FUTURE INVESTIGATORS in NASA EARTH and SPACE SCIENCE and TECHNOLOGY (FINESST)

NNH19ZDA005K

FINESST Proposals due: February 1, 2019 at 11:59 p.m. ET
FINESST Selection Announcements: May 15, 2019 (target)
Start date of FINESST Grants: September 1, 2019 (target)
Future Investigators in NASA Earth and Space Science and Technology (FINESST)

1. Introduction

Through this Future Investigators in NASA Earth and Space Science and Technology (FINESST) solicitation, the National Aeronautics and Space Administration (NASA) Science Mission Directorate (SMD) solicits proposals from accredited U.S. universities for research grants to begin in the 2019-2020 Academic Year that identify an individual pursuing a graduate degree in Earth and space sciences related disciplines, as the participating Future Investigator (FI). The purpose of the FINESST is to provide relevant research and/or technology development project training in disciplines needed to achieve the goals of NASA SMD. FINESST grants are for student-designed research projects that contribute to SMD's science, technology and exploration goals.

FINESST succeeds the NASA Earth and Space Science Fellowship (NESSF). Numbers of NESSF submissions and selections by divisions from past years may be found at https://science.nasa.gov/researchers/sara/grant-stats/nasa-earth-and-space-science-fellowship-nessf-selections. The titles and abstracts of proposals that were selected under the most recent predecessor NESSF solicitation may be found on the NSPIRES page for NESSF-2018, by downloading the PDFs under the heading "Selections". NASA expects to receive similar numbers of FINESST proposals and to make similar numbers of selections.

Awards resulting from the FINESST competition will be made in the form of grants or, if NASA determines it necessary, as cooperative agreements, to the submitting universities with a graduate research advisor designated by the university serving as the Principal Investigator (PI). Civil servants may not serve as Principal Investigators. Please note that a proposal cannot be submitted if any listed team member does not confirm their participation in NSPIRES. Potential proposers should refer to the FINESST 2019-2020 Proposal Submission Instructions (PDF) and the Frequently Asked Questions (FAQ PDF) on the NSPIRES page for this solicitation under other documents. Questions regarding this solicitation should be directed to the point(s) of contact listed below. Questions and answers will be added to the FAQ anonymously, as appropriate.

A key criterion for proposal evaluation (See Section 5) and selection is the relevance of the proposed investigation to the Science Mission Directorate (SMD). SMD's high-level strategic objectives are presented in the 2018 NASA Strategic Plan.

Detailed plans by science area corresponding to the science divisions of SMD: Heliophysics, Earth Science, Planetary Science, and Astrophysics appear in Chapter 4 of the 2014 NASA Science Plan. The financial support for FINESST comes from SMD's Science Divisions, each of which has its own budget and technical priorities. At the time of submission, the offeror will have to choose the SMD division to which the proposal is being submitted. However, proposals that are relevant to more than one division are welcome. After having chosen the primary division, proposers will have an opportunity to indicate the other division to which a proposal may be relevant by responding to the questions on the NSPIRES cover page.

All FINESST proposals must address goal(s) and objective(s) of one or more SMD divisions. If NASA determines that the proposal has been submitted to the wrong division it may suggest that offeror reassign the proposal to another division.
Proposals should present how their intended research is relevant not just to SMD generally but to the division to which it was submitted in particular. To ascertain whether a potential research topic is relevant to an SMD division, prospective proposers should refer to 1) the specific priorities of the Science Divisions listed in subsections 2.1-2.4, below, and 2) the specific research topics solicited by each Division e.g., the topics listed in ROSES, and especially see the text in the Division overviews i.e., A.1 Earth Science Research Overview, B.1 Heliophysics Division Overview, C.1 Planetary Science Research Program Overview, and D.1 Astrophysics Research Program Overview.

The proposal must present a well-defined problem and a justification of its scientific significance, as well as a detailed approach for its solution.

The Future Investigator (FI, the student) shall have the primary initiative to define the proposed FINESST research and must be the primary author, with input or supervision from the proposal's PI, as appropriate. In cases when the advisor already has an ongoing research award from NASA, the research proposed under FINESST may address a similar topic, but the proposal should make clear how the proposed research goes beyond what NASA has already agreed to support.

If applicable to the proposed research, the proposal may include an appendix requesting high-end computing resources. See Appendix A of this solicitation for details.

2. Division Research Overviews

This section presents an overview of the research program in each of the science divisions. Please review these subsections prior to deciding to which division your research proposal should be submitted. Potential proposers are also encouraged to refer to the program elements solicited by each division in Table 3 of the ROSES solicitation. Even if a particular program element is not solicited in ROSES in any given year, that topic is still solicited here. For example, just because Terrestrial Hydrology was not solicited as program element A.21 in ROSES-2018, that should not discourage a proposer with an interest in that subject from proposing it to FINESST.

2.1 Earth Science Research Program

The Earth Science Research Program, managed by the Earth Science Division of the Science Mission Directorate (https://science.nasa.gov/earth-science), contributes to NASA’s mission, in particular, Strategic Objective 1.1: Understanding The Sun, Earth, Solar System, And Universe (from the 2018 NASA Strategic Plan). This strategic objective is motivated by the following key questions:

- How is the global Earth system changing?
- What causes these changes in the Earth system?
- How will the Earth system change in the future?
- How can Earth system science provide societal benefit?

These science questions translate into seven overarching science goals to guide the Earth Science Division's selection of investigations in scientific and technological research and other programmatic decisions:

- Advance the understanding of changes in the Earth’s radiation balance, air quality, and the ozone layer that result from changes in atmospheric composition (Atmospheric Composition)
- Improve the capability to predict weather and extreme weather events (Weather)
- Detect and predict changes in Earth’s ecological and biogeochemical cycles, including land cover, biodiversity, and the global carbon cycle (Carbon Cycle and Ecosystems)
- Enable better assessment and management of water quality and quantity to accurately predict how the global water cycle evolves in response to climate change (Water and Energy Cycle)
- Improve the ability to predict climate changes by better understanding the roles and interactions of the ocean, atmosphere, land, and ice in the climate system (Climate Variability and Change)
- Characterize the dynamics of Earth’s surface and interior, improving the capability to assess and respond to natural hazards and extreme events (Earth Surface and Interior)
- Further the use of Earth system science research to inform decisions and provide benefits to society

The outcomes that NASA anticipates from its research and development in these overarching scientific goals are summarized in detail in Chapter 4.2 of the NASA 2014 Science Plan available at [http://science.nasa.gov/about-us/science-strategy/](http://science.nasa.gov/about-us/science-strategy/).

The Earth System Science component of the FINESST encourages proposals that place particular emphasis on the utilization of unique NASA capabilities in studies of the Earth. Foremost among NASA’s unique capabilities is its fleet of Earth observing satellites as well as sensors aboard the International Space Station, together providing a comprehensive suite of measurements of all the components of the Earth system. See descriptions of the missions at [https://science.nasa.gov/missions-page/](https://science.nasa.gov/missions-page/) with more details about related airborne missions at [https://airbornescience.nasa.gov/](https://airbornescience.nasa.gov/), and information about data access and discovery at [https://earthdata.nasa.gov/](https://earthdata.nasa.gov/). Additional examples of emphasis include:

- Integration of satellite-, aircraft-, and surface-based measurements, in conjunction with models and simulations.
- Innovative scientific and engineering research in the areas of remote sensing technologies, including those which are relevant to the suite of Earth-viewing missions and measurements recommended by the National Academy of Sciences in its [2017-2027 Decadal Survey for Earth Science and Applications from Space, "Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space".](https://www.nap.edu/read/24923/)
- Relevant research contributing significantly to interagency programs established by Congressional and/or administration direction. These would include, but are not limited to, the US Global Change Research Program ([http://www.globalchange.gov](http://www.globalchange.gov)), other groups under the auspices of the National Science and Technology Council (especially the Committee on Environment), and the Office of the Federal Coordinator for Meteorological Services and Supporting Research.
- Relevant research contributing to domestic and international assessments, such as those conducted under the auspices of the U.S. Global Change Research Program, the
Intergovernmental Panel on Climate Change, the World Meteorological Association, and the United Nations Environment Program.

The Earth Science Division welcome proposals that integrate the use of NASA and non-NASA remote sensing and in situ observations.

The Earth Science Applications component of the FINESST encourages submissions from individuals pursuing interdisciplinary degrees linking Earth science research results with policy, business, operations, and management, including but not limited to:

- Potential application of research results, or advancing the readiness of application science, to specific fields such as natural resource or ecosystem management, environmental policy, public health, air quality, water resources, disaster and emergency management (e.g., preparedness, response, and initial recovery), land or marine ecosystem planning, conservation biology, international development;
- Analysis of climate-related influences and impacts; and
- Examination of relevant issues in public and private sector decision-making (e.g., uncertainty, risk, alternatives, valuation, implications, costs, benefits, etc.).

Proposals that use NASA data, science and technology to inform decisions are encouraged. The current focus areas include:

- Disasters
- Ecosystems and Ecological Forecasting
- Health and Air Quality
- Water Resources

More information is available at [https://appliedsciences.nasa.gov/](https://appliedsciences.nasa.gov/).

In addition, the Earth Science Division encourages technology research relating to advanced components, advanced information systems, and instrument development complementing the investments of NASA's Earth Science Technology Office ([http://esto.nasa.gov](http://esto.nasa.gov)). From space-borne instruments and components to data systems and models, these technologies cover a broad range of scientific observations, operating environments, as well as applied science approaches that benefit the society at large.

Proposals that bring the techniques of other scientific disciplines to bear on remote-sensing relevant to Earth science problems are also encouraged. For example, this would include proposals that will bring techniques and methodologies from computing and computational sciences and software engineering to bear on the large modeling and data systems used to integrate and analyze large and diverse Earth science data sets.

Interdisciplinary Earth science proposals that align with NASA Earth science research and applications objectives are welcome, including those that combine social sciences with physical and/or biological sciences.

Submissions that address the topics listed below are encouraged to seek other applicable components in FINESST (e.g., astrobiology in the Planetary Science Research Program) or other applicable graduate research opportunities.

- molecular biology, biochemistry, development, physiology, or evolution of living organisms, without a direct utilization of remote sensing approaches or global/regional modeling which makes use of remote sensing data, or
- efforts in laboratory and/or theoretical chemistry that are not directly related to remote sensing and/or computational modeling of atmospheric gas phase and particulate composition, or
- social science research that is not directly linked to NASA observations and/or models.

2.2 Heliophysics Research Program

The NASA Strategic Objective for Heliophysics is to understand the Sun, Earth, Solar System, and Universe. Further information on NASA's Strategic Goals and Objectives may be found in NASA Policy Directive (NPD) 1001.0C, 2018 NASA Strategic Plan. In pursuit of this objective, and with guidance from the National Research Council’s most recent decadal survey, Solar and Space Physics, A Science for a Technological Society (download free PDF), the following questions are posed:

- What causes the Sun to vary?
- How do the geospace, planetary space environments, and the heliosphere respond?
- What are the impacts on humanity?

To address these questions, the NASA Science Mission Directorate (SMD) is conducting heliophysics investigations designed to address the following science goals:

- Explore the physical processes in the space environment from the Sun to the Earth and throughout the solar system.
- Advance our understanding of the connections that link the Sun, the Earth, planetary space environments, and the outer reaches of our solar system.
- Develop the knowledge and capability to detect and predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth.

Further information on the objectives and goals of NASA's Heliophysics Program may be found in the 2014 Science Plan and Our Dynamic Space Environment: Heliophysics Science and Technology Roadmap for 2014-2033 (download PDF). The Heliophysics research program is described in Chapter 4.1 of the SMD Science Plan 2014 available at http://science.nasa.gov/about-us/science-strategy/. The program supports theory, modeling, and data analysis utilizing remote sensing and in situ measurements from a fleet of missions; the Heliophysics System Observatory (HSO). Frequent CubeSats, suborbital rockets, balloons, and ground-based instruments add to the observational base. Investigations that develop new observables and technologies for heliophysics science are sought.

Supported research activities include projects that address understanding of the Sun and planetary space environments, including the origin, evolution, and interactions of space plasmas and electromagnetic fields throughout the heliosphere. The program seeks to characterize these phenomena on a broad range of spatial and temporal scales, to understand the fundamental processes that drive them, to understand how these processes combine to create space weather events, and to enable a capability for predicting future space weather events.
The program supports investigations of the Sun, including processes taking place throughout the solar interior and atmosphere and the evolution and cyclic activity of the Sun. It supports investigations of the origin and behavior of the solar wind, energetic particles, and magnetic fields in the heliosphere and their interaction with the Earth and other planets, as well as with the interstellar medium.

The program also supports investigations of the physics of magnetospheres, including their formation and fundamental interactions with plasmas, fields, and particles and the physics of the terrestrial mesosphere, thermosphere, ionosphere, and auroras, including the coupling of these phenomena to the lower atmosphere and magnetosphere. Proposers may also review the information in the ROSES-18 Heliophysics Research Program Overview for further information about the Heliophysics Research Program.

2.3 Planetary Science Research Program

The Planetary Science Research Program, managed by the Planetary Science Division, sponsors research that addresses the broad strategic objective to "Ascertaining the content, origin, and evolution of the Solar System and the potential for life elsewhere." To pursue this objective, the Planetary Science Division has five science goals that guide the focus of the division's science research and technology development activities. As described in Chapter 4.3 of the SMD 2014 Science Plan (https://science.nasa.gov/about-us/science-strategy), these are:

- Explore and observe the objects in the Solar System to understand how they formed and evolve.
- Advance the understanding of how the chemical and physical processes in the Solar System operate, interact and evolve.
- Explore and find locations where life could have existed or could exist today.
- Improve our understanding of the origin and evolution of life on Earth to guide our search for life elsewhere.
- Identify and characterize objects in the Solar System that pose threats to Earth or offer resources for human exploration.

In order to address these goals, the Planetary Research Program invites a wide range of planetary science and astrobiology investigations.

This program supports research into topics that may include, but are not limited to:

- Investigations aimed at understanding the formation and evolution of the Solar System and (exo) planetary systems in general, and of the planetary bodies, satellites, and small bodies in these systems;
- Investigations aimed at understanding materials present, and processes occurring, in the early stages of Solar System history, including the protoplanetary disk;
- Investigations aimed at understanding planetary differentiation processes;
- Investigations of extraterrestrial materials, including meteorites, cosmic dust, presolar grains, and samples returned by the Apollo, Stardust, Genesis, and Hayabusa missions;
- Investigations of the properties of planets, satellites (including the Moon), satellite and ring systems, and smaller Solar System bodies such as asteroids and comets;
- Investigations of the coupling of a planetary body’s intrinsic magnetic field, atmosphere, surface, and interior with each other, with other planetary bodies, and with the local plasma environment;
- Investigations into the origins, evolution, and properties of the atmospheres of planetary bodies (including satellites, small bodies, and exoplanets);
- Investigations that use knowledge of the history of the Earth and the life upon it as a guide for determining the processes and conditions that create and maintain habitable environments and to search for ancient and contemporary habitable environments and explore the possibility of extant life beyond the Earth;
- Investigations into the origin and early evolution of life, the potential of life to adapt to different environments, and the implications for life elsewhere;
- Investigations that provide the fundamental research and analysis necessary to characterize exoplanetary systems;
- Investigations related to understanding the chemistry, astrobiology, dynamics, and energetics of exoplanetary systems;
- Astronomical observations of our Solar System that contribute to the understanding of the nature and evolution of the Solar System and its individual constituents;
- Investigations to inventory and characterize the population of Near Earth Objects (NEOs) or mitigate the risk of NEOs impacting the Earth;
- Investigations into the potential for both forward and backward contamination during planetary exploration, methods to minimize such contamination, and standards in these areas for spacecraft preparation and operating procedures;
- Investigations which enhance the scientific return of NASA Planetary Science Division missions through the analysis of data collected by those missions;
- Advancement of laboratory- or spacecraft-based (including small satellites, e.g., CubeSats) instrument technology that shows promise for use in scientific investigations on future planetary missions; and
- Analog studies, laboratory experiments, or fieldwork to increase our understanding of Solar System bodies or processes and/or to prepare for future missions.

Proposers may also review the information in the ROSES-18 Planetary Science Research Program Overview for further information about the Planetary Science Research Program.

2.4 Astrophysics Research Program

The Astrophysics Research Program, managed by the Astrophysics Division, explores the universe beyond our solar system: from the search for planets and life in other stellar systems to the origin, evolution, structure, and destiny of the universe itself. The broad themes of the Astrophysics Research Program are:

(i) Physics of the Cosmos:

to discover how the universe works at the most fundamental level; to explore the behavior and interactions of the particles and fundamental forces of nature, especially their behavior under the extreme conditions found in astrophysical situations; and to explore the processes that shape the structure and composition of the universe as a whole, including the forces which drove the Big Bang and continue to drive the accelerated expansion of the universe.

(ii) Cosmic Origins:

to discover how the universe expanded and evolved from an extremely hot and dense state into the galaxies of stars, gas, and dust that we observe around us today; to discover how dark matter clumped under gravity into the tapestry of large-scale filaments and structures which formed the
cosmic web for the formation of galaxies and clusters of galaxies; to discover how stars and planetary systems form within the galaxies; and to discover how these complex systems create and shape the structure and composition of the universe on all scales.

(iii) Exoplanet Exploration:

to search for planets and planetary systems about nearby stars in our Galaxy; to determine the properties of those stars that harbor planetary systems; to determine the percentage of planets that are in or near the habitable zone of a wide variety of stars, and identify candidates that could harbor life.

(iv) Research Analysis and Technology Development:

a vital component of the astrophysics program is the development of new techniques that can be applied to future major missions: the test-beds for these new techniques are the balloons and rockets that are developed and launched from NASA’s launch range facilities.

This program also supports technology development that includes detectors covering all wavelengths and fundamental particles, as well as studies in laboratory astrophysics. Examples of these studies could include atomic and molecular data and properties of plasmas explored under conditions approximating those of astrophysical environments.

Investigations submitted to the Astrophysics research program should explicitly support past, present, or future NASA astrophysics missions. These investigations can include theory, simulation, data analysis, and technology development. The Astrophysics research program and missions are described in Chapter 4.4 of the SMD 2014 Science Plan available at https://science.nasa.gov/about-us/science-strategy.

Proposers may also review the information in the ROSES-18 Astrophysics Research Program Overview for further information about the Astrophysics Research Program.

3. Eligibility

This call solicits proposals for research projects to be carried out by an individual future investigator pursuing Masters or PhD degrees in Earth- and space sciences-related disciplines from accredited U.S. universities. By the proposal due date, the future investigator that will be listed as a participant on the proposal must have applied to, been admitted to, and/or be enrolled as a graduate student at the accredited U.S. university submitting the proposal. At the time of award, the student must be enrolled as a graduate student at the U.S. University submitting the proposal.

A student funded by this award may not concurrently receive a fellowship or traineeship nor receive stipend from another source such as another research grant, nor be paid to conduct research (e.g., as a postdoc). However, students funded by a FINESST grant may receive funding for expenses not covered by this award (e.g., to purchase of equipment as opposed to stipend) and may take a hiatus to pursue other options (see Section 6 below and FAQ on this topic). FINESST proposers (or grantees) must inform NASA if the student has accepted any fellowship or traineeship during the period that a FINESST proposal is under consideration or during the period of performance of a FINESST grant.

In accordance with 2 CFR 200 and a recipient university's policies, students funded by a FINESST grant may be eligible to pursue other employment, e.g., teaching, consulting, etc.
FLIs with disabilities and/or from underrepresented minority groups are urged to apply. No applicant shall be denied consideration on the grounds of race, color, age, ethnicity, religion, pregnancy, sexual orientation, gender identity, sex, marital status, disability, or status as a U.S. Veteran. NASA recognizes and supports the benefits of having diverse and inclusive scientific, engineering, and technology communities.

3.1 Limitations on Proposal Submission

Although a proposing organization may submit more than one proposal to this solicitation, duplicative proposals from the same organization are not solicited and may be returned without review.

A student may be proposed as a FI, i.e., participant, on only one proposal.

More than one proposal may be submitted to this solicitation with the same PI.

A student currently or in the past supported by a NESSF award is not normally eligible for FINESST support. Only students who were supported for fewer than three years are eligible for support and only up to a maximum of three years total support from NESSF and FINESST combined.

3.1.1 Potential Citizenship Restrictions

In accordance with restrictions in Appropriation Acts that restrict NASA from funding certain projects involving the People's Republic of China (PRC) 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." See the NASA Grant and Cooperative Agreement Manual GCAM (Download a word version of the GCAM at https://tinyurl.com/GCAMrev2017). Proposing organizations will be required to certify compliance with regarding this NASA PRC funding restriction. Prospective FINESST PIs or/and FLIs affiliated with PRC institutions may not be eligible.

Please note that applications by citizens of or persons born in "Designated Countries" will be subject to additional levels of scrutiny which may result in a proposal being denied. The "Designated Country List" can be found at the NASA Export Control website: https://oijr.hq.nasa.gov/nasaecp/. This list is regularly updated, therefore please consult the website to ensure use of the most up-to-date list. To ensure full compliance with U.S. export control and sanctions laws and regulations, it is NASA's long-standing policy not to support or fund research activities of any citizens of, or persons born in, States Sponsors of Terrorism (Column 2 of NASA’s Designated Country List) and their proposals are reviewed under a presumption of denial.

4. Proposal Preparation and Submission

The FLI (student) must be the primary author of the proposal, as described in Section 1.

Proposals are due: 11:59 p.m. Eastern Time, February 1, 2019

All proposals must be submitted in electronic format only. Instructions for submitting electronic proposals are located at http://nspires.nasaprs.com - click on "Solicitations" then click on "Open Solicitations" and then select the FINESST 2019-2020 announcement. Also refer to "Proposal Submission Instructions" listed under "Other Documents."
Main body text of proposals and captions must use an easily read font of no more than 15 characters per horizontal inch (typical of 12-point Times New Roman) and no more than 5.5 lines per vertical inch (i.e., single spaced). There must be at least one-inch margins on all sides, and the proposal must be sized for US letter size (8.5x11) paper. Non-compliant proposals may be returned without review.

4.1 FINESST Proposals

Proposers must complete the NSPIRES cover pages, including a proposal summary/abstract and responses to the FINESST Program Specific Data questions. (see "Proposal Submission Instructions" listed under "Other Documents" on the NSPIRES page for FINESST-2019) and the proposal must include the elements listed below, clearly identified, starting on a new page, and appearing in the following order in a single PDF file:

1. A personal statement that outlines a FI’s goals, experiences, attributes, and academic achievements that, when considered in combination with the other proposal components, shows academic excellence, as broadly construed (refer to "Proposal Evaluation and Selection"). This section may total no more than one single-spaced uploaded page.

2. A description of the proposed research project, including figures and tables, as appropriate. This section, excluding citations, may total no more than six uploaded pages. Citations and/or footnotes must directly follow the project description and are not included in the page limit. The project description should include the following elements:
   a. A well-defined problem with a justification of its scientific significance and a detailed approach for its resolution.
   b. A statement describing the relevance of the proposed work to the appropriate SMD Division.
   c. A period of performance or timeline for the proposed project listing anticipated accomplishments and major milestones, including expected publications.

3. A schedule stating the degree type and start and completion dates, as well as anticipated milestones, of the student’s degree program.

4. Curriculum Vitae of the faculty advisor and the student, limited to two pages each.

5. A signed letter(s) of recommendation from the student’s academic advisor(s) on institutional letterhead, which must include the name of the student, the name of the proposing institution, and the FINESST proposal title, and should address the academic excellence evaluation criterion from Section 5.1.

6. A statement signed (electronic signature is fine) by both the student and faculty advisor affirming the proposal is the work of the student and has not been written by another team member, such as the advisor.

7. Official or unofficial, legible unaltered undergraduate (and graduate if applicable) transcripts (provide an explanation if the transcripts are not current or recent). If all or part of the applicant’s Social Security Number or Date of Birth appears on the transcript, this must be redacted (blocked out) prior to submission. This is the only alteration permitted to a transcript.

8. A brief budget justification explaining the proposed allocation of funds across eligible participant support categories, e.g., what, if any, amount it requested for tuition or similar funds for the University. When the university is committing to reduce or waive tuition and fees for the student, specify that amount in the budget justification. See Appendix B - Limitations on a FINESST Budget Categories.
9. Optional High-End Computing Appendix. The HEC Appendix is a separate PDF file, so do not include it in the PDF file for items 1-8. See Appendix A of this solicitation for details on how to pursue this option.

Please note: All of these required proposal elements, excluding the NSPIRES cover page forms and the optional high-end computing appendix, must be combined into a single PDF document and uploaded on the NSPIRES site for submission.

The general conditions described in the NASA Federal Acquisition Regulation Supplement Part 1852.235-72 are applicable, except where the special instructions provided herein pertaining to the FINESST (e.g., evaluation criterion of the "academic excellence" of the student participant in Section 5.1) supersede those general guidelines.

4.2 Proposal Submission Due Dates

FINESST proposals submitted after the due date or deadline will be labeled "late" by the NSPIRES system and they will be handled in accordance with the SMD Policy on Late Proposals. SMD does not pre-approve the submission of a late proposal. The decision to submit a late proposal is solely that of the proposer, and it is then NASA’s decision whether to accept it or not. The FINESST program officers/administrators are not empowered to authorize the submission of a late proposal.

5. Proposal Evaluation and Selection

5.1 Review

The criteria for evaluation include:
(a) The scientific merit of the proposed research. The scientific merit of the proposed research includes:
   1. The compelling nature of the research topic.
   2. The exhibited depth of understanding of the research topic.
   3. The expected impact of the research, should it succeed.
   4. The feasibility of the proposed research plan, including the availability of resources for successful completion of the project.
   5. The robustness of the research plan to anticipated setbacks.
(b) The relevance of the proposed research or technology development to NASA's objectives in Earth and/or space science;
(c) Academic excellence based upon an FI personal statement, transcripts, and the signed letter of recommendation by the student's academic advisor(s), the degree to which the FI's academic background supports the proposed research, and the FI's curriculum vitae. Reviewers evaluating submissions submitted to the FINESST may consider the following with respect to the "academic excellence" of a FI: academic achievement and capability to successfully complete their proposed project. Academic achievement is demonstrated by the FI’s past performance in coursework and training. Does the FI’s record of performance demonstrate an ability to excel and to learn? Capability to successfully complete their proposed project is demonstrated by the FI’s past training, achievements, and strategy for graduate study. Has the FI taken the appropriate coursework to successfully implement the proposed methodology, and is a plan presented to gain any missing skills or coursework? Does the choice of academic advisor or
committee complement any lacking skills and training needs? Has the FI considered cross-disciplinary skills that might enhance the project (i.e., computational techniques, statistical methods, etc.)? Has the FI been involved in any activities within or outside of academia that make the student particularly capable of conducting the proposed work?

(d) Cost reasonableness. FINESST grants are limited cost category awards, NASA personnel will look at the split between stipend and allowance (see Section 6), how the allowance is being used, and recommend how many proposals should be supported in a division or focus area based on availability of funds.

Proposal evaluation may be conducted by community-based reviewers via either mail or panel review, or both, or by the relevant NASA SMD Division program managers.

5.2 Selection

The Directors of the Science Divisions of SMD at NASA Headquarters or their designees will make respective selections for award on a competitive basis. The target date to announce selection of an award is May 15, 2019, and the default start date of all new awards of September 1, 2019, unless otherwise specified in the proposal.

At the conclusion of the review process, notification of selection letters will be addressed to the PI and FI at the university address entered on NSPIRES. New selections will be posted on the NSPIRES page for FINESST-2019.

5.3 Award Management

A NASA grant officer will conduct a pre-award review of risk associated with the proposer (i.e., submitting university) as required by 2 CFR 200.205. For all proposals selected for award, the grant officer will review the submitting university’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. Prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, NASA is required to review and consider any information about the proposer that is in the designated integrity and performance system (currently FAPIIS) accessible through SAM (https://www.sam.gov) (see 41 U.S.C. 2313). A proposer, at its option, may review information in FAPIIS and comment on any information about itself that NASA previously entered and is currently in FAPIIS. NASA will consider any comments by the proposer, in addition to the other information in FAPIIS, in making a judgment about the proposer's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by proposers as described in 2 CFR 200.205.

For proposal 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 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 nondisclosure agreements signed by the assisting contractor or subcontractor, and their individual employees who may require access to the CBI to perform the assisting contract.
6. **Award Information**

The maximum amount of a FINESST award is $45,000 per 12-months and up to $135,000 total for a period of performance maximum of 36 months (not including a hiatus, if applicable, see below). The university should prorate the FINESST stipend and allowances if the projected schedule for completion is known to be less than 12 months.

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 may be found at [https://missionstem.nasa.gov/filing-a-complaint.html](https://missionstem.nasa.gov/filing-a-complaint.html).

FINESST grants are made to the proposing organization with the designated faculty advisor as the PI. The FINESST grant can fund up to three-year research project, contingent upon availability of funds and satisfactory progress as demonstrated through the annual progress report from the university.

No FI may be supported for more than three years by FINESST but, if NASA agrees and the NASA Shared Services Center (NSSC) implements the change as an administrative supplement or amendment, the duration or project's period of performance may exceed three calendar years. For example, SMD will accommodate reasonable requests for a hiatus (to pause and later resume the research project and hence costing the FINESST grant) e.g., for family, medical, or military leave or for the student to gain beneficial work experience (e.g., teaching, conducting fieldwork). Awardees may seek a No-Cost Extension Request at [https://www.nssc.nasa.gov/nocostextension](https://www.nssc.nasa.gov/nocostextension).

NASA will not provide funding via a FINESST grant for more than 36 months. However, a student who was supported for fewer than three years while obtaining a Masters may continue to be supported by the FINESST grant while they pursue a PhD. Similarly, even after completing their terminal degree, if the FI remains at the grantees institution conducting the research project then, with NASA concurrence, they may continue to be supported by the institution with the current funding increment already sent to the university.

Not all projects require the maximum amount available in the period of performance. Proposers should lay this out clearly in the proposal's budget justification. SMD suggests a student stipend of $35,000 per 12 months; however, the stipend should be comparable with the prevailing rate see Appendix B. An allowance of up to $10,000 may be requested to support a student's tuition; fees (allowable under 2 CFR 200 and consistent with university policy); travel in support of the research investigation or to conferences, symposia, or collaborative meetings; text books or other instructional supports; expendable laboratory supplies; page charges for journal articles; printing of a thesis; health insurance policy, see Appendix B.

Equipment, including computers, may not be purchased with FINESST funds. NASA does not intend to provide nor should proposers expect Government furnished equipment.

FINESST supports an independent, full-time research project performed by a graduate student. If valid justification is provided in the budget narrative, then the amounts in the stipend and allowance budget categories may be adjusted as long as the total amount requested does not exceed $45,000 annually. The PI and student are to work with the university Office of Sponsored Research or its equivalent to determine the appropriate allocation in each budget category. Changes between stipend and allowance budget categories after the award has been made must be approved by NASA.

FINESST19-14
If, prior to the award's expiration date, a student departs the university, or ceases to perform the research project without reasonable justification and expectation of return to the project, the university must communicate this promptly to NASA. In such cases NASA may consider allowing the university to use the remainder of the current funding increment already sent to the university for another student participant.

If the PI (faculty advisor) needs to be changed the standard NASA policies in the GCAM apply.

7. Reporting Requirements and Intellectual Property

In accordance with any awards terms and conditions provided by the NASA Shared Services Center (NSSC) at the time of award, a progress report must be submitted (via NSPIRES unless otherwise noted) by 11:59 p.m. Eastern Time, March 15, 2020. The NSSC will not permit funds to be sent to the university if an adequate progress report is not received by NASA.

Unless specified otherwise in the award, progress reports will be uploaded via NSPIRES based on instructions that will be provided to the grantees. By submitting the progress report, PI and AOR are acknowledging that the FI's work has been satisfactory and should continue. In addition to the NSPIRES cover page including any applicable program specific questions, progress reports must include the elements listed in Appendix C of this announcement.

If for any reason, the organization will not be requesting continuation of a FINESST grant, a progress report should not be submitted. Instead, an email to that effect should be sent to the award's 1) technical officer, 2) FINESST administrative point of contact and 3) the Grant’s Officer at the NASA Shared Services Center (NSSC.) Various final and closeout reports will be described in the NSSC award documentation.

Expenditures under any NASA grants, including FINESST, are subject to inspection and audit during the period of the grant and for three (3) years thereafter. Records at the awarded institution must be maintained in sufficient detail to evidence prudent management and to facilitate the preparation of the required reports for determining whether expenditures are being/were made for the purposes for which the funds were granted.

Reporting requirements consistent with 2 CFR 200, will be specified by the official grant sent to the university upon issuance of the award (see Exhibit E – Required Publications and Reports of the NASA Grant and Cooperative Agreement Manual (accessible from https://prod.nais.nasa.gov/pub/pub_library/srba/index.html).

One of NASA's missions is to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof. Therefore, it is NASA's intent that all knowledge developed under this solicitation be shared broadly through publication of the results of the student's research. Award recipients may be subject to reporting requirements under the NASA Plan for Increasing Access to the Results of Scientific Research, including submitting peer-reviewed manuscripts and metadata to a designated repository (currently PubMed Central) and reporting publications with progress reports. For more details on public access to scientific publications and digital scientific data resulting from NASA-funded research, please see: https://www.nasa.gov/open/researchaccess. Any such requirements will be identified in the Notice of Award.

For information about data rights, and other aspects of intellectual property such as invention rights resulting from awards, see the file entitled "Award and Intellectual Property Information"
under the section called "Grant and Cooperative Agreement Guidance" at https://prod.nais.nasa.gov/pub/pub_library/srba/.

8. **Collection of Demographic Information**

NASA requests and collects demographic data from principal investigators and other NSPIRES users for the purpose of analyzing demographic differences associated with its award processes. Information collected will include name, gender, race, ethnicity, and disability status. Submission of the information is voluntary, confidential and is not a precondition of award.

9. **Divisional Points of Contact and Frequently Asked Questions**

Email questions to: HQ-FINESST@mail.nasa.gov and:

- For Earth Science email claire.i.macaulay@nasa.gov Program Administrator for FINESST Research.
- For Space Science (Heliophysics, Planetary Science, and Astrophysics) email mnorris@nasa.gov Program Administrator for FINESST Research.

FINESST questions and responses, with identifying information removed, will be posted on the NSPIRES page for FINESST-2019 under other documents.

10. **Appendices**

**Appendix A - 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, namely, 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 on a periodic basis. 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 must be explicitly justified by completing a two-step request submission process: (1) generate a request form for inclusion with a FINESST proposal (see sections i and ii below); and (2) if selected for funding, submit detailed requirements for evaluation by the HEC Program (see section iii below).

(i) **Generate Request for HEC Resources**

The purpose of this step is to inform science review panels of your computational needs, and if the FINESST proposal is selected, establish eligibility to use HEC resources. First complete a request form in the HEC eBooks system at: https://hec.reisys.com/hec/computing/index.do. 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.

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 eBooks system has a built-in calculation feature to assist with conversion from 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; contact information can be found at 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) Upload Request for HEC Resources

The HEC eBooks system will generate a PDF version of your completed computing request for download, as well as send the PDF via email as an attachment. 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;
- 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 in the email and on the PDF itself).

Reminder: Be sure to answer the HEC Program Specific Data questions with the NSPIRES Cover Page.

It is important to note that selection of your proposal only means that your request is eligible to progress to the next step for evaluation by the HEC Program (see section iii below). Your HEC allocation may differ from your request given resource constraints.

(iii) Submit Detailed Requirements for Allocation of HEC Resources

If your proposal is selected for funding, you will be prompted to log back in to the HEC eBooks system to complete the request process. Principal Investigators (PIs) will be required to submit detailed requirements (e.g., preferred facility/system for where the computational project will be conducted and data security, data transfer, application information, etc.) to be evaluated along with the proposed multi-year phasing plan. The HEC Program will then issue award 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 will have the opportunity to submit requests to increase or decrease allocations of HEC resources as demands change on a semi-annual basis. The HEC website at https://www.hec.nasa.gov/request/science.html provides the mechanism for PIs to formally request changes. Requests for modifications 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), the HEC program will consider providing a minimal allocation to such projects which have been notified of pending funding soon after the PI submits an allocation request in e-Books (accessed through the HEC...
website). PIs must provide the name of the student participant who may use the account and identify this foreign national status in their request abstract and in the FINESST Program Specific Data Questions item 5 and 6.

For further information or questions about NASA provided High-End Computing resources please contact Tsengdar Lee at Tsengdar.J.Lee@nasa.gov or 202-358-0860.

Appendix B - Limitations on FINESST Budget Categories

In general, NASA does not permit indirect costs to be requested or recovered on participant support costs. Per 2 CFR 200.75 Participant support costs are direct costs for

- stipends
- subsistence allowances
- travel allowances
- registration fees paid to or on behalf of the student in connection with conferences

Since the PI's university employment includes compensation to serve as the FI's advisor and continues whether or not the proposal is selected by NASA, no salary, travel, or other costs shall be requested from NASA for the PI's use.

The purchase of equipment, including personal computers or devices such as mobile phones, are not permitted through FINESST awards.

FINESST budgets require a narrative justification in the proposal (about 1 page by three broad cost categories 1) FI stipend; 2) FI allowance(s), e.g., travel etc.; and 3) University Fees/Tuition.

Input these the FI costs on the NSPIRES coversheet, under letter E. Direct Costs-Participant/Trainee Support Cost. NSPIRES listed subcategories are 1) Tuition/Fees/Health Insurance; 2) Stipends, 3) Travel, 4) Subsistence and 5) Other.

FINESST awards are limited to single students, so the Number of Participants/Trainees on the NSPIRES covers sheet is never greater than 1.

A FI’s maximum stipend normally is $35,000 in any 12-month period. If an FI’s stipend will be less (or more) than $35,000, then the amounts in the stipend and allowances budget categories may be adjusted/exchanged. Normally, however, the FI’s travel, registration fees and other participant support costs may not exceed $10,000 in a 12-month period.

Any request for partial year, i.e., a period of less than 12 months, should be proposed accordingly prorating the stipend and allowance costs.

If NASA determines sufficient justification is provided, then the amounts in the stipend and allowance budget categories may be adjusted as long as the total amount requested does not exceed $45,000 in a 12-month period.

Changes to the period performance, including no cost extensions, will follow normal NASA grant procedures. The PI and FI are to work with the university’s Office of Sponsored Research, or its equivalent, to determine the appropriate allocation in each budget category at the time of proposal and any subsequent changes to the budget post award in the annual progress report.
Appendix C - Elements of a FINESST Progress Report

The first progress report must be submitted (via NSPIRES unless otherwise noted) by 11:59 p.m. Eastern Time, March 15, 2020. Progress report elements, excluding the NSPIRES cover page forms and the optional high-end computing appendix, must be combined into a single PDF document and uploaded on the NSPIRES site for submission.

I. Administrative

- Name and address of the recipient’s institution & Award Number
- Name of the Principal Investigator:
- Award Title:
- Type of Report: Choose one: Annual/Final/Interim
- Period covered by the report: <Month/Year to Month/Year>
- Cost or Draw Down Data (if available)

II. Accomplishments

Start by reminding NASA what are the major goals and objectives of the project and what did the FI do to progress toward those goals?

Did the FI do coursework or receive any professional development funded by the project? Provide an update toward completing a degree program, with month/year completion date estimated. Include an updated transcript, if applicable, for any coursework attributable/relevant to the FINESST’s Program Officer judging progress in the period being reported. If no course work was planned or taken, state no coursework for this period.

III. Status/Changes/Issues/Updated Budget Narrative Justification (if applicable)

FI should discuss any stated goals not met or started.

If the PI got a costing warning notification from the NSSC, then explain why the lack of funds drawn down.

If not previously reported in writing to the NASA Shared Services Center and the awards technical officer at NASA Headquarters through other mechanisms, i.e., calls emails, provide the following additional information:

- Changes in approach and reason for change
- Actual or Anticipated problems or delays and actions or plans to resolve them
- Changes that have a significant impact on expenditures

An updated budget justification narrative, if needed, especially if it is anticipated that the student may graduate, take a hiatus, or leave the program or university for any reason.

IV. Dissemination Activities

How have the results/activities been disseminated: For example, include a list of presentations, publications, videos with URLs, etc. Publications including web postings should acknowledge NASA support, including the FINESST name and the NASA award number.
V. PI Assessment of the FT’s progress/PI Updates (optional)

A signed assessment from the PI, i.e., faculty advisor(s) on institutional letterhead that includes the name of the FI is optional. Because the university’s Authorized Organizational Representative (AOR) is submitting the progress report via NSPIRES, the Cover Page carries implicit institutional endorsement that sufficient progress is being made. If there will be a proposed PI change on the current FINESST award, in addition to the letter justifying the change, include a 2-page bio for the new PI requesting the change.

VI. Known Future Plans

Do the PI/FI anticipate a hiatus and/or no-cost extension?
If this is a final report will the work continue post funding?
Is the FI remaining at the institution or moving on to new studies or a job offer, etc.?

VII. High-End Computing

If applicable, a progress report may include a new or updated appendix to request or modify high-end computing resources. See Appendix A of this solicitation for details. Be sure to allow enough time to complete the steps outlined in Appendix A in order to create a HEC appendix for the progress report.