



Earth Venture Instrument-5 SALMON-3 AO Program Element Appendix (PEA) Prospective Bidders Web Conference

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Purpose & Outline

1. Present an overview of the *Earth Venture Instrument-5* (EVI-5) PEA of the *SALMON-3 AO*.
2. Discuss differences between EVI-5 and EVI-4.
3. Point to documents in the EVI-5 Library.
4. Answer questions from you.



Overall Context & What is a PEA?

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- EVI-5 is solicited through a *Program Element Appendix (PEA)*.
- The *EVI-5 PEA* is an Appendix of the *Third Stand Alone Missions of Opportunity Notice (SALMON-3) Announcement of Opportunity (AO)*.
- All proposers must read both the *EVI-5 PEA* and the *SALMON-3 AO* carefully, and must comply with the requirements and constraints contained within the two documents.
- The *EVI-5 PEA* replaces, supersedes and clarifies some of the information in *SALMON-3 AO*, but not all of the information required to propose is contained in the PEA.



Venture Class – ESD Objectives

A sustained, successful Venture-class element is a priority from both the 2007 and the 2017 Decadal Surveys.

- Advances science/applications and promotes community involvement through frequent, regular proposal opportunities;
- Ensures overall program scientific flexibility and responsiveness through constrained development schedules.

ESD Venture-class characteristics:

- Science-driven, involving sustained (> seasonal) data acquisition;
- Technology developments/demonstrations are not solicited;
- Frequent, regular solicitations:
 - 4 year frequency for EVS-# (Suborbital) & EVM-# (Mission);
 - Nominal 18 month frequency for EVI (Instruments and CubeSat investigations);
- Competitively selected, PI-led.
- Cost Capped and Schedule Constrained.
 - Explicit cost caps per investigation defined in each solicitation;
 - <5-year development time-to-launch for space missions or delivery to platform for EVI. All science requirements must be achieved within nominal (typically 1-3 year) mission.



Scope and Parameters

Science Scope

- EVI-5 solicitation will be an open call to address science from any of the Earth Science Focus Areas or any of the thirty-five 2017 Decadal Survey science questions.

Evaluation Criteria

- Evaluation criteria in the SALMON-3 and PEA will be used to evaluate proposals
 - (a) *Intrinsic Science Merit of the Proposed Investigation* 40%,
 - (b) *Experiment Science Implementation Merit and Feasibility of the Proposed Investigation* 30%, and
 - (c) *Technical, Management, and Cost (TMC) Feasibility of the Proposed Investigation Implementation* 30%.

Partnerships

- Enabling partnerships are encouraged, however the stability & reliability of the partnership will be considered as a risk element in the proposal.

Complete investigations with the proposed instrument or CubeSat(s) shall be proposed.



Access To Space

- Access to space for all EVI solicitations is provided by NASA.
- Proposals are required to clearly state the desired and acceptable orbits and operational constraints (e.g., duty cycle or observational cadence) and describe the relative scientific merits of each possible orbit.
- A “Template for EVI-5 Accommodation Worksheet” is provided on the EVI-5 Library for proposers to provide Instrument accommodation requirements to be levied on the NASA provided platform.
- Proposals may include information on any research that has been completed to identify potential payload accommodations. However, this is not a requirement for any proposal.
- The access to space budget is outside the PI managed cost cap and is not cost constrained. This is separately managed by NASA.
- ISS is not considered as a hosting option for this solicitation.
- NASA’s CubeSat Launch Initiative (CSLI) provides regular launch opportunities for CubeSats as secondary payloads on U.S. Government missions. For information, please check the following website:
http://www.nasa.gov/directorates/heo/home/CubeSats_initiative.html.



EVI Selection History

Previous EVI Selections:

- EVI-1: Selected November 2012; **TEMPO** GEO Hosted payload.
- EVI-2: Selected July 2014; two ISS payloads; **GEDI** Class C & **ECOSTRESS** Class D.
- EVI-3: Selected March 2016; **MAIA** Class C LEO hosted & **TROPICS** CubeSat constellation.
- EVI-4: Selected February 2018; **EMIT** Class C ISS payload & **PREFIRE** Class D CubeSat pair.
- EVI-5: Current solicitation
- Seven Overall: One GEO; One LEO; Three ISS; Two CubeSat



Earth Science Focus Areas

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The *2014 Science Mission Directorate Science Plan* is available through the EVI-5 Library and can also be found at <http://science.nasa.gov/about-us/science-strategy/>.

The NASA Earth science research program strives to advance Earth system science and has goals in the following six *Science Focus Areas* and *Applied Sciences* as well as interdisciplinary programs:

- Atmospheric Composition
- Weather
- Carbon Cycle & Ecosystems
- Water & Energy Cycle
- Climate Variability & Change
- Earth Surface & Interior
- Further the use of Earth system science research to inform decisions and provide benefits to society

The focus areas and their main aims are articulated in the *2014 Science Mission Directorate Science Plan*.



2017 Decadal Survey

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Thriving on Our Changing Planet

A Decadal Strategy for Earth Observation from Space

#EarthDecadal

*The National
Academies of*

SCIENCES
ENGINEERING
MEDICINE



Prioritization Criteria

Earth Decadal Survey



35 » **103**
Questions **Objectives**
see Table 3.3

Most Important **24**
Very Important **25**
Important **54**

AREA	DESCRIPTION
Science Questions	Science objectives that contribute to answering the most important basic and applied scientific questions in Earth System science. These questions may span the entire space of scientific inquiry, from discovery to closing gaps in knowledge to monitoring change.
Applications & Policy	Science objectives contributing directly to addressing societal benefits achievable through use of Earth System science.
Interdisciplinary Uses	Science objectives with benefit to multiple scientific disciplines, thematic areas, or applications.
Long-Term Science and/or Applications	Objectives that can support scientific questions and societal needs that may arise in the future, even if they are not known or recognized today.
Value to Related Objectives	Science objectives that complement other objectives, either enhancing them or providing needed redundancy.
Readiness	Are we in a position to make meaningful progress to advance the objective, regardless of measurement?
Timeliness	Is now the time to invest in pursuing this objective? Examples include recently occurring phenomena that require focused near-term attention and the existence of complementary observing assets that may not be available in the future.



EVI-5 PEA: Overview 1 of 2

Solicits Instrument and CubeSat Investigations

Single-Step Evaluation & Selection Process

PI-Managed NASA Life Cycle Cost Cap

- The proposed PI-Managed Mission Cost shall be no more than \$108M for Class C instrument or \$35M for Class D instrument or CubeSat based investigations in FY 2022 dollars. Also, a \$5M Science Enhancement Option for Class D / CubeSats.
- The PI-Managed Mission Cost excludes the integration of the instrument to the selected platform or the integration of the CubeSat(s) to the selected launch vehicle but includes proposed science activities in all Phases A-F.

Life Cycle Schedule

- Delivery of Class C Instrument (end of Phase C) by ~May, 2024.
- Delivery of Class D Instrument (end of Phase C) by ~ May, 2023.
- Delivery of CubeSat(s) (within Phase D) by ~ May, 2023.



EVI-5 PEA: Overview 2 of 2

Standard NASA Earth Science Data Policy for Missions, no period of exclusive use.

Education and Communications Programs

- Education Program Plan and/or a Communications and Outreach Program Plan are not required with the proposal. A Communication Program may be required after selection, however those costs will be mostly outside the PIMMC.

No limit on non-NASA or non-US contributions

- Contributions to the investigation (part of hardware and/or investigators) on a no-exchange-of-funds basis is permitted with no cost limitations.
- Enabling partnerships are encouraged, however the stability & reliability of the partnership will be considered as a risk element in the proposal.

Complementary Data - Each proposal shall clearly outline which additional ongoing or planned observations, instrumentation, or platforms, if any, are required for the proposed investigation to achieve its baseline mission science investigation. The proposal shall describe how the high-level science requirements will be impacted if such observations, instrumentation or platforms are not available when the proposed investigation requires them.

Risk Classification

- Payload Class C or Class D (see cost limits).



PI-Managed Mission Cost (PIMMC)

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Reminder: What is included in the PI-Managed Mission Cost?

- Cost of the Instrument (Phases A-C) and/or CubeSat(s) (Phases A-C and part of Phase D).
- Science Team support, Algorithm Development, Calibration & Validation.
- Key management and engineering staff during Phase D (Project Manager, Instrument Manager, Systems Engineer, etc.) assuming a 2 year Phase D.
- Post-launch instrument commissioning activity (within Phase D).
- Phase E & F – e.g., Operation & Ground processing, Data Analysis & proposed data product generation.
- Any Student Collaboration cost above 1% of the PI-Managed Mission Cost.

What is not part of PI-Managed Mission Cost, yet required in proposal?

- Investigation Costs during a potential gap between completion of instrument or CubeSat(s) and start of integration (planning budget up to 4 years, on a per-year basis for Instruments and planning budget up to 2 years, on a per-year basis for CubeSat(s))
- Integration and test to selected platform (within Phase D) (planning budget nominally 2 years for Instruments and 1 year for CubeSats).



Evaluation Process

Proposers should be aware that, during the evaluation and selection process, NASA may request clarification of specific points in a proposal; if so, such a request from NASA and the proposer's response must be in writing. In particular, before finalizing the evaluation of the *TMC Feasibility of the Proposed Investigation Implementation* (see Section 7.2.4), NASA will request clarification on specific, potential major weaknesses that have been identified in the proposal. NASA will request clarification in a uniform manner from all proposers. The ability of proposers to provide clarification to NASA is limited, as NASA does not intend to enter into discussions with proposers. A typical limited response is to direct NASA's attention to pertinent parts of the proposal without providing further elaboration.

For the EVI-5 solicitation, NASA also intends to request clarifications on potential major weaknesses for the *Intrinsic Science Merit of the Proposed Investigation* and the *Experiment Science Implementation Merit and Feasibility of the Proposed Investigation* criteria.



EVI-5 Proposal Schedule

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Nominal EVI-5 PEA Release

~ June, 2018

EVI-5 Pre-Proposal Workshop*

~ 2 Weeks After PEA Release

*via WebEx; see the EVI-5 Acquisition Homepage at <http://essp.larc.nasa.gov/EVI-5/> for date, agenda, and logistical information

EVI-5 Notices of Intent Due*

~ 3 Weeks After PEA Release

*Required and must include all PI, Co-Is and collaborators to facilitate planning for review process.

EVI-5 Q&A Period Closes

~ 2 Weeks Before Proposals Due

EVI-5 Proposals Due

~90 Days After PEA Release



Changes In EVI-5 From EVI-4 (1 of 3)

- EVI-5 solicitation is a PEA of the SALMON-3 AO instead of SALMON-2 AO.
- ISS will not be available as a proposed observation platform.
- References to the 2017 Earth Science and Applications from Space (ESAS) Decadal Survey replace earlier references.
- EVI-5 PEA solicits proposals that respond to 2017 Decadal Survey science questions as well as science goals outlined in the 2014 Science Mission Directorate Science Plan.
- The new SMD Guidelines for Class D missions are referenced in the PEA and are available in the EVI-5 Library.



Changes In EVI-5 From EVI-4 (2 of 3)

- Proposers are cautioned to avoid substantial overlap with previously-selected space missions.
- ESSP PO support for certain communication activities, e.g., launch support, small brochures, mission in-orbit animations, project videos, key concept videos, and social media video series. Requires a “small” contribution from the project.
- 30-page limit for the Heritage Appendix – Section J.9 of the SALMON-3 AO.



Changes In EVI-5 From EVI-4 (3 of 3)

- A Science Enhancement Option (SEO) for Class D / CubeSat investigations with a separate \$5M budget added for the following activities:
 - Enhanced applications activities;
 - Decreased data latency to enhance science objectives and/or the operational or applications objectives of other agencies or partners;
 - Enhanced calibration/validation activities;
 - More robust and wide-ranging science team support.

The core investigation (without SEO) must still be viable and meet all requirements.

- Applications section added using similar language to that used in the EVM-2 solicitation.
- An ITAR-free version of the proposal is required to be submitted via CD-ROM.



Cost Cap and Accounting

The PI-Managed Mission Cost Cap for an Earth Venture Instrument investigation depends on the instrument class as described in Section 4.5 of this PEA. For Class D instrument-based investigations or for CubeSat-based investigations, the cost cap is \$35M in FY22 dollars plus possible \$5M for SEO. For Class C instrument based investigations, the cost cap is \$108M in FY22 dollars.

NASA expects to select some combination of Class C and Class D investigations based on funding availability at the time of selection, assuming all such investigations are deemed selectable.

4.5.4. Full Cost Accounting for NASA Facilities and Personnel

Please refer to text in Section 4.5.4 of the EVI-5 PEA and Section 5.7.5 of the SALMON-3 AO.



Investigation Schedule

4.5.5 Schedule Requirements and Constraints

Requirement tbd-16.

For Class C instrument investigations, proposals shall include a development schedule that delivers an instrument for integration onto the selected platform no later than five years after the initial award.

For Class D instrument or CubeSat investigations, proposals shall include a development schedule that is consistent with Class D requirements and that delivers an instrument for integration onto the selected platform and/or a CubeSat(s) that can be integrated to a launch vehicle no later than four years after selection.



CubeSats

The EVI-5 PEA maintains the limit on CubeSats at 6U.

4.6.2 CubeSat Investigations

Requirement tbd-18. All CubeSat investigations proposing compliance with the requirements in the NASA Launch Services Program, *Program Level Dispenser and CubeSat Requirements Document* shall propose CubeSat form factors (size) no larger than 6U, with qualifying form factors of 1U, 1.5U, 2U, 3U, 6U (2x1x3). Concepts that do not comply with these standards shall clearly describe how their designs are packaged and deployed. CubeSat form factors larger than 6U will not be considered.



Data Policy

4.6.6 NASA Earth Science Data Policy

Proposals shall clearly identify the standard data products from the investigation and describe the complete data processing flow leading to archived data products, including the time required to complete the initial and final on-orbit calibration and validation of the measurements. Proposal shall show adequate resources for delivering data products to the assigned NASA DAAC(s).

Proposals shall clearly present a plan for analysis of the mission data leading to completion of the proposed science investigation and achieving the identified investigation goals and objectives. Proposals shall show that adequate resources, including funding, schedule, and personnel, are identified to complete the proposed science investigation. Proposals shall demonstrate a clear commitment to providing data at the earliest possible time to the broader scientific and applications communities.



ITAR and EAR

Proposal Content Requirements

Requirement tbd-27. All proposers shall answer the key data questions regarding the presence of export-controlled information in the proposal either YES or NO when completing the electronic submission; these questions shall not be left unanswered.

Note that it is the proposer's responsibility to determine whether any proposal information is subject to the provisions of ITAR or EAR (Export Administration Regulations). Information about U.S. export regulations is available at <http://www.pmddtc.state.gov/> and at <http://www.bis.doc.gov/>.

Requirement tbd-28. All proposals shall identify any export-controlled material in the proposal as instructed in Sections 5.9.3 of the SALMON-3 AO; in addition, (a) the export-controlled material shall be printed in a red font or enclosed in a red box as described in the required statement in Requirement 99 of the SALMON-3 AO, and (b) an electronic version of the proposal, in PDF format, with the ITAR export-controlled material redacted but otherwise identical to the full unredacted version, shall be included on the proposal CD-ROM.



Proposal Preparation & Submission

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Proposal Submission Requirements

Requirement tbd-29. The proposal shall be submitted electronically through NSPIRES no later than the time deadline on the proposal due date given in Section 7 of this PEA.

Proposal CD-ROMs shall be sent to the address given in Section 6.2.3 of the SALMON-3 AO so that it is received no later than the CD-ROM due date stated in Section 7 of this PEA.



EVI-5 Homepage and Library

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Proposers are encouraged to periodically check the EVI-5 Acquisition Homepage. This site provides updates and any PEA addenda during the solicitation process. It provides links to the PEA, any pertinent announcements, PowerPoint presentations for the Prospective Bidders Web Conference and the Preproposal Conference (when available), EVI-5 questions and answers, and the list of potential teaming partners.

The EVI-5 Library provides additional regulations, policies, and background information related to the solicitation. Examples of new and updated documents and links in the EVI-5 Library are:

- 2018 NASA Strategic Plan
- Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space. (2017)
- ESSP Program Plan
- The Common Instrument Interface (CII) links
- Draft 2018 Directive on Project Applications Program Tailored for EV Projects
- Class D Policy and Related Links Website
- Updated Microsoft Excel Versions of the Template Tables in the SALMON-3 AO



Questions??

Questions and Comments

All questions pertaining to the EVI-5 PEA MUST be addressed to:

Hank Margolis
Earth Venture Instrument-5 Program Scientist
Earth Science Division
Science Mission Directorate
NASA Headquarters
Washington, DC 20546

Preferably by email at:

Hank.A.Margolis@nasa.gov
Subject line to read "EVI-5 PEA"