program element should be directed to the point of contact for the particular program element and cc sara@nasa.gov.

Answers to these questions may appear in the ROSES NRA Frequently Asked Questions (FAQ) at https://science.nasa.gov/researchers/sara/faqs/. Any FAQs for individual program elements will appear under "other documents" on the NSPIRES web page for the program element. FAQs merely clarify, they do not contradict instructions in the *Guidebook*, *ROSES Summary of Solicitation* or program elements.

(h) Access to NASA Facilities/Systems

To access NASA facilities and/or systems, award recipients must work with NASA to ensure proper credentialing. For example, for access to High-End Computing (HEC) Resources (see Section I(e) above) and for physical access to a NASA facility, one would work with the badging office at that NASA Center. Authors of proposals that would involve Foreign National access to NASA facilities/systems should refer to the *Foreign National Access Management (FNAM) Operations Manual*.

Consistent with guidance from Executive Orders, the Centers for Disease Control and the White House Safer Federal Workforce Task Force, NASA continues to adjust safety protocols for those who access NASA facilities. As of the date of publication of this

NRA, all non-NASA badged Grant and Cooperative Agreement award recipients, NASA Postdoctoral fellows, interns, etc. who seek to enter a NASA Facility should expect to complete a Certification of Vaccination status or provide proof of a negative COVID-19 test taken within 72 hours of a visit. Check with the host facility and see the latest guidance at: https://www.nasa.gov/offices/ocfo/gpc where one may find the Procedures for Award Recipients Entering NASA Facilities During COVID-19 and COVID-19 Attestation Form Instructions. The latest guidance from NASA's Office of Procurement for contractors may be found at: https://www.nasa.gov/office/procurement/covid19-contractor-information.

(i) Citizen science

Citizen science projects rely on volunteer participants in the scientific process. Proposers to any ROSES program element are invited to incorporate citizen science and crowdsourcing methodologies into their submissions, where such methodologies will advance the scientific objectives of the proposed investigation. In addition, there are ROSES elements that specifically emphasize citizen science. See, for example, the Citizen Science Seed Funding Program element, F.9 of this ROSES solicitation. The current SMD Policy on citizen science describes standards for evaluating proposed and funded SMD citizen science projects. For more information see Section 3 H.R.6414 - Crowdsourcing and Citizen Science Act of 2016, which authorizes federal agencies to utilize crowdsourcing and citizen science and the https://science.nasa.gov/citizenscience webpage, that provides information about existing SMD-funded projects, including how to sign up for the NASA-SOLVE email listserv.

(j) Science Activation

NASA's Science Mission Directorate recognizes the importance its content and experts play in advancing human knowledge. SMD created a new program to activate learners of all ages to become more scientifically literate and create a life-long love of learning. By leveraging community-based organizations across the U.S. and online, new opportunities can be provided. See the Science Activation program element, F.6 of this ROSES solicitation. If you are a subject matter expert and would like to learn more - visit https://science.nasa.gov/learners. To volunteer as a subject matter expert in the Science Activation program, see https://science.nasa.gov/learners/sme-map.

(k) Other Information about this Solicitation

As stated in Section IV(b)(i), registration for either proposal submission system which may be used to submit proposals to this solicitation, NSPIRES or https://grants.gov/, must be performed by an organization's electronic business point-of-contact (EBPOC) in the System for Award Management. The Data Universal Number (DUNS) number will no longer be the official identifier for doing business with the U.S. Government after April 4, 2022. After that date, entities doing business with the federal government must use a Unique Entity Identifier created in SAM.gov.

This funding opportunity is not subject to Executive Order 12372, "Intergovernmental Review of Federal Programs".

In general, ROSES proposals are solicited by the Science Mission Directorate, as indicated by CFDA number 43.001 on the front page. However, any given program element may solicit jointly with another part of NASA (e.g., HEOMD with BPS calls in Appendix E; HEOMD and STMD PRISM calls in Appendix F) or with another agency (e.g., NOAA in Space Weather calls in Appendix B). Rather than listing all of the participating CFDA numbers on the ROSES front page, which would be confusing, we will simply identify organizations other than SMD in the individual program elements.

II. AWARD INFORMATION

(a) Funding and Award Policies

Prospective proposers to this NRA are advised that funds are not available for new awards for most of its solicited program elements at the time of its release. The Government's obligation to make awards is contingent upon the availability of sufficient appropriated funds from which payment can be made and the receipt of proposals that are determined acceptable for award under this NRA.

Awards from ROSES may support projects as they were proposed, or NASA may offer to fund only selected parts, or all or part of what was proposed for a shorter duration (e.g., a one-year pilot study), or a combination of duration and content reductions. Proposals for pilot studies are welcome. Awards may depend on acceptable revised budgets, statements of work, data management plans, or other elements of proposals described in ROSES or in the *NASA Guidebook for Proposers*. Moreover, even after an award letter has been sent or an award has begun, NASA has the authority to suspend or terminate a grant in whole or in part in accordance with 2 CFR (Code of Federal Regulations) 200.338–340.

The funds expected to be available for the first year of new awards for proposals submitted in response to this NRA are given in the Summary Table of Key Information at the end of each program element. An estimate of the number of awards that might be made for each program element is also given in this Table, contingent on budget allocation to that program element and availability of funding and presuming the submission of sufficient highly rated proposals.

The typical period of performance for an award is three years, but some programs may allow up to five years and others specify shorter periods.

ROSES-2022 will receive ~5000 proposals across all program elements and will select/award ~1250 totaling ~$600 million over the lifetime of the awards. Individual award sizes will vary based on scope from as little as ~$5000 to help support workshops up to multi-year awards in the millions of dollars.

NASA's goal is to initiate new awards as rapidly as possible after the selection of proposals is announced. However, the workload experienced by NASA, the availability of appropriated funds, and any necessary post-selection negotiations with the proposing organization(s) needed for the award(s) in question can all cause delays. Regarding this last item, every proposer is especially encouraged to submit full and detailed explanations of the requested budget to help expedite the processing of the award, should their proposal be selected.

The ROSES NRA is structured to allow NASA to make the full range of award types: grants, cooperative agreements, contracts, and intra- (within NASA) or inter- agency transfers. The budget narrative need not state the type of award instrument that is anticipated. A NASA awards officer will determine the appropriate award instrument for the selections resulting from this solicitation based on the guidance in Section 3 of the *NASA Grant and Cooperative Agreement Manual (GCAM)*.

However, ROSES is a research solicitation so proposers must assume that awards to non-governmental organizations will be grants or, when appropriate, cooperative agreements. As indicated in the GCAM, cooperative agreements are awarded to non-governmental participants on research proposals when there is substantial NASA involvement, e.g., if the PI is at a NASA Center and a funded participant is at non-governmental organization or when NASA provides or procures the launch service, see Section VIII. Unless otherwise stated in a program element, (or the result of a prior arrangement, e.g., JPL) ROSES proposals will not result in contracts since it would not be appropriate for the public purpose of what is solicited. In the rare cases where contracts are solicited, the program element will say so explicitly.

If a prospective proposer thinks that their work should be funded as a contract, but the program element does not explicitly allow this, the proposer should communicate, well in advance of proposal submission, with the point of contact for that program element and cc sara@nasa.gov.

Grants and cooperative agreements will be subject to the policies and provisions identified in the regulations at 2 CFR (Code of Federal Regulations) 200 and 2 CFR 1800, the *NASA Grants and Cooperative Agreements Manual* (GCAM), and contracts will be subject to the provisions of the Federal Acquisition Regulations (FAR) and the NASA FAR Supplement.

Unless otherwise specified, Diversity, Equity, Inclusion, and Accessibility activities, third-party or independent project/program evaluation, and other types of project-level assessments or performance measurement are not required. If a proposal includes such costs, the budget narrative should include a description of institutional policies or procedures that support the charging of these costs uniformly. Costs not fundamental to the research and/or that exceed program requirements may be disallowed. See 2 CFR 200.414 Indirect (F&A) costs; §200.412 Classification of costs; and 2 CFR 200.403-405 Factors affecting allowability of costs, Reasonable costs, Allocable costs. The final decision on such costs will reside with the NASA Grants Officer (GO) and not SMD.

Awards to proposers from governmental agencies other than NASA will be made as interagency agreements (IAAs). Governmental proposers should specify whether they think that their IAA should be an assisted acquisition (FAR definition) or not. If the other government Agency is amenable, NASA will use the FS Forms 7600.

(b) Award Period of Performance

The maximum period of performance (duration) for new awards from proposals submitted in response to this NRA is given in the Summary of Key Information at the end of each program element. The period of performance ranges from one year to five years for extensive, comprehensive studies, with three years being typical. Award

durations may be longer in special cases, such as teams of long-duration space missions. Whatever the proposed period of performance it must be justified in the proposal. The appropriateness of the proposed period of performance will be evaluated by peer review. SMD may offer to support an award of shorter duration than was proposed. Award start and end dates will vary by program element, but award start dates are rarely less than 6 months from the proposal due date.

(c) Increasing Access to the Results of Federally Funded Research

In keeping with the NASA Plan for Increasing Access to Results of Federally Funded Research the SMD Strategy for Data Management and Computing for Ground Breaking Science 2019-2024, and SPD-41: Scientific Information Policy, most proposers to ROSES must provide a Data Management Plan (DMP) or an explanation of why one is not necessary given the nature of the work proposed. The DMP conveys how publications, data, and software will be managed to ensure their long-term accessibility and to enable reproducibility of the research.

If a DMP is required, the sufficiency of the data management plan will be evaluated as part of the proposal's intrinsic merit and will have a bearing on whether or not the proposal is selected. Unless otherwise stated, the data management plan will be placed in a 2-page section in the proposal PDF immediately following the references and citations for the Scientific/Technical/Management (S/T/M) portion of the proposal and does not count against the page limit for the S/T/M Section. For questions and answers on DMPs and ROSES see the https://science.nasa.gov/researchers/sara/faqs/dmp-faq-roses/.

Program elements that do not conform to the default approach for DMPs described above will say so explicitly and they are: First, for some proposals the nature of the work is inexorably linked to the handling of data, so the DMP is part of the page-limited S/T/M section of the proposal. Examples include (but are not necessarily limited to) proposals to: B.7 Space Weather Science Applications, B.12 Heliophysics Data Environment Emphasis, C.4 Planetary Data Archiving and Restoration, F.3 Exoplanets Research, and certain proposals to D.2 Astrophysics Data Analysis. Second, instrument development and technology development programs are generally exempted from providing a DMP at all under the presumption that no "data" will be generated. However, even if a DMP is not required as a part of a proposal, if an award is made the standard requirements and expectations regarding release of supporting data and code still apply, see below.

Whether in the separate 2-page section or in the page-limited S/T/M portion of the proposal, proposals should allocate suitable time and resources for this activity. For information about data rights and other aspects of intellectual property such as invention rights resulting from awards, see Appendix J of the *NASA Guidebook for Proposers*.

As always with ROSES, this *Summary of Solicitation* sets the defaults, but any division may modify or supersede these in the Division Research Program Overviews (e.g., A.1, B.1…) or in a specific program element. For example, some elements, like A.13 Ocean Vector Wind Science Team and A.52 Coastal Resilience, require a separate Software Development Plan and may require that code must be made publicly available under a certain kind of license, may specify preferred archives, or may otherwise require more

than is outlined in this *Summary of Solicitation*. Some program elements provide templates for the data management plan. The template for the program elements in Appendix A (Earth Science) may be found here, the template for the program elements in Appendix B (Heliophysics) may be found here and the template for the program elements in Appendix C (Planetary Science) may be found here. Please read the program elements carefully.

For the convenience of proposers, we address data, software, and publications separately below.

Data: In this solicitation, "data" means information needed to validate the scientific conclusions of peer-reviewed publications resulting from an award, including data underlying figures, maps, and tables, must be made available at the time of publication, publicly and electronically in a place where it can be found and it is likely to persist, e.g., in the supplemental material of the article, a community-endorsed repository, a NASA repository such as http://data.nasa.gov/, or a repository supported by a division, or a combination of different resources as would be most appropriate to the data being shared.

Software: Code developed should be made publicly available when it is practical and feasible to do so, and when there is scientific utility in doing so. Please also note that for instrument/technology development programs there is a requirement that applies only to them: final reports (only, not annual progress reports) must be made public via NASA TechPort.

Publications: The DMP should clearly indicate how products (e.g., manuscripts publications, presentations etc.) will be shared. Awards deriving from ROSES include terms and conditions requiring that accepted manuscript versions of peer-reviewed publications (hereinafter "manuscripts") that result must be uploaded via NASA PubSpace. The Federal Register notice on this subject specifies that manuscripts must be deposited within one year of completion of the (manuscript) peer review process. Please note that the NASA research access FAQ at https://sti.nasa.gov/faq/ says that not doing so "may delay or prevent awarding of funds". The cost for publishing open access may be included in the proposal budget. This applies only to peer-reviewed manuscripts. Patents or publications that contain material governed by personal privacy, export control, proprietary restrictions, or national security law or regulations are not covered by this requirement. For more details on public access to scientific publications and digital scientific data resulting from NASA-funded research, please see: https://sti.nasa.gov/. NASA encourages publications to be published Open Access, and any cost to do so may be included in the budget. NASA also encourages publications to be posted on community appropriate preprint servers.

(d) Rephasing of Award Budgets, Family or Medical Leave, and No-Cost Time Extensions

Occasionally the schedule for a research project changes, and this will change the phasing of the funding requirement. "Rephasing" funding may be initiated either at the request of the PI or NASA.

In keeping with NASA's policy in the *Grants and Cooperative Agreement Manual (GCAM)*, SMD will accommodate all reasonable requests from the PI or Authorized Organization Representative (AOR) to rephase ROSES awards to accommodate a PI's need to care for family and health (e.g., for family or medical leave). In the case of contracts, rephasing will be performed as long as it does not compromise previously agreed upon project goals, timelines, or deliverables associated with a NASA requirement described in the contract.

NASA policy allows grantee-initiated, first time no-cost extensions (NCEs) of up to 12 months. Grantees should use the form at https://www.nssc.nasa.gov/nocostextension to request NCEs. PIs at Government labs should contact their program officer directly.

SMD program officers may engage in active grant management to diminish carrying forward uncosted funds from one fiscal year to the next fiscal year (carryover). Program officers may invite PIs to rephase their funding requirement where funds for a year or more are being carried forward. In this way, the awarding of future year funds can more closely align with the timing of project activities. The total funds disbursed over the period of performance will not change, only the fiscal year (FY) in which they arrive.

SMD policy is that rephasing should not cause work on continuing awards to be deferred because of a delay in receipt of funds. PIs should communicate clearly to the program manager if a rephasing would interfere with the planned schedule for the grant. If an award is rephased, NASA will make every reasonable effort to provide the next fiscal year funding in a timely manner. Honoring commitments and ensuring the continuation of existing projects is a high priority of SMD.

III. ELIGIBILITY

Organizations of every type, domestic and foreign, Government and private, for-profit and not-for-profit, may submit proposals without restriction on teaming arrangements, other than with China, see subsection (c), below.

NASA recognizes and supports the benefits of having diverse and inclusive scientific, engineering, and technology communities and fully expects the reflection of such values in the composition of all panels and teams, including peer review panels, proposal teams, science definition teams, and mission and instrument teams. Please see Section IV(e) on the Inclusion Plan Pilot Study.

To broaden the base of investigators involved in SMD-supported science and engineering, SMD especially seeks proposals from investigators who and institutions that have rarely if ever received funding from SMD. A resource that some proposers may find useful is the NASA MSI Exchange at https://msiexchange.nasa.gov/. Per Federal statutes and NASA policy, no eligible applicant shall experience exclusion from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NASA on the grounds of their race, color, creed, age, sex, national origin, or disability. NASA welcomes proposals from all qualified and eligible sources, and strongly encourages proposals from Historically Black Colleges and Universities (HBCUs), Minority Serving Institutions (MSIs), small-disadvantaged businesses (SDBs), veteran-owned small businesses, service-disabled veteran-owned small businesses (SDVOSB), HUBZone small

businesses, and women-owned small businesses (WOSBs), as eligibility requirements allow.

(a) Number of Proposals and Teaming Arrangements

There is no general restriction on the number of proposals that an organization may submit to this solicitation, nor on the teaming arrangements, including teaming with NASA Centers and the Jet Propulsion Laboratory. However, some appendices or program elements limit the number of proposals that may be submitted on behalf of an individual PI to a program element or bar duplicate proposals, see Section I(f).

(b) Foreign Participation in General

Participation in ROSES-funded research by non-U.S. organizations is welcome on a "no exchange of funds" basis. That is, unless otherwise stated, NASA will fund research at selected U.S. organizations and the sponsoring foreign agency or institution must do the same for theirs. NASA does not fund research efforts at foreign organizations, including travel, whether proposed directly by a foreign organization, or as part of proposals submitted by U.S. organizations. However, the direct purchase of goods, supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted.

If a proposal with a non-U.S. partner is selected, NASA will determine whether such participation should be covered by and implemented through an international agreement between NASA and the sponsoring foreign agency or funding/sponsoring institution under which the parties agree to each bear the cost of discharging their respective responsibilities.

Foreign Co-Is on proposals from U.S. organizations must include a letter of certification from their government agency or funding/sponsoring institution indicating that, should NASA select the proposal, the support needed by the foreign Co-I for their portion of the research will be provided.

Further information on foreign participation is provided in ROSES FAQ #14 on this topic and the *NASA Guidebook for Proposers*.

(c) Restrictions Involving China

In accordance with restrictions in Appropriation Acts, NASA is prohibited from funding any work that involves the bilateral participation, collaboration, or coordination with China or any Chinese-owned company or entity, whether funded or performed under a no exchange of funds arrangement.

Proposals involving bilateral participation, collaboration, or coordination in any way with China or any Chinese-owned company, whether funded or performed under a no exchange of funds arrangement, may be ineligible for award.

For more information, please see the ROSES PRC FAQ on the SARA web page at https://science.nasa.gov/researchers/sara/faqs/prc-faq-roses/

As stated in 2 CFR 1800 Appendix A, NASA requires Certifications, Assurances, and Representations, including Certifications and Assurances to implement restrictions in Appropriation Acts, that are applicable to all awards. By submission of a proposal,

proposers are certifying that the proposing organization has read and is in compliance with all the Certifications, Assurances, and Representations, including that they are not China or a Chinese-owned company, and that they will not participate, collaborate, or coordinate bilaterally with China or any Chinese-owned company, at the prime recipient level or at any subrecipient level, whether the bilateral involvement is funded or performed under a no exchange of funds arrangement.

(d) Cost Sharing or Matching

Unless otherwise specified, cost sharing is not required for an institution of higher education or other not-for-profit organization to receive a grant or cooperative agreement, although NASA may accept cost sharing if it is voluntarily offered (see 2 CFR 200.306, 2 CFR 1800.306, *Grants and Cooperative Agreement Manual (GCAM)* 5.6 Funding).

Each proposal must include a Table of Personnel and Work Effort with names and planned work of all personnel necessary to perform the proposed effort, regardless of whether that work effort requires funding or not. As this is outside of the budget section, any work listed in this table that is not to be funded by NASA is not considered cost sharing as defined in 2 CFR § 200.29. Level of effort estimates for unfunded team members are not intended to represent voluntary committed cost sharing. Collaborators should be listed on the table, but their level of effort may be simply given as "de minimis." See Section IV(b)iii for an example.

IV. Proposal and Submission Information

All information needed to apply to this solicitation is contained in this ROSES NRA and anything not mentioned here is subject to the default Agency rules in the *NASA Guidebook for Proposers*. 48 CFR 1852.235-72 "Instructions for responding to NASA Research Announcements" appears by reference in the *NASA Guidebook for Proposers*. Proposers are responsible for understanding and complying with its procedures for the successful, timely preparation and submission of their proposals. Proposals that do not conform to its standards may be declared noncompliant and returned without review.

The introductory material, as well as the appendices, of the *NASA Guidebook for Proposers* provides additional information about the entire NRA process, including NASA policies for the solicitation of proposals, guidelines for writing complete and effective proposals, and NASA's general policies and procedures for the review and selection of proposals and for issuing and managing the awards to the institutions that submitted selected proposals.

Unless otherwise stated in the program element, each proposal must be a single separate, stand-alone, complete PDF document for evaluation purposes, other than the Total Budget file, the (optional) HEC request appendix, and, if relevant, documentation associated with the Dual-Anonymous Peer Review (DAPR) process.

Potential proposers may find useful the additional miscellaneous information about a variety of the NASA proposal and award processes, policies, and procedures in the Frequently Asked Questions (FAQs) at https://science.nasa.gov/researchers/sara/faqs/.

NASA collects demographic data (name, gender, race, ethnicity, and disability status) from proposers via NSPIRES for the purpose of analyzing demographic differences associated with its award processes. Submission of this information is strictly voluntary, is not communicated to program officers, and is neither any part of the evaluation or selection process nor a precondition of award.

(a) Web Addresses for Due Dates and Amendments

This ROSES-2022 omnibus NRA will be available as PDF files, at https://solicitation.nasaprs.com/ROSES2022 and is synopsized on Grants.gov (https://www.grants.gov). The names of the program elements that make up ROSES are given in Table 2 (ordered by full/Step-2 proposal due date) and Table 3 (ordered by Division/Topic). Each name is hypertext linked to a web page and on the right, at the bottom of the list of "Announcement Documents" a PDF version of that program element may be downloaded. Individual program elements in ROSES that are expected to result in grants (and/or cooperative agreements) are synopsized on Grants.gov at the time of their release and each program element provides the funding opportunity number for downloading an application package from Grants.gov in the Summary of Key Information, which is generally at the end of each program element.

SMD maintains an electronic notification system to alert all registered users of the NASA proposal database system at https://nspires.nasaprs.com of its research program announcements. To add or change a subscription to the electronic notification system (e.g., to learn of additional new program elements or amendments to ROSES), users should login, select "Account Management" then "email Subscriptions." Owing to the increasingly multidisciplinary nature of SMD programs, this email service will notify all subscribers to the Science Mission Directorate General Subscription List of (i) all NASA SMD research program solicitations regardless of their type or science objectives; (ii) amendments to all SMD solicitations that have been released for which the proposal due dates have not passed; and (iii) special information that SMD wishes to communicate to those interested in proposing to its sponsored research programs. Altogether, a subscriber may receive 50-100 notifications per year. SMD maintains this subscription list in confidence and does not attempt to discern the identity of its subscribers. Division-specific subscription lists are used to communicate non-solicitation information of interest to that Division. Automated spam filtering software may identify SMD's electronic notifications as spam or junk mail. Subscribers are advised to ensure that email received from "…@listsrv2.nasaprs.com", "NSPIRES-help@nasaprs.com", or nspires@nasaprs.com are not identified by any automated email filtering system as unwanted email. Note that the latter address is an outgoing (from NSPIRES) address only; all enquiries should be directed to the help address.

In addition, potential proposers to ROSES are encouraged to subscribe to:

- The ROSES-2022 Blog for amendments, clarifications, and corrections at http://science.nasa.gov/researchers/sara/grant-solicitations/ROSES-2022/ and
- The ROSES-2022 due date Google calendars. Instructions are at https://science.nasa.gov/researchers/sara/library-and-useful-links.

Questions regarding a program element should be directed to the program officer identified in the Summary Table of Key Information at the end of each program element

or on the list of program officers on the SARA web page. Any clarifications or questions and answers that are published will be posted on the relevant program element's index page in NSPIRES.

(b) Content and Form of the Proposal

The technical content required of a ROSES proposal is determined by the individual program elements listed in and hypertext linked from Table 2 (ordered by due date) and Table 3 (ordered by Division/Topic). The constituent parts of the proposals are given in Table 1 at the end of this *ROSES Summary of Solicitation*.

For more information about the types of research supported by the individual program elements solicited in previous editions of this NRA and other predecessor NRAs, the titles and abstracts of all investigations selected through previous solicitations are available by program element at https://nspires.nasaprs.com: click "CLOSED/PAST", search by keyword for the particular ROSES program element of interest and information on the selected proposals will be in a downloadable PDF file. For example, the selections from proposals submitted to Planetary Protection Research in ROSES-2021 may be found on the NSPIRES page for that program element, by downloading the PDF linked from the words "Planetary Protection Research 2021 Selections" under the heading "Selections".

(i) Electronic Proposal Submission

All proposals in response to this ROSES NRA must be submitted electronically and on time by one of the officials at the PI's organization who is authorized to make such a submission. No hard copy submission of the proposal is permitted. Electronic submission by a person authorized to do for the organization (see below) serves as the required "signature" of the proposing organization. Difficulty in registering with or using a proposal submission system is not, in and of itself, a sufficient reason for NASA to consider a proposal that is submitted after the proposal due date (See the SMD Policy on Late Proposals). After submission via NSPIRES, proposers can verify proposal delivery by logging into NSPIRES and selecting "proposals" and "Submitted Proposals/NOIs". Additionally, the proposal PI and the submitting organization's AOR(s) will receive an email from NSPIRES confirming that the submission has been completed.

Proposers may opt to submit proposals in response to this ROSES NRA via either of two different electronic proposal submission systems: the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) at https://nspires.nasaprs.com; see Section IV(b)(iv) below, or Grants.gov at https://www.grants.gov; see Section IV(b)(v) below. The only exceptions are occasional joint calls with other Agencies that use the other Agency submission system and the Astrophysics General Investigator (GI) and General Observer (GO) programs. See Section IV(b)viii on the two-phase process and those program elements for details.

Note the following requirements for submission of an electronic proposal, regardless of the intent to submit via NSPIRES or Grants.gov:

- Every organization that intends to submit a proposal to NASA in response to this NRA, including educational institutions, industry, not-for-profit institutions, the Jet

Propulsion Laboratory, NASA Centers, and other U.S. Government agencies, must be registered in NSPIRES. This applies equally for proposals submitted via Grants.gov. Every organization that intends to submit a proposal through Grants.gov must also be registered in Grants.gov, as well as in NSPIRES. Registration for either proposal data system must be performed by an organization's electronic business point-of-contact (EBPOC) in the System for Award Management (https://www.sam.gov/SAM/). Applicants are required to maintain an active SAM registration, with current information loaded, at all times while competing for a federal award, and, if applicable, during the period of performance of the award.

- Any organization requesting NASA funds through the proposed investigation must be listed on the Proposal Cover Page. NASA will not fund organizations that do not appear on the Proposal Cover Page.
- Unless specifically allowed by an individual program element, CoPIs are not permitted. The use of other team member roles in NSPIRES (described in the *NASA Guidebook for Proposers*) including Co-I/Science PI, Co-I/Institutional PI, and Co-I/Co-PI (only from a non-U.S. organization under specific circumstances), are permitted. Any role with "PI" in the title is subject to the rules, requirements, page limits, etc. laid out for the PI. For more information on rules and expectations regarding the Co-I/Science PI, please see SARA FAQ #9.
- Each individual team member (e.g., PI, Co-Investigators, and Collaborators), including all personnel named on the proposal's electronic cover page, must be registered in NSPIRES. NSPIRES registration applies equally for proposals submitted via Grants.gov since these databased names and affiliations are used for conflict of interest checking. Additionally, each team member must confirm their participation on that proposal (indicating team member role) and must specify an organizational affiliation. For proposals submitted via NSPIRES, this confirmation is via NSPIRES (see Section IV(b)(iv), below). For proposals submitted via Grants.gov, this confirmation is via "Letters of Commitment" included within the proposal. The organizational affiliation specified on the cover page must be the organization through which the team member would work and receive funding while participating in the proposed investigation. If the individual has multiple affiliations, then this organization may be different from the individual’s primary employer or preferred mailing address. Team members are asked to ensure that their contact information in NSPIRES is up to date. Changes can be made using the "Account Management" link on the "NSPIRES Options" page.

Typically, an electronic proposal consists of electronic forms (i.e., the NSPIRES cover pages) and two or more attachments. The electronic forms contain data that will appear on a proposal’s cover pages and will be stored with the proposal in the NSPIRES database. A proposal submitted in response to this NRA must have two attachments: the main proposal PDF and the Total Budget PDF. The main proposal PDF contains all ten sections of the proposal listed in Table 1, including the Table of Contents, main Science/Technical/Management section, References, Data Management Plan (See Section IIc for exceptions) Biographical sketches/CVs, Table of Personnel and Work Effort, Current and Pending Support, any Statements of Commitment or Letters, Budget (excluding any salary, fringe or overhead), and Facilities and Equipment. The separately

uploaded Total Budget PDF contains the full and complete budget, including salary, fringe and overhead (see Section IV(b)iii). If there is an accompanying HEC request (see Section I(d) above) then a HEC Appendix is uploaded as a separate, third PDF.

The most common exception to the general rule above is for the case of proposals submitted to those programs that use a dual-anonymous peer review (DAPR) process in which, not only are proposers unaware of the identity of the members of the review panel, but the reviewers are not told the identity of the proposers until after the review of the merit, relevance, and cost reasonableness of the proposal. In ROSES this year the programs evaluating proposals using DAPR include:

- A.18 Aura Science Team and Atmospheric Composition Modeling and Analysis Program,
- A.26 Earth Science U.S. Participating Investigator,
- A.32 Studies with ICESat-2,
- B.4 Heliophysics Guest Investigators-Open,
- B.16 Heliophysics Artificial Intelligence/Machine Learning-Ready Data Program,
- Planetary Science data analysis programs (DAPs C.7-C.11),
- D.2 Astrophysics Data Analysis,
- Astrophysics General Investigator/Observer/Scientist Calls (D.5, D.6, D.9-D.11),
- D.16 Astrophysics Decadal Survey Precursor Science,
- D.17 XRISM Guest Scientist Program,
- Exoplanets Research (F.3), and
- F.4 Habitable Worlds.

Proposers to these programs must provide an anonymized version of the proposal for peer review, and a separate non-anonymized document that contains elements of the proposal that would reveal the identities and affiliations of participating researchers, such as expertise, facilities, and resources. Any program element that is using DAPR (and thus has these special requirements) will 1) include a notification indicating that this is the case, 2) contain a special section with detailed instructions about how to prepare proposals, 3) link to a special web FAQ on this subject, and 4) the NSPIRES page of any program using DAPR will host "Guidelines for Anonymous Proposals" under "Other documents". As always, a separate (not anonymized) Total Budget file will also be required. DAPR processes are described in Section V(b).

Submission of proposals via either NSPIRES or Grants.gov is a two-part process. When the PI has completed entry of the data requested in the required electronic forms and attachment of the allowed PDF attachments, including the Science/Technical/ Management section, an official at the PI's organization who is authorized to make such a submission, referred to as the Authorized Organizational Representative (AOR), must submit the electronic proposal (forms plus attachments). Coordination between the PI and his/her AOR on the final editing and submission of the proposal materials is facilitated through their respective accounts in NSPIRES and/or Grants.gov.

(ii) Proposal Format and Contents

All proposals submitted in response to this NRA must include responses to any questions and/or electronic forms required by NSPIRES or Grants.gov. For example,

submission requires online input of a 4000-character Proposal Summary (the award purpose, goals, and outcomes and, if applicable, indicators and beneficiaries.), Business Data (such as dates and fiscal years), Other Project Information (such as Environmental Impact), Budget information, Program Specific Data (such as government participation) and online confirmation of team members.

The Science/Technical/Management (S/T/M) section and other required sections of the proposal must be submitted as a single, searchable, unlocked PDF file that is attached to the electronic submission using one of the proposal submission systems. Proposers must comply with all format requirements specified in this NRA (see below and Table 1 of this *Summary of Solicitation*) and in the *NASA Guidebook for Proposers*. The S/T/M section is page limited and only the parts specified in Table 1 are permitted. Proposals that exceed page limits, violate formatting rules, or contain extra sections or appendices that are not specifically requested or allowed by this NRA or a program element may be declared noncompliant and returned without review or rejected after review, no matter what their rating. The *NASA Guidebook for Proposers* provides default Agency-wide discussions of the content and organization of proposals, as well as the default page limits of a proposal's constituent parts. Those apply by default unless superseded by instructions detailed in ROSES, see Section I(g).

Note that some of the program element descriptions in Appendices A through F of this NRA may specify different page limits for the Science/Technical/Management section of the proposal; if so, these page limits will be prominently given in the Summary of Key Information subsection that concludes each program element description. In the event the information in this NRA is different from or contradictory to the information in the *NASA Guidebook for Proposers*, ROSES takes precedence, see Section I(g).

Unless otherwise stated in the appendix or program element, proposals submitted in response to ROSES must follow these rules for formatting: The body text and captions may not, on average across a solid block of text, exceed 15 characters per horizontal inch, including spaces, though text within figures and tables may be smaller if still judged by the reviewers to be readable. Easily read sans serif fonts (e.g., Arial, Helvetica, Verdana) are encouraged but not required. Proposals may not have more than 5.5 lines per vertical inch of text, must have at least one-inch margins, be set for US letter size (8.5x11) paper, and expository text necessary for the proposal may not be located solely in figures, tables, or their captions. Moving images are not allowed unless explicitly permitted by the program element. Pages must be numbered.

Important note on creating PDF files for upload: It is essential that all PDF files generated and submitted meet NASA requirements. This will ensure that the submitted files can be ingested by NSPIRES regardless of whether the proposal is submitted via NSPIRES or Grants.gov. At a minimum, it is the responsibility of the proposer to: (1) ensure that all PDF files are unlocked and that edit permission is enabled – this is necessary to allow NSPIRES to concatenate submitted files into a single PDF document; and (2) ensure that all fonts are embedded in the PDF file and that only Type 1 or TrueType fonts are used. TeX and LaTeX users are strongly cautioned to ensure that their settings conform with the paper size, font size, margins etc., listed above. Do not include any digital signatures in the proposal document, NSPIRES cannot concatenate these PDF files with the cover page, total budget, etc. For more

information on creating NSPIRES compliant PDF documents see https://nspires.nasaprs.com/tutorials/PDF_Guidelines.pdf. PDF files that do not meet NASA requirements cannot be ingested by the NSPIRES system; such files may be declared noncompliant and not submitted to peer review for evaluation.

There is a 20 MB size limit for proposals. Proposers may not use acronyms in the S/T/M Section that are defined solely outside of the page-limited S/T/M section. Acronyms must first be defined in the S/T/M Section.

(iii) Table of Work Effort and Redaction of Salary, Fringe and Overhead Costs

Peer reviewers need to see the individual effort that will be spent on the project, whether at the proposing organization or not, whether NASA would be paying for it as a result of this proposal or not. Thus, every proposal must include a Table of Personnel and Work Effort (see example table below) that simply lists all of the planned work commitment, by person or role without any technical details.

Example Table of Personnel and Work Effort

Person and/or Role	Time charged to this proposal	Time not charged to this proposal	Total Time per person/year
PI, Ed Mercer	3 months/year	N/A	3 months/year
Co-I, Kelley Grayson	4 months/year	N/A	4 months/year
Co-I, Dr. Claire Finn*	N/A	1.5 months/year	1.5 months/year
Collaborator, Alara Kitan	N/A	*de minimis*	*de minimis*
Grad Student, P. Bortus[o]	N/A	12 months/year	12 months/year

* A letter of support is provided from the (foreign organization) Saturnian School of Medical Sciences for Dr. Claire Finn, participating at no cost to this proposal.

[o] The Graduate student from Moclan College is funded by a FINESST award and thus participating at no cost to this proposal.

Note, this table is outside of and is distinct from the budget and the page-limited main part of the proposal and thus, unless otherwise stated in an individual program element, any person time listed in the table of work effort that is offered at no cost by the proposing organization is assumed to be an estimate of anticipated additional effort that may be provided to the project as needed and is considered voluntary uncommitted effort. Descriptions of the work that each team member would be performing must be included in the page-limited S/T/M section the proposal, not in this table. The example table presumes a simple case for which all investigators are working the same amount of time on the project each year. The reality is often more complicated, and your table should reflect the best estimate of the amount of time each participant will spend on the project. Planetary Science Division Templates have been provided for those proposing to Appendix C, and Earth Science Division Templates for the Table of Work Effort (and Current and Pending Support) are now required for an increasing number of program elements in Appendix A.

Peer reviewers do not need to know salaries or overhead rates to evaluate the cost reasonableness of ROSES proposals. Thus, proposals should not include costs of

salary, fringe, or overhead anywhere in the uploaded proposal PDF, including the budget detail or justification sections in the main proposal, which will be seen by peer reviewers. Unless otherwise specified by the program element, all proposers must include all costs, including salary, fringe and overhead of NASA civil servants, all subawards, and any separate Co-I awards in two places outside of the uploaded proposal PDF: the NSPIRES web page budgets and the separately uploaded "Total Budget" PDF file, see below and the walkthrough on this subject. Exceptions to this rule are C.11 DDAP, which does not request budgets with the proposal, just cost category (small, medium, or large) and Phase-2 proposals for the astrophysics observing programs e.g., Neil Gehrels Swift Observatory General Investigator (D.5), Fermi General Investigator (D.6), NuSTAR General Observer (D.9), TESS General Investigator (D.10), and NICER General Observer (D.11) because those are cost-only proposals (essentially just budgets) that are not peer reviewed. See Section IV(b)(viii).

However, peer reviewers certainly do need to see the costs of everything other than salary, fringe, and overhead. Although quotes are not required, proposers are strongly encouraged to include both adequate budget detail and justification for the peer reviewers to evaluate whether costs of things (other than team members) are reasonable. For example, if 6 Series B MSO Mixed Signal Oscilloscope that costs tens of thousands of dollars is needed, the proposal must give the price in the detailed budget and, in the budget justification, explain why such an expensive oscilloscope is needed, when a TBS1000C or TBS2000B can be purchased for a fraction of the price.

In the budget justification in the main proposal PDF, proposers may refer to the time, but not costs, for a subaward that involves salary, fringe or overhead, e.g., "1.5 months/year are allocated for Co-I Dr. Claire Finn, as can be seen in the Table of Personnel and Work Effort. Dr. Finn will be funded via a subaward to the Saturnian School of Medical Sciences. The total cost for that subaward is given in the NSPIRES cover page budget in Section F line 5 and is included in the separately uploaded Total Budget PDF file but is not included here in the proposal."

Almost all ROSES program elements are set up to allow proposers to fill out the NSPIRES web page budgets. These NSPIRES web page budgets are not required for Step-1 proposals. Unless otherwise specified in the ROSES program element, these NSPIRES web page budgets should include all costs, including salary, fringe and overhead of all participants. The full NSPIRES web page budgets will not be seen by peer reviewers. Where more than one organization is involved, the total cost for the Co-I organization is simply given as a single number in row 5, 8, or 9 of Section F (of the NSPIRES cover page budget). When funds are going to Co-I organizations funded directly by NASA, such as NASA centers and other government labs, then lines 8 or 9 should be used and customized. Row 10 in Section F is reserved for reporting any subaward that does not have any salary component. Proposers are strongly encouraged to read the FAQs with a walkthrough on this subject.

Almost all ROSES program elements are set up to allow proposers to separately upload a "Total Budget" PDF along with their (full or Step-2) proposal. Unless otherwise specified in the ROSES program element, all proposers are required to include this separate Total Budget PDF. The Total Budget should simply include the full and complete budget from your proposing organization and that of your Co-Is (in whatever is

the standard form used by your organizations). This means that proposers need to get this information from their Co-Investigators, whether or not they are Civil Servants. Budgets are generally laid out by project year but since NASA Civil Servant salaries must be charged to present fiscal year dollars, proposals that include NASA Civil Servant salaries may need to phase the funds for NASA Centers by fiscal year. The Total Budget PDF must lay out clearly how much is going to each organization, indicating whether the funds are passing through the proposing organization and which are not. Where the funds are passing through the proposing organization to a Co-I organization, the Total Budget PDF must specify any overhead charged on funds passing through. Such charges never apply to funds sent directly to Co-I organizations such as NASA centers and other government labs. The Total Budget PDF is uploaded in exactly the same way as the proposal PDF is uploaded, but by choosing document type "Total Budget". This Total Budget file will not be seen by peer reviewers. These budget files are not required for Step-1 proposals.

NASA Civil Servant time must be included in the summary table of work effort and all costs for NASA civil servant investigators must be included in the budgets just as it would be for any other team member. In general, it is not anticipated that directed work to NASA Centers will overlap with work proposed via ROSES. However, any questions about whether NASA Civil Servant participation on a ROSES proposal is already covered by directed work and how to present this in a proposal budget should be directed to the appropriate Headquarters SMD division R&A Lead, a list of which may be found at https://science.nasa.gov/researchers/sara/program-officers-list/.

Proposers from JPL shall not include the JPL award fee in the funds requested via ROSES, nor should the budgets of JPL Co-Investigators on proposals from other institutions include the JPL award fee in their budgets. JPL award fees are paid for and accounted for by a different mechanism than that used to fund awards from ROSES.

(iv) Submission of Proposals via NSPIRES, the NASA Proposal Data System

Proposals may be submitted electronically via NASA's Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES). To submit a proposal via NSPIRES, this NRA requires that the proposer register key data concerning the intended submission with NSPIRES at https://nspires.nasaprs.com. Potential applicants are urged to access this site well in advance of the Notice of Intent (NOI) and proposal due dates of interest to familiarize themselves with its structure and enter the requested identifier information. Potential PIs should ensure that their organization is also registered in NSPIRES, as it is only an official from the PI's registered organization, not the PI, who can submit a proposal.

Every individual named on the proposal’s electronic Cover Page form (see below) as a team member (even Collaborators) must be registered in NSPIRES and must confirm their commitment to the proposal and the organization through which they are participating via NSPIRES prior to proposal submission. Team members will receive an email from NSPIRES indicating that he/she has been added to the proposal and must log in to NSPIRES to confirm.

- Once logged in, the team member should follow the link in the "Reminders and Notifications" section of his NSPIRES homepage, titled "Need <role> confirmation

for proposal <title> for Solicitation <<solicitation number>>". On the "Team Member Participation Confirmation" page, the proposal team member should read language about the Organizational Relationship, then click the "Continue" button.

- If the contact information displayed on the "Team Member Profile" screen is out of date, the proposal team member should update this information later using the "Account Mgmt" link in the NSPIRES navigation bar across the top. Prior to making that update, however, the team member should follow the on-screen prompts to identify the organization through which he/she is participating on this proposal. Click the "Link Relationship" button to the right side of the "Organizational Relationship" banner. Select the organization from the "Link Proposal to an Association" part of the page. If the correct organization is not displayed here, try using the "Add Association" button to add the organization to this list. Then click the "Save" button at the bottom of the page. If the team member cannot find the organization when searching in the "Add Association" area (i.e., the organization is not registered), type in the formal name in the space provided (or select "Self," if appropriate). Once the organization is selected and the "Save" button is clicked, there is a confirmation page that allows the team member to edit that relationship if it was chosen incorrectly. Click "Continue".
- Note that the organization through which the proposal team member is participating in the proposal might not be the proposal team member's primary employer or primary mailing address. If the address information is accurate (or once it has been edited to be accurate), the proposal team member may log out of NSPIRES.
- NSPIRES will send an email to both the team member and the PI confirming that the commitment was made, and the organization was identified. The PI may additionally monitor the status of proposal team member commitments by examining the "Relationship Confirmed" column on the Team Member page of the NSPIRES proposal cover page record. Note that the proposal cannot be submitted until all identified team members have confirmed their participating organizations.

Proposers must complete the required elements of the NSPIRES Proposal "Cover Page" form to be able to submit a proposal. This form is composed of several distinct sections: a Cover Page that contains the identifier information for the proposing institution and personnel; a Proposal Summary that provides an overview of the proposed investigation that is suitable for release through a publicly accessible archive should the proposal be selected; Business Data that provides the proposed start and end dates, as well as other proposal characteristics; a Budget form that contains a budget summary of the proposed research effort; Program Specific Data that includes required questions specific to ROSES and that particular program element; and Proposal Team that provides the Co-Investigators and other participants in the proposal. This Cover Page form is available for access and submission well in advance of the proposal due dates given in Tables 2 and 3 of this NRA and remains open until the proposal due date for each program element. Unless specified in the program element description itself, no other web-based forms are required for proposal submission via NSPIRES.

The proposer is responsible for assembling the complete proposal document for peer review. The required elements of any proposal submitted in response to this NRA must

be submitted as a single, searchable, unlocked PDF document that contains the complete proposal, including the Science/Technical/Management section and budget justification, assembled in the order provided in Table 1 and uploaded as a single attachment. Unless otherwise specified in the program element the only permitted separate attachments are the HEC request, if any, see Section I(e), and the Total Budget file, see Section IV(b)(iii). Documents such as team member biographical sketches, letters (e.g., of commitment or resource support), and current and pending support, as well as the proposal abstract (proposal summary) may not be uploaded to NSPIRES as separate files.

NSPIRES generates error and warning messages as part of the element check concerning possibly missing data. An error (designated by an X in a red circle) will preclude proposal submission to NASA by the AOR so those must be addressed prior to submission. A warning, indicated by an exclamation mark (!) on a yellow triangle, is an indication that data may be missing and can be ignored if the proposer has verified that it's not referring to something essential to the proposal (e.g., "Yes, we know the budget is only one year, it was intentional"). Any actions taken because of warnings are at the PI's discretion.

Please do not attempt to download the Proposal Cover Page and incorporate it into the uploaded Proposal Document. NSPIRES automatically includes it with the proposal.

Proposers are encouraged to begin their submission process early. NSPIRES help topics may be accessed through the NSPIRES online help site at https://nspires.nasaprs.com/external/externalhelp/public/index.htm#t=First_Topic.htm. For any technical questions not resolved with the available online help menus, contact nspires-help@nasaprs.com or (202) 479-9376, Monday through Friday, excluding Federal Holidays, 8:00 a.m. – 6:00 p.m. Eastern Time.

(v) Submission of Proposals via Grants.gov

Grants.gov may be used in place of NSPIRES to submit proposals in response to almost all program elements this ROSES NRA. Grants.gov is now using the Workspace environment. Grants.gov requires that the PI use Workspace for either online completion of forms or downloading of forms for completion offline. In addition, proposers must download the program-specific instruction package from Grants.gov. Identifying the appropriate application package requires the funding opportunity number for that program element; the Grants.gov funding opportunity number may be found in the Summary of Key Information table at the end of each program element. That number will be of the form NNH22ZDA001N-XXXX where the "XXXX" will be an abbreviation for that program, e.g., NNH22ZDA001N-HSR for Heliophysics Supporting Research. Proposals submitted via Grants.gov must be submitted by the AOR.

Submitting a proposal via Grants.gov requires at least the following:

a. Grant researchers (PIs) do not need to register with Grants.gov. However, every individual named in the proposal as a proposing team member in any role, including PI, Co-Investigators, and Collaborators, as well as the PI's organization, must be registered in NSPIRES (https://nspires.nasaprs.com) and such individuals must perform this registration themselves; no one may register a second party,

even the PI of a proposal in which that person is committed to participate. This NSPIRES site is secure, and all information entered is strictly for NASA's use only.

b. Follow Grants.gov instructions provided at the website to download any software tools or applications required to submit via Grants.gov.
c. Preview the application package from Grants.gov for either online completion or downloading for completion offline by selecting "Preview" under "Package" for the specific Funding Opportunity at https://www.grants.gov. Each program element described in an appendix of ROSES requires a different application package and has a different Funding Opportunity Number; the Funding Opportunity Number may be found in the Summary of Key Information at the end of the program element description in each appendix of ROSES. Enter the appropriate Funding Opportunity Number to retrieve the desired application package. All ROSES application packages may be found by searching on CFDA Number 43.001.
d. Note that Grants.gov proposers must additionally download the "Instructions" zip file, as this includes a proposal summary form and the Program Specific Data form that contains important questions about, for example, China and ITAR. The “Read Me” file included in the instructions zip includes special instructions for submission of proposals to DAPR programs.
e. When ready to apply, click "Apply" to create, complete, and submit a Workspace. Completing a workspace allows proposers to complete all the required forms online or download PDF versions to be uploaded later.
f. Complete the required Grants.gov forms, including the Standard Form 424 Application for Federal Assistance, research and research-related (R&R) Other Project Information, R&R Senior/Key Person Profile, and R&R Budget. Every named individual must be identified with the organization through which they are participating in the proposal, regardless of their place of permanent employment or preferred mailing address.
g. Complete the required NASA specific forms including NASA Other Project Information, NASA PI and Authorized Representative Supplemental Data Sheet, and NASA Senior/Key Person Supplemental Data Sheet (this form is only required if there are Senior/Key Persons other than the PI).
h. Complete the NASA program-specific form that is required for the specific program element. This form, which is usually required for all ROSES program element submissions, is included as a PDF form within the proposal instruction package downloaded from Grants.gov. The form, once completed, is attached to the NASA Other Project Information form.
i. Create a proposal in PDF, including the Science/Technical/Management section and all other required proposal sections (see the *NASA Guidebook for Proposers*). Attach sections as separate PDF documents as prompted by Grants.gov. Do not duplicate materials; if a document must be provided as a separate attachment, do not also include it as part of the proposal narrative PDF file. Even though Grants.gov permits the attachment of non-PDF documents, NASA requires that all attached documents be PDF files, which conform to the specifications outlined in Section IV(b)(ii) above. Be sure to include a separate "Total Budget" PDF file and, if relevant, a separate "HEC Request" PDF file.

j. Because Grants.gov does not support the electronic commitment of team members, statements of commitment from all team members must be provided as letters attached to the proposal application at the place(s) specified by Grants.gov. This statement must include confirmation of both the team member role in the proposed effort (e.g., Co-Investigator, collaborator) and the identification of the organization through which the team member will be participating.
k. Here is an example of a statement of commitment: "I acknowledge that I am identified by name as <<role>> to the investigation, entitled <<name of proposal>>, that is submitted by <<name of Principal Investigator>> to the NASA Research Announcement <<alpha-numeric identifier>>, and that I intend to carry out all responsibilities identified for me in this proposal. I understand that the extent and justification of my participation as stated in this proposal will be considered during peer review in determining in part the merits of this proposal. I have read the entire proposal, including the management plan and budget, and I agree that the proposal correctly describes my commitment to the proposed investigation. For the purposes of conducting work for this investigation, my participating organization is <<insert name of organization>>."
l. Submit the proposal via the Authorized Organization Representative (AOR); the PI may not submit the application to Grants.gov unless he/she is an AOR.
m. Within a few days of submitting the proposal to Grants.gov, the PI and AOR should receive an email verifying submission of the proposal to the NSPIRES system, for review. Any proposer not receiving such a verification should contact the NSPIRES Help Desk.

Potential applicants are urged to access the Grants.gov site well in advance of the proposal due date(s) of interest to familiarize themselves with its structure and download the appropriate application packages and tools.

Potential applicants considering employing Grants.gov should pay special attention to program elements that require a Notice of Intent, as Grants.gov does not provide the capability to submit an NOI. See Section IV(b)vi, below.

Additional instructions for formatting and submitting proposals via Grants.gov may be found in the *NASA Guidebook for Proposers*. Instructions for the use of Grants.gov may be found at https://www.grants.gov/web/grants/applicants/workspace-overview.html. Instructions for NASA-specific forms and NASA program-specific forms may be found in the application instructions package. For any questions that cannot be resolved with the available online help menus and documentation, requests for assistance may be directed by email to support@grants.gov or by telephone to (800) 518-4726 twenty-four hours a day, seven days a week, except Federal holidays when the support center is closed.

(vi) Notice of Intent to Propose

The Notice of Intent (NOI) to propose is a brief summary of the planned work by the proposer. Such statements are of used to identify expertise needed for the review panel and to avoid inviting panelists who are planning to propose. Most of the program elements in Earth Science (Appendix A) and Astrophysics (Appendix D) request NOIs. In most cases where NOIs are requested, they are not required for submission of

proposals. However, some programs, (e.g., D.3 APRA, and D.7 SAT) require an NOI as a prerequisite for submission of a full proposal. For those program elements where the NOI is mandatory, this will be stated clearly in the program element and NOI due dates will be marked "mandatory" in the tables of due dates. NOIs may be submitted via NSPIRES directly by the PI by 11:59 p.m. Eastern Time on the due date given in Tables 2 and 3 of this NRA; no action by an organization's AOR is required to submit an NOI.

Moreover, some program elements do not request an NOI. For example, those programs to which one may submit at any time don't request an NOI. See the third bullet in Section I(d) for a list of those programs.

Grants.gov does not provide NOI capability; therefore, when required (or requested) by a program element, NOIs must (or should) be submitted via NSPIRES, whether or not the proposal will be submitted via NSPIRES or Grants.gov. Interested proposers must register with NSPIRES before it can be accessed for use. NSPIRES is open for the submission of NOIs for typically 30 days, starting about 90 days in advance of the due date for the proposals themselves. When NOIs are requested but not required, late NOIs may be submitted by email to the main point of contact given in the Summary Table of Key Information at the end of the individual program element.

(vii) The Two-Step Proposal Process

Some ROSES program elements require that proposals be submitted using a two-step process in which NOIs are replaced by required Step-1 proposals. Step-1 proposals are abbreviated presentations of the intended research and, as proposals, they must be submitted by the Step-1 due date given in Tables 2 and 3 of this NRA by the organization Authorized Organizational Representative (AOR). The Step-1 proposal is a prerequisite for submission of a full Step-2 proposal, but it does not obligate offerors to submit a Step-2 (full) proposal later.

For some program elements, the purpose of Step-1 proposals is simply to avoid conflicts of interest or appearance of bias in the assembly of the review panel and no responses to their Step-1 proposals will be provided to proposers. For other program elements, Step-1 proposals may be evaluated to determine if the anticipated research project exhibits sufficient programmatic relevance and responsiveness to the program element to permit or encourage submission of full Step-2 proposals. Thus, the two-step process can be structured in two ways: 1) A Nonbinding two-step process in which Step-2 proposals may be submitted even if the preceding Step-1 proposals were discouraged or 2) A binding two-step process in which Step-2 proposals can only be submitted if "invited" after the evaluation of the Step-1 proposals. In any case, those who submitted Step-1 proposals will be informed no later than four weeks prior to the Step-2 due date whether they are, or are not, "encouraged" or "invited" to submit a full Step-2 proposal.

The required Step-1 proposal is typically just the contents of the 4000-character limited Proposal Summary field in the cover pages but rarely may require a PDF document upload. When the Step-1 proposal is an uploaded PDF document, the permitted page length and required contents for the Step-1 proposal will be specified in the program element description. In some cases (e.g., Appendix C, Planetary Science), the team may be adjusted between the Step-1 and Step-2 proposal, but in other cases (e.g.,

Appendix B, Heliophysics), changes to the team are limited. When a Step-2 proposal is created, the team members and their confirmation are carried forward from the Step-1 automatically. However, if a Step-1 team member has changed organizations since confirmation on the Step-1 proposals, this could prevent the submission of the Step-2 proposal. When a confirmed Step-1 team member has changed organizations, the proposer must instruct the team member to update his or her participation confirmation in NSPIRES for the Step-2 proposal and inform the NASA POC immediately.

Please read the program element carefully. Budget data will not be requested as part of the Step-1 proposal. Unlike a Notice of Intent, which may be submitted by an individual, the Step-1 proposal must be submitted by an Authorized Organizational Representative of the proposing organization. Proposers are encouraged to read the instructions document on Submitting Step-1 proposals that appears under "Other Documents" on the NSPIRES web page of any program element that requires a Step-1 proposal.

The tables of due dates clearly indicate which program elements require a Step-1 proposal. At the time of release of this ROSES-2022 NRA, the program elements that solicit proposals using a two-step process include (but are not limited to): A.2, Land-Cover/Land-Use Change, approximately one quarter of the Heliophysics program elements (Appendix B), and several program elements in Planetary Science (Appendix C), Space Biology calls in Appendix E, and PRISM, Exoplanets Research and Habitable World calls in Appendix F.

(viii) The Two-Phase Proposal Process

On occasion, NASA will solicit proposals using a two-phase proposal process for which Phase-1 is a request for an observation to be performed by a NASA space observatory as part of a NASA general investigator/observer program element. Phase-2 is a funding request that is not peer reviewed. As such the Phase-2 proposals are not subject to the requirements in Section IV(b)iii to omit salary, fringe and overhead from submitted budgets. An NOI may or may not be requested, and the Phase-1 observing request must be submitted to the observatory web page by the proposal due date in Tables 2 and 3 of this NRA. Note the time and mode of proposal submission.

This ROSES NRA contains a number of general investigator/observer program elements in Astrophysics that use the two-phase proposal process: Neil Gehrels Swift Observatory General Investigator (D.5), Fermi General Investigator (D.6), NuSTAR General Observer (D.9), the TESS General Investigator Program (D.10), and NICER General Observer (D.11).

Phase-1 observing requests for these programs cannot be submitted via either NSPIRES or Grants.gov. They must be submitted via the URL given in the Summary Table of Key Information given at the end of program element description. The Phase-2 proposal for funding must be submitted via NSPIRES by a proposal due date that will be announced when NASA announces the disposition of the Phase-1 observing requests. The process and requirements for the submission of Phase-1 observing requests and Phase-2 proposals may differ for each program element; proposers should read carefully the relevant program element appendix to this ROSES NRA. The tables of due dates clearly indicate which program elements require a Phase-1 proposal.

(c) Proposal Due Dates

Tables 2 and 3 of this NRA, which will be posted at https://solicitation.nasaprs.com/ROSES2022table2 and https://solicitation.nasaprs.com/ROSES2022table3, respectively, provide proposal due dates and hypertext links to descriptions of the solicited program elements in the appendices of this NRA. For each program element, the electronic proposal must be submitted in its entirety by an Authorized Organizational Representative (AOR) no later than the proposal deadline (time) on the appropriate proposal due date given in Tables 2 and 3 of this NRA. Unless stated otherwise in the program element (e.g., Phase-1 proposals in Astrophysics), the proposal deadline is 11:59 p.m. Eastern Time and must be submitted electronically using either NSPIRES or Grants.gov (see Sections IV(b)(i-iii) above). Regarding due dates see also https://science.nasa.gov/researchers/NoDD.

Proposals submitted after the proposal due date and deadline will be labeled "late" by the NSPIRES system and proposals (including certain types of Step-1 proposals) that are late will be handled in accordance with the SMD Policy on Late Proposals. The vast majority of late proposals are rejected without review.

(d) Funding Restrictions

In addition to the default Agency funding restrictions and requirements given in the *NASA Guidebook for Proposers* and the *GCAM*, the following information and/or restrictions are applicable to this ROSES NRA:

- The estimated funding and number of proposals anticipated to be funded, as shown in the Summary of Key Information at the end of each program element, are subject to the availability of appropriated funds, as well as the submission of a sufficient number of proposals of adequate merit.
- Unless specifically noted otherwise in the specific ROSES appendix and/or program element, the proposing PI organizations are expected to subaward funding for all proposed Co-Is at non-Government organizations, even though this may result in a higher proposal cost because of subawarding fees. Rare exceptions will be considered on a case-by-case basis when requested in the proposal and found to be in the interest of the Government and consistent with appropriate law, regulation, policy, and practice.
- Unless otherwise noted in a program element, SMD will send funds directly to Co-Is at NASA Centers and other U.S. Government organizations, including JPL. Thus, if a proposal submitted by a university has a Government Co-I, the funds will not pass through the university, so the university (or other institution that receives a grant) may not include overhead or any other pass-through charges on those funds. Funds for Co-Is who do not work for the Government would pass through the university and those charges may be applied. Regardless of whether a Co-I will be funded through a subaward via the proposing institution or funded directly by NASA, the cover page budget for the proposal must include all funding requested from NASA for the proposed investigation, including salaries for NASA civil servants, see Section IV(b)iii. Time for Co-Is, costs of procurements (not labor or overhead), and other (non-salary) direct costs (e.g. technical support costs for on-site contractors) at NASA Centers and other U.S. Government organizations must be justified in the

proposal's Budget Narrative. No indirect burden from non-governmental organizations should be applied to funds for Co-Is at NASA Centers and other U.S. Government organizations. (See the *NASA Guidebook for Proposers*).

- For most federal assistance awards allowable costs are governed by 2 CFR Part 200. All proposed costs, including matching or cost sharing, must be allowable, allocable, and reasonable. Funds may only be used for the project. Unless otherwise directed in 2 CFR 200, for changes to the negotiated indirect cost rate that occur throughout the project period, you must apply the rate negotiated for that year, whether higher or lower than at the time of the initial award. All activities charged under indirect costs must be allowed under the cost principles in 2 CFR Part 200. In general, the construction of facilities is not an allowed activity for any of the program elements solicited in this NRA. As described in the *GCAM* Section 4 (Limitations), facilities are different and distinct from equipment, which may be an allowable expense.
- Computers are allowable under grants if they are essential for the project. It is no longer required that computers be used exclusively for the project. See ROSES FAQ #27 for more information on this topic.
- Travel, including travel outside of the U.S. by team members at U.S. organizations, is allowed, if necessary for the meaningful completion of the proposed investigation, including publicizing its results at appropriate professional meetings. Proposers from NASA Centers should consult the latest NASA policy document regarding restrictions on travel funding. Note that selection of a proposal and approval of a proposed budget that includes travel for civil servants does not guarantee that a NASA Center has sufficient travel authority to approve the proposed travel under NASA's reduced travel budget. For those at non-governmental organizations: if it was in your budget and the proposal was selected without comments or adjustments to that budget then you have prior approval. However, NASA funding may not be used for travel expenses by any team member who is not participating as a member of a U.S. organization.
- In general, proposals for sponsorship of topical workshops, symposia, and conferences are solicited through the ROSES program element F.2 Topical Workshops, Symposia, and Conferences.
- Regardless of whether a conference is sponsored by NASA, individual conference travel by grantees is permitted and proposers from universities, or other eligible non-governmental institutions, may include a budget for travel to workshops, symposia, and conferences. Proposers from NASA Centers should consult their Center implementing policy on the latest NASA guidance on conference spending and reporting requirements. Note that selection of a proposal and approval of a proposed budget that includes travel for civil servant does not guarantee that a NASA Center has sufficient travel authority under NASA's reduced travel budget to approve the proposed travel.
- Profit for commercial organizations is not allowable under grant or cooperative agreement awards but is allowable under contract awards. Costs for managing the project may be allowed under a grant. These costs, whether direct charges or part of the indirect cost agreement, must be consistent with 2 CFR 200 Subpart E.

- NASA funding may not be used for subcontracted foreign research efforts, i.e., grant funds may not pay for research at non-U.S. organizations. U.S. research award recipients may directly purchase supplies and/or services from non-U.S. sources that do not constitute research, but award funds may not be used to fund research carried out by non-U.S. organizations. However, a foreign national may receive remuneration through a NASA award for the conduct of research while employed either full- or part-time by a U.S. organization. Special restrictions apply to collaboration with China, see Section III(c).
- As noted in the *NASA Guidebook for Proposers*, costs of preparing, publishing, and disseminating the results of NASA funded research (e.g., page charges, open access fees, etc.) may be included in research proposals and are allowable charges against the grant, as long as the charges are levied impartially on all research papers published by the journal.
- Non-NASA U.S. Government organizations should propose based on full-cost accounting, unless no such standards are in effect; in that case such proposers should follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board. NSPIRES cover pages and uploaded "Total" budgets must include all costs that will be paid out of the resulting award.
- Regardless of whether functioning as a team lead or as a team member, personnel from NASA Centers must propose budgets consistent with the current NASA accounting implementation for the requested year of performance. All NSPIRES cover page budgets must include all costs that will be paid out of the resulting award, including costs of NASA civil servants. Costs that will not be paid out of the resulting award, but are paid from a separate NASA budget (e.g., center management and overhead; CESO) and are not based on the success of this specific proposal, should not be included in the proposal budget. For example, CESO should not be included in the proposal budget while other direct charges (including procurements and labor) to the proposed research task should be included. NASA civil servant Co-Is must provide to the proposing organization all costs requested of the ROSES program, so that the proposing organization may correctly complete the cover page budgets in NSPIRES.

(e) Other Submission Requirements

(i) Demonstration of Access to Required Facility

For any facility required for the proposed effort, the proposal must state which team member has access or provide a letter of resource support from the facility or resource confirming that it is available for the proposed use during the proposed period. ROSES no longer requires that the facility or resource be under the "control" of the team member.

(ii) Inclusion Plan Pilot Study

SMD is committed to fostering an environment that supports NASA's core value of Inclusion and implementing Strategy 4.1 from *A Vision for Scientific Excellence* (formerly known as the Science Plan). Creating an atmosphere of inclusion and respect

for all, as outlined in NASA's Anti-harassment Program and DEIA policies, allows us to value the strengths afforded by both our commonalities and differences with an aim to fully engage all talents, ideas, and perspectives. In keeping with this core value, and expanding on the Inclusion Plan Pilot Program begun in 2021, programs in ROSES-22 (e.g., A.23 ESI, A.28 IDS, B.22 SWxCs, D.3 APRA, D.7 SAT, D.12 TCAN, D.13 Pioneers, D.15 LPS, D.16 ADSPS, and F.10 PRISM) will require the addition of an Inclusion Plan to:

- Identify barriers to creating a positive and inclusive working environment for those carrying out the proposed investigation,
- Address ways in which the investigation team will work against these barriers to create and sustain such an environment, such as fostering communication and openness amongst the team, involving under-represented groups in proposal activities, etc., and
- Discuss contributions the proposed investigation will make to the training and development of a diverse and inclusive scientific workforce.

The default is that these plans will two pages, immediately following the Data Management Plan. More information will be provided in those program elements participating in this pilot study. The plan will be evaluated by IDEA experts. Feedback will be provided to the proposers as part of the panel review summaries but will not contribute to the adjectival ratings or selection recommendations. However, funding may be withheld until an adequate Inclusion Plan is received. If the NASA requested revision of, or addition to, an Inclusion Plan will involve extra cost, a revised budget may also be submitted.

Proposers seeking to reap the benefits of a more diverse team may consider, for example, referring to the Minority Serving Institution (MSI) Exchange at https://msiexchange.nasa.gov/ to find potential participants on their proposals.

V. Proposal Review Information

(a) Evaluation Criteria

As stated in the *NASA Guidebook for Proposers*, proposals are ordinarily evaluated on three criteria: intrinsic merit, relevance, and cost. A ROSES proposal that is not relevant is not selectable, no matter what the scores for merit or cost, or mean or median of all three criteria scores. Indeed, SMD may return without peer review a proposal deemed to be not relevant. The manner in which SMD evaluates ROSES proposals for relevance and cost varies from program to program. ROSES proposals may be scored by peer reviewers for all three criteria on the full 5-level scale from the *Guidebook*, or the proposal may be scored on the full scale only for merit, with relevance and/or cost evaluated on an abridged scale, or with only comments provided for relevance and/or cost, or the peer review panel may not be asked to comment on relevance and cost at all.

Note the following specific points:

- Some of the program elements discussed in Appendices A through F will give specific factors, based on the solicited research objectives, which will be

considered when evaluating a proposal's science and/or technical merits and/or its relevance to program objectives.

- Unless otherwise stated, relevance will be judged by whether the proposal addresses goals and objectives for the ROSES Appendix and/or specific program element to which it was submitted, rather than NASA's broader goals. Unless otherwise stated in the program element, relevance of the proposed work is judged based on whether the work proposed is deemed to be relevant, independent of whether or not it includes an overt, clear and direct statement of relevance. That is, unless otherwise stated in the program element, no proposal will be returned as noncompliant for lack of a relevance section or statement, and inclusion of a relevance section or statement is no guarantee that the proposal will be judged relevant. Please read the program elements carefully. See also Section I(g).
- Cost data for U.S. proposals may be evaluated by peer review (for reasonableness) and by NASA program personnel (for consistency with the available budget). Proposers must follow the budget requirements in Section IV(b)iii and Table 1 of this document. When evaluating the cost reasonableness of the proposals, reviewers will assess whether the proposed level of effort (i.e., labor FTEs) and the proposed other direct costs (i.e., supplies, equipment, travel) are commensurate with those required to accomplish the goals of the investigation. Salary levels, fringe benefit rates, and overhead rates are not part of that evaluation, and will be hidden from peer reviewers.
- Except in rare instances where it is explicitly acknowledged in the program element (e.g., A.40 Ecological Forecasting when it's solicited), neither the existence of proposed voluntary cost sharing, nor the lack thereof, nor the magnitude of such cost sharing will be used as evaluation factors or as a precondition for award. If voluntary cost sharing is proposed, the proposer should describe, in detail, any proposed cost sharing arrangements (see Section III(d) above). Please note that the Table of Personnel and Work Effort is no longer in the budget section and the *Guidebook* explicitly notes that any planned work commitment not funded by NASA is not considered cost sharing as defined in 2 CFR § 200.29.
- The *NASA Guidebook for Proposers* gives definitions for the five scores on the full five-level scale (from Excellent down to Poor). NASA may provide decision letters and/or evaluations with intermediate scores such as "Excellent/Very Good".
- A NASA awards officer will conduct a pre-award review of risk associated with the proposer as required by 2 CFR 200.206. For all proposals selected for award, the Grant Officer will review the submitting organization's information available through the Federal Awardee Performance and Integrity Information System (FAPIIS) and the System for Award Management (SAM) to include checks on entity core data, registration expiration date, active exclusions, and delinquent federal debt.
- For proposal evaluation and other administrative processing, NASA may find it necessary to release information submitted by the proposer to individuals not employed by NASA. Business information that would ordinarily be entitled to confidential treatment may be included in the information released to these individuals. Accordingly, by submission of this proposal, the proposer hereby consents to a limited release of its confidential business information (CBI). Except

where otherwise provided by law, NASA will permit the limited release of CBI only pursuant to non-disclosure agreements signed by the assisting contractor or subcontractor, and their individual employees and peer reviewers who may require access to the CBI to perform the assisting contract.

(b) Review and Selection Processes

Review and selection of proposals submitted to this NRA will be consistent with the policies and provisions given in the *NASA Guidebook for Proposers*, the SMD Peer Review Policy and the SMD policy on avoidance of Peer Review Conflicts of Interest.

Although not part of the peer review process, the selection official may take into account programmatic considerations such as impact on current or future missions, balance across: subdisciplines, technologies, methodologies, career stage, risk, innovation, types of institutions (e.g., MSI, PUI, vs. R1), and project size (such as funding several small investigations instead of one large one).

Unless otherwise specified, the SMD Division Director responsible for a research program (or a delegate, such as the R&A Lead) is its Selection Official.

SMD is strongly committed to ensuring that the review of proposals is performed in an equitable and fair manner that reduces the impacts of any unconscious biases. To this end, selected program elements under ROSES will employ a dual-anonymous peer review (DAPR) process in which, not only are proposers not told the identity their reviewers, reviewers are not told the identity of the proposers until after they have evaluated all of the anonymized proposals.

DAPR will be applied to proposals submitted to: A.18 Aura Science Team and Atmospheric Composition Modeling and Analysis Program, A.26 Earth Science U.S. Participating Investigator, A.32 Studies with ICESat-2, B.4, Heliophysics Guest Investigators-Open, B.16 Artificial Intelligence/Machine Learning-Ready Data, C.7 New Frontiers Data Analysis Program, C.8 Lunar Data Analysis, C.9 Mars Data Analysis, C.10 Cassini Data Analysis Program, and C.11 Discovery Data Analysis, D.2 Astrophysics Data Analysis, all Astrophysics GO/GI programs (D.5, D.6, D.9-D.11), D.16 Astrophysics Decadal Survey Precursor Science, D.17 XRISM Guest Scientist Program, and F.3 Exoplanets Research. Proposers to these program elements must adhere to the instructions in those program elements on how to prepare anonymized proposals. Also, detailed instructions for the preparation of proposals will be posted on the NSPIRES page for these ROSES elements and at https://science.nasa.gov/researchers/dual-anonymous-peer-review.

In brief, proposers to these program elements will provide an anonymized version of the proposal for peer review, and a separate not anonymized "Expertise and Resources - Not Anonymized" appendix document that contains identifying expertise and resources information. DAPR panels will be instructed to evaluate the anonymized proposals based on their scientific merit, without taking into account the proposing team qualifications. As a final check, and only after the evaluation is finalized for all proposals, the panel will be provided with the separate non-anonymized Expertise and Resources document to assess the team capabilities required to execute the proposed science investigation.

In ROSES-2022 SMD will continue to invite proposers to indicate on the NSPIRES cover page whether (and why) their proposal is both high risk and high impact and reviewers will assess the (intellectual) risk and impact of ROSES proposals.

If NASA anticipates that the total Federal share (translation: the awarded amount) on any award under ROSES will be greater than the simplified acquisition threshold (currently $250K) over the period of performance (see 2 CFR § 200.88 Simplified Acquisition Threshold), NASA is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through the System for Award Management (SAM, https://www.sam.gov/SAM/) (currently FAPIIS) (see 41 U.S.C. 2313). The applicant, at its option, may review information in the designated integrity and performance system accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM. NASA will consider any comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 CFR § 200.206 Federal awarding agency review of risk posed by applicants.

(c) Service as a Peer Reviewer

The success of NASA's research program rests on the quality of peer review. NASA will contact expert investigators and ask them to serve as peer reviewers. Since those whose proposals were selected in prior competitions are highly qualified and may not be submitting a proposal to the current competition, they are highly encouraged to serve on SMD peer review panels. Any qualified person who wants to gain insight into our review process is encouraged to volunteer by filling out one of the review forms at https://science.nasa.gov/researchers/volunteer-review-panels or by sending an email to the manager of the program of interest, see the SARA program officer list. It is good experience for early-career scientists, and the addition of new reviewers is healthy for the process. We are eager to have qualified reviewers from institutions not normally funded by SMD.

(d) Processes for Appeals

(i) Reconsideration by SMD

SMD has a process for requesting a debrief and/or reconsideration of a declined proposal submitted in response to an SMD NASA Research Announcement and Cooperative Agreement Notices. Reconsideration may be requested if the PI believes that the proposal evaluation contained factual errors or was otherwise handled improperly. This process is described in the SMD Policy on Reconsideration (SPD-09C) available in the "Library" section of the SARA website at https://sara.nasa.gov).

(ii) Ombudsman Program

The NASA Procurement Ombudsman Program is available under this NRA as a procedure for addressing concerns and disagreements. The clause at NASA FAR Supplement (NFS) 1852.215-84 ("Ombudsman") is incorporated into this NRA.

The cognizant ombudsman is

Jason Detko
Deputy Assistant Administrator for Procurement
Email: agency-procurementombudsman@nasa.gov

(iii) Protests

Only contract awards are subject to bid protest, either at the Government Accountability Office (GAO) or with the Agency, as defined in FAR 33.101. The provisions at FAR 52.233-2 (Service of Protest) and NFS 1852.233-70 (Protests to NASA) are incorporated into this NRA. Under both of these provisions, the designated official for receipt of protests to the Agency and copies of protests filed with the GAO is

Jason Detko
Deputy Assistant Administrator for Procurement
Email: jason.t.detko@nasa.gov

(e) Anticipated Selection Announcement and Federal Award Dates

SMD's goal is to announce selections within 150 days of the proposal due date and within 60 days after the conclusion of the peer review. Selections are typically announced between 150 days and 220 days after the proposal due date. Although there are many reasons why selections are not announced earlier, the most common are the uncertainty in the NASA budget at the time selection decisions could be made and the time required to conduct an appropriate peer review and selection process. NASA does not usually announce new selections until the funds needed for those awards are approved through the Federal budget process. Therefore, a delay in the budget process for NASA usually results in a delay of the selection announcement date. After 150 days have passed since the proposal due date, proposers may contact the responsible Program Officer listed at the conclusion of that program element and on the SARA web page. If the program officer does not respond proposers may send an inquiry to SARA@nasa.gov.

In order to announce selection decisions as soon as is practical, even in the presence of budget uncertainties, the Selection Official may make and announce selection decisions about some proposals and defer decisions on others. If a Selection Official uses this option, then proposers may be told that a proposal has been "selected", "declined," or that a decision has not yet been made. If a decision has not yet been made, then those proposals are termed "selectable" and will be considered for a supplemental selection if circumstances allow. Eventually proposers will be notified whether their proposal is selected or is no longer being considered for selection. All proposers will be notified via NSPIRES and provided with a written review (usually the panel evaluation) of the proposal. Proposers may contact the Program Officer for a "debriefing" to gain a better understanding of the evaluation process and the reasoning supporting the decision not to select the proposal, see the SMD Reconsideration Policy for more information.

Information that successful proposers must submit after notification of award may include evidence of compliance with requirements relating to human subjects or information needed to comply with the National Environmental Policy Act (NEPA 42 U.S.C. 4321-4370h), see Section VI(d).

VI. Award Administration Information

As mentioned above, grants and cooperative agreements will be subject to the policies and provisions identified in the regulations at 2 CFR 200 and 2 CFR 1800, the *NASA Grants and Cooperative Agreements Manual* (GCAM), and contracts will be subject to the provisions of the Federal Acquisition Regulations (FAR) and the NASA FAR Supplement.

(a) Award Notices

All proposers will be notified via NSPIRES from which they will be able to retrieve their proposal evaluation and what is often called "decision" or "notification" letter (called a "Notification of Intent to Make a Federal Award" in the GCAM). If a proposal is selected, the business office of the offeror will be contacted by a NASA Grants Officer from the NASA Shared Services Center, who is the only official authorized to obligate the Government. Any costs incurred by the proposer in anticipation of an award will be subject to 2 CFR Section 1800.209, Pre-award costs. NASA waives the approval requirement for pre-award costs of up to 90 days.

(b) Administrative and National Policy Requirements

By default, this solicitation does not invoke any special administrative or national policy requirements: 2 CFR 200, 2 CFR 1800, and the *Grants and Cooperative Agreement Manual* will apply to any awards that derive from this NRA, as applicable. Note that the research terms and conditions have been updated - see Section 5.10.1 of the *GCAM* for more information. Moreover, when a grant or cooperative agreement is issued for research, additional research terms and conditions apply – see section 5.10.2 of the *GCAM* and for NASA's implementation of the November 2020 changes to 2 CFR 200 including revised Research Terms and Conditions see the Agency implementation statements and the NSF website.

Awards from this funding announcement that are issued under 2 CFR 1800 are subject to the Federal Research Terms and Conditions (RTC) located at https://www.nsf.gov/awards/managing/rtc.jsp. In addition to the RTC and NASA-specific guidance, three companion resources can also be found on the website: Appendix A - Prior Approval Matrix, Appendix B - Subaward Requirements Matrix, and Appendix C - National Policy Requirements Matrix.

(c) Reporting

The reporting requirements for awards made through this NRA will be consistent with 2 CFR 200.327-.329. Award recipients must also comply with reporting requirements found in 2 CFR 180.335 and 2 CFR 180.350. Unless otherwise noted, ROSES satisfies the requirement in 2 CFR 200 for Increased Focus on Performance (a.k.a., Results-Oriented Accountability for Federal Grants) by specifying that the goals, objectives, tasks and timelines in the proposal are those against which the proposers must report

(typically annually, but sometimes more often e.g., for instrument development/flight programs) and that is how SMD assesses performance for ROSES federal assistance awards. Programs that require progress reporting more frequent than annually will clearly state the nature and cadence of the requirement (e.g., quarterly quad charts) in the program element.

As part of their (typically annual) technical reports, award recipients must report on progress not just in conducting the research but also archiving of final peer-reviewed manuscripts and, as applicable, consistent with their data management plans, archiving of data and code, see Section II(c) Increasing Access to the Results of Federally Funded Research.

If the total value of your currently active awards from all Federal awarding agencies exceeds $10,000,000 for any period of time during the period of performance of this Federal award, additional reporting requirements will apply. See 2 CFR 200 Appendix XII—Award Term and Condition for Recipient Integrity and Performance Matters.

If the total Federal share of an award includes more than $500,000 over the award's period of performance, NASA must include the term and condition available in Appendix XII - Award Term and Condition for Recipient Integrity and Performance Matters. See also §200.113 Mandatory disclosures. The non-Federal entity or applicant for a Federal award must disclose, in a timely manner, in writing to the Federal awarding agency or pass-through entity all violations of Federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the Federal award. Non-Federal entities that have received a Federal award including the term and condition outlined in Appendix XII - Award Term and Condition for Recipient Integrity and Performance Matters - are required to report certain civil, criminal, or administrative proceedings to SAM. Failure to make required disclosures can result in any of the remedies described in §200.338 Remedies for noncompliance, including suspension or debarment (See also 2 CFR part 180, 31 U.S.C. 3321, and 41 U.S.C. 2313(d) Compliance with the National Environmental Policy Act.

All awards made in response to proposals to this solicitation must comply with the National Environmental Policy Act (NEPA). While most research awards will not trigger action-specific NEPA review, and the majority of grant-related activities are categorically excluded, there are some activities, including international actions, that will require NEPA review. A blanket NASA Grants Record of Environmental Consideration (REC) provides NEPA coverage for these anticipated activities. The NSPIRES cover pages include questions to determine whether a specific proposal falls within the Grants REC. These questions must be completed as part of the proposal submission process. Activities outside of the bounding conditions of the Grants REC will require additional NEPA analysis. Examples of actions that will likely require NEPA analysis include, but are not limited to: suborbital-class flights not conducted by a NASA Program Office (see Section VIII); activities involving groundbreaking construction/fieldwork; and certain payload activities such as the use of expendable weather reconnaissance devices (dropsondes). Proposers of such activities are encouraged to plan and budget for any anticipated environmental impacts and communicate with Tina Norwood, NASA NEPA Manager, at tina.norwood-1@nasa.gov or (202) 358-7324.

(d) Acknowledgement of Support for Antarctic Access

For science projects that receive assistance from the U.S. Antarctic Program, this support must be acknowledged in publications. The acknowledgement should include: "Logistical support for this project in Antarctica was provided by the U.S. National Science Foundation through the U.S. Antarctic Program." Any additional requirements will be specified in the program element description.

VII. Points of Contact

General questions and comments about the policies of this NRA may be directed to:

Max Bernstein
SMD Lead for Research
Science Mission Directorate
National Aeronautics and Space Administration
Washington, DC 20546-0001
Email: sara@nasa.gov

Note: Proposals must not be submitted to this address. Proposals must be submitted electronically, as described in Section IV(b)(iv) above.

Specific questions about a given program element in this NRA should be directed to the Program Officer(s) listed in the Summary Table of Key Information at the end of each program element appendix. Up-to-date contact information for program officers can also be found online at the SARA web page's Program Officers List at https://science.nasa.gov/researchers/sara/program-officers-list.

Points of contact for suborbital-class platforms can be found in Section VIII(c).

Inquiries about accessing or using the NASA proposal submission web interface located at https://nspires.nasaprs.com should be directed by an email that includes a telephone number to nspires-help@nasaprs.com or by calling (202) 479-9376. This help center is staffed Monday through Friday, 8:00 a.m. - 6:00 p.m. Eastern Time.

Inquiries about accessing or using Grants.gov located at https://www.grants.gov should be directed by an email to support@grants.gov or by calling (800) 518-4726 twenty-four hours a day, seven days a week, except Federal holidays when the center is closed.

Students, faculty or staff in programs receiving NASA financial assistance, such as grant awards from this solicitation, may raise allegations of discrimination, including harassment, by contacting the NASA Office of Diversity and Equal Opportunity. Information on filing a complaint through ODEO at https://missionstem.nasa.gov/filing-a-complaint.html.

Grantees may not create or operate public social media accounts with use of the NASA name, likeness or emblems, without prior approval from NASA. For information or approval please contact Emily Furfaro at emily.furfaro@nasa.gov.

VIII. Other Information: Flight-Based Research Investigations

Flight-based research and/or technology development investigations are solicited in all of the five ROSES Appendices corresponding to the SMD Science Divisions (A-E), and

may also be solicited in Cross-Division Appendix F. Unless otherwise specified in a program element, flight-based research or technology development investigations solicited through ROSES are managed using the requirements of NPR 7120.8A, have modest costs (compared to flight missions solicited via announcements of opportunity that fall under 7120.5), and reduced mission assurance requirements appropriate for a research program. Given the nature of the work solicited, based on the guidance in Section 3 of the *GCAM* awards to non-governmental organizations will be federal assistance (i.e., grants or, if NASA provides or procures the ride, cooperative agreements). Hereinafter "flight" refers to these kinds of investigations. If contracts are solicited and/or selected projects will be managed under 7120.5, the program element will say so explicitly.

(a) Overview of Flight Platforms

Flight investigations are of three types depending on destination.

- Suborbital (e.g., aircraft, balloons, sounding rockets, rocket powered vehicles) Including:
  - Traditional NASA-provided balloons and sounding rockets
  - Commercial suborbital platforms procured via STMD's Flight Opportunities Program (FOP) Indefinite Delivery/Indefinite Quantity (IDIQ) contracts
  - Proposer-provided commercial suborbital launch vehicles
- Earth orbit (e.g., International Space Station payloads) and
- Beyond Earth Orbit (e.g., to the Moon).

While, in most cases, enumerated above the destination corresponds to a particular platform, SmallSats/CubeSats are applicable to all destinations. Since each platform has its own point of contact, subsection (c) below, is organized by platform. General requirements for proposals to use any of these platforms (except aircraft, see below) are discussed in this section of ROSES. Note: NASA Flight Opportunities Program (FOP) is no longer using the term suborbital reusable launch vehicle. They now refer to 'Rocket Powered Vehicles' including both suborbital launch vehicles that reach high altitudes and may include periods of microgravity, as well as lander vehicles that specialize in entry, descent, and landing technologies. Both of these classes of vehicles are typically recoverable and reusable after launch.

Proposers who would use aircraft should refer to Section 6.5 of A.1, the Earth Science Research Program Overview and https://airbornescience.nasa.gov/.

Generally, proposals for investigations that are carried out through development, launch, and operation of a short duration orbital experiment, such as one on a CubeSat or ISS-based project, are permitted in any ROSES program element that solicits investigations for use on suborbital-class platforms. In this sense, a CubeSat or an ISS-based investigation is considered a "suborbital class" investigation, even though it will be placed into orbit. CubeSat or ISS-based "suborbital class" investigations are subject to the same cost constraints to which traditional suborbital investigations are subject.

Proposals for Space Biology and Physical Sciences investigations, e.g., on the International Space Station (ISS) are solicited through Appendix E.

(b) General Guidelines for Flight Proposals

ROSES awards support science investigations and/or technology development utilizing payloads flown on suborbital-class platforms. Unless otherwise specified, flight proposals, like all ROSES proposals, are for complete science investigations, including development of any necessary hardware/instruments, collection of data and plans for management and for reduction, analysis, and archiving of the data must be given in the proposal. Although most awards are three or four years in duration, a five-year proposal may be accepted to develop a completely new, highly meritorious investigation through its first flight. Suborbital-class payloads may be recovered, refurbished, and reflown, in order to complete an investigation. Please read the individual ROSES program element for program specific requirements.

Budgets of flight proposals are expected to cover complete investigations, including payload development and construction, instrument calibration, travel expenses to support integration and launch activities, launch, data analysis, and publication of results. The number of investigations that can be supported is limited and heavily dependent on the funds available to the relevant research program. Note that NASA does not carry reserves for Suborbital-Class Investigations and proposers should not expect NASA to accommodate any cost overrun incurred by a particular investigation, including the damage and/or loss of the payload owing to a suborbital-class platform system failure. Therefore, failure to achieve the proposed goals within the proposed time and budget could require descoping the initially proposed investigation, delaying it, canceling a particular launch opportunity, or canceling the investigation altogether. Unlike most other ROSES investigations where the proposing PI organization must subcontract funding to non-Government investigators, funding for suborbital-class investigations will sometimes be split into multiple awards. Please read the individual ROSES program element and consult with the POC. When proposers would use a NASA-provided traditional suborbital platform or a commercial suborbital platform procured via NASA, the default is that the cost should not be included in the proposal budget, but the budget justification must describe which NASA provided service is to be used. When proposers elect to acquire or arrange for a commercial suborbital launch vehicle, to ensure that cost is seen by NASA personnel but not peer reviewers, the cost of the subcontract for the ride is to be included: 1) on the NSPIRES cover page budgets in Section F line 5, 8, or 9, which are redacted, and 2) in the separately uploaded total budget. Reminder: individual program elements may supersede the instructions given here.

(i) Additional Guidelines for Suborbital Proposals

NASA provides several avenues for the provision of suborbital launch vehicle platforms, namely:

- Sounding rockets provided by the NASA Sounding Rockets Program Office (SRPO) at the NASA Goddard Space Flight Center/Wallops Flight Facility (NASA/GSFC/WFF)
- Balloons provided by the NASA Balloon Program Office (BPO) at the NASA/GSFC/WFF
- New for ROSES-2022, commercial rocket-powered vehicles and high-altitude

balloons procured through the NASA Space Technology Mission Directorate's (STMD) Flight Opportunities Program (FOP)

NASA recognizes the unique capabilities and cost advantages of commercial suborbital platforms and encourages proposers to consider proposing innovative investigations to take advantage of them in order to increase the scientific yield and impact of the proposed research. NASA expects to fly smaller and cheaper payloads that take advantage of these capabilities at a higher cadence, provided that proposals are of sufficient quality.

All suborbital proposals for NASA-provided suborbital platforms or NASA-procured commercial suborbital platforms must be accompanied by a table of the key performance parameters (e.g., payload mass, altitude, etc.) required for the investigation (please refer to the solicitations for specific guidance). Proposers may additionally specify a candidate launch vehicle, but NASA has the final authority in the choice of which vehicle is to be used.

In general (e.g., for APRA, FORT, LCAS), proposers using NASA-provided traditional suborbital flights or NASA-procured commercial suborbital flights are not to include the cost in their budgets.

Proposers may continue to provide their own commercial suborbital launch vehicle see Section VIII(c)iv.

(c) Points of Contact for Flight Platforms

NASA provides several avenues for procurement of suborbital launch vehicle services, including: sounding rockets provided by the NASA Sounding Rockets Program Office (SRPO) at the NASA Goddard Space Flight Center/Wallops Flight Facility (NASA/GSFC/WFF), balloons provided by the NASA Balloon Program Office (BPO) at the NASA/GSFC/WFF, as well as other commercial suborbital launch vehicle services, to include rocket-powered vehicles and high altitude balloons procured through the NASA Space Technology Mission Directorate's (STMD) Flight Opportunities Program (FOP).

SMD also solicits investigations as CubeSats and as small International Space Station payloads. Regardless of which launch vehicle service is anticipated, all prospective PIs are required to demonstrate the capacity, availability, and commitment of the suborbital-class platform to support their investigation.

PIs are strongly urged to discuss prospective investigations with NASA program personnel (see below) prior to submitting their proposal to ensure that probable operational costs are properly anticipated.

(i) NASA-provided Sounding Rocket Services

Information on the capabilities of currently available sounding rocket vehicles is available at https://sites.wff.nasa.gov/code810/vehicles.html. Proposers are encouraged to consider these capabilities in designing their investigations, but the Sounding Rockets Program Office (SRPO) has the final authority in the choice of which vehicle is to be used.

The nominal U.S. launch sites for sounding rockets are White Sands Missile Range (WSMR) in New Mexico, Wallops Flight Facility in Virginia, Poker Flat Research Range (PFRR) in Alaska, and Reagan Test Site (RTS) in the Kwajalein Atoll. The SRPO also conducts launches from the established non-U.S. launch sites at Andoya, Norway (Andoya Space); Kiruna, Sweden (Esrange); or Australia; subject to science community requirements and the availability of SRPO operations funding to conduct the campaign.

Investigators proposing payloads to be flown on sounding rockets should answer the program-specific questions on the NSPIRES proposal cover pages. This information is needed by the SRPO to generate a rough order of magnitude cost estimate for the operational requirements associated with a proposed investigation and is used for planning purposes. The required information includes the envisioned vehicle type, payload mass, trajectory requirements, launch site, telemetry requirements, attitude control, or pointing requirements, and any plans for payload recovery and reuse.

Investigators proposing sounding rocket payloads should contact the SRPO to obtain technical information related to SRPO launch vehicle capabilities, services, and the latest planned campaign schedules. Questions concerning sounding rockets may be addressed to:

Giovanni Rosanova
Sounding Rockets Program Office
Code 810
GSFC/Wallops Flight Facility
National Aeronautics and Space Administration
Wallops Island, VA 23337
Telephone: (757) 824-2202
Email: giovanni.rosanova@nasa.gov

(ii) NASA-provided Balloon Services

Information on the capabilities of current available balloon vehicles is available at https://sites.wff.nasa.gov/code820/operations.html and at https://www.csbf.nasa.gov/balloons.html. Proposers are encouraged to consider these capabilities in designing their investigations, but the Balloon Program Office (BPO) has the final authority in the choice of which vehicles to be used.

The nominal U.S. launch sites for Balloons are Fort Sumner, New Mexico, and at the Columbia Scientific Balloon Facility in Palestine, Texas. The BPO also conducts launches from established non-U.S. launch sites at McMurdo, Antarctica; Alice Springs, Australia; Kiruna, Sweden (Esrange); or Wanaka, New Zealand, subject to science community requirements and the availability of BPO operations funding to conduct the campaign.

Proposers needing investigation unique engineering, flight support systems, and/or technical support services from NASA, such as the Wallops Arc-Second Pointing System (WASP), should contact the BPO directly for an estimate of the Government Furnished Equipment (GFE) cost of the desired support.

Investigators proposing balloon payloads should contact the BPO to obtain technical information related to BPO balloon capabilities, services, and the latest planned campaign schedules.

Questions concerning balloons may be addressed to:

Debora Fairbrother
Balloon Program Office
Code 820, GSFC/Wallops Flight Facility
National Aeronautics and Space Administration
Wallops Island, VA 23337
Telephone: (757) 824-1453
Email: debora.a.fairbrother@nasa.gov

(iii) STMD Flight Opportunities Program Commercial Suborbital Launch Vehicles

In a significant change from prior years, proposers may avail themselves of STMD's Flight Opportunities Program (FOP) Indefinite Delivery/Indefinite Quantity (IDIQ) contracts to suborbital flight service providers. Information on commercial suborbital flight vehicles, including general vehicle capabilities and contact information for some vendors, is available at https://www.nasa.gov/directorates/spacetech/flightopportunities/flightproviders. For payloads to be flown on FOP-contracted commercial suborbital flights, the flight and all other services provided by the commercial vendor will be procured directly by the FOP rather than through the award. The payloads to be flown on FOP-contracted suborbital flights must either be automated or remotely operated. ROSES does not solicit proposals including human participants to fly on FOP-procured commercial suborbital reusable launch vehicles. FOP is not currently offering aircraft parabolic flights to SMD proposers through ROSES.

Investigators proposing FOP-contracted commercial suborbital flight service payloads are strongly urged to discuss prospective investigations with operations personnel in the Flight Opportunities Program and/or a potential vendor to ensure that probable integration, safety and mission assurance, and operational costs are properly anticipated.

Questions concerning FOP-contracted commercial suborbital launch vehicle investigations may be addressed to:

Paul De León
Flight Opportunities Campaign Manager
Phone: (650) 604-0275
Email: paul.deleon@nasa.gov

(iv) Proposer-provided Commercial Suborbital Launch Vehicles

In addition to the description of the science investigation required of all proposals, proposals that would use Proposer-Provided commercial Suborbital Launch Vehicles (PPSLVs) must describe vehicle integration, launch and flight operations. Proposers planning to use PPSLVs must identify a vehicle that will provide the technical capabilities required to successfully conduct the proposed investigation.

Proposals using PPSLVs as platforms must specify the technical requirements that their investigation places on the vehicle. Proposals for investigations using PPSLVs as platforms must provide a description of the instrument; its current status; a clear assessment of what it will take to develop, modify, and integrate the instrument onto the SLV; and include a plan to provide calibrated, research grade data.

SMD will conduct a PPSLV continuing investigation review (CIR) for all PPSLV-based projects. The CIR will take place following maturity of the SLV-based project to the equivalent of a Phase A concept study report or a systems requirement review. A proposal for a PPSLV-based project must describe the proposed schedule for CIR and the proposed funding required to reach CIR.

The CIR will include payload description, flight performance assessment, proposed payload configuration and interfaces, mission success criteria, requirements matrix, operational requirements, launch vehicle, and project schedule. Once the PPSLV-based project reaches that level of design maturity, the CIR will be held at NASA Headquarters. The SMD Associate Administrator (or designee) is the decision authority for approval to proceed beyond the CIR. It is expected that PPSLV-based projects will spend no more than approximately $100K prior to CIR approval.

Proposals for PPSLV-based investigations must be submitted to the appropriate ROSES program element, depending on the science to be addressed by the proposed investigation. The proposed PPSLV-based investigation must meet the constraints of the program element to which it is being proposed. This explicitly includes any constraints on the areas of science that are solicited, on the available funding, and on the requirement for a complete science investigation.

Proposers who choose to provide their own commercial suborbital launch vehicles, rather than using STMD's Flight Opportunities Program (FOP) contracts for commercial suborbital platforms, must do the following:

- Inform the point of contact for the program element prior to submission and cc SARA@nasa.gov,
- The cost to SMD for the flight and related services being performed for the proposer must be included in the NSPIRES cover page budget in Section F, line 5, 8, or 9, which are redacted, and also in the separately uploaded "Total Budget" PDF.
- The proposal document must describe the commercial flight services in adequate detail for peer review and include a statement as to why the proposer chose that launch, how it satisfies their requirements, e.g., as opposed to FOP.

Unless otherwise specified in a program element, in addition to the normal evaluation factors specified in Section V(a) and the *NASA Guidebook for Proposers*, evaluation of the intrinsic merit of SLV-based proposals shall include the following additional factors:

- The likelihood that the proposed vehicle will be available at the proposed time for flight and that it will be capable of providing the required technical capabilities;
- The feasibility of the proposed technical investigation, including the concept for conduct of the experiment during the suborbital flight and the plans for calibrating and analyzing the data obtained to accomplish the proposed science objectives; and

- The quality of the plans for completing the preliminary design prior to the investigation confirmation review.

The evaluation of cost reasonableness of a proposal shall include a pre-selection assessment, by NASA personnel, of the affordability of the proposed vehicle vendor cost for the flight and other required services compared to available budget.

(v) Research Investigations Utilizing the International Space Station

NASA has determined that there may be payload opportunities for small, suborbital-class space and Earth science research investigations, including both science and technology development, that utilize the International Space Station (ISS). Available external attach points include both zenith and nadir pointing locations and internal attach points include nadir pointing locations. NASA has regular opportunities to launch external and pressurized (internal) cargo for use in the Window Observational Research Facility. Opportunities and constraints for ISS attached payloads may be found at: https://www.nasa.gov/mission_pages/station/research/experiments/explorer/Facility.html?#id=349 and https://earth.esa.int/web/eoportal/satellite-missions/i/iss-worf.

Proposals seeking use of the ISS must take advantage of the Station's unique capabilities. Proposals must include a clear and convincing scientific and/or technical argument that use of the ISS is required to produce the needed results in ways that could not be accomplished through the use of other platforms. Investigations that make use of the ISS may be proposed for periods of performance of up to five years.

Proposers interested in using the ISS to conduct an Earth or space science investigation must identify a specific accommodation location that can provide the technical capabilities required to conduct the proposed investigation. The proposal must include a letter of feasibility from the ISS Research Integration Office that must contain: (1) a preliminary assessment of the feasibility of the proposed concept and requirements for access to and accommodation on the Space Station, (2) identification of any significant challenges or conditional provisions for access and accommodation, and (3) a description of the level of technical interchange or negotiation required to mature the proposed concept for access and accommodation on ISS. Transportation and accommodation will be provided by NASA at no cost to the proposed research investigation, and costs for transportation to and accommodation on the ISS should not be included in the proposed budget. However, the PI's cost for all accommodation, safety, and other reviews that are conducted and supported by the PI must be included in the PI's proposed investigation budget. It can take the ISS Research Integration Office several weeks to prepare the letter of feasibility.

In addition to a description of the instrument and its current status proposals for utilizing the ISS must provide a clear assessment of what it will take to develop, modify, and integrate the instrument onto the ISS and include a plan to provide calibrated, research grade data. Proposals must be for complete investigations that include payload development**,** construction, ISS integration, launch and flight operations, data analysis, and publication of results.

The ISS Research Integration Office will provide integration services, launch services, on-orbit operations and services, as well as safety and mission assurance reviews for all ISS investigations.

There is no single due date for investigations for the ISS; rather, proposals must be submitted to the appropriate ROSES program element depending upon the science addressed by the proposed investigation. The proposed investigation must meet the constraints of the program element to which it is being proposed. This explicitly includes any constraints on the areas of science that are solicited, on the available funding, and on the requirement for a complete science investigation.

Investigations proposed for the ISS will be approved for the first year only. During the first year, in addition to beginning the proposed investigation, a detailed transportation and accommodation study will be undertaken by the ISS Program's Research Office with the ISS Research Integration Office at no cost to the proposer. Approval for continued funding beyond the first year will be contingent on the ISS Program making a firm commitment for transportation and accommodation on the ISS that is compatible with the requirements of the proposed investigation.

Investigators proposing ISS payloads are required to contact the ISS Research Integration Office to begin the technical discussion needed in order to start the ISS technical requirements interface and resource utilization feasibility and accommodation assessment. It is only after such feasibility assessment is performed by the ISS Research Integration Office that a signed feasibility letter will be issued to the investigator. The signed ISS feasibility letter must be submitted with any proposal requesting the use of ISS as a science platform to perform any experiment.

All proposals will be evaluated with respect to the criteria specified in the *NASA Guidebook for Proposers*. In addition to the factors specified in the *Guidebook*, by default, the intrinsic merit of an ISS proposal shall include:

- The extent that the advantages (e.g., scientific, technical, or cost) of the International Space Station's capabilities and location will be utilized; and
- The feasibility of the proposed technical investigation includes the on-orbit operations concept and the plans for calibrating and analyzing the data obtained to accomplish the proposed science objectives.

External accommodation locations for payloads include Express Logistics Carriers (ELCs), the Japanese Experiment Module-Exposed Facility (JEM-EF), and the Columbus Orbiting Facility-Exposed Facility (COF-EF). Internal accommodations are also available in the pressurized environment via the Window Observational Research Facility (WORF). More detailed information can be found at www.nasa.gov/stationfacilities.

For research investigations that would use the International Space Station, in addition to any periodic project reviews or certifications specified in individual program elements and award terms and conditions, please note: ISS payloads must be certified for transportation and use in a human-tended vehicle. Payloads must obtain ISS Safety certification, meet ISS to payload interface requirements, complete verifications, and develop a feasible ops plan, including crew procedural inputs. Unpressurized external payloads typically begin integration efforts with the ISS 24-36 months before launch

(depending on the experience of the payload developer) and are delivered for integration into the launch vehicle approximately two months before launch. Pressurized payloads for the WORF typically begin integration efforts with the ISS 9-12 months before launch and are delivered for packing and integration into the launch vehicle approximately four months before launch.

For ISS Program accommodation support please email both of these points of contact from the ISS Program's Research Office:

Name	email
Steve Huning	steven.w.huning@nasa.gov
Jennifer Scott Williams	jennifer.j.scottwilliams@nasa.gov

(vi) Use of Short Duration Orbital Platforms, including CubeSats

Short duration (<2 years, in orbit) orbital platforms, including any ISS mounted payload that is retrievable and returned to Earth, ISS CubeSat deployments, and CubeSats, generally have historically been used as teaching tools and technology demonstrators, and offer newly developed capabilities for the conduct of NASA scientific research and technology advancement. CubeSats may be built as a single unit (1U), weighing less than 1.33 kg, or combined in units of two, three, six (2x1x3 form factor), twelve (2x2x3 form factor e.g., D.3 APRA) and, in some cases, even larger. For example, B.11 H-FORT allows CubeSats up to 27U, with >12U dispensed from an ESPA ring. Proposers contemplating >6U are strongly encouraged to communicate with the point of contact for the ROSES program element to which they plan to propose to verify the availability of an appropriate dispenser and that costs can be accommodated by the program.

Proposals for science investigations utilizing short duration orbital platforms, such as CubeSats, must be for complete investigations, and must describe a complete science investigation, including CubeSat construction, payload integration and test, launch vehicle integration, communications, mission operations, data analysis, and publication of results.

CubeSats are typically launched as secondary payloads to low-Earth orbit or from the International Space Station. Further, additional commercial opportunities to leave Earth orbit as a secondary payload may arise on future mission launches. The CubeSat Launch Initiative (CSLI) program has narrowed eligibility to investigations performed by students without any governmental involvement. Proposers who may be eligible for CSLI may refer to Cubesat Launch Initiative Announcement "Partnership" Opportunity web page and inquire of the POCs listed at the end of this section, but most proposers to ROSES who want to avail themselves of NASA-provided rides will use the Launch Services Program (LSP).

NASA's Launch Services Program, or LSP, facilitates the launch of uncrewed rockets delivering science and robotic missions from nanosats to flagship level primary payloads. LSP's focus is bringing together those with a payload needing a ride to space with the appropriate launch vehicle provider, based on cost, schedule, and technical capabilities. LSP is able to utilize a variety of contracting and partnership opportunities to find the appropriate launch opportunity for the PI. Additional information including

performance quotes for orbits/destinations, mission integration inquiries, and standard services may be obtained from the LSP point of contact below. At an appropriate time after selection, SMD will provide mission specific direction to the Launch Services Office. This direction will request the project be considered for manifest on a launch vehicle going to an appropriate orbit via LSP contracting mechanisms.

As a result of their secondary status, CubeSats are placed into orbits that are dictated by the primary payload. Therefore, in any given year a finite number of specific orbits (e.g., inclinations and altitudes) will be available for CubeSats, and the types of orbits available will vary from year to year. Thus, CubeSat-based missions requiring very specific orbital parameters may be at a disadvantage for securing a timely launch. Proposals should include the CubeSat Mission Parameters Table (below) and clearly indicate both the required and the acceptable range of orbital parameters needed to meet mission objectives. NASA's CubeSats are deployed from the ISS via the NanoRacks CubeSat dispenser or from an expendable launch vehicle via a dispenser on contract at the time of manifesting. Please indicate whether or not a Space Station launch is acceptable.

CubeSats must be compliant with Launch Services Program, Program-Level Dispenser and CubeSat Requirements Document (LSP-Req-317.01) and the

CubeSat Mission Parameters								
Mission Name	Mass	Cube Size	Desired Orbit		Acceptable Orbit Range	400 km @ 51.6 degree incl. Acceptable – Yes or No	Ready Date	Desired Mission Life
			Altitude					
			Inclination					

Compliance and Reference Documents referenced therein. That document may be found at: https://www.nasa.gov/pdf/627972main_LSP-REQ-317_01A.pdf

Unless otherwise stated, awards made in response to proposals to ROSES do not fall under NASA Procedural Requirement (NPR) 7120.5. Instead, they fall under NASA Procedural Requirement (NPR) 7120.8, NASA Research and Technology Program and Project Management Requirements, appropriately tailored depending on the project size, complexity, and scope.

Proposals for CubeSat investigations should note the following:

- The cost of launch for a single, ≤ 3U, spacecraft to Low Earth Orbit (LEO) will be covered under the Launch Services Program (LSP) at no cost to the investigation. For this standard case, proposers should mention (e.g., in the budget justification) that only the standard LSP-provided launch services are needed. Proposers should not include such launch service charges in the budgets of a ROSES proposal.
- Proposals to go beyond LEO, utilize more than one spacecraft, or involve a CubeSat >3U must contact LSP representatives (see below) to obtain a cost

estimate. Proposals shall state explicitly in the budget justification that there are additional costs for launch within the proposed budget and give those costs in the NSPIRES cover page budget and the separately uploaded Total Budget file, see (b) General Guidelines for Flight Proposals above. However, such quoted launch services costs are not in the hands of the proposing organization and overhead must not be charged on those costs.

- The proposed CubeSat investigation must meet the constraints of the program element to which it is being proposed. This explicitly includes any constraints on the areas of science that are solicited, on the available funding, and on the requirement for a complete science investigation.
- In addition to the factors specified in the *NASA Guidebook for Proposers*, the proposal will be evaluated against any additional (e.g., flight-related) factors called out in the program element to which it is being proposed.
- Proposals for investigations using CubeSats must satisfy the constraints for a standard CubeSat and the NASA CubeSat deployer.
- Please note that 12U is the maximum size for Nanoracks ISS and Cygnus CubeSat deployments, see https://nanoracks.com/satellite-deployment/.
- Proposals must specify any constraints placed on the required orbit and orbital lifetime. The likely availability of NASA launches satisfying any constraints in the time period contemplated will be a consideration for the ROSES evaluation. The less stringent the orbital constraints, the more probable it will be that NASA can manifest the CubeSat investigation for launch.
- Proposals must demonstrate knowledge of the requirements for limiting orbital debris and must address how the mission will meet the requirements of NPR 8715.6 for Limiting Orbital Debris.
- Proposals must address the approach to downlink and uplink communications licensing, frequency band selection, and frequency coordination for operations between space and ground within the RF spectrum.
- All costs for preparing, testing, and delivering the CubeSat for launch must be included in the proposal.
- Launch service charges should be included in the proposal cost request only if they exceed the normal LSP-provided launch services, as described above or if the proposer procures their own launch service.
- Proposals for short duration orbital experiments other than CubeSats must include provisions for access to space as part of the proposal.

Investigators proposing CubeSats are strongly urged to discuss prospective investigations with personnel listed below regarding constraints, launch opportunities, and other technical matters. For further information on SMD CubeSats, please contact:

Florence Tan
Phone: (202) 358-0058
Email: florence.w.tan@nasa.gov and

For further information on LSP and CSLI, please contact:

Norman Phelps,
Launch Services Program Mission Manager,
Phone: 321-698-5707
Email: norman.l.phelps@nasa.gov.

TABLE 1: CHECKLIST FOR ROSES-2022 PROPOSALS

This list does not apply to Step-1 proposals. Many items on this checklist may be superseded by the program element and, if there is a difference, the text in the program element takes precedence. The instructions here supersede the *NASA Guidebook for Proposers;* if there is a difference, see Section I(g).		
NSPIRES cover pages: This table lists the few aspects that most commonly cause difficulties to proposers. There are many required parts to the cover pages, see the NSPIRES online help for guidance.		
Section or topic		Requirements, caveats, citations, notes, link for more information
	Team	All investigators must indicate participation via NSPIRES, except proposals submitted via Grants.gov. If any team member doesn't confirm their participation the AOR will get an error that prevents submission.
	Team	Paid team members may not be collaborators, they should be given a role permitted to receive funds, such as Co-I.
	Team	A critical partner with a sustained, continuing role is a Co-I, not a collaborator, even if unpaid. See also FAQ #21.
	Project Summary	Project Summary (abstract) must be in the 4000-character text box in the NSPIRES cover pages, not the Science/Technical/ Management section of the proposal (except DAPR proposals).
	Budget	List all costs. Include all salary and indirect costs in the NSPIRES cover page budgets but not in the proposal PDF, see Section IV.(b)iii.
	Submission	The author must "release" the proposal and the AOR must "submit" prior to the due date.
	Other	There are questions that must be answered and there may be other required content, e.g., some program elements collect a relevance statement via the cover page, see I(g).
Proposal document		
Table of contents		First component of proposal. One page at most and optional.
Scientific/ Technical/ Management (S/T/M) Section		Second component and the main part of the proposal. The sequence for science content here is recommended; proposers may order the elements as they prefer.
	Length restriction	Typically, 15 pages (except for a Step-1 proposal) and more may be permitted for some (e.g., Flight) programs and less for others (e.g., B.12 HDEE, F.2 TWSC). Please read the program element and refer to the summary table of key information.
	Format	8.5" x 11.0" page size
	Format	Single spaced, single column text (unless otherwise specified).
	Format	One-inch margins on all four sides. No reviewable content in margins.
	Format	No more than 5.5 lines per vertical inch

Table 1 Continued: Checklist for ROSES-2022 Proposals

	Text Format	No more than 15 characters per horizontal inch, including spaces. This is typically consistent with a font size of 12.
	Captions Format	As above (font size 12 etc.). Text necessary for the proposal may not be solely in figures, tables, or their captions.
	Figure Format	Text and content on/in figures must be easily legible without magnification.
	Table Format	Text and content on/in Tables must be easily legible without magnification.
	Content	Discuss objectives and their significance.
	Content	Discuss perceived impact of the work.
	Content	Discuss relevance of the work to the program element. See V(a)
	Content	Explain the technical approach and methodology.
	Content	Discuss potential sources of uncertainty
	Content	Present mitigation strategy or alternate approach given obstacles
	Content	Discuss roles of all team members so it's clear what they are doing
	Content	Present a work plan, with milestones, management structure
	Content	Present a data sharing and/or archiving plan in the S/T/M section only if it is required by program element, see Section II.(c).
	Special Content	Provide other special requirements of program element, e.g., special statements for participating scientists, team leads, etc.
References: Third component of proposal		
	Length	No page limit
	Excluded	No references to documents unavailable to reviewers. See FAQ19
Data Management Plan (DMP) fourth component of proposal. Location differs from that given in *Guidebook*. See Section II(c) for exceptions.		
	Length	2 pages
	Required	Unless otherwise stated, a DMP or explanation of why it is not needed must be provided in this section.
	Content	See Section II(c) and the DMP FAQ for content and templates.
Biographical Sketches/Curriculum Vitae (CVs): fifth component of proposal		
	Required	For a PI and each Co-I.
	Length restriction	CV for a PI (or Science PI) - up to two pages, unless otherwise specified.
	Length restriction	CVs for anyone other than a PI are limited to one page
	Not required	CVs for collaborators are typically not needed, but may be included
Table of Personnel and Work Effort: This is the sixth component of the proposal. Location differs from that given in *Guidebook*. See Section IV(b)iii		
	Required	Names and/or titles of all personnel to perform the proposed effort
	Required	Planned work commitment (e.g., in weeks, months etc.) to be funded by NASA see example in Section IV(b)iii.

Table 1 Continued: Checklist for ROSES-2022 Proposals

	Required	Planned work commitment (e.g., in weeks, months etc.) that will not be funded by NASA, if any. See example in Section IV(b)iii.
	Note	This table is outside of the budget Section. Time commitment included here that is not funded by NASA is not considered cost sharing, as defined in 2 CFR § 200.29.
	General	Where names are not known, include the position, such as postdoctoral fellow or technician.
	Exception	Note requirements for anonymity in DAPR programs.
Current and Pending Support: seventh component of the proposal, not page limited.		
	Required	Required for the PI and funded participants who would devote ≥10% of their time in any given year to the proposed work.
	Required	For each current project or pending proposal that would account for ≥10% of the person's time, list the level of effort for that team member (only) per year. Award $ values are not requested.
	Excluded	Do not include Current and Pending for collaborators.
	Discouraged	Current and Pending for students is discouraged.
	Discouraged	Current and Pending for Foreign Co-Is is discouraged.
	Excluded	Do not self-reference this proposal in the current and pending
Statements of Commitment and Letters of Support, Feasibility and Endorsement, the eighth component of the proposal.		
	General	Statements of Commitment by team members have been replaced by an indication of participation via the NSPIRES web interface.
	Statements of Commitment	Statements of Commitment must be included for Grants.gov proposals, since web confirmation of team member participation is not possible via Grants.gov.
	Letter of Endorsement – only permitted in special cases.	In general, not permitted. Special cases include 1) Foreign Co-Is must include letters of endorsement from their government agency or funding/sponsoring institution in their country and 2) Letters from commercial vendor are required for proposals for investigations using SLVs not contracted by the Flight Opportunities Program. See Section VIII(c)iii.
	Letter of Resource Support	See Section IV(e) for when a letter of resource support is needed from a necessary facility or resource confirming that it is available for the proposed use during the proposed period.
	Letter of feasibility	A letter of feasibility from the NASA Space Station Payload Office must be included with proposals to use ISS.
	Letter of affirmation	In general, letters of affirmation are not permitted for normal research proposals, but letters from the community may be included only where explicitly allowed, e.g., for C.17 PSEF, and F.2 TWSC.

Table 1 Continued: Checklist for ROSES-2022 Proposals

Budget: The ninth component of the proposal, no page limit overall.		
Budget Narrative (a.k.a. Budget Justification)		
	General	Please explain in words what is being purchased and why it is reasonable. See the *Guidebook for Proposers*
	Required	Budget Narrative: justify each proposed component of cost, including subcontracts/subawards, consultants, other direct costs (including travel), and facilities and equipment. Give the "basis of estimate;" quotes need not be provided, but the proposal should indicate that the cost was based upon a quote, prior experience, etc.
	Excluded	Do not include any values for salary, fringe, or overhead.
	Optional	Proposers need not specify anticipated award type (i.e., grant vs. contract), see Section II(a)
Budget Details (a.k.a. Detailed Budget)		
	Strongly Recommended	Detailed budget, itemizing expenses.
	Strongly Recommended	Separate detailed budget from each subaward organization.
	Excluded	Do not include any $ or % values for salary, fringe, or overhead in this section which is peer reviewed. See the FAQ#8.
Facilities and Equipment: The tenth component of the proposal, no page limit.		
	Length	As needed
	Excluded content	May not include scientific or technical information beyond a description of the facilities and equipment, i.e., don't add here what should be in the page-limited scientific/technical Section.
PDF Appendices Separate from the main proposal document		
	"Total" Budget Document (separate PDF file attached as type "Total Budget").	
	Required	Separately uploaded "Total" Budget PDF file see Section IV(b)(iii).
	HEC Appendix Document (separate PDF file attached as "Appendix")	
	Required for High-End Computing	If the Program Specific Data Question on the use of NASA-provided HEC was answered in the affirmative, an appendix document must be provided. See Section I(e) for information.
	Expertise and Resources - Not Anonymized (separate PDF file attached as document type "Appendix")	
	Selectively required	Required only program elements employing Dual-Anonymous Peer Review (DAPR). Please note that the anonymization requirement for DAPR programs changes some of the components of this table, e.g., CVs, Table of Work Effort, Current and Pending, etc. See Section IV(b)i for more information.