National Aeronautics and
Space Administration

Geospace Dynamics Constellation (GDC) Mission of Opportunity Evaluation Plan Investigation Implementation Study (IIS) Phase

Third Stand Alone Missions of Opportunity Notice Announcement of Opportunity NNH17ZDA004O, Program Element Appendix P Investigation Implementation Study (IIS) Guidelines and Criteria

August 24, 2022

Introduction

This evaluation is a second step following a selection under the Third Stand Alone Mission of Opportunity Notice (SALMON-3) Announcement of Opportunity (AO) and Geospace Dynamics Constellation (GDC) Mission of Opportunity (MO) Program Element Appendix (PEA) P.

At an outcome of the Step 1, five investigations were selected for Investigation Implementation Studies (IISs), which constitute the early part of each investigation's Concept and Technology Development Phase (Phase A) of the Formulation process, as outlined in NPR 7120.5E.

Under IIS contracts with NASA, the five investigation teams will develop Investigation Implementation Reports (IIRs) which constitute updates to their Step 1 proposals.

IIS teams have been provided *Geospace Dynamics Constellation Investigation Implementation Study Guidelines and Criteria* outlining specific requirements that apply to their IIRs.

This Evaluation Plan is to define the ground rules, processes, organizations, and schedules to be used in evaluating the GDC MO Phase A Investigation Implementation Reports (IIRs).

The outcome of this competitive IIS step will be the down-selection of up to two investigations:
- Up to one investigation providing a magnetometer,
- Up to one investigation providing a plasma instrument.

Investigations Selected for IIS

The following three investigations are being considered for delivery of magnetometers to the GDC spacecraft:

- Magnetic Field Investigation for Currents and Energy Flow in Magnetosphere-Ionosphere-Thermosphere Coupling (**MAG**), led by Guan Le at NASA Goddard Space Flight Center,
- Near Earth Magnetometer Instrument in a Small Integrated System (**NEMISIS**), led by Mark Moldwin at University of Michigan in Ann Arbor,
- MAGnetometers to Advance GDC (**MAG**), led by David Miles at University of Iowa in Iowa City.

The following two investigations are being considered for delivery of thermal plasma instruments to the GDC spacecraft:

- Thermal Plasma Sensor for the Geospace Dynamics Constellation (**TPS**), led by Philip Anderson at University of Texas in Dallas,
- 3-Dimensional ion velocity and composition Imager (**3DI**), led by Keiichi Ogasawara at Southwest Research Institute in San Antonio.

$250K and ≅4 months were allocated to each IIS. Due date for IIR **September 15, 2022**

Evaluation Approach

Each IIS is selected to resolve deficiencies and risks identified in their Step-1 proposal during the evaluation process. IIRs will be considered modifications of the Step-1 proposals and evaluated as such.

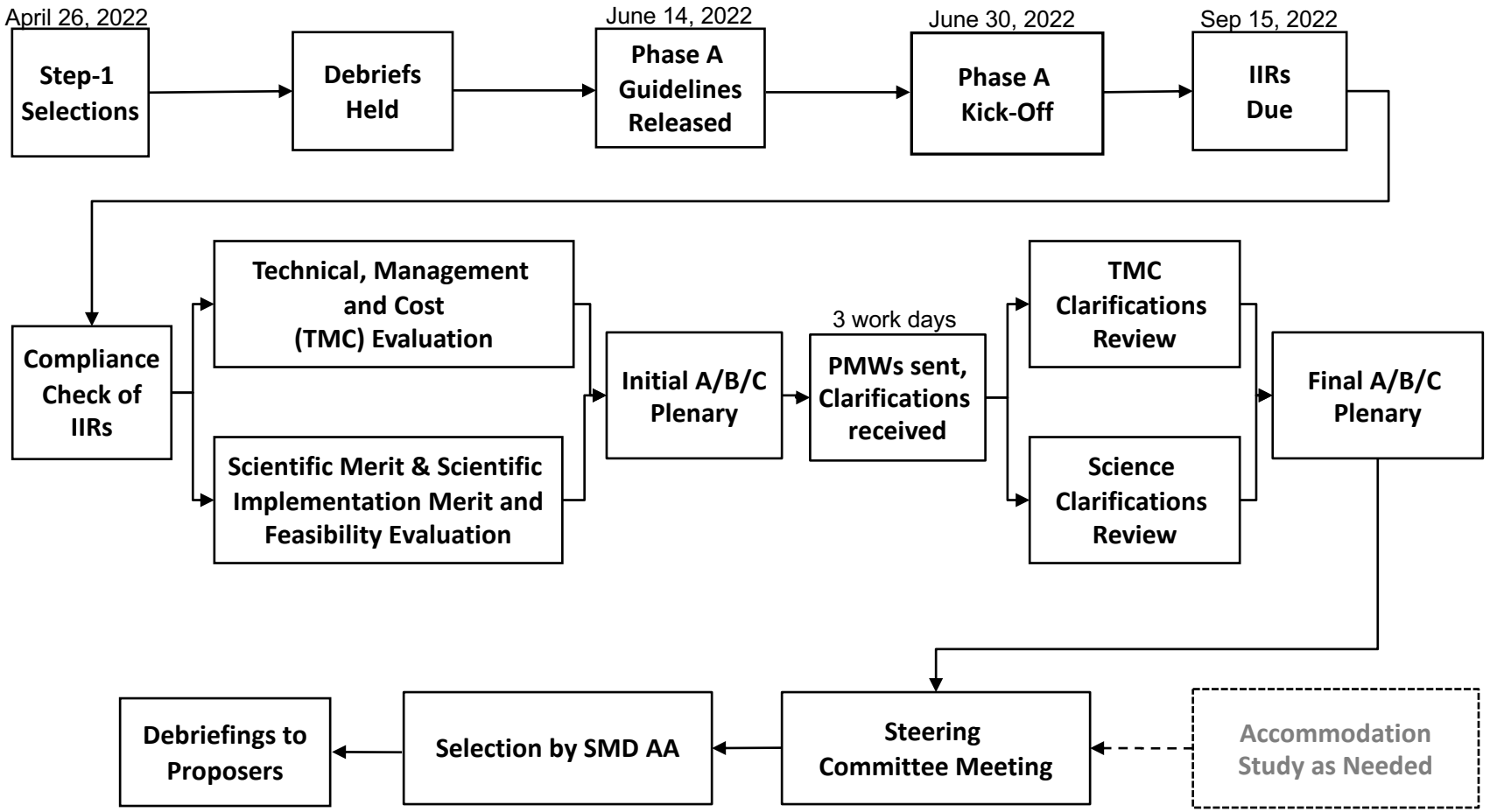
The IIS evaluation starts with the outputs of the Step 1 evaluation including Form A, Form B and Form C. There will be no re-evaluation of any of the aspects of the Step-1 proposal that are not changed by the IIR.

The requirements, evaluation criteria and selection factors remain all the same as for the SALMON-3/PEA-P and associated evaluation plan. Based on the modifications described in the IIR, the evaluation will produce amended Form A, Form B and Form C for submission to the Selection Committee.

This evaluation plan has two major sections:

- IIR-specific evaluation plan
- Evaluation factors and Products from the SALMON-3/PEA-P evaluation plan that remain unchanged for IIS application.

Proposal Evaluation Flow



Handling of Proprietary Data

- The evaluation team will be provided access to the Step-1 evaluations and will perform their evaluation with the Step-1 forms as a basis.
- All IIR materials, as well as the Step-1 evaluation forms, will be considered proprietary.
- Viewing of IIR materials and Step-1 evaluation forms are only on a need-to-know basis.
- Each evaluator signs a Non-Disclosure Agreement (NDA) that must be on file at NRESS prior to any IIR materials and Step-1 evaluation forms being distributed to that evaluator.
- The proposal materials that each evaluator has access to is recorded.
- Evaluators and Observers will be briefed at a Kickoff telecon on how to handle the IIR material.
- Evaluators are not permitted to discuss proposals with anyone outside the Science and TMC Panels, without the prior approval of the Program Scientist.
- All proprietary information that must be exchanged between evaluators will be exchanged via the secure NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES), via secure NASA Box, via the secure Remote Evaluation System (RES), secure WebEx or via encrypted email, FedEx, fax, or regular mail. Weekly Web conferences among TMC Panel evaluators will be conducted via secure lines.
- Evaluators' electronic and paper evaluation materials will be deleted/destroyed when the evaluation process is complete. Archival copies will be maintained in the NASA SOMA vault.
- SPD-17 detailing Observers at Review Panels will be followed. Observers will not have access to IIR or evaluation materials.

Conflict of Interest Prevention Requirements

- NASA will assemble an evaluation team of scientific and technical peers.
- The Science and TMC Panel members will be on-boarded through the NASA Science Office for Mission Assessments (SOMA) support contractor, Cornell Technical Services (CTS), and the non-Civil Servants will be hired as contractors.
- The Step-1 evaluation process completed an extensive Conflict of Interest prevention process for both the Science Panel and the TMC Panel. This included:
  - Cross-check of Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational COI exists.
  - All evaluators must divulge any other financial, professional, or potential personal COI, and whether they work for a profit-making company that directly competes with any profit-making proposing organization.
  - All Civil Service evaluators must self certify confirming that no COI exits.
  - Development and maintenance of the Conflict of Interest Mitigation Plan and Mitigation Logs.
- NASA will select the evaluation team with appropriate amount of overlap with the Step-1 evaluation team.
- The same COI prevention processes will be repeated where needed to capture:
  - Any change in proposal participants for any of the proposals participating in the IIS,
  - Any change in COI situation since the Step-1 evaluations,
  - Any new evaluators on the Science or TMC panel(s).
- CTS cross-checks all contracted Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational COI exists.

Organizational Conflict of Interest Avoidance and Mitigation Plan

The GDC PEA requires that each proposal include an Organizational Conflict of Interest Avoidance Plan (OCIAP, Req. P-2). That Plan must cover:

- Both proposal development (past) and instrument development (future)
- Contracts and companies that were involved in the development of PEA requirements
- Actions to avoid and mitigate OCIs due to those contracts'/companies' involvement

Each Plan will be evaluated by NASA outside of Forms A, B, and C, and will not be included in the Preliminary Major Weaknesses process. The evaluation will be performed by NASA Civil Servants from the Office of General Counsel and the Office of Procurement, with the results returned to the GDC Program Scientist.

The evaluations will be conveyed to the Selection Official to confirm compliance and responsiveness. Compliant and responsive Plans will not affect the selection process.

The Plans will be finalized, addressing any NASA-identified issues, and need to be accepted before contract awards are in place.

Compliance Checklist

NASA will check for compliance with the Guidelines before releasing a IIR for evaluation. All other requirements will be checked during evaluation.

IIS-Specific Compliance Items

1. Electronic IIRs received on time
2. IIR includes all required files and sections
3. Each IIR section meets its page limits
4. IIR submission meets general requirements for format and completeness (maximum lines text/page, maximum characters/inch – font size, margins)
5. No additional file or section included beyond those required
6. Budgets are submitted in required formats
7. Modifications from the Step 1 proposal are clearly marked per the Guidelines
8. The “Resolution of Investigation Deficiencies and Risks” section discusses all modifications.
9. All export-controlled information has been identified and a redacted version of the IIR included.

Compliance Checklist

Compliance Confirmation as already applied to Step-1 proposals

11. Complied with restrictions Involving China
12. Addresses solicited science, exploration, or technology programs
13. Requirements traceable from objectives to mission
14. Plan to calibration, analyze, publish, and archive the data returned
15. Baseline and Threshold Investigation defined
15. Complete spaceflight mission (Phases A-F) proposed
16. Team led by a single PI (Principal Investigator)
17. PI-Managed Mission Cost within the PEA-specific Cost Cap (if PEA specifies Cost Cap)
18. Contributions within contribution limit (if PEA specifies a contribution limit)
19. Co-Investigator costs in budget
20. Launch/Commitment date prior to deadline (if PEA specifies a deadline)
21. Includes table describing non-U.S. participation
22. Includes letters of commitment from funding agencies for non-U.S participating institutions
23. Includes commitment from all U.S. organizations offering contributions
24. Includes letters of commitment from all major partners and non-U.S. institutions providing contribution of efforts of anyone on the Proposal Team.
25. Includes an Instrument Manufacturing Plan

Note: SALMON-3 Section 5.9.1.2 states "Major partners are the organizations, other than the proposing organization, responsible for providing research leadership, project management, system engineering, major hardware elements, science instruments, integration and test, mission operations, and other major products or services as defined by the proposer."

Initial Science Evaluation

- The Program Scientist leads the Science Panel.
- The science evaluation will be conducted via two sub-panels, one for each instrument type.
- Starting from the Step-1 Forms A and B, the Science Panel evaluates **any changes to** the Intrinsic Science Merit of the Proposed Investigation and the Experiment Science Implementation Merit and the Feasibility of the Proposed Investigation.

Initial TMC Evaluation

- The SOMA Acquisition Manager leads the TMC Panel.
- Starting from the Step-1 Form C, the TMC Panel evaluations **any changes to** the TMC Feasibility of the Proposed Investigation Implementation.
- The TMC evaluation will be conducted via two sub-panels with appropriate overlap with the two Step-1 subpanels.

Initial TMC and Science Evaluation: Principle

The evaluation of the IIRs will be based on and will incorporate the Step-1 proposals' evaluation findings.

For each criterion, the evaluation process will consider:

- whether the IIS has successfully resolved any deficiencies or risks identified in Step-1,
- whether any new deficiencies or risks have been introduced, and
- whether any additional strengths have been developed.

NASA does not intend to re-review the Step-1 proposal. Any new deficiencies, risks, and strengths will be identified as part of the assessment of the IIR's modification, clarification, and/or additional support of the investigation design and implementation.

Initial TMC and Science Evaluations: Process

- Each IIR is evaluated by assigned panel members, with a Form Lead for each proposal leading the discussions.
- Each panel member reviews the Step-1 evaluations and the IIRs, and independently generates findings in the form of modified or new Strengths and Weaknesses.
- During the teleconference, IIRs and the individual evaluations (including any non-panel/mail-in evaluations from special experts) are discussed.
- Following the teleconference, the Form Leads capture/synthesize individual evaluations including discussions and generates the Phase A Draft Evaluation Forms including draft findings.

TMC Cost Analysis: Competitive Phase A Process

- The Step-1 cost evaluations will be available to the IIR cost evaluators
- Updates to the Step-1 cost analyses will be accomplished on the basis of information provided in the IIRs (consistency, completeness, proposed basis of estimate, contributions, use full cost accounting, maintenance of reserve levels, cost management, etc.).
- One or more cost models are utilized to validate the proposed cost. The independent cost models utilized in the evaluation are first compared against as-flown actual cost of instruments similar to those proposed to determine applicable error bars.
- Implementation threats are identified.
- Cost threat impacts to the proposed unencumbered reserves are assessed (see Cost Threat Matrix slide). The remaining unencumbered reserves are compared to the minimum required in the PEA.
- The entire panel participates in Cost deliberations. All information from the entire evaluation process is considered in the final cost assessment.
- Cost Risk is reported as an adjectival rating, ranging from “LOW Risk” to “HIGH Risk” on a five-point scale.
- Significant findings are documented in the Cost Factor on Form C.

Initial Plenary

Science and TMC Panels combine at the Initial Plenary.

The Initial Plenary is used to identify significant issues related to Criterion A, B and C based on the initial evaluation of the IIRs. Initial Step-2 Forms A, B, and C are reviewed.

The goals of the Initial Plenary are to:

1. Identify Major Weakness, Minor Weaknesses, Major Strengths and Minor Strengths of each IIR
2. Ensure consistency between Science and TMC evaluations for each IIR
3. Ensure consistency and fairness of evaluations across all IIRs
4. Prepare Potential Major Weaknesses (PMWs) for submission to the Clarification process.

No polling on grades occurs at the Initial Plenary.

Clarifications

NASA will request clarifications of PMWs identified by the evaluation panels in all three criteria; Intrinsic Science Merit of the Proposed Investigation (Form A), Experiment Science Implementation Merit and Feasibility of the Proposed Investigation (Form B), and TMC Feasibility of the Proposed Investigation Implementation (Form C). NASA will request such clarification uniformly, from all five proposers.

- All requests for clarification from NASA and the proposers' responses are in writing.
- The ability of proposers to provide clarification to NASA is limited to the guidelines described on Charts # 17 – 20.
- PIs whose proposals have no PMWs are informed that no PMWs have been identified at that time, however, they are free to provide any additional information relevant to the proposed investigation as explained in Requirement 7.
- The PIs are given 3 full working days to respond to the request for PMW clarification.

PMWs Clarification Process Requirements (1 of 4)

Clarifications Responses must conform to the following requirements:

Requirement 1: Proposers shall submit a single Clarification Response Documents; i.e., one document covering Intrinsic Science Merit of the Proposed Investigation, Experiment Scientific Implementation Merit and Feasibility of the Proposed Investigation and TMC Feasibility of the Proposed Investigation Implementation.

Requirement 2: The Clarification Response Document shall be a single unlocked (e.g., without digital signatures) searchable Adobe Portable Document Format (PDF) file, composed of the response text, figures, and/or tables. Images (e.g., figures and scans) shall be converted into machine-encoded text using optical character recognition. Animations shall not be included. Links to materials outside of the response are not permitted. Do not insert any comment fields.

PMWs Clarification Process Requirements (2 of 4)

Requirement 3: The Clarification Response Document shall be presented in 8.5 x 11 inch paper (or A4). Text shall not exceed 5.5 lines per vertical inch and page numbers shall be specified. Margins at the top, both sides, and bottom of each page shall be no less than 1 inch if formatted for 8.5 x 11 inch paper; no less than 2.5 cm at the top and both sides, and 4 cm at the bottom if formatted for A4 paper. Type fonts for text, tables, and figure captions shall be no smaller than 12-point (i.e., no more than 15 characters per horizontal inch; six characters per horizontal centimeter). Fonts used within figures shall be no smaller than 8-point.

Requirement 4: The Clarification Response Document shall not exceed a total of **six** pages. Text, table(s) and figure(s) are permitted, however all material shall be within the **six** page limit and limitations in Requirement 3.

PMWs Clarification Process Requirements (3 of 4)

Requirement 5: The Clarification Response Documents shall not contain International Traffic in Arms Regulations (ITAR), Export Administration Regulations (EAR), or classified material.

Requirement 6: Each PMW shall be addressed and each clarification response labelled with the PMW number provided. Each PMW clarification response shall only contain information relevant to the PMW.

Requirement 7: The proposers are free to provide any additional information on any criteria or requirements relevant to the proposed investigation, e.g., for TMC Feasibility of the Proposed Investigation Implementation, advances in proposed technologies since proposal submission. However, this response together with the PMW clarification responses shall fulfill requirements above and not exceed the total page limitation per Clarification Response Document.

PMWs Clarification Process Requirements (4 of 4)

Requirement 8: In support of each PMW clarification response, proposers shall not provide more than two new references; references are restricted to peer reviewed literature. In support of any additional information response, proposers shall not provide more than three additional references; references are restricted to peer reviewed literature. Proposers shall not provide URLs with any of the responses, with the exception of any DOI links for the references. References that were already included in the IIR do not count towards this limit.

Requirement 9: Proposers shall include within the PMW clarification response page limit all modifications to the Science Traceability Matrix, Table B1, the Mission Traceability Matrix, Table B2, the Master Equipment List, Table B4, existing fold-outs (this includes cost Tables B3a and B3b) and any new fold-out submissions. Proposers shall append to the response, outside of the page limitation, complete versions of any fold-out or table mentioned above that contains at least three modifications and are encouraged to append any fold-out or table mentioned above that contains less than three modifications. The modified part of a fold-out or table, or a new fold-out or table will be counted against the response page limit as described in SALMON-3 AO Requirement B-4. Modifications presented in text form shall be clearly labeled to enable reviewers to easily identify changes in a fold-out. All fold-outs, whether included (in part or in whole) in the response or appended to the response, shall have modifications clearly marked by the use of yellow font color or by a yellow-bordered box (labeled “PMW Clarification”).

Final Plenary

Science and TMC Panels combine at the Final Plenary. The panels finalize all evaluation Forms based on the information in the IIRs, as well as updates to the IIRs via clarifications.

Only Major Strengths and Major Weaknesses are considered in the Ratings for all Forms (A, B, C).

Forms A & B Ratings: Polling will be held twice on the Form A and B ratings. The individual ratings from the final polling are recorded and reported. The final rating is set equal to median of the final polling. A median score that falls between two ratings will be “rounded” up. If there is a divergence of opinion, there may be additional rounds of discussion and polling. Half-step ratings for the Intrinsic Science Merit and Experiment Science Implementation Merit and Feasibility criteria may be used.

Form C Rating: The Form C will be reviewed three times. Polling will be held twice on the Form C risk rating after the last two reviews of the Form C. The final polling is recorded and reported. For the final polling, the individual ratings are recorded, the median calculated and the final rating recorded which reflects the Form C Risk rating of the median of the polling. A median score that falls between two risk ratings will be “rounded” to the higher risk rating. If there is a divergence of opinion, there may be additional rounds of discussion and polling.

Cost Risk Rating: Polling will be held twice on the Cost Risk risk rating after the first two reviews of the Form C. The rest of the methodology is the same as for the Form C Risk rating above.

Accommodation Study

After the evaluation, but prior to the selection decision, NASA might perform an accommodation study of selectable investigation proposals to assess the extent to which the proposed investigations are compatible with other potential investigations and spacecraft, including their interfaces and operations. This accommodation study would also consider the accommodations of selectable proposals for launch.

An accommodation study was carried out in Step-1 on the basis of the Step-1 proposals, which were accompanied by and Accommodations tables.

Changes to instrument designs that result in changes to the accommodation tables, are an example situation where NASA might decide to carry out a new accommodation study.

If carried out, this accommodation study will be performed by firewalled NASA Civil Servants working in the GDC Project Office, with potential support from contractors whose participation in the GDC PEA has been fully limited (GDC PEA, Section 4.2.1).

Steering Committee

Once Forms A, B, and C have been completed, the Evaluation is considered complete unless any issue is questioned by a subsequent AO Steering Committee review.

The AO Steering Committee will conduct an independent assessment of the IIR evaluation processes regarding their compliance to established policies and practices, as well as the completeness, self-consistency, and adequacy of all supporting materials.

Selection Criteria

The results of the IIR evaluations based on the criteria described in the SALMON-3 AO and the applicable PEA will be considered in the selection process.

The Selection Official(s) may take into account a wide range of programmatic factors in deciding whether or not to select any proposals and in selecting among top-rated proposals, including, but not limited to, planning and policy considerations, available funding, programmatic merit and risk of any proposed partnerships, and maintaining a programmatic balance across the mission directorate(s). While NASA develops and evaluates its program strategy in close consultation with the NASA community through a wide variety of advisory groups, NASA programs are evolving activities that ultimately depend upon the most current Administration policies and budgets, as well as programs' objectives and priorities that can change quickly based on, among other things, new discoveries from ongoing missions.

The investigation PI-Managed Mission Cost will be considered in the final down-selection of investigations, including the necessity of any updates to ensure the completion of the proposed investigation objectives and the delivery of instrument flight units for integration onto the GDC spacecraft without driving unanticipated cost growth or schedule delays on either the spacecraft or the investigation itself.

Third Stand Alone Missions of Opportunity Notice Announcement of Opportunity NNH17ZDA004O and GDC PEA-P

Evaluation Plan Elements

Unchanged for Phase A IIR Evaluations

Principles for Evaluation

- All proposals are to be treated fairly and equally.
- Merit is to be assessed on the basis of material in the proposal and clarification process (if applicable).
- Evaluation Ratings reflect the written strengths and weaknesses.
- Everyone involved in the evaluation process is expected to act in an unbiased objective manner; advocacy for particular proposals is not appropriate.

General Evaluation Ground Rules

- All proposals are evaluated to uniform standards established in the solicitation, and without comparison to other proposals.
- All evaluators are experts in the areas that they evaluate.
- Non-panel/mail-in evaluators (to provide special science expertise to the Science Panel) and specialist evaluators (to provide special technical expertise to the TMC Panel) may be utilized, respectively, based on need for expertise in a specific science or technology/engineering area that is proposed.

Evaluation Criteria and Selection Factors

Evaluation Criteria from Section 7.2 of the SALMON-3 AO:

1. Intrinsic Science, Exploration, or Technology Merit of the Proposed Investigation (Evaluated by the Science Panel);
2. Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Proposed Investigation (Evaluated by the Science Panel);
3. TMC Feasibility of the Proposed Investigation Implementation (Evaluated by the TMC Panel).

Weighting: the first criterion is weighted approximately 40%; the second and third criteria are weighted approximately 30% each.

Other Selection Factors from Section 7.3 of the SALMON-3 AO:

- Programmatic factors
- PI-Managed Mission Cost

Science Evaluation Factors and Products Unchanged from Step 1

Science Panel Evaluation Factors

Factors A-1 to A-6. Intrinsic Science, Exploration, or Technology Merit of the Proposed Investigation: Please refer to Section 7.2.2 of the SALMON-3 AO for details.

- Factor A-1. Compelling nature and priority of the proposed investigation's science, exploration, or technology goals and objectives.
- ~~Factor A-2. Programmatic value of the proposed investigation.~~ [not evaluated for PEA-P]
- Factor A-3. Likelihood of science, exploration, or technology success.
- Factor A-4. Science, exploration, or technology value of the Threshold Investigation.
- ~~Factor A-5. Merit of any Science-Exploration-Technology Enhancement Options (SEOs), if proposed.~~ [not evaluated for PEA-P]
- ~~Factor A-6. Merit of any PI-developed Technology Demonstration Opportunities (TDOs), if proposed.~~ [not evaluated for PEA-P]

Science Panel Evaluation Factors

Factors B-1 to B7. Experiment Science, Exploration, or Technology Implementation Merit and Feasibility of the Proposed Investigation: Please refer to Section 7.2.3 of the SALMON-3 AO for details.

- Factor B-1. Merit of the instruments and investigation design for addressing the science, exploration, or technology goals and objectives.
- Factor B-2. Probability of technical success.
- Factor B-3. Merit of the data analysis, data availability, data archiving plan, and software management plan. [as amended in the PEA-P]
- Factor B-4. Science, exploration, or technology resiliency.
- Factor B-5. Probability of investigation team success.
- ~~Factor B-6. Merit of any Science-Exploration-Technology Enhancement Options (SEOs), if proposed.~~ [not evaluated for PEA-P]
- ~~Factor B-7. Merit of PI-developed Technology Demonstration Opportunities (TDOs), if proposed.~~ [not evaluated for PEA-P]
- Factor B-8. Merit of the calibration capabilities and calibration plan [new Factor in the PEA-P]

Science Evaluation Findings

- **Major Strength:** A facet of the implementation response that is judged to be of superior merit and can substantially contribute to the ability of the project to meet its scientific objectives.
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its scientific objectives.
- **Minor Strength:** A strength that is worthy of note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of merit.
- **Minor Weakness:** A weakness that is sufficiently worrisome to note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of merit.

Note: Findings that are considered "as expected" are not documented in the Forms.

Factors A and B Rating Definitions

Excellent: A comprehensive, thorough, and compelling proposal of exceptional merit that fully responds to the objectives of the AO as documented by numerous and/or significant strengths and having no major weaknesses.

Very Good: A fully competent proposal of very high merit that fully responds to the objectives of the AO, whose strengths fully outbalance any weaknesses.

Good: A competent proposal that represents a credible response to the AO, having neither significant strengths nor weakness and/or whose strengths and weaknesses essentially balance.

Fair: A proposal that provides a nominal response to the AO, but whose weaknesses outweigh any perceived strengths.

Poor: A seriously flawed proposal having one or more major weaknesses (e.g., an inadequate or flawed plan of research or lack of focus on the objectives of the AO).

Note: Only Major Findings are considered in the rating.

Science Panel Products: Form A

For each proposal, the Science evaluation will result in two forms, Forms A and B:

Form A

- Proposal title, PI name, and submitting organization;
- Proposal summary;
- The Intrinsic Science Merit of the Proposed Investigation adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
- Summary rationale for the median rating;
- Narrative findings supporting the adjectival rating in the form of specific major or minor strengths or weaknesses;
- Comments to PI, Comments to NASA (optional)

Science Panel Products: Form B

For each proposal, the Science evaluation will result in two forms, Forms A and B:

Form B

- Proposal title, PI name, and submitting organization;
- The Experiment Science Implementation Merit and Feasibility of the Proposed Investigation adjectival ratings from each evaluator, ranging from “Excellent” to “Poor”;
- Summary rationale for the median rating;
- Narrative findings supporting the adjectival rating in the form of specific major or minor strengths or weaknesses;
- Comments to PI, Comments to NASA (optional)

TMC Evaluation Factors and Products Unchanged from Step 1

TMC Panel Evaluation Factors

Factors C1 – C6: TMC Feasibility of the Proposed Investigation Implementation: Please refer to Section 7.2.4 of the SALMON-3 AO for details. These factors are evaluated as applicable for each proposed investigation.

Factor C-1. Adequacy and robustness of the instrument implementation plan.
Factor C-2. Adequacy and robustness of the investigation design and plan for operations.
~~Factor C-3. Adequacy and robustness of the flight systems.~~ [not evaluated for PEA-P]
Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.
Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.
Factor C-6. Adequacy and robustness of the instrument manufacturing plan. [new Factor for PEA-P]

TMC Evaluation Cost Analysis: Cost Threat Matrix

The likelihood and cost impact, if any, of each weakness is stated as "This finding represents a cost threat assessed to have an Unlikely/Possible/Likely/Very Likely/Almost Certain likelihood of a Very Minimal/Minimal/Limited/Moderate/Significant/Very Significant cost impact being realized during development and/or operations, which results in a reduction from the proposed unencumbered reserves."

- The likelihood is the probability range that the cost impact will materialize.
- The cost impact is the current best estimate of the range of costs to mitigate the threat.

The cost threat matrix defines the adjectives that describe the likelihood and cost impact.
The minimum cost threat threshold is $1M.

			Cost Impact (CI) % of PI-Managed Mission Cost to complete Phases B/C/D or % of Phase E not including unencumbered cost reserves or contributions					
	Likelihood of Occurrence	Weakness	Very Minimal	Minimal	Limited	Moderate	Significant	Very Significant
			0.5% < CI ≤ 2.5% ($xM < CI ≤ $xM)	2.5% < CI ≤ 5% ($xM < CI ≤ $xM)	5% < CI ≤ 10% ($xM < CI ≤ $xM)	10% < CI ≤ 15% ($xM < CI ≤ $xM)	15% < CI ≤ 20% ($xM < CI ≤ $xM)	CI > 20% (CI > $xM)
			1% < CI ≤ 2.5% ($xM < CI ≤ $xM)	2.5% < CI ≤ 5% ($xM < CI ≤ $0M)	5% < CI ≤ 10% ($xM < CI ≤ $xM)	10% < CI ≤ 15% ($xM < CI ≤ $xM)	15% < CI ≤ 20% ($xM < CI ≤ $xM)	CI > 20% (CI > $xM)
Likelihood (L, %)	Almost Certain (L > 80%)							
	Very Likely (60% < L ≤ 80%)							
	Likely (40% < L ≤ 60%)							
	Possible (20% < L ≤ 40%)							
	Unlikely (L ≤ 20%)							

Note: Each "$xM" is converted to dollars according to the associated percentage depending on the proposed PIMMC.

TMC Panel Evaluation Finding Definitions

- **Major Strength:** A facet of the implementation response that is judged to be well above expectations and can substantially contribute to the ability of the project to meet its technical requirements on schedule and within cost.
- **Minor Strength:** A strength that is worthy of note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its technical objectives on schedule and within cost.
- **Minor Weakness:** A weakness that is sufficiently worrisome to note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

Note: Findings that are considered "as expected" are not documented in the Form C.

TMC Risk Ratings

- Based on the narrative findings, each proposal is assigned one of three risk ratings, defined as follows:
- **LOW Risk:** There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the proposer's capability to accomplish the investigation well within the available resources.
- **MEDIUM Risk:** Problems have been identified but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Investigation design may be complex and resources tight.
- **HIGH Risk:** One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources.

Note: Only Major Findings are considered in the risk rating.

TMC Panel Product: Form C

For each proposal, the TMC evaluation results in a Form C that contains:

- Proposal title, PI name, and submitting organization;
- The TMC Feasibility of the Proposed Investigation Implementation adjectival risk rating from each evaluator of “LOW Risk”, “MEDIUM Risk” or “HIGH Risk”;
- Summary rationale for the median risk rating;
- Narrative findings supporting the adjectival risk rating in the form of specific major or minor strengths or weaknesses;
- Comments to the PI, Comments to the Selection Official (optional)

TMC Evaluation Products: Cost Risk Ratings (1 of 3)

Low Risk

- No cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of all modelled lower Work Breakdown Structure (WBS) levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is very well supported by the information in the proposal.

Low/Medium Risk

- No cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of most modelled lower WBS levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is well supported by the information in the proposal.

TMC Evaluation Products: Cost Risk Ratings (2 of 3)

Medium Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost or the cost of most modelled lower WBS levels are greater than or equal to the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is mostly supported by the information in the proposal.

Medium/High Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves below the Appropriate Cost Reserves.
- The proposed investigation cost or the cost of most modelled lower WBS levels are lower than the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is not well supported by the information in the proposal.

TMC Evaluation Products: Cost Risk Ratings (3 of 3)

High Risk

- Cost threats have been identified by the TMC evaluation panel that reduce the proposed unencumbered cost reserves significantly below the Appropriate Cost Reserves.
- The proposed investigation cost and the cost of most modelled lower WBS levels are significantly lower than the lower bounds of the TMC Base Independent Cost Estimate error bars.
- The proposed investigation cost estimate is not supported by the information in the proposal.

Tailoring

- Investigations may contain proposed adjustments to NASA requirements. Proposers must identify the tailorable requirements described in NPR 7120.5E that are being adjusted, provide a rationale for each adjustment, and describe any cost or schedule impacts that would occur should the adjustments be rejected by NASA.
- The panel evaluating the third evaluation criterion, TMC Feasibility of the Proposed Investigation Implementation, will provide comments to the Selection Official on the proposed adjustments and their justifications. These comments will not be considered for the TMC Feasibility of the Proposed Investigation Implementation risk rating but may be considered in the selection decision.

Approval

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Concurrences and
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