

A.22 SOIL MOISTURE ACTIVE-PASSIVE MISSION SCIENCE TEAM

NOTICE: This program will evaluate proposals using dual-anonymous peer review, see Section 4 and the associated "Guidelines for Anonymous Proposals" document under "Other Documents" on the NSPIRES page for this program element.

1. Scope of Program

Proposals are solicited for science investigations that utilize data from the Soil Moisture Active-Passive (SMAP) mission (<https://smap.jpl.nasa.gov/>). The Soil Moisture Active-Passive mission primarily uses passive (radiometer) L-band microwave remote sensing to determine the land surface soil moisture and freeze/thaw state. These measurements will advance the study of the water, carbon, and energy cycles, both individually and at their points of interconnection.

SMAP was launched as a result of the recommendation from the National Research Council report *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond* (http://www.nap.edu/catalog.php?record_id=11820).

The objective of this solicitation is to select research projects that will respond to the Decadal Survey outlined science priorities for the SMAP mission, as well as enable pursuit of new methods of exploiting SMAP's observations for Earth System Science. These priorities and possibilities include, but are not limited to:

- 1) Enabling advances in the study of the water, carbon, and energy cycles, especially on those topics that deal with the intersections of these cycles.
- 2) Exploring the impact of soil moisture variability and its role as the 'memory' for the land surface, on weather and climate.
- 3) The role of soil moisture in floods, droughts, agricultural productivity, wildfires, and public health related concerns (e.g., vector borne diseases).

To be compliant, proposals must be prepared in a manner consistent with dual-anonymous peer review, see Section 4.

2. Types of Proposals Solicited

2.1 Utilization of SMAP Products for Process Studies

The state and amount of water in the soil is a critical determinant in many complex Earth System processes. For example, it can limit or enable photosynthesis. It can determine the ratio of precipitation and snowmelt that percolates into the ground or runs off. The amount of water in the soil will affect whether incoming radiation is used to heat the lowest layer of the atmosphere or to evaporate water, which might later be used to form clouds and/or precipitation. Studies are encouraged that use the SMAP observations to improve our understanding of these and other processes, be they aspects of the water, carbon, or energy cycles.

2.2 Utilization of SMAP for Model Evaluation and Improvement

SMAP's products, with inherent radio frequency interference mitigation, offer an unprecedented look at global soil moisture variability. This should be instrumental in global evaluation of land surface model performance and highlight areas that can be

improved. Through this work, evaluation and improvement of other types of models (i.e., those used for weather forecast, climate prediction, or vegetation activity) should be possible.

2.3 Algorithms

2.3.1 *Maintenance*

Environmental observations from SMAP may benefit from continued scrutiny of the existing calibration of its radiometric data. Also, it is known that radiofrequency interference (RFI) may undesirably influence SMAP observations. NASA will accept efforts that evaluate the existing SMAP calibration and RFI mitigation operations and seek improvements that benefit the soil moisture and state data products.

2.3.2 *Novel topics*

The L-band observations of SMAP can be used to observe aspects of the Earth System other than land surface moisture. NASA will accept proposals that seek to develop new or advance existing uses for SMAP data that are not duplicative to other supported efforts. These novel uses of the SMAP data will be viable only if they address high priority gaps in our global observing system.

2.3.3 *Related Data products*

The level one data products (e.g., brightness temperatures) can be used in other fashions than those planned by the SMAP project to produce soil moisture (both surface and root-zone), freeze-thaw state, and carbon-cycle metrics (e.g., net ecosystem exchange). NASA will accept efforts that propose new algorithms and/or approaches that would offer data products that would be significantly different than those produced by the SMAP project, provided that they present substantial added value. This may be accomplished by combining SMAP data with other satellite data products (e.g., surface temperature or precipitation). Proposed new algorithms and/or methods should not require ongoing ingesting of limited area land-based or airborne-based observations. NASA continues to be interested in alternative methods to downscale the radiometer soil moisture observations to finer spatial scales and/or determine root-zone soil moisture. NASA is also interested in investigations that seek to leverage current and future L-band systems, such as CYGNSS and NISAR, to achieve higher spatial and/or temporal resolutions.

3. Technical Requirements

All proposals submitted in response to this solicitation must exhibit comprehensive knowledge of the relevant SMAP data products to be employed. Details on these products are available in the SMAP handbook (<http://smap.jpl.nasa.gov/mission/description/>) and Algorithm Theoretical Basis Documents (ATBDs; <https://smap.jpl.nasa.gov/documents/>). Proposers should also be knowledgeable of past and ongoing SMAP calibration and validation efforts and should not look to duplicate those. Any proposed activities that might replicate calibration and/or validation activities should explicitly defend those with a description of their well-documented additional value.

All proposed studies must plan to use SMAP data in a critical way. Proposed studies should not be accomplishable without SMAP data.

New algorithms and methods (Section 2.3) should be globally implementable, with an expectation of adequate performance over a majority of the relevant Earth surface.

Proposals to develop new algorithms should include a description of:

- a.) Preparing and writing an ATBD
- b.) Product calibration and validation
- c.) Error characterization

Proposals from currently funded NASA investigators should make clear in their proposals how the proposed work is different from their currently funded projects.

4. Preparing Proposals for Dual-Anonymous Peer Review

Proposals submitted to this program will be evaluated using a [dual-anonymous peer review](#) (DAPR) process in which not only are proposers unaware of the identity of the reviewers, the reviewers are not told the identity of the proposers until after the evaluation of the anonymized proposal (see below). The objective of dual-anonymous peer review is to minimize bias in the evaluation of the merit of a proposal.

Proposers must follow the instructions in the "Guidelines for Anonymous Proposals" document under "Other Documents" on the NSPIRES page for this program element that explain how to properly prepare the proposal for dual-anonymous peer review.

The forms filled out on the NSPIRES web pages with Proposal Summary, Budget, Proposal Team and Program Specific and Business Data known as the NSPIRES "cover pages" will be partly hidden for the peer reviewers. The Proposal Summary must be anonymized but all other sections of the NSPIRES cover page should be completed as normal and NSPIRES will hide the identifying information from the reviewers. The proposal document must be anonymized, and proposers must upload a separate "Expertise and Resources Not Anonymized" document that contains all of the personally (and organizational) identifying information.

Review panels will be instructed to evaluate the anonymized proposals without taking into account the qualifications and capabilities of the proposers. After the evaluation of all the anonymized proposals has been finalized, panelists will be provided with the "Expertise and Resources Not Anonymized" documents for proposals that scored highly. The panel will then assess the qualifications and capabilities of the team for these proposals and provide comments to NASA.

A summary of the key requirements for anonymized proposals, reproduced from the "Guidelines for Anonymous Proposals" document, is listed below:

Item	Requirement
Proposal Document PDF file	In addition to anonymizing the content, ensure that any PDF bookmarks are anonymous and the document properties do not reveal names of author or organization.
Science-Technical-Management (S/T/M) section of proposal	The S/T/M section must be anonymized. Omit all names of team members and names of their organizations.

References	References must be in the [1], [2] format.
Open Science and Data Management Plan	An anonymized OSDMP is required as a section of up to 2 pages immediately following the references and citations for the S/T/M section. See Section 1.1 of A.1 the Earth Science Research Overview for more information.
Biographical Sketches	Do not include in main proposal document. Include in separate "Expertise and Resources Not Anonymized" document.
Table of Personnel and Work Effort	Include in an anonymized fashion (e.g., PI; Co-I#1; Co-I#2) in the main proposal document and in non-anonymized fashion in the separate "Expertise and Resources Not Anonymized" document.
Current and Pending Support	Do not include in main proposal document. Include in separate "Expertise and Resources Not Anonymized" document.
Letters or Statements	All Statements of Commitment and Letters of Support, Feasibility or Endorsement are to be included in the separate "Expertise and Resources Not Anonymized" document
Redacted Budget and Narrative	Include both redacted budget and narrative in proposal document in an anonymized format.
Facilities and Equipment	The Facilities and Equipment Section is to be placed only in the separate "Expertise and Resources Not Anonymized" document. However, the S/T/M Section of the anonymized proposal should address the need for and capabilities of facilities and equipment necessary for the proposed research in an anonymized fashion. Any unique/identifying descriptions of facilities and evidence of access to or affiliation with facilities are to be included in the separate "Expertise and Resources Not Anonymized" document.
Separate "Expertise and Resources Not Anonymized" document	Upload as a separate document in NSPIRES. Choose Attachment Type = "Expertise and Resources Not Anonymized". This document provides a list of all team members, their roles, institutional affiliations, expertise, and contributions to the work. The document should also discuss any specific resources that are key to completing the proposed work, as well as a summary of work effort. Statements of Current and Pending Support must also be included.
Total Budget	Upload as a separate document in NSPIRES. Choose Attachment Type = Total Budget. The mandatory total budget file is full and complete with all costs for those at U.S. organizations, including those at government laboratories. It is not redacted or anonymized.

High-End Computing (HEC) request	Submit optional not-anonymized PDF HEC form as attachment type "Optional HEC request" in NSPIRES. The S/T/M section in the main proposal must state that a HEC request is included and must provide an outline of the computing resources required in an anonymized fashion.
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5. Programmatic Information

Total funds available for work selected under this solicitation are approximately \$4.5M per year for three years. The program anticipates making a total of approximately 30 selections. There is no a priori planned distribution of projects across the solicited areas of Section 2. Proposals that are outside of the research areas described in Section 2 and/or those that do not meet the requirements of Section 3 will not be considered. It is anticipated that project start dates would be on or soon after January 1, 2024.

6. Science Team Membership

Principal Investigators (PIs) of the selected investigations will make up the SMAP science team going forward and be expected to help advise the project. PIs should expect to be invited to future annual SMAP team meetings and plan accordingly.

7. Summary of Key Information

Expected annual program budget for new awards	~ \$4.5M
Number of investigator awards pending adequate proposals of merit	~30
Maximum duration of awards	3 years
Due date for Notice of Intent to propose (NOI)	See Tables 2 and 3 of this ROSES NRA
Due date for proposals	See Tables 2 and 3 of this ROSES NRA
Planning date for start of investigation	January 1st, 2024.
Page limit for the central Science-Technical-Management section of the Step-2 proposal	15 pp; see also Table 1 <i>ROSES 2023</i> and the NASA Guidebook for Proposers .
Relevance	This program is relevant to the Earth Science questions and goals in the NASA Science Plan. Proposals that are relevant to this program are, by definition, relevant to NASA
General information and overview of this solicitation	See the <i>ROSES-2023 Summary of Solicitation</i> .
General requirements for content of proposals	See A.1 the Earth Science Research Program Overview , and Section IV and Table 1 of <i>the ROSES Summary of Solicitation</i> .
Detailed instructions for the submission of proposals	See NSPIRES Online Help , Sections 3.22-4.4 of the NASA Guidebook for Proposers and

	Section IV(b) of <i>the ROSES Summary of Solicitation</i> .
Submission medium	Electronic proposal submission is required; no hard copy is required or permitted.
Web site for submission of proposals via NSPIRES	http://nspires.nasaprs.com/ (help desk available at nspires-help@nasaprs.com or (202) 479-9376)
Web site for submission of proposals via Grants.gov	https://www.grants.gov/ (help desk available at support@grants.gov or (800) 518-4726)
Funding opportunity number for downloading an application package from Grants.gov	NNH23ZDA001N-SMAP
Point of contact concerning this program	Jared Entin Earth Science Division Science Mission Directorate NASA Headquarters Washington, DC 20546-0001 Telephone: 202-358-0275 Email: jared.k.entin@nasa.gov