

1. Short Title: (you can enter up to 1000 characters)

2. Type of institution:

3. Additional Institution Classification

*\* Please check all that apply to the proposing organization; leave blank if not relevant. See <https://msiexchange.nasa.gov/institutions> for information on MSIs. See <https://tinyurl.com/PUIdefinition> for information on PUIs. See <https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/basic-classification/> for the classification of R1 vs not R1 research activities.*

Minority-Serving Institution (MSI)

Predominantly Undergraduate-serving Institution (PUI)

is NOT a "very highly research intensive institution" (R1)

4. Will any funding be provided to a federal government organization including NASA Centers, JPL, other Federal agencies, government laboratories, or Federally Funded Research and Development Centers (FFRDCs)?

Yes

No

5. Is this Federal government organization a different organization from the proposing (PI) organization?

*(Answer N/A if answer to previous question is NO. Answer YES for different NASA Centers).*

Yes

No

N/A

6. Does this proposal include the use of NASA-provided high end computing (HEC)?

*\* If you answer "yes" to this question, you must provide as a separate PDF upload "appendix" the information requested in a template. See the Summary of Solicitation, Section I (d) for instructions on accessing the template document. Please note that this question only refers to the computer resources described in Section I (d) of the ROSES Summary of Solicitation.*

Yes

No

7. HEC Request Number (you can enter up to 1000 characters)

*If you indicated above that the proposal would contain a request for HEC time, please provide the HEC Request Number (e.g. HEC-SMD-XX-XXXX) provided as part of PDF file and the RMS request confirmation email.*

8. Research Category:

*This question is asked for broad, SMD directorate level statistical purposes. Please choose the category that closest describes the work being done. If a particular program element does not permit a type of work, this question is not meant to imply that it is allowed.*

9. Flight Services

*Does this proposal's budget request NASA funding for non-passenger aircraft or helicopter flight services, including Unmanned Aircraft Systems (UAS)/Drones or the acquisition or construction of such flight vehicles?*

Yes

No

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10. Team members not confirmed via NSPIRES (you can enter up to 4000 characters)

*If a Team Member cannot confirm their participation via NSPIRES, they must be listed here. Give name, institution, city, state or country, and a brief description of the role. A statement of commitment is required for those listed here, see Section IV(b)v of the ROSES Summary of Solicitation for an example. Do not list administrative support staff, such as resource analysts, nor unnamed students or post docs.*

11. Does this proposal contain information and/or data that are subject to U.S. export control laws and regulations including Export Administration Regulations (EAR) and International Traffic in Arms Regulations (ITAR)?

*\* It is the proposer's responsibility to determine whether any information in the submitted proposal is subject to provisions of the EAR and/or ITAR. This question addresses only the content of this proposal and not any activity that follows as a result of a potential award.*

Yes

No

12. I have identified the export-controlled material in this proposal.

*If you answered, "YES" above, you must identify explicitly (e.g., figure number, paragraph reference), by statements or highlighting, those parts of the proposal that contain export-controlled material so that it can be redacted if necessary.*

Yes

No

N/A

13. I acknowledge that the inclusion of such material in this proposal may complicate the government's ability to evaluate the proposal.

*While inclusion of export-controlled material in proposals is not prohibited, proposers are advised that inclusion of such material may complicate NASA's ability to evaluate proposals, as NASA may employ non-U.S. Persons, who are not lawful permanent residents of the U.S., to review proposals submitted to this solicitation.*

Yes

No

N/A

14. Does the proposed work include any involvement with collaborators in China or with Chinese organizations, or does the proposed work include activities in China?

*NASA's appropriation from Congress includes this restriction: "None of the funds made available by this [law] may be used for the National Aeronautics and Space Administration or the Office of Science and Technology Policy to develop, design, plan, promulgate, implement, or execute a bilateral policy, program, order, or contract of any kind to participate, collaborate, or coordinate bilaterally in any way with China or any Chinese-owned company unless such activities are specifically authorized by a law enacted after the date of enactment of this division."*

Yes

No

**The National Environmental Policy Act (NEPA) obligates NASA to consider the potential environmental effects of proposed projects, including those that NASA funds which are implemented by grantees. The majority of grant-related activities are categorically excluded as research and development projects that do not pose adverse environmental impacts. The following questions enable NASA to ascertain whether your proposal will require additional NEPA analysis if selected (e.g., filling out an Environmental Checklist) or the completion of NASA's Executive Order (EO) 12114 Checklist for an activity to be conducted abroad. "Yes" responses are not selection criteria, however, if a "Yes" response is marked, proposers should consider NEPA and/or EO compliance in cost and schedule estimates.**

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15. Would the proposal involve any activity that includes: a. Construction of new facilities or modification to the footprint of an existing-facility, or b. Ground disturbance (e.g., excavation, clearing of trees, installation of equipment, etc.), or c. Outdoor discharges of water (e.g., waste water runoff), air emissions (e.g., ozone-depleting substances) or generation of noise exceeding 115 dBA (excluding those associated with aircraft operations)?

Yes

No

16. Would the proposal involve any field activity that would: a. Release equipment (e.g., dropsondes, sensors, etc.) or chemicals (e.g., dyes, tracers, etc.) into the air, bodies of water or on the ground, or b. Release a parachute or use equipment that would not be recovered, or c. Involve equipment or a payload that contains hazardous (e.g., petroleum, hypergols, oxidizers, solid propellants, etc.) or radioactive materials?

Yes

No

17. Would the proposal involve the launch of a payload, equipment, or instrument (e.g., via launch vehicle, sounding rocket, balloon, etc.)?

Yes

No

18. Would the proposal involve any activity to be conducted outside the United States or its territories excluding travel for meetings or conferences?

Yes

No

19. Comments (you can enter up to 4000 characters)

*The Comments block below allows you to expand on any "Yes" responses to the NEPA questions above to provide context, background and perspective.*

20. Does this proposal contain a citizen science component?

*Citizen Science is a form of "open collaboration" in which individuals or organizations participate voluntarily in the scientific process in various ways. Citizen science projects must be open to participation by new volunteers at some phase of the project, not limited to a pre-determined list of participants. Before submitting a citizen science proposal please read the Policy for SMD-funded citizen science projects which, along with examples of SMD citizen science projects, may be found at <https://science.nasa.gov/citizen-science/>. Questions about citizen science may be directed to [Marc.J.Kuchner@nasa.gov](mailto:Marc.J.Kuchner@nasa.gov).*

Yes

No

21. AI or ML?

*Would Artificial Intelligence (AI) or Machine-Learning (ML) tools be used or developed?*

Yes

No

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22. Would the results of this proposal advance the strategic objectives of more than one SMD Division?

*The strategic objectives may be found at: <https://science.nasa.gov/astrophysics/science-questions/>, <https://science.nasa.gov/planetary-science/science-questions/>, <https://science.nasa.gov/heliophysics/science-questions/>, <https://science.nasa.gov/earth-science/>, <https://science.nasa.gov/biological-physical/>*

Yes

No

23. If you checked yes, which Divisions?

*\* Check all that apply*

Astrophysics

Biological and Physical Sciences

Earth Science

Heliophysics

Planetary Science

24. Interdivisional Explanation (you can enter up to 4000 characters)

*If you checked yes, please add an explanation for your answers above. Your answer to this question will solely be used to understand the amount of interdivisional research proposed to ROSES. It will play no role in proposal evaluation or selection.*

25. Entry TRL

*\* Choose the entry/starting Technology Readiness Level*

26. Exit TRL

*\* Choose the planned exit/ending Technology Readiness Level*

27. Primary Technology

*\* Choose the primary proposed technology from the standard NASA taxonomy (see <https://www.nasa.gov/offices/oct/taxonomy>)*

28. Technology Subarea(s)

*\* Select one or more technology subareas e.g., TX 8.1 Remote Sensing Instruments and Sensors. See <https://www.nasa.gov/offices/oct/taxonomy> for definitions." Leave blank if not applicable.*

TX01.1 Chemical Space Propulsion

TX01.2 Electric Space Propulsion

TX01.3 Aero Propulsion

TX01.4 Advanced Propulsion

TX03.1 Power Generation and Energy Conversion

TX03.2 Energy Storage

TX03.3 Power Management and Distribution

TX03.X Other Aerospace Power and Energy Storage

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TX04.1 Sensing and Perception  
TX04.2 Mobility  
TX04.3 Manipulation  
TX04.4 Human-Robot Interaction  
TX04.5 Autonomous Rendezvous and Docking  
TX04.6 Robotics Integration  
TX04.X Other Robotic Systems  
TX06.1 Environmental control and life support systems and habitation systems  
TX06.2 Extravehicular activity systems  
TX06.3 Human health and performance  
TX06.4 Environmental monitoring, safety, and emergency response  
TX06.5 Radiation  
TX06.6 Human systems integration  
TX06.X Other Human Health, Life Support, and Habitation Systems  
TX07.1 In-Situ Resource Utilization  
TX07.X Other Exploration Destination Systems  
TX08.1 Remote Sensing Instruments/Sensors  
TX08.2 Observatories  
TX08.3 In-Situ Instruments/Sensor  
TX08.X Other Sensors and Instruments  
TX09.1 Aeroassist and Atmospheric Entry  
TX09.2 Descent  
TX09.3Landing  
TX09.4 Vehicle Systems  
TX09.X Other Entry, Descent, and Landing  
TX10.1 Situational and Self Awareness  
TX10.2 Reasoning and Acting  
TX10.3 Collaboration and Interaction  
TX10.4 Engineering and Integrity  
TX10.X Other Autonomous Systems  
TX11.1 Software Development, Engineering, and Integrity  
TX11.2 Modeling  
TX11.3 Simulation  
TX11.4 Information Processing  
TX11.5 Mission Architecture, Systems Analysis and Concept Development  
TX11.6 Ground Computing

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TX11.X Other Software, Modeling, Simulation, and Information Processing

TX12.1 Materials

TX12.2 Structures

TX12.3 Mechanical Systems

TX12.4 Manufacturing

TX12.5 Structural Dynamics

TX12.X Other Manufacturing, Materials, and Structures

TX13.1 Infrastructure Optimization

TX13.2 Test and Qualification

TX13.3 Assembly, Integration and Launch

TX13.4 Mission Success Technologies

TX13.X Other Ground, Test, and Surface Systems

TX14.1 Cryogenic Systems

TX14.2 Thermal Control Components and Systems

TX14.3 Thermal Protection Components and Systems

TX14.X Other Thermal Management Systems

TX17.1 Guidance and Targeting Algorithms

TX17.3 Control Technologies

TX17.4 Attitude Estimation Technologies

TX17.5 GN&C Systems Engineering Technologies

TX17.6 Technologies for Aircraft Trajectory Generation, Management, and Optimization for Airspace Operations

TX17.X Other Guidance, Navigation, and Control

29. PDS Nodes

*Does this proposal plan to archive at least some of its data with the Planetary Data System (PDS)? Proposers intending to archive data in the PDS must obtain a letter of support from the appropriate PDS Discipline Node confirming that the PDS is willing to accept their submission. See Section 3.7.6 of Appendix C.1 for additional information.*

No

Yes, at the Atmospheres Node.

Yes, at the Cartography and Imaging Node.

Yes, at the Geosciences Node.

Yes, at the Planetary Plasma Interactions Node.

Yes, at the Ring-Moon Systems Node.

Yes, at the Small Bodies Node.

Yes, at the Navigation and Ancillary Information Facility (NAIF).

Yes, at multiple PDS nodes.

Other appropriate archive

30. Facilities Request

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*\* If this proposal contains a plan to use the facilities listed in Appendix C.1 of the Planetary Science Research Program Overview, please indicate which facilities will be used.*

Ames Vertical Gun Range (AVGR) [NASA Ames]

The NASA Facility for Astromaterials Research (NFAR) [JSC]

GeoSoilEnviroCARS (GSECARS) Synchrotron Facility [Argonne National Lab.]

Glenn Extreme Environment Rig (GEER) [NASA Glenn]

High Resolution X-ray CT Facility [U. Texas, Austin]

KiloElectron-Volt Ion Irradiation Facility for Space Science (KEVION) [U. Virginia]

Kuiper-Arizona Laboratory for Astromaterials Analysis (K-ALFAA) [U. Arizona]

Planetary Aeolian Facility (PAL) [NASA Ames]

Planetary Cloud Aerosol Research Facility [JPL]

Reflectance Experiment Laboratory (RELAB) [Brown U.]

The Lunar and Planetary Institute Scanning Electron Microscope Facility [LPI]

Venus In-situ Chamber Investigations (VICI) [NASA Goddard]

Other

31. CLPS-provided services

*Will the proposed investigation require any CLPS-provided services?*

Yes

No

32. CLPS summary (you can enter up to 4000 characters)

*If CLPS-provided services are requested, summarize them here. Be sure details are provided in the proposal. This box does not need to be full prose (e.g., "context camera will be needed")*