

**National Aeronautics and Space Administration
Office of STEM Engagement**

NASA Cooperative Agreement Notice (CAN)

**Established Program to Stimulate
Competitive Research
(EPSCoR)**

International Space Station (ISS) Flight Opportunity

Announcement Number: NNH21ZHA001C
Catalog of Federal Domestic Assistance (CFDA) Number: 43.008

Release Date:
Proposals Due:

September 28, 2020
January 7, 2021

NASA Headquarters
Office of STEM Engagement
Washington, DC 20546-0001

Summary of Key Information

The National Aeronautics and Space Administration (NASA) Office of Science, Technology, Engineering and Mathematics (STEM) Engagement (OSTEM), in cooperation with the International Space Station (ISS) Research Office, NASA's Human Exploration & Operations Mission Directorate (HEOMD), the Science Mission Directorates (SMD), the Space Technology Mission Directorate (STMD), and NASA's nine (9) Centers plus NASA's Jet Propulsion Laboratory (JPL), solicits proposals for the NASA Established Program to Stimulate Competitive Research (EPSCoR).

The 28 eligible jurisdictions that are eligible for this opportunity are: Alabama, Alaska, Arkansas, Delaware, Guam, Hawaii, Idaho, Iowa, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Puerto Rico, Rhode Island, South Carolina, South Dakota, US Virgin Islands, Vermont, West Virginia, and Wyoming.

This Cooperative Agreement Notice (CAN or Solicitation) is for current or previously funded EPSCoR projects or other research projects that are mature enough to design a research experiment or develop research experimental hardware to the point that it can be safely flown on the ISS. Each NASA-funded EPSCoR proposal is expected to perform scientific and/or technical research in areas that support NASA's strategic research and technology development priorities and contribute to the overall research infrastructure, science and technology capabilities of higher education, and economic development of the jurisdiction receiving funding.

Solicitation Availability

This Solicitation is open to the 28 eligible EPSCoR jurisdictions only and is accessible through the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) and through Grants.gov.

To access this CAN through NSPIRES, go to <http://nspires.nasaprs.com> and click on Solicitations.

To access this CAN through Grants.gov, go to <http://www.grants.gov/search/agency.do> and select the link for NASA.

Selection Process and Selecting Official

This selection will be a two-step process:

- In the first step, the proposals will be evaluated through an online NSPIRES peer review process by an ISS Program representative for flight feasibility and by the appropriate Mission Directorate representative for evaluation of ground-based results. There may be a down-select of proposals at the conclusion of this step based on feedback from the ISS Program representative as to the supportability.
- During the second step, the proposals recommended for flight will be presented to a Mission Directorate review panel for funding recommendations.

Funds Availability

The Government's obligation to make an award is contingent upon the availability of appropriated funds from which payment can be made.

Number and Size of Awards

It is anticipated that up to five (5) awards of up to \$100,000 each, to be expended over a three (3) year period of performance, will be made under this Notice pursuant to the authority found at 2 Code of Federal Regulations (CFR) § 200, Uniform Administrative Requirements, Cost Principles and Audit Requirements for Federal Awards, as adopted and supplemented by NASA through the *NASA Grant and Cooperative Agreement Manual* (GCAM), Appendix D, and 2 CFR § 1800 (all available at http://prod.nais.nasa.gov/pub/pub_library/srba/index.html). The exact number of awards depends on the available funding within the EPSCoR Research Budget.

NASA Safety Policy

As stated in NASA Policy Directive (NPD) 8700.1E, Paragraph 1.a., NASA Policy for Safety and Mission Success, the objectives of the NASA Safety Program are “to protect the public from harm, ensure the safety of employees, and affect positively the overall success rate of missions and operations through preventing damage to high-value equipment and property” and to “protect the public, NASA workforce, high-value equipment and property, and the environment from potential harm as a result of NASA activities and operations by factoring safety as an integral feature of programs, projects, technologies, operations, and facilities.”

Proposal Submission

All information needed to respond to this solicitation is contained in this announcement and in the companion document entitled *Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreement Notice (CAN)* (2020 edition), hereafter referred to as the *NASA Guidebook for Proposers*. The latest PDF version is available through: https://prod.nais.nasa.gov/pub/pub_library/srba/proposers_guidebooks.html

Within the Agency, NASA Research Announcements (NRAs) and CANs are types of solicitations used to solicit proposals for grants and cooperative agreements. The main difference between a NRA and a CAN is that a CAN is used when the decision has been made in advance that cooperative agreements, rather than grants, will be awarded for a given research opportunity. The procedures and processes to be followed by proposers when responding to CANs and NRAs are the same.

Inquiries

Technical and scientific questions about programs in this CAN may be directed to:

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1.0 Description of Opportunity

1.1 Technical Description

The National Aeronautics and Space Administration (NASA) Office of Science, Technology, Engineering, and Mathematics (STEM) Engagement (OSTEM), in cooperation with the International Space Station (ISS) Research Office, Human Exploration & Operations Mission Directorate (HEOMD), Science Mission Directorates (SMD), Space Technology Mission Directorate (STMD), and NASA's nine Centers plus NASA's Jet Propulsion Laboratory (JPL), solicits proposals for the NASA Established Program to Stimulate Competitive Research (EPSCoR). Each funded NASA EPSCoR proposal is expected to establish research activities that will make significant contributions to the strategic research and technology development priorities of one or more of NASA's Mission Directorates, and contribute to the overall research infrastructure, science and technology capabilities, higher education, and economic development of the jurisdiction receiving funding.

NASA shall assign a Technical Monitor (TM) to each award. The TM shall monitor the progress of the research and collaborate as required to keep the research aligned with the approved project's objective(s). Each recipient shall provide an annual report on the progress of the research; this report shall be reviewed by the TM and approved by the NASA EPSCoR Project Manager. These reports shall be shared with the NASA Mission Directorates, NASA Centers, and JPL.

The program parameters are:

- Only one proposal per jurisdiction shall be accepted;
- It is estimated that up to five (5) proposals may be selected for funding per paragraph 1.3 below (EPSCoR Eligibility and Proposal Acceptance);
- The maximum funding request per proposal is \$100,000. This amount is to be expended over a three-year period;
- There is no cost share requirement for this opportunity; and
- Proposals are due no later than 11:59 p.m., Eastern Time, **January 7, 2021** per paragraph 6.2. below.
- The anticipated start date may be negotiated with the NASA Shared Services Center (NSSC) Grants Officer.

This solicitation is being announced in electronic form through the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES) and through Grants.gov.

To access the CAN through NSPIRES, go to <http://nspires.nasaprs.com> and click on Solicitations.

To access the CAN through Grants.gov, go to <http://www.grants.gov/search/agency.do> and select the link for NASA.

1.2 EPSCoR and ISS Background

EPSCoR

The NASA Authorization Act for Fiscal Year 1993, Public Law 102-588, and the EPSCoR Re-authorization Act of 2017, Public Law 114-32 authorized NASA to initiate NASA EPSCoR to strengthen the research capability of jurisdictions that have not historically participated equably in competitive aerospace research activities. The goal of NASA EPSCoR is to provide seed funding that will enable jurisdictions to develop an academic research enterprise directed toward long-term, self-sustaining, nationally-competitive capabilities in aerospace and aerospace-related

research. This capability will, in turn, contribute to the jurisdiction's economic viability and expand the nation's base for aerospace research and development.

Based on the availability of funding, NASA will continue to help jurisdictions achieve these goals through NASA EPSCoR. Funded jurisdictions' proposals shall be selected through a merit-based, peer-review competition, presented for review to a NASA HQ Mission Directorate Review Panel, and accepted by the ISS Program Office.

The following are the specific objectives of NASA EPSCoR:

- Contribute to and promote the development of research capability in NASA EPSCoR jurisdictions in areas of strategic importance to NASA's mission;
- Improve the capabilities of the NASA EPSCoR jurisdictions to gain support from sources outside the NASA EPSCoR program;
- Develop partnerships among NASA research assets, academic institutions, and industry; and
- Contribute to the overall research infrastructure and economic development of the jurisdiction.

International Space Station (ISS)

Utilization of the ISS will further strengthen the relationships between NASA and the EPSCoR jurisdictions in the pursuit of national priorities for the advancement of science. This use of the ISS will also open new paths for the jurisdictions to compete for and win much larger spaceflight research projects.

The ISS, including its large solar arrays, spans the area of a U.S. football field, including the end zones. The complex has more livable room than a conventional five-bedroom house, and has two bathrooms and a gymnasium. The ISS provides the microgravity (less than 10^{-5} g) environment in a work volume accessible to the ISS crew of astronauts. The broader ISS Program provides launch capabilities, crew time, training, data downlink, commanding, thermal control and electrical power. General information about the ISS is available at:

http://www.nasa.gov/mission_pages/station/main.

1.3 EPSCoR Jurisdiction Eligibility

The National Science Foundation (NSF) determines overall jurisdiction eligibility for NASA EPSCoR. The latest available NSF eligibility tables are used to determine overall jurisdiction eligibility for NASA EPSCoR. The NSF 2020 eligibility table is available at:

https://www.nsf.gov/od/oia/programs/epscor/Eligibility_Tables/FY-2019-Eligibility.pdf

The following jurisdictions are eligible to submit a proposal to this NASA EPSCoR solicitation: Alabama, Alaska, Arkansas, Delaware, Guam, Hawaii, Idaho, Iowa, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Puerto Rico, Rhode Island, South Carolina, South Dakota, US Virgin Islands, Vermont, West Virginia, and Wyoming.

While proposals can be accepted only from institutions for which the NASA EPSCoR Directors are serving currently, all institutions of higher education within the jurisdiction shall be given the opportunity to propose by being made aware of this NASA EPSCoR CAN.

1.4 Period of Performance

NASA EPSCoR awards will support a three(3)-year cooperative agreement. It is anticipated that this period of performance will enable the researchers to achieve the performance task objectives of the microgravity flight as stated in the original proposal and/or as included in any amendments

submitted with the recipient’s annual progress reports and accepted by the NASA EPSCoR project office.

1.5 Connections between the NASA’s EPSCoR and the ISS

NASA EPSCoR, through the jurisdiction’s Research CAN projects, will provide the ground-based research. Proposed projects have previously been selected by NASA EPSCoR for ground based research funding. Approximately \$750,000 was provided by NASA and \$375,000 was provided by the jurisdiction and was vetted and selected for funding by NASA Mission Directorate Programs. All proposed projects shall be mature enough to transition to a flight experiment with little or no additional NASA funding.

Through this solicitation, the ISS will provide the integration and flight opportunity. There are a variety of laboratory facilities and capabilities designed to support a range of scientific disciplines on the ISS. A general overview of the research facilities and capabilities is at

https://www.nasa.gov/mission_pages/station/overview/index.html. For additional information see <https://www.nasa.gov/stationopportunities>

ISS experts will evaluate each proposal’s potential for integration and flight based on:

Criterion	Strong	Average	Weak
Feasibility	No impediment	Minor impediment	Major impediment
Time to hardware readiness	Less than 1 year	Less than 2 years	More than 2 years
Crew time requirements	No crew involvement beyond installation and removal	Requires less than 1 hour of crew intervention per increment period (6 months)	Requires more than 1 hour of crew intervention per increment period (6 months)
Power requirements	None	Less than 500w	More than 500w
Physical Space Requirements	Fits in 3U CubeSat (100mm X 100mm X 340.5mm)	Fits in a single Express Rack Locker	Larger than a single Express Rack Locker

* Proposers are not required to fund launch costs. However, proposers shall fund the cost of their research equipment/hardware unless such hardware is already available in the NASA-owned ISS inventory. Proposers shall fund the cost of their use of any commercially owned facilities on ISS. Proposers shall also be responsible for providing data for the required flight documentation including safety, interface verification and operations.

The ISS Program will develop a payload unique Applicable Verification Matrix, identifying all of the required and recommended design interfaces and associated verifications. NASA test facilities may be utilized by the Payload Developer (PD) to complete verification testing; however, it is the PD’s responsibility to cover all costs associated with this testing, unless otherwise documented in their Payload Integration Agreement (PIA). For further explanation of these products, please contact Willie Williams at willie.b.williams@nasa.gov.

2.0 Project Overview and Guidelines

2.1 General

Each selected NASA EPSCoR flight project shall perform scientific and/or technical research in areas that support NASA’s strategic research and technology development priorities. Proposals shall emphasize how a flight in microgravity will influence/improve the results/quality of any ground-based research.

2.2 Funding and Cost-Sharing

The maximum funding that a jurisdiction may request from NASA is \$100,000 per proposal based on the availability of NASA funds. This amount is to be expended over three (3) years in accordance with the budget details and budget narrative which will be included in the proposal and will be approved at the time of award.

All awards made in response to proposals to this solicitation shall comply with the [National Environmental Policy Act \(NEPA\)](#). Thus, proposers are encouraged to plan and budget for any anticipated environmental impacts per instructions in the *Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreement Notice (CAN) 2020 Edition* (hereafter referred to as the *NASA Guidebook for Proposers*). The latest PDF version is available through: https://prod.nais.nasa.gov/pub/pub_library/srba/proposers_guidebooks.html

Cost-sharing is not required. However, the proposer shall be aware that costs to cover the work such as hardware and/or software development and documentation development support (i.e. data to the ISS), which are needed to fly to ISS must be covered by this award.

2.3 Restrictions

In addition to the funding guidelines and requirements in the *NASA Guidebook for Proposers*, the *2 Code of Federal Regulations (CFR) §200*, *2 CFR §1800*, and the *NASA Grant and Cooperative Agreement Manual (GCAM)*, Appendix D, the following restrictions govern the use of the federally-provided NASA EPSCoR funds and are applicable to this CAN:

- Funds may not be used to fund research carried out by non-U.S. institutions. However, U.S. research award recipients may directly purchase supplies and/or services that do not constitute research from non-U.S. sources.
- Subject to export control restrictions, 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. institution. For additional guidance on foreign participation, see Section 3.2 of the *NASA Guidebook for Proposers* and the *NASA FAR Supplement (NFS) Part 1835.016-70*.
- EPSCoR support shall be acknowledged by the EPSCoR research project number in written reports and publications. Note that there is no limit for domestic travel, which is defined as that travel which does not require a passport, and shall be appropriate and reasonable to conduct the proposed research. Researchers from proposals selected for this ISS opportunity shall attend an ISS one-day workshop (Date TBD) at the ISS Program Office located at Johnson Space Center (JSC) in Houston, TX.
- NASA EPSCoR funding shall not be used to purchase general purpose equipment, e.g. desktop workstations, office furnishings, reproduction and printing equipment as a direct charge. Special purpose equipment purchases (i.e., equipment that is used only for research, scientific, and technical activities directly related to the proposed research activities) are allowed and shall be reflected as a direct charge as per cost principles cited in the GCAM, Appendix D7, Equipment and Other Property. In addition, proposers shall comply with 2 CFR 200.216: Prohibition on certain telecommunication and video surveillance services or equipment
- NASA EPSCoR funding shall not be used to support NASA civil service participation (FTE) in a research project unless that funding is provided through a funding vehicle between the jurisdiction and NASA center, such as a Space Act Agreement or other reimbursable agreement. NASA EPSCoR shall not set aside funding obtained from an award to send to a Center for FTE support, including travel.

- NASA EPSCoR funds shall be expended on NASA EPSCoR institutions. If a Co-Investigator (Sc-I/Co-I) with an NASA EPSCoR award transfers to a non-EPSCoR institution, the EPSCoR funding amount, or the part of it that remains unobligated at the time of Sc-I/Co-I transfer, shall not be transferred to the non-EPSCoR institution.
- All proposed funds shall be allowable, allocable and reasonable. Funds may only be used for the EPSCoR ISS project. All activities charged under indirect costs shall be allowed under 2 CFR § 200, Subpart E - Cost Principles.
- The non-Federal entity shall use one of the methods of procurement as prescribed in 2 CFR § 200.320. As defined in 2 CFR § 200.67, the micro-purchase threshold for acquisitions of supplies or services made under grant and cooperative agreement awards issued to institutions of higher education, or related or affiliated nonprofit entities, or to nonprofit research organizations or independent research institutes is \$10,000; or such higher threshold as determined appropriate by the head of the relevant executive agency and consistent with audit findings under chapter 75 of Title 31, United States Code, internal institutional risk assessment, or state law.
- Unless otherwise directed in 2 CFR § 200, for changes to the negotiated indirect cost rate that occur throughout the project period, the proposer/recipient shall apply the rate negotiated for that year, regardless of whether it is higher or lower than at the time the budget and application was awarded.
- Proposals shall not include 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.
- Any funds used for cost sharing or matching shall be allowable under 2 CFR § 200.
- Existing projects are not eligible to submit proposals, nor compete with new submissions. In addition, no human research (HRP) proposals will be accepted.
- Procurement contracts shall not be awarded in conjunction with this solicitation.

2.4 Special information relative to this solicitation

Researchers from proposals selected for this ISS opportunity shall help complete Part 1 of the Payload Integration Agreement (PIA). See Appendix A for a sample PIA template. *Note: Part 1 of the PIA does not need to be filled out in response to this solicitation.*

2.4.1 Experiments

Experiments shall fit within the mass and volume constraints of existing ISS launch vehicles and shall adhere to ISS integration requirements. Experiments can be launched pressurized or unpressurized. The proposer shall include specific requirements for mass, volume, power, and data from the ISS. Also, it is highly recommended that proposers include drawings or photographs of any flight hardware.

All ISS flight experiments shall undergo a three (3)-phase safety review process and the PD shall provide a letter certifying that the experiment is safe for flight. This is a very stringent safety review process that may be accomplished via Webex, but travel to JSC is preferred. *It is strongly recommended that all selected projects appoint a safety representative to interface with NASA safety experts, provide the required documentation, and lead the project's safety review at JSC.*

2.4.2 Student Research Assistants

The use of NASA EPSCoR funds for support of research assistants is allowable and encouraged, and shall be detailed in the budget justification and described in the narrative and evaluation

sections of the proposal.

2.4.3 Labs and Jurisdiction Funding Support

If post-flight labs are required, the ISS requires the jurisdictions to provide this lab support.

Funding requirements: The selected research project will be an EPSCoR project. The NASA ISS Program will fund the flight to and from the ISS.

Jurisdictions shall provide funding/resources for the research project's faculty, students, and PIs; the basic (ground) research; and program integration documentation inputs, use of any commercial hardware available on ISS, and any specific hardware not already available in the ISS Program inventory.

In keeping with the NASA Plan for Increasing Access to Results of Scientific Research, new terms and conditions, consistent with the Rights in Data clause in the award, information about making manuscripts and data publicly accessible may be attached to NASA EPSCoR Research awards. As a general rule, proposals will be required to provide a Data Management Plan (DMP) or proposers shall provide an explanation as to why a DMP is not necessary given the nature of the work proposed. *The DMP shall be submitted by responding to the NSPIRES cover page question about the DMP (limited to 4000 characters).* Any research project for which a DMP is not necessary shall provide an explanation in the DMP block. Example explanations are as follows:

- *This is a development effort for flight technology that will not generate any data that the proposer/recipient can release, so a DMP is not necessary;*
- *The data that the proposer/recipient will generate will be subject to ITAR; or*
- *The proposer/recipient may explain why its project is not going to generate data.*

The proposal type that requires a DMP is described in the NASA Plan for increasing access to results of federally funded research (see above link). The DMP shall contain the following elements, as appropriate to the project:

- A description of data types, volume, formats, and (where relevant) standards;
- A description of the schedule for data archiving and sharing;
- A description of the intended repositories for archived data, including mechanisms for public access and distribution;
- A discussion of how the plan enables long-term preservation of data; and
- A discussion of roles and responsibilities of team members in accomplishing the DMP. (If funds are required for data management activities, these should be included in the budget and budget justification sections of the proposal.)

Proposers that include a plan to archive data should allocate suitable time for this task. Unless otherwise stated, this requirement supersedes the data sharing plan mentioned in the *NASA Guidebook for Proposers*.

In addition, researchers submitting NASA-funded articles in peer-reviewed journals or papers from conferences shall make their work accessible to the public through NASA's *PubSpace* at <https://www.nihms.nih.gov/db/sub.cgi>. NASA's instructions for completing the submission process are available at <https://www.nasa.gov/open/researchaccess/pubspace>.

The following documents are available online at the address shown: International Space Station Facilities and Accommodations Overview.

http://www.nasa.gov/mission_pages/station/research/facilities_category/index.html

ISS Research Facilities:

<http://www.nasa.gov/stationfacilities>

2.5 Partnerships and Interactions

All EPSCoR projects in eligible jurisdictions shall be made aware of this solicitation. *All proposals shall be submitted through the jurisdiction's NASA EPSCoR Director's office.* Existing EPSCoR awards already demonstrate partnerships or cooperative arrangements among academia, government agencies, business and industry, private research foundations, jurisdiction agencies, and local agencies, and shall not be repeated.

"Letters of affirmation" (i.e., letters that endorse the Intrinsic Merit, including significance or impact, of a proposal) do not satisfy the requirement for statements of commitment and letters of resource support. NASA neither solicits nor evaluates such proposal endorsements. Whether a proposal fully meets the evaluation criteria is determined by NASA with input from the peer review process. The *NASA Guidebook for Proposers* includes a description of the distinctions between statements of commitment and letters of resource support.

Note: If letters of affirmation are submitted, they may not be submitted as an appendix to the proposal; rather, they shall be included as part of the Scientific/Technical/Management plan and will be counted within the required proposal page limitations.

3.0 Program Management

3.1 NASA EPSCoR Program Levels

The NASA EPSCoR project is administered by the Kennedy Space Center (KSC) Office of STEM Engagement (OSTEM) for NASA HQ, which has overall responsibility for EPSCoR policy, program management, and oversight. NASA HQ OSTEM is also responsible for reporting evaluation, outcomes, and results to the appropriate program-level entity. NASA EPSCoR project management is closely coordinated with the NASA Mission Directorates and NASA Centers. Also, a NASA Technical Monitor (TM) will be assigned to provide technical oversight and an independent evaluation of the progress of the award.

The primary points of contact for this solicitation are listed in Appendix E.

3.2 Jurisdiction Level

The jurisdiction's NASA EPSCoR Director shall serve as the managing Principal Investigator (PI) on the award, providing leadership and direction for the team from an oversight role. The submitting and recipient's institution shall be that of the jurisdiction's NASA EPSCoR Director. The Director/PI is responsible for oversight and overall management of the project to ensure compliance with NASA EPSCoR and ISS administrative requirements. Also, the Director is responsible for ensuring the timely reporting by the team of progress and accomplishments of its work. The Science-Investigator (Sc-I) shall be listed as the technical POC and Payload Developer for ISS integration and flight.

The Government's obligation to continue any award is based on satisfactory progress as detailed in the recipient's required annual progress reports. The research proposal may include a reasonable level of funding for management, administrative, and oversight function of the jurisdiction's NASA EPSCoR Director/PI. If required, this amount shall be included in the \$100,000 proposal limit.

3.3 Cancellation of Program Announcement

NASA HQ OSTEM reserves the right to not make any awards under this CAN and to cancel this CAN at any time. NASA assumes no liability (including bid and proposal costs) for cancelling the CAN or for any entity's failure to receive such notice of cancellation.

4.0 Proposal Review and Selection

4.1 Evaluation Criteria

The evaluation criteria are as follows:

EPSCoR Project Office:

All complaint proposals shall not exceed 15 pages, which does not include budget, biographies, letters of support, or certifications. They will be peer reviewed via NSPIRES and by representatives of the ISS Program Office in consultation with the NASA HQ Mission Directorates. The EPSCoR Program Office will ensure that all proposals are evaluated based on:

- Intrinsic merit of microgravity requirement (i.e., what is the added value of flying what is proposed on the ISS?);
- Approach to flight safety process; and utilization requirements of available ISS resources; and
- Budget (shall be adequate, appropriate, reasonable, and realistic, and demonstrate the effective use of funds that align to the proposed project).

ISS Program Office:

Proposals will be evaluated by ISS Program personnel based on the following:

- Feasibility;
- Time to flight;
- Crew time requirements;
- Power requirements; and
- Physical space requirements.

4.2 Review and Selection Process

This selection shall be a two-step process. In the first step, the proposals will be evaluated by ISS Program Office personnel for flight feasibility and by the Mission Directorates for scientific benefit of microgravity flight. Proposals selected in the first step will then proceed to the second step, in which ISS Program personnel will evaluate them for inclusion as a proposed project on the ISS flight manifest. At the end of the second step, the proposals recommended for funding will be presented to the EPSCoR Project Manager, who is the selecting official for this CAN.

The NASA Grant Officer, located at the NASA Shared Services Center (NSSC), will conduct a pre-award review of risk associated with the proposer as required by 2 CFR § 200.205. 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 (FAPIS) 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 (currently \$250,000), NASA is required to review and consider any

information about the applicant that is in the designated integrity and performance system (currently FAPIIS) accessible through SAM, <https://www.sam.gov> (see 41 U.S.C. 2313).

At its option, an applicant 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 applicant, in addition to the other information in FAPIIS, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards in completing the review of risk posed by applicants as described in 2 CFR § 200.205 Federal awarding agency review of risk posed by applicants.

Successful research proposals are likely to be those that provide sound contributions to both immediate and long-term scientific and technical needs of NASA as explicitly expressed in current NASA documents and communications; successful proposals are also likely to contribute to the overall research infrastructure and economic development of the proposing jurisdiction.

4.2.1 Intrinsic merit of microgravity requirement (40% of total score)

- Existing Research - If relevant, the narrative shall include a very brief history of the NASA EPSCoR Research project (include the grant number assigned by the NSSC; and
- Benefit of a microgravity environment to the research – Each proposal shall provide a detailed technical narrative of the proposed research activity and the potential impact of a microgravity environment on the proposed research (i.e. Project Description, Microgravity Goals and Objectives, Anticipated Results, and Timeline).

4.2.2 Approach to flight and ground safety review process (40% of total score).

The ISS Payload Safety Review Panel (PSRP) is an ISS Safety Review Panel (SRP) located at the JSC. The purpose of the PSRP is to ensure that the Payload Developer (PD) complies with technical and process safety requirements. Specifically, the PSRP performs the following functions:

- Assists the PD in the interpretation of safety requirements;
- Conducts safety reviews during appropriate phases of the payload development to assess the payload compliance to the relevant program safety and process requirements;
- Evaluates hazard assessment revisions resulting from modifications to payloads that may affect a safety critical subsystem or create a potential hazards to the crew, ISS, or other ISS/International Partner visiting vehicles;
- Evaluates the safety analyses, safety reports, and waiver/deviation requests prepared by the PD and elevates to Program Management (for written approval) those non-compliances that are above the delegated authority of the PSRP; and
- Ensures the resolution of payload safety issues, including (as required) the formation of splinter groups, subpanels, and/or coordination with other organizations to perform technical activities required to accomplish assigned responsibilities.

The PD will be required to work with the PSRP to produce a Safety Data Package (SDP) as a part of the payload integration process. The SDP usually contains the following two parts:

- Part one of the SDP is descriptive text that contains information (usually drawings) to describe the payload, its systems, sub-systems, and interfaces, as well as flight and ground operations. It also summarizes hazard analyses used in the identification and control of payload hazards.
- Part two of the SDP is typically a hazard report. The hazard report is used to summarize

- controls and verifications to ensure compliance to safety requirements. Elements of a hazard report include technical requirement references, description of hazard, hazard category, hazard cause, hazard controls, and safety verification methods.

More information can be found in the “Payload Developers and Principal Investigators Payload Planning, Integration and Operations Primer” at: http://www.nasa.gov/pdf/501115main_ISS_Payload_Integration_Process_Primer_final_submission_baseline.pdf.

4.2.3 Budget (20% of total score)

A detailed budget is required for the entire three (3) year period of performance. A suggested format to use in preparing the proposed budget is contained in the *NASA Guidebook for Proposers*, Appendix C. The budget will be evaluated based upon the clarity and reasonableness of the funding request. A budget narrative shall be included in the proposal.

The proposed budget shall: be adequate, appropriate, reasonable, and realistic, and demonstrate the effective use of funds; reflect clear alignment with the content and text of the proposal; and contain sufficient cost detail and supporting information to facilitate evaluation.

4.2.4 ISS Program vetting of select proposals.

Proposals that the EPSCoR Project Office recommends for acceptance then will be evaluated by ISS Program personnel based on the following; a maximum of ten (10) points will be awarded per the following table:

Criterion	Strong (10 points)	Average (5 points)	Weak (0 points)
Feasibility	No impediment	Minor impediment	Major impediment
Time to hardware readiness	Less than 1 year	Less than 2 years	More than 2 years
Crew time requirements	No crew involvement beyond installation and removal	Crew intervention required less than once per 1hr period per increment period (6 months)	Crew intervention required more than once per 1hr period per increment period (6 months)
Power requirements	None	Less than 500w	More than 500w
Physical Space Requirements	Fits in 3U CubeSat Reference Volume (100mm X 100mm X 340.5mm)	Fits within a single Express Rack Locker	Larger than a single Express Rack Locker; does not fit within one
Funding Feasibility (EPSCoR)	Sufficient budget to complete experiment	Budget risks exist that shall be addressed	Insufficient budget to complete The proposed experiment

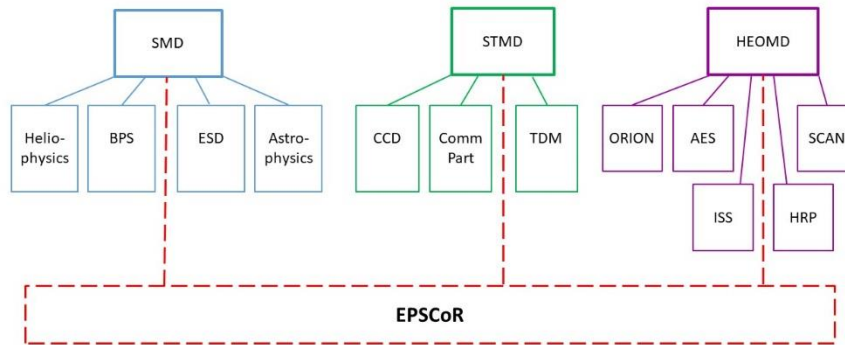
The ISS Program Office requires information for each selected project in order to complete *Part 1 of the Payload Integration Agreement* by the time of the kick-off meeting at the JSC. See Appendix A.

The EPSCoR Project Office will request that the NSSC include the Exhibit C of the GCAM which is a required *Cross-Waiver of Liability for International Space Station Activities* in the ISS Flight Opportunity awards. See Appendix B.

Appendix C includes a list of possible services that can be negotiated with the ISS Program.

NASA OSTEM/EPSCoR is the sponsor at the level shown in the chart below.

NASA's RESEARCH SPONSORS TO THE ISS



4.3 Selection Announcement

NASA's goal is to issue award notices as soon as possible after the selections are announced (anticipated in the February/March timeframe) to the proposers. However, delays may be caused by:

- The need for additional materials from the proposer (e.g., revised budgets and/or budget details) before NASA may legally obligate Federal money; and
- A delay in NASA receiving its appropriation for the current fiscal year.

5.0 Award Administration Information

5.1 Notice of Award

For selected proposals, a NASA Grants Officer will contact the business office of the proposer's institution. The NASA Grants Officer is the only official authorized to obligate the Government. The anticipated notice / announcement of awards for selected proposals is late March, 2021. For a grant or cooperative agreement, any costs that the proposer incurs within 90 calendar days before an award are at the recipient's risk in accordance with 2 CFR § 1800.209.

A proposer has the right to be informed of the major factor(s) that led to the acceptance or rejection of its proposal. Debriefings will be available upon request. Again, it is emphasized that proposers should be aware that proposals of nominally high intrinsic and programmatic merits may be declined for reasons entirely unrelated to any scientific or technical weaknesses.

5.2 Administrative and National Policy Requirements. All administrative and national policy requirements may be found at 2 CFR § 200, 2 CFR § 1800, 14 CFR § 1274 and the NASA Grant and Cooperative Agreement Manual (GCAM) (all available at: http://prod.nais.nasa.gov/pub/pub_library/srba/index.html).

5.3 Award Reporting Requirements

The reporting requirements for awards made through this CAN shall be consistent with the NASA GCAM, Appendix D. Recipients also need to comply with reporting requirements at 2 CFR § 180.335 and 2 CFR § 180.350. Specific reporting requirements are described below.

5.4 Annual Progress and Final Reports

Jurisdictions shall submit electronic progress reports to the NSSC at NSSC-Grant-Report@mail.nasa.gov and the technical officer at agency-epscor@mail.nasa.gov on the results of

Years-1&2 ISS flight integration activities (as PDF files) no later than 60 days prior to the end of the first anniversary of the award.

The EPSCoR Project Office Program Coordinator shall notify the Jurisdiction PI in advance when a report is coming due and provide specific formats and data entry forms. The Program Coordinator shall also provide a Research Project Progress/Performance Reporting Outline, which is a template of the required data. This will be followed by notification from the NSSC that the report is due.

A NASA Technical Monitor (TM) shall evaluate accomplishments toward project goals by reference to indicators such as, but not limited to, the metrics outlined above. NASA may approve no-cost extensions when requested by the recipient in accordance with the *GCAM, Appendix D3, Extensions*.

The ISS staff, EPSCoR staff, and a NASA TM shall review the annual and final reports for completeness. A recipient's failure to provide an annual project report and/or final report with Invention Disclosures shall delay or preclude the participation of the respective jurisdiction in other funding opportunities related to NASA EPSCoR.

Awards issued under this CAN shall comply with the provision set forth in the NASA Plan for Increasing Access to the Results of Scientific Research (http://www.nasa.gov/sites/default/files/files/NASA_Data_Plan.pdf), including the recipient's responsibility for reporting publications with the annual and final progress reports. Requirements shall be identified in the Notice of Award.

If the Federal share of any award issued under this CAN is more than \$500,000 over the total period of performance, additional reporting requirements shall apply. See 2 CFR § 200 Appendix XII— Award Term and Condition for Recipient Integrity and Performance Matters (http://www.ecfr.gov/cgi-bin/text-idx?SID=4b63b1740bdb186d3bf5d346f5ddf42c&mc=true&node=ap2.1.200_1521.xii&rgn=div9)

5.5 Access to NASA Facilities/Systems

All recipients shall work with NASA project/program staff to ensure proper credentialing for any individuals who need access to NASA facilities and/or systems.

5.6 Intellectual Property

Data Rights: NASA encourages the widest practicable dissemination of research results at any time during the course of the investigation. The award will contain the Rights in Data clause at GCAM, Appendix D. This clause allows a recipient to assert copyright in any work that is subject to copyright and was developed, or for which ownership was acquired, under the NASA award. NASA will reserve a royalty-free, nonexclusive and irrevocable right to reproduce, publish, or otherwise use the work for Government purposes, and to authorize others to do so, in any such copyrighted work. Note that the Grant Officer may revise the language under this Rights in Data clause to modify each party's rights based on the particular circumstances of the program and/or the recipient's need to protect specific proprietary information.

Patent Rights: Recipients will be allowed to elect to retain title to any inventions made under the award. Awards will include the provisions of 37 CFR § 401.3(a) which requires use of the standard clause set out at 37 CFR § 401.14 “Patent Rights (Small Business Firms and Nonprofit Organizations),” and the NASA GCAM, Appendix D “Patent Rights.”

6.0 Updates and Submission Information

6.1 Announcement and Updates/Amendments to Solicitation

This solicitation will be announced via NSPIRES and Grants.gov, but submission shall be an on-time electronic submission via NSPIRES (<http://nspires.nasaprs.com>). Proposers shall carefully note the following requirements for submission of an electronic proposal via NSPIRES. Instructions for submission of proposals are also detailed in the *NASA Guide for Proposers*, Section 4.

Every organization that intends to submit a proposal to NASA in response to this CAN shall be registered in NSPIRES. Registration for the proposal data system shall be performed by an organization's electronic business point-of-contact (EBPOC) who continues to hold a valid registration with the System for Award Management (SAM) and provides a valid DUNS number with the proposal. See: <https://www.sam.gov/portal/public/SAM/>

Each individual team member (e.g., PI, co-investigators, etc.), including all personnel listed on the proposal's electronic cover page, shall be individually registered in NSPIRES.

While every effort is made to ensure the reliability and accessibility of the web site and to maintain a help center via e-mail and telephone, difficulty may arise at any point on the internet, including with the user's own equipment. Therefore, proposers are strongly urged to familiarize themselves with the NSPIRES site and to submit the required proposal materials well in advance of the proposal submission deadline. Difficulty in registering with or using the proposal submission system (NSPIRES) is not, in and of itself, a sufficient reason for NASA to consider a proposal that is submitted after the proposal due date. Additional programmatic information for this CAN may become known before the proposal due date. If so, such information shall be added as a formal amendment to this CAN and posted on its homepage at <http://nspires.nasaprs.com>.

It is the proposer's responsibility to regularly check this CAN's homepage for updates.

6.2 Electronic Submission of Proposal Information

All proposals submitted in response to this CAN shall be submitted electronically via NSPIRES (<http://nspires.nasaprs.com>). Hard copy proposals will not be accepted. Electronic proposals shall be submitted in their entirety by 11:59 p.m., Eastern Time on January 7, 2021

6.3 Collection of Science, Technology, Engineering, and Math (STEM) Information

NASA is implementing a process to collect demographic data from grant applicants for the purpose of analyzing demographic differences associated with its award processes. NASA continually monitors the operation of its review and award processes to identify any inequities based on gender, ethnicity, race, or disability.

Therefore, we are requesting additional demographic data to ensure compliance with Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d et seq., Title IX of the Education Amendments of 1972, 20 U.S.C. § 1681 et seq., Section 504 of the Rehabilitation Act of 1973, 29 U.S.C. § 701 et seq. and NASA's implementing regulations at 14 CFR. §§1250, 1251, and 1253. Submission of the requested information on NASA Form 1839 is voluntary and will not affect the organization's eligibility for an award. Any individual not wishing to submit some or all the information should check the box provided for this purpose.

7.0 Proposal Preparation

Proposals shall not exceed 15 pages total. Required elements of the proposal are described in section 4 (para 4.1) above, Proposal Review Process.

Appendix A: ISS Payload Integration Agreement (PIA) Part 1 Template

Payload Integration Agreement (PIA) Part 1 for {Payload Name}

{If this is an update or replacement to an approved PIA, use this paragraph, otherwise delete}

This PIA supersedes and replaces PIA *{insert previously approved PIA number}* dated *{insert the date of the previously approved PIA}*.

This PIA documents joint management agreements and expectations between the International Space Station (ISS) Program and the Payload Developer (PD) to integrate and execute the mission preparation, ground processing and handling, transportation services, on-orbit operations, and conditioned stowage for the payload in accordance with the Standard Payload Integration Agreement (SPIA). Any unique agreements or agreed deviations from the SPIA shall be documented in this PIA.

The PD is responsible for defining and meeting functional requirements for payload mission success. The ISS Program will assess the unique services and other needs in support of the payload's mission success. Those agreed to by the ISS Program will be documented in this PIA.

The ISS Program will support the payload's development, planning, operations, and overall integration with the ISS and visiting vehicles. The PD is responsible for on-time delivery of payload data in order to support these integration processes. If data is not provided on-time, the ISS Program cannot guarantee successful integration which may result in not meeting target manifest and operations timeframes.

The ISS Program shall develop a payload unique Applicable Verification Matrix, identifying all of the required and recommended design interfaces and associated verifications. NASA test facilities may be utilized by the PD to complete verification testing; however, it is the responsibility of the PD to cover all costs associated with this testing, unless otherwise documented in this PIA.

The Research Portfolio Manager shall serve as the focal point for development of Part 1. Following a handoff, the Payload Integration Manager (PIM) and Research Integration Manager (RIM) shall serve as the focal points for development of PIA Part 2 and overall maintenance. Updates to this PIA can be made as often as needed with joint approval of the PD and ISS Research Integration Office Manager.

PART 1 {Developed by OZ3/OZ4 (sponsors). Submit to the PIP chair for approval and addition to the IPL. Once approved, the PIA is transitioned to OZ6 (PIM/RIM) to manage changes.}

PAYLOAD DESCRIPTION

Payload Name	{enter payload OpNom name if known, otherwise Project name}
PD	{enter payload developer organization or appropriate office. Include Organization name, Project Manager name, email, and phone #}
Sponsor	NASA/STEM Engagement/EPSCoR
Funding Authority	NASA/STEM Engagement/EPSCoR
Research Objectives	{Enter a description of the Research objectives or goals, including minimum mission success criteria}
Ground Processing Plan	{Enter a brief summary of ground processing plan, with focus on services needed. Normally ambient payloads go to CMC, conditioned payloads go to cold stowage, externals are delivered directly to the launch vehicle provider.} Integrated at {customer or program facility} and turned over to {the ISS Cargo Mission Contract (CMC) or launch vehicle provider}.
Launch Plan	{Enter a brief summary of launch/ascent plan, with focus on launch vehicle interfaces – power, cold stowage, late load, early return} Launched {pressurized or external} on {default should be “any available ISS carrier”. Exclusions or request specific carriers should include valid justification. Do not specify specific flight number as the PIA does not guarantee manifesting.}
Operations Concept	{Enter a brief summary of the operations concept, with focus on resources/interfaces if known (crew time, power, data, thermal, structural, etc). Identify the intent to utilize any payload facilities (e.g. EXPRESS, HRF, MSG, Cold Stowage Fleet, SAMS, etc.), payload/system laptops (EXPRESS Laptop Computer, Station Support Computer) and/or payload software to be loaded on the laptops, or ISS systems support/resources (e.g. EVA/EVR, JEM Airlock, EXPRESS Logistics Carrier, JEM EF, UOP/SUP, VES/VRS, etc.). Identify general operational or life-cycle requirements (i.e., operated for X months to satisfy primary objects and another Y months for secondary objectives, collected X number of subjects data, changes to nominal ISS environment). For external payloads, include their viewing requirements (Nadir, Zenith, etc.).}

Return / Disposal Plan	<p>{Select from the appropriate return / disposal paragraphs below } <i>{All <u>pressurized</u> payloads use this paragraph if they plan to have their hardware <u>disposed</u> of on-orbit.}</i> The ISS Program shall dispose of the payload after the payload has completed its experiment objectives.</p> <p><i>{All <u>pressurized</u> payloads use this paragraph if they plan to have their hardware <u>returned</u> to the ground.}</i> All payload hardware and/or samples transported to ISS shall be returned to the ground.</p> <p><i>{All <u>pressurized</u> payloads use this paragraph if they plan to have part of their hardware <u>disposed</u> of on-orbit <u>and</u> part of their hardware <u>returned</u> to the ground.}</i> The PD agrees that the ISS Program shall dispose of the payload with the exception of <i>{list the payload hardware that will return to the ground}</i> that will be returned to the ground.</p> <p><i>{All payloads use this paragraph if they plan to dispose of their payload by <u>jettison</u>.}</i> The payload will be disposed of by jettison from the ISS, and shall meet ISSP PPD 1011, Multilateral ISS Jettison Policy.</p> <p><i>{All <u>external</u> payloads being <u>disposed</u> via return use this paragraph and customize if appropriate for <u>specific disposal vehicles</u>.}</i></p>
	<p>The PD agrees that the ISS Program shall dispose of the payload after the payload has completed its experiment objectives. The PD shall design the payload to be compatible with all known disposal options. The PD shall design its payload such that its configuration for disposal allows for robotics transfer from the ISS to the disposal vehicle, and stowage within the return/disposal vehicle allocated external volume.</p> <p><i>{All payloads use this paragraph if they plan to have their hardware <u>remain on board</u> for the duration of the ISS. IP payloads may delete this paragraph if their hardware is stowed in their own specific IP module.}</i> All hardware will remain on-orbit for the duration of the ISS in collection of the payload’s science objectives and in agreement with the ISS Research Integration Office.</p>

GOVERNING AGREEMENTS

SPIA	{enter either or both of the following} SSP 57072, Standard Payload Integration Agreement for ISS Pressurized Payloads SSP 57061, Standard Payload Integration Agreement for External Payloads
Export Classification	{enter payload Export Classification obtained for the payload hardware/software/data.}
Proprietary Considerations	{enter any information relative to proprietary protections that need to be applied to the payload’s integration data, drawings, etc., otherwise state “Not Applicable”}

<p>Cross Waiver of Liability</p>	<p>{Sometimes there will be multiple agreements that are invoked and more than one third party that has rights in the payload or its results. In those instances, all applicable cross waivers shall be referenced. }</p> <p>{If no cross-waiver of liability is needed (i.e. the payload is NASA-sponsored and there is no other third party that has any involvement or rights to either the payload or the results of the payload), include the following statement. }</p> <p>No Cross Waiver of Liability is required.</p> <p>{If the payload is flown on the ISS under a binding agreement (a Space Act Agreement (SAA), contract, cooperative agreement, grant, etc.) between the PD and NASA, provide that binding agreement in the sentence below. }</p> <p>Liability related to transporting the payload to and, if applicable, from the ISS is covered by {enter the binding agreement}, cross-waiver.</p> <p>{Use this sentence if International Partner sponsored. }</p> <p>Liability related to transporting the payload to and, if applicable, from the ISS is subject to the Cross-waiver of Liability as found in the Intergovernmental Agreement Concerning Cooperation on the Civil International Space Station of January 1998.</p>
<p>GFE Provisioning</p>	<p><i>{Does the payload's development contract with NASA [SAA, MOU, or other type contract] contain a GFE provisioning clause which authorizes NASA Logistics/Property Management to ship government furnished equipment to the PD organization if necessary? Enter Yes/No and state the contracting mechanism, otherwise state "Not Applicable"}</i></p>
<p>RS Operations</p>	<p><i>{U.S. payloads which <u>operate within Russian Segment</u> use this paragraph, otherwise delete}</i></p> <p>Since the payload plans to operate within the Russian Segment, it shall be designed to meet the requirements in the latest revision of P32958-106, Technical Requirements for Hardware to be Stored or Operated on the ISS Russian Segment, as negotiated/documentated with the Russian side via the Joint Cargo Certification Team (JCCT) coordination.</p>
<p>Additional Agreements</p>	<p>{Add additional narrative to document and describe any binding agreements that impact ISS integration activities, such as Program Directives, Space Act Agreements, Contracts, etc. }</p> <p>{If International Partner (IP) resources are needed use this paragraph. If not, delete this paragraph. }</p> <p>The scope of this PIA accounts only for the payload's involvement with NASA resources {ex. US launch/return vehicle transportation, operations within U.S. Segment, use of NASA cold stowage assets, use of NASA provided equipment, or installation into a NASA on-orbit facility}. This PIA does not address the payload's use, interfaces, or installation within, or on, non-U.S. modules or vehicles. The activities, services and items provided by NASA under this PIA reflect the implementation of obligations contained in the {name of IP agreement}. Any activities beyond the scope of the {name of IP agreement} require a separate agreement between NASA and {IP} prior to implementation.</p>

Appendix B: Cross-Waiver of Liability for ISS Activities (Appendix E of the GCAM)

Each Proposer shall attach the language below to its proposal; this language will be included in a resulting cooperative agreement. This language does not count towards the proposal page count limit.

CROSS-WAIVER OF LIABILITY FOR INTERNATIONAL SPACE STATION ACTIVITIES (DEC 2014)

(a) The Intergovernmental Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning Cooperation on the Civil International Space Station (IGA) for the International Space Station (ISS) contains a cross-waiver of liability provision to encourage participation in the exploration, exploitation, and use of outer space through the ISS. This cross-waiver of liability is to be broadly construed to achieve this objective.

(b) As used in this provision, the term:

(1) "Agreement" refers to any NASA agreement, grant, cooperative agreement, or contract that contains the cross-waiver of liability provision authorized by 14 CFR Part 1266.102.

(2) "Damage" means:

- (i) Bodily injury to, or other impairment of health of, or death of, any person;
- (ii) Damage to, loss of, or loss of use of any property;
- (iii) Loss of revenue or profits; or
- (iv) Other direct, indirect, or consequential damage.

(3) "Launch Vehicle" means an object, or any part thereof, intended for launch, launched from Earth, or returning to Earth which carries payloads or persons, or both.

(4) "Partner State" includes each Contracting Party for which the IGA has entered into force, pursuant to Article 25 of the IGA or pursuant to any successor agreement. A Partner State includes its Cooperating Agency. It also includes any entity specified in the Memorandum of Understanding (MOU) between NASA and the Government of Japan's Cooperating Agency in the implementation of that MOU.

(5) "Party" means a party to an Agreement involving activities in connection with the ISS, including a party that is the prime recipient under this grant\cooperative agreement.

(6) "Payload" means all property to be flown or used on or in a Launch Vehicle or the ISS.

(7) "Protected Space Operations" means all Launch or Transfer Vehicle activities, ISS activities, and Payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of the IGA, MOUs concluded pursuant to the IGA, implementing agreements, and contracts to perform work in support of NASA's obligations under these Agreements. It includes, but is not limited to:

- (i) Research, design, development, test, manufacture, assembly, integration, operation, or use of Launch or Transfer Vehicles, the ISS, Payloads, or instruments, as well as related support equipment and facilities and services; and

(ii) All activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services. “Protected Space Operations” also includes all activities related to evolution of the ISS, as provided for in Article 14 of the IGA. “Protected Space Operations” excludes activities on Earth which are conducted on return from the ISS to develop further a Payload’s product or process for use other than for ISS-related activities in implementation of the IGA.

(8) "Related Entity" means:

- (i) A contractor, recipient or subcontractor of a Party or a Partner State at any tier;
- (ii) A user or customer of a Party or a Partner State at any tier; or
- (iii) A contractor or subcontractor of a user or customer of a Party or a Partner State at any tier. The terms “recipient,” “contractor,” and “subcontractor” include suppliers of any kind.

(9) “Transfer Vehicle” means any vehicle that operates in space and transfers Payloads or persons or both between two different space objects, between two different locations on the same space object, or between a space object and the surface of a celestial body. A “Transfer Vehicle” also includes a vehicle that departs from and returns to the same location on a space object.

(c) The Recipient agrees to a cross-waiver of liability pursuant to which it waives all claims against any of the entities or persons listed in paragraphs (c)(1)(i) through (c)(1)(iv) of this provision based on Damage arising out of Protected Space Operations.

(1) This cross-waiver shall apply only if the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for Damage, whatever the legal basis for such claims, against:

- (i) A Party as defined in (B)(5) above;
- (ii) A Partner State including the United States of America;
- (iii) A Related Entity of any entity identified in paragraph (c)(1)(i) or (c)(1)(ii) of this provision; or
- (iv) The employees of any of the entities identified in paragraphs (c)(1)(i) through (c)(1)(iii) of this provision.

(2) In addition, the Recipient shall, by contract or otherwise, extend the cross-waiver of liability set forth in paragraph (c)(1) of this provision to its Related Entities at any tier by requiring them, by contract or otherwise, to:

- (i) Waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this provision; and
- (ii) Require that their Related Entities waive all claims against the entities or persons identified in paragraphs (c)(1)(i) through (c)(1)(iv) of this provision.

(3) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of claims arising from the Convention on International Liability for Damage Caused by Space Objects, which entered into force on September 1, 1972, where the person, entity, or property causing the Damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.

(4) Notwithstanding the other conditions of this provision, this cross-waiver of liability shall not be applicable to:

- (i) Claims between a Recipient and its own Related Entities;
- (ii) Claims made by a natural person, his/her estate, survivors or subrogees (except when a subrogee is a Party to an Agreement or is otherwise bound by the terms of this cross-waiver) for bodily injury to, or other impairment of health of, or death of, such person;
- (iii) Claims for Damage caused by willful misconduct;
- (iv) Intellectual property claims; or
- (v) Claims for Damage resulting from a failure of the Recipient to extend the cross-waiver of liability to its Related Entities, pursuant to paragraph (c)(2) of this provision.

(5) Nothing in this provision shall be construed to create the basis for a claim or suit where none would otherwise exist.

(6) This cross-waiver shall not be applicable when 51 U.S.C. 50101 et seq. is applicable.

(7) This cross-waiver shall not apply to or affect the rights and obligations arising from any other Term and Condition or provision of this grant/cooperative agreement.

Appendix C: ISS Available Services

Coordinated Services

ISS Program Coordinated Services are defined services that explicitly require Program and Payload Developer (PD) negotiations, technical coordination, and possible funding agreements with the specific NASA organization providing the service. These services, if requested by the PD and approved by the Program, shall be documented as a unique agreement in the PIA.

- A. 1553 Remote Terminal (RT) Validation Test - Each payload requiring commanding needs to perform a Validation Test to ensure that the payload hardware is compliant with the Mil Spec protocols. The ISS Program offers this test capability.
- B. STELLA Software Package - This Software Toolkit for Ethernet Lab-Like Architecture (STELLA) can easily adapt Ethernet based software communications to the ISS. PD ground software that communicates with their ISS onboard payload software using Transmission Control Protocol/Internet Protocol (TCP/IP) or User Datagram Protocol (UDP) protocols can use STELLA to transition to the ISS C&DH interfaces.
- C. Joint Station LAN (JSL) On-Board Usage - The JSL provides wired and wireless Ethernet connectivity between all segments of the ISS, and between the ISS and MCC-H. The JSL team supports the PD in the necessary verification activities (analysis, test, inspection or demonstration) for connectivity to the ISS JSL to certify that the payload hardware/software meets all appropriate sections of SSP 50892, Ethernet Requirements for Interoperability with the Joint Station LAN (JSL).
Note 1: The PD is required to identify the need for a Wireless Access Point (WAP – Bellaire/MOXA) resource for development purposes.
Note 2: All testing will be coordinated utilizing the current SDIL test process which identifies all testing and necessary resources via a Schedule Issues Form (SIF).
- D. JSL Laboratory Testing - If requested, payloads can perform a functional demonstration test of their payload Ethernet interface at the JSL laboratory located at the SCTF. Payloads using external wireless Ethernet for communications can request to perform a functional demonstration test of their payload Ethernet interface at the JSL lab located at the SCTF. In addition, JEM-EF installed payloads are required to perform a functional demonstration test that their payload Ethernet interface can communicate with the LEHX hardware found on the JEM.
Note 1: All testing will be coordinated utilizing the current SDIL test process which identifies all testing and necessary resources via a SIF.
- E. JSC Frequency Management Analysis – This analysis ensures that payloads with Radio Frequency transmissions do not interfere with ISS frequencies. The PD shall provide data into the JSC Frequency Management database. *This is a mandatory test.*
- F. ISS Payload Power Quality Testing - This testing can help ensure the PD is collecting power data in a manner that satisfies the electrical interface verification requirements. The ISS Program offers power testing support to payloads using various electrical interfaces on ISS. This test service is available at JSC in the SCTF Integrated Power Lab (IPL), at KSC in the SSPF, or it can be performed at the payload's development site with the proper coordination. The JSC Energy System Test Area (ESTA) Power Testing Lab also can support power quality testing to verify a payload works properly with the various electrical power supplied by ISS. This testing includes 120Volt (V) Direct Current (DC), 28VDC, 120V Alternating Current (AC), and various DC load testing. The ESTA lab can also test compliance with turn on/off current, AC and DC impedance, and voltage

- excursions. Since JSC ESTA lab services are independent of the ISS Program, there typically are costs associated with use of this lab. (Identify all tests requested in the PIA).
- G. Payload Rack Checkout Unit (PRCU) - Utilized to test payload hardware interfaces to the ISS and conduct end-to-end development or functional testing. In this capacity the PRCU serves as a high fidelity emulator of on-orbit ISS interfaces and allows experiment developers to ensure that their payload will interact properly once connected on-orbit. PRCUs are located at NASA JSC, KSC, MSFC, and GRC.
- H. MSFC Telescience Resource Kit (TReK) - TReK is a remote operations solution for PDs. It can be used to monitor and control ISS payloads from anywhere in the world. TReK is comprised of a suite of software applications and libraries that provide generic data system capabilities and access to HOSC services. TReK also includes a suite of lightweight libraries and applications that can be used onboard ISS. This includes support for communicating using standard network protocols (UDP, TCP), working with packets (creating, populating, building, and decomposing), recording data, transferring files using the CCSDS File Delivery Protocol (CFDP), configuring and managing a Delay Tolerant Networking (DTN) node, and support for EXPRESS Payload to ISS C&DH System Ethernet interfaces (Payload Health and Status, PEP Bundle Request, PEP Procedure Execution Request, Rack Time Request, Ancillary Data Configuration Control, Payload Telemetry Downlink Data). TReK is available for Windows (ground and flight computers) and Linux (ground and flight computers). Users can register for use of TReK at <http://trek.msfc.nasa.gov>.
- I. EXPRESS Program Specialized Test Equipment (STE) - Payloads requiring specialized equipment to support testing and/or verification shall identify such equipment (STEP, ScS, and Remote Advanced Payload Test Rig [RAPTR]) and process a hardware request using the Payload Hardware Request Process. STE requests will be coordinated through the PIP and approved by the respective hardware owners.
- J. KSC Coordinated Services are identified below and if agreed upon will require input by the PD into the KSC Support Requirements:
1. KSC services that require coordination/negotiation:
 - Payload hardware and/or science processing lab for short duration usage
 - Animal Care Facility usage;
 - Use of low profile dollies and associated lifting/handling gear;
 - Internal Thermal Control System (ITCS) fluid servicing of payload hardware;
 - Use of KSC FRAM-based shipping containers, low profile dollies, and associated lifting/handling gear;
 - Use of EXPRESS Payload Adapter (ExPA) or Columbus External Payload Adapter (CEPA) test cables; and
 - Developmental and/or final payload end-to-end verification testing support with the ELC Simulator.
 2. KSC services that may require detailed coordination, supplemental funding, and allocation of additional resources:
 - Payload processing that requires a facility other than the SSPF;
 - Non-standard facility environmental and/or cleanliness controls;
 - Large quantities or unique consumables/bench stock items;
 - Payload fueling services;
 - Domestic and International shipping services;
 - Technical shop support (cable shop, failure analysis lab, etc.);

- Component cleaning (flex hoses, gauges, valves, etc.); and
- Fabrication / repair of flight hardware.

K. POIC Coordinated Services - The services available to the PD are outlined in SSP 50304.

L. JSC Receiving, Inspection, and Testing Facility (RITF) – Facility available to perform a variety of mechanical testing, such as fastener testing. Its use shall be coordinated through OB.

M. Attitude and Pointing Support Services – The Flight Operations Directorate (FOD) Attitude Pointing Group (CM36) can provide a variety of attitude and pointing support services to payloads requiring orbital timing or target opportunity information. The analysis can calculate line of sight to any target, incorporate payload instrument restrictions, integrate ISS static and dynamic blockage, and fold in communication requirements/availability into a single output (FOD/CM36).

Services for Pressurized Payloads:

N. Flight Media Production/Testing - The PSIVF can be utilized to create and test flight certified media (Compact Discs [CDs] or Digital Video Discs [DVDs]) containing payload software for launch to ISS. The ISS CD Library Process owned by JSC/ISS Avionics & Software Office (OD) is the ISS Program’s preferred method for manifesting media for use onboard the ISS. The Payload Software Control Panel (PSCP) allows PDs to simply turnover their payload media and supporting documentation to the PSIVF for all ISS CD Library processing. The PSIVF and the Software Configuration Management team will then build, verify, and deliver flight media which meets the requirements in SSP 50613, ISS CD Library Requirements Document. Using a PSCP-owned and managed media duplicator and the process described in the Payload CD Library Process flow diagram, the PSCP will ensure a consistent, timely, repeatable, and highly successful flight media delivery process for the PD.

O. SSC Software/Integration Testing - Testing of PD provided software can occur in the SCTF along with integration into ISS Service Packs.

P. Freezer Verification Testing - The Cold Stowage team can provide freezer verification testing for payload containers if negotiated and coordinated in advance.

Q. Cold Stowage Late Load Launch Services - The Cold Stowage team can perform late Coldbag and GLACIER integration of PD hardware later than L-48hrs, if appropriate scientific rationale is documented in the PIA.

R. Cold Stowage Early Samples Return (Los Angeles) - Requests for early return of conditioned science samples to the PD after SpaceX recovery boat docking will be evaluated based on appropriate scientific rationale documented in the PIA. If approved, real-time ground transportation factors will determine the precise time of PD pickup. Typically early return will occur at a Los Angeles area airport facility between R+48hours and R+72hours. Cold Stowage representatives shall deliver the payload hardware/samples to the PD.

S. CMC Early Hardware Return (Los Angeles) - Requests for early return of hardware and/or non-cold conditioned science samples to the PD after SpaceX recovery boat docking will be evaluated based on appropriate scientific rationale documented in the PIA. If approved, real-time ground transportation factors will determine the precise time of PD pickup. Typically, early return will occur at a Los Angeles area airport facility between R+48hours and R+72hours. CMC representatives shall deliver the payload hardware/samples to the PD.

- T. CMC Early Hardware Return (Houston) - Hardware and/or science samples are available for early return pickup by the PD in Houston at the CMC LM16 facility, typically as early as R+72hours. Appropriate scientific rationale shall be documented in the PIA. Real-time air/ground transportation as well as overall CMC workload and prioritization factors will determine the precise time available for pickup.

Services for External Payloads:

- U. Coordinated External Contamination Analysis - The standard service provided by the Boeing External Contamination Group becomes a coordinated service if out-gassing and venting properties for materials used by the PD are not readily available.

Note 1: This service will not be available for Payloads that integrate to the JEM-EF or the COL EPF.

- V. EVA Worksite Analysis - For payloads robotically installed on to a USOS payload site, with the exception of JEM element sites, NASA via Boeing EVA and Systems Engineering and Integration will be responsible for payload contingency EVA data products and requirements definition. This includes an EVA Analysis Report (EAR) for each payload and an EVA Verification Report for each payload's integrated EVA requirements. These reports will be provided to the PD and will include all documentation required to support verification closure of the payload's integrated EVA requirements.

For payloads robotically installed on to JEM elements, EVA verification NASA and JAXA, with input from the PD, shall jointly determine if the payload has unique EVA requirements not enveloped by existing JEM-EF verification work. If an agreement is not reached, the issue shall be brought to the EVA Analysis Integration Team (AIT) for resolution. When required, JAXA shall perform EVA verification. JAXA shall develop the Integrated EVA verification analysis report (worksite and translation path) and provide it to the NASA Vehicle Office. NASA Vehicle Office representatives shall be responsible for producing any necessary exceptions paperwork, which shall be reviewed by JAXA and then presented to the EVA AIT for approval. The JAXA report of the Integrated EVA verification analysis shall be archived as part of the payload verification records.

- W. JSC Dexterous Manipulator Trainer (DMT) - The JSC DMT provides an SPDM trainer which can be used for payload robotic interface engineering unit testing and training.
- X. Glint/Obstruction Analysis - The JSC Graphics Research and Analysis Facility Lab is used for glint analysis of an ISS external payload and can also be used for truss site PAS obstruction analysis.

Appendix D: Definitions

- Center – NASA Centers, located throughout the United States, provide leadership for and execution of NASA’s work. There are nine NASA Centers, plus NASA’s only Federally Funded Research and Development Center, the Jet Propulsion Laboratory (JPL). The nine NASA Centers are: Ames Research Center (ARC), Armstrong Flight Research Center (AFRC), Glenn Research Center (GRC), Goddard Space Flight Center (GSFC), Johnson Space Center (JSC), Kennedy Space Center (KSC), Langley Research Center (LaRC), Marshall Space Flight Center (MSFC), and Stennis Space Center (SSC). For the purpose of collaboration in NASA EPSCoR, JPL is eligible to be a collaborator in the same manner as a NASA Center.
- Cooperative Agreement – An award of federal assistance similar to a grant with the exception that NASA will be substantially involved in the recipient’s performance of the project. Cooperative agreements are managed pursuant to the policies set forth in 2 CFR § 200, 2 CFR § 1800, and the *NASA Grant and Cooperative Agreement Manual* (GCAM).
- Jurisdiction – A State or Commonwealth that is eligible to submit a proposal in response to this CAN.
- NASA Research Contact – The primary NASA point of contact during the proposal writing stage for the proposed research area. If the proposer has contacted and received permission from a NASA scientific or technical person, that individual may be listed in the proposal as the NASA Research Contact. Otherwise the NASA Research Contact is the University Affairs Officer at the NASA Center, or the NASA Mission Directorate contact at NASA Headquarters.
- Principal Investigator (PI) – For this EPSCoR CAN, the Principal Investigator (PI) is the jurisdiction’s EPSCoR Director. The PI has an appropriate level of authority and is responsible for proper conduct of the research, including appropriate use of funds and administrative requirements such as the submission of the scientific progress reports to the Agency. The PI is the administrator for the proposal.
- Science-Investigator (Sc-I) – For this CAN, the Sc-I will serve as the POC with the ISS Program. The formally stated PI will remain responsible for the overall direction of the effort and the use of funds.
- Research area – One of the areas of research interest for the NASA Mission Directorate(s).
- Research Assistant – A student (undergraduate, graduate, or postdoctoral) who receives a research appointment in direct support of the NASA EPSCoR research in a research proposal.

Appendix E: NASA Points of Contact

Technical and scientific questions about this CAN may be directed to:

EPSCoR

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Inquiries regarding the submission of proposals via NSPIRES may be addressed to:

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Appendix F: Certifications

Certification of Compliance, Assurances, and Representations

Awards from this funding announcement that are issued under 2 CFR 1800 are subject to the Federal Research Terms and Conditions (RTC) located at <http://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.

By submitting the proposal identified in the Cover Sheet/Proposal Summary in response to this Research Announcement, the Authorizing Official of the proposing organization (or the individual Proposer if there is no proposing organization) as identified below—

- (a) Certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
- (b) Agrees to accept the obligation to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- (c) Confirms compliance with all applicable terms and conditions, rules, and stipulations set forth in the Certifications, Assurances, and Representations contained in this NRA or CAN. Willful inclusion of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

The AOR's signature on the Proposal Cover Page automatically certifies that the proposing organization has read and is in compliance with all certifications, assurances, and representations as detailed in GCAM Appendix C, Section C1. The GCAM can be found at the following site: http://naistst1.nais.nasa.gov/pub/pub_library/srba/certs.html.

Note: On February 2, 2019, the System for Award Management (SAM) implemented a new process that allows financial assistance registrants to submit common Federal Government-wide certifications and representations. The new process will be required effective January 1, 2020. Guidance on the new process and system change can be found at:

<https://interact.gsa.gov/blog/certifications-and-representation-improvements-sam>