National Aeronautics and Space Administration

Evaluation Plan for: 2023 Dynamic Neutral Atmosphere-Ionosphere Coupling (DYNAMIC)

Announcement of Opportunity

NNH23ZDA019O

May 30, 2023

Outline

Introduction

Introduction

- The goal of this Evaluation Plan is to define the ground rules, processes, organizations, and schedules to be used in evaluating the proposals received in response to the DYNAMIC Announcement of Opportunity (AO).
- This Evaluation Plan covers evaluation information from the AO and from the evaluation processes conducted by the Science Panel and the Technical Management and Cost (TMC) Panel.
- This Evaluation Plan describes step one of a two-step competitive process to down-selection for Phase B. NASA reserves the right to select through a single step. In the case of a single-step selection, the step one process is identical. Instead of selection to proceed into a Step 2, competitive Phase A, the Step-1 selection would result in a single project proceeding to a non-competitive Phase A.
- The Science Office for Mission Assessments (SOMA) at NASA Langley Research Center (LaRC) developed this DYNAMIC Evaluation Plan for the Science Mission Directorate (SMD) at NASA Headquarters.
- This Evaluation Plan has been cleared for public release by SMD.
- The Solar Terrestrial Probe Lead Program Scientist is responsible for validating all evaluation processes, responsibility assignments, assumptions, and ground rules.

DYNAMIC Solicitation

- All investigations proposed in response to this solicitation must support NASA's Heliophysics science goals, the goals and objectives of the STP Program, and address the decadal-recommended DYNAMIC science questions, and must be implemented by Principal Investigator (PI)-led project teams. Achieving the science objectives of the investigation must require the provision of a spaceflight mission (AO 5.1.1) and the proposal must be for a complete spaceflight project (AO 5.2.1).
- AO-provided access to space, where NASA is responsible for the mission's access to space, is offered under this AO. The baseline is accommodation as a Rideshare Payload (RPL) on a Secondary Payload Adapter (SPA).
- PI-provided access to space, where the investigation team takes responsibility for all of the mission's access to space, is not permitted under this AO.

Evaluation Organization

Evaluation Panel

Dr Jared Leisner, Program Scientist
Heather Futrell, Program Executive
Science Mission Directorate (SMD), NASA Headquarters

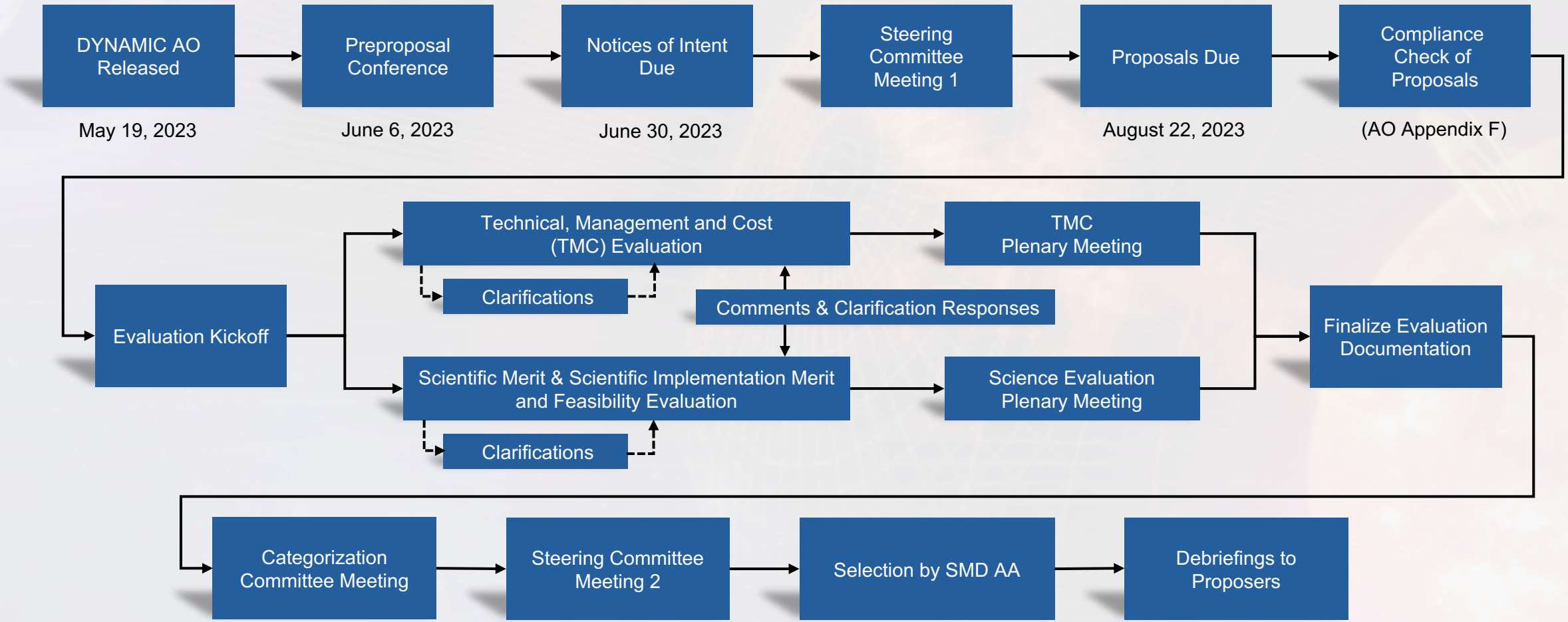
Science Evaluation Panel

Dr Jared Leisner, Program Scientist
Heather Futrell, Program Executive
Heliophysics Division, SMD

TMC Evaluation Panel

Elisabeth Morse, Acquisition Manager (AM)
Behzad Raiszadeh and Omar Torres, Backup AMs
NASA Science Office for Mission Assessments (SOMA)

Proposal Evaluation Flow



Compliance Checklist, DYNAMIC AO Appendix F

Compliance Checklist

This is the list of items that NASA Checks for compliance before releasing a proposal for evaluation. All other requirements are checked during evaluation.

Administrative:

1. Mandatory NOI submitted on time
2. Electronic proposal received on time
3. Augmented submission via the NASA Box service made on time
4. Original signatures of PI and of authorizing official included
5. Meets page limits
6. Meets general requirements for format and completeness (max 5.5 lines per vertical inch, max 15 characters per horizontal inch, 12-pt font, 1-inch margins)
7. Required appendices included; no additional appendices
8. Budgets are submitted in required formats
9. All individual team members who are named on the cover page indicate their commitment through NSPIRES
10. All export-controlled information has been identified
11. Restrictions involving China acknowledged on Electronic Cover Page

Compliance Checklist

Scientific:

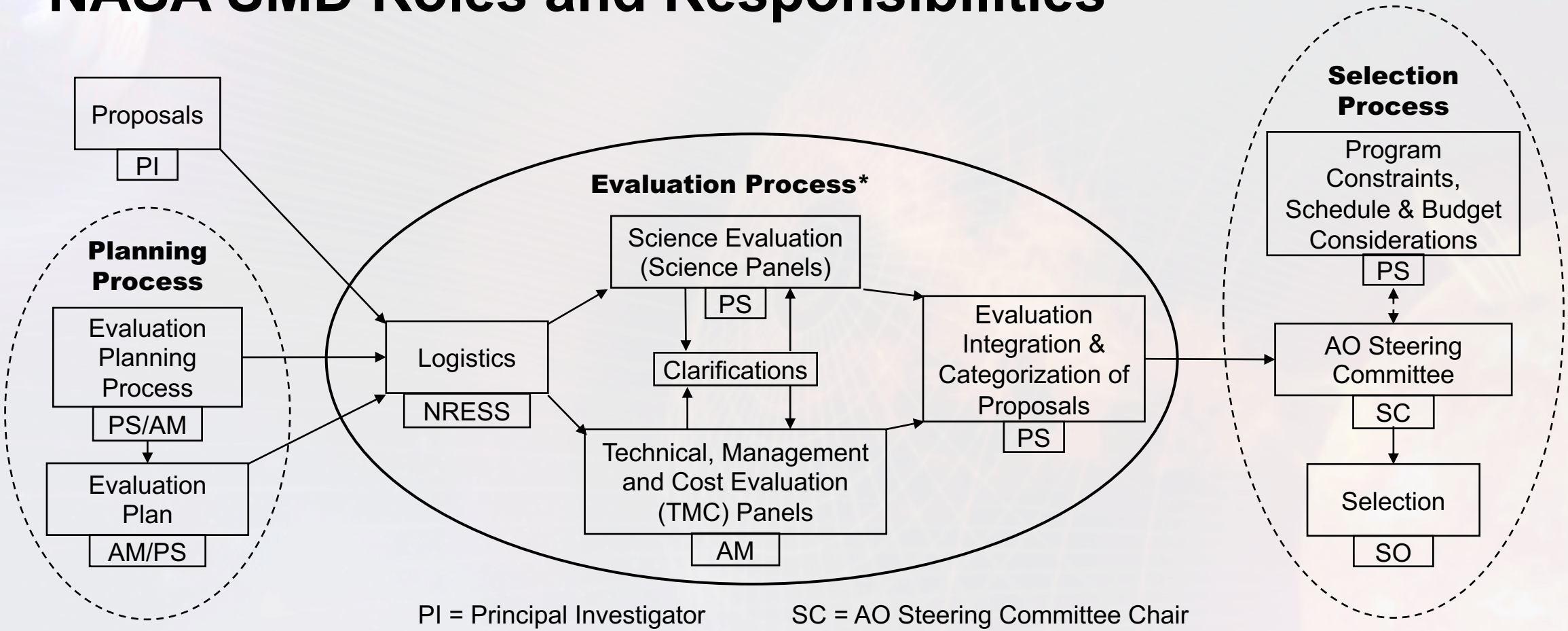
12. Addresses solicited program science objectives
13. Requirements traceable from science to instruments to mission
14. Appropriate data archiving plan
15. Baseline and threshold science investigations defined

Technical

16. Complete spaceflight project (Phases A-F) proposed
17. Team led by a single PI
18. PIMMC within AO Cost Cap or Adjusted AO Cost Cap, as applicable
19. Phase A costs within Phase A cost limits
20. Co-investigator costs in budget
21. Proposed delivery readiness prior to AO-required delivery readiness date
22. Includes table describing non-U.S. participants
23. Includes letters of commitment from funding agencies for non-U.S. participating institutions
24. Includes letters of commitment from all U.S. organizations offering contributions
25. Includes letters of commitment from all major partners and on-U.S. institutions providing contribution of efforts of anyone on the Proposal Team

General Evaluation Requirements

NASA SMD Roles and Responsibilities



PI = Principal Investigator
PS = Program Scientist
AM = Acquisition Manager
SC = AO Steering Committee Chair
SO = Selecting Official
NRESS = NASA Research and Education Support Services

** The Evaluation Process is addressed in this document.*

Pre-Evaluation - Steering Committee

- As part of the Evaluation Planning Process, before the evaluation process begins, an AO Steering Committee will be convened. This Committee is composed of the SMD Deputy Associate Administrator for Research (DAAR) and a small number of SMD Program Scientists/Executives.
- The AO Steering Committee will conduct an independent assessment of the planned evaluation and associated processes regarding their compliance to established policies and practices, completeness, and self-consistency. They may provide recommendations to the Program Scientist and Acquisition Manager on potential adjustments to the evaluation team and the planned processes.

Conflicts of Interest (COI) Prevention and Mitigation Requirements

- The Science Panel members are on-boarded through the NASA Research and Education Support Services (NRESS) contractor, and the non-Civil Servants are provided an honorarium for their participation.
- The NRESS contractor cross-checks all the Science Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational Conflict of Interest (COI) exists.
- The non-Civil Servants TMC Panel members will be hired as contractors through the NASA Science Office for Mission Assessments (SOMA)'s Evaluations, Assessments, Studies, Services, and Support 3 (EASSS 3) contractor.
- The EASSS 3 contractor cross-checks all contracted TMC Panel members against the lists of personnel and organizations identified in each proposal submitted to determine whether any organizational COI exists.
- All contracted evaluators must divulge any other financial, professional, or personal potential COIs, and whether they work for a profit-making company that directly competes with any profit-making proposing organization.
- All Civil Servant and Intergovernmental Personnel Act (IPA) evaluators must self-certify their COI status by reviewing a combined listing of individuals and organizations associated with the DYNAMIC proposals.
- The TMC evaluators must notify the SOMA Acquisition Manager in case of a potential COI. The Science evaluators must notify the Program Scientist in case of a potential COI.

Conflicts of Interest (COI) Prevention and Mitigation Requirements

- Community standards for conflicts of interest will be applied to all evaluators as directed in SMD Policy Document SPD-01A, *Handling Conflicts-of-Interest for Peer Reviews*. Standards for financial conflicts of interest as specified in 18 U.S.C. § 208 will be applied to Civil Servant and IPA evaluators. The HQ Office of General Counsel will be consulted as necessary.
- All known potential COI issues are documented, and a COI Mitigation Plan is developed to minimize the likelihood that an issue will arise in the evaluation process. Any potential COI issue is discussed with the Program Scientist and the SMD Deputy Associate Administrator for Research and documented in the COI Mitigation Plan. All determinations regarding possible COIs that arise will be logged as an appendix to the COI Mitigation Plan.
- If any previously unknown potential COI arises during the evaluation, the conflicted member(s) will be notified to stop evaluating proposals immediately, and the Panel Chair will be notified immediately. If a COI is confirmed, the conflicted member(s) will be immediately removed from the evaluation process, and steps will be taken expeditiously, to remove, mitigate, or accept any actual or potential bias imposed by the conflicted member(s). The steps will be documented in the COI Mitigation Plan.
- Members of the Science and TMC panels are prohibited from contacting anyone outside their panel for scientific/technical input, or consultation, without the prior approval of the Program Scientist.

Handling of Proprietary Data

- All proposal and evaluation materials are considered proprietary.
- Viewing of proposal materials will be only on a need-to-know basis.
- Each evaluator who is not a Civil Servant or IPA will sign a Non-Disclosure Agreement (NDA) that must be on file with the NRESS contractor or the EASSS 3 contractor prior to any proposals being distributed to that evaluator.
- Civil Servants and IPA evaluators are under statutory obligations and are not required to sign an NDA.
- A record will be kept of who has been supplied with what materials.
- Evaluators will be briefed at a Kickoff web conference on how to handle the proposal materials. Evaluators will be briefed that they are not allowed to discuss proposals with anyone outside the Evaluation Panels ever, unless authorized by NASA. Evaluators will be briefed to not contact anyone outside of the Evaluation Panels to gain insight on any proposal related matter without expressly getting authorization from the Program Scientist (Dr. Jared Leisner).

Handling of Proprietary Data (continued)

- Any Observers at Review Panels will not have access to proposals or evaluation materials (See Slide 59 for more information).
- During the Evaluation, all proprietary information that needs to be exchanged between evaluators will be transferred securely via the Remote Evaluation System (RES) website maintained by SOMA, via the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES), via the secure NASA's Box file transfer capability, via the secure ScienceWorks system maintained by SMD, via secure WebEx, via NASA's Google docs, or via encrypted email, parcel post, fax, or regular mail. Proprietary information will not be sent via unencrypted email.
- Web conferences or teleconferences among evaluators will be conducted via controlled Web conference and teleconference lines. Virtual meeting information is confidential. The meeting numbers and pass codes are posted in a file on the RES or on NASA's Google docs. Participants will be briefed to ensure they do not provide this information to anyone or distribute this information via unencrypted email or text messages.
- When the evaluation process is complete, proposal materials will be collected from the evaluators and deleted/destroyed. Some copies (for archival purposes) will be maintained at NASA HQ by the Program Scientist, and in the SOMA vault. Also, all proposal material from the selected project(s) will be provided to the STP Program Office at NASA Goddard Space Flight Center (GSFC). All other proposal materials will be destroyed.

Principles for Evaluation

- All proposals are to be treated fairly and equally.
- Merit and Risk are to be assessed on the basis of the material provided in the proposal and through the clarification process.
- Evaluation Ratings shall 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 DYNAMIC AO, and without comparison to other proposals.
- All evaluators are experts in the areas that they evaluate.
- Non-panelist/mail-in evaluators (to provide special science expertise to the Science Panels) and specialist evaluators (to provide special technical expertise to the TMC Panel) may be used, respectively, based on need for expertise in a specific science or technology/engineering area that is proposed.

Evaluation Criteria from DYNAMIC AO:

A. Scientific Merit of the Proposed Investigation (Form A, AO Section 7.2.2);

B. Scientific Implementation Merit and Feasibility of the Proposed Investigation (Form B, AO Section 7.2.3);

C. TMC Feasibility of the Proposed Mission Implementation (Form C, AO Section 7.2.4);

D. Programmatic Value of the Proposed Investigation (Form D, AO Section 7.2.5)

Weighting: the first criterion is weighted approximately 35%; the second and third criteria are weighted approximately 30% each; the fourth factor is weighted approximately 5%.

Other Selection Factors (Section 7.3):

- Programmatic factors
- PI-Managed Mission Cost

Science Evaluation

Science Panel Composition and Organization

- The Program Scientist leads the Science Panel.
- Science evaluators are typically, but not exclusively, recruited from the academic, governmental, and industrial research communities.
- The approach to evaluator identification is reviewed by the pre-evaluation Steering Committee convened by the DAAR (Steering Committee Meeting 1, page 13).
- The Science Panel evaluates the *Scientific Merit of the Proposed Investigation* (A Factors, AO Section 7.2.2), the *Scientific Implementation Merit and Feasibility of the Proposed Investigation* (B Factors, AO Section 7.2.3), and the *Programmatic Value of the Proposed Investigation* (D Factors, AO Section 7.2.5)
- The science evaluation is conducted via one Science Panel; however, sub-panels may be employed, depending on the number and variety of proposed investigations.
  - Any sub-panel is led by a NASA Civil Servant and may be co-chaired by a member from the scientific community.
  - Sub-panels may have an Executive Secretary.
- Each proposal is evaluated by assigned panel members.
  - The Lead Evaluator for each proposal will lead the discussion. At least two secondary (supporting) evaluators are assigned to each proposal.
  - At the request of the Lead Reviewer, a Supporting Reviewer will take notes on the discussion.
- The TMC Panel may provide comments and questions to the Science Panel, and vice versa.
- The Science Panel may request clarifications from proposers on any Potential Major Weaknesses (PMWs) that are identified during the evaluation process in Forms A, B, and D.

Science Panel Procedures

- Non-US Science Panel evaluators will review a version of the proposal in which any export-controlled material has been redacted. Proposers are required to indicate such material; NRESS will redact the proposal pdf.
- Each Science Panel member evaluates proposals as directed by the Chair.
  - If special science expertise is required, the Science Panels may use non-panelist evaluators to assist with one or more proposals.
  - Non-panelist evaluators evaluate only those parts of proposals pertinent to their scientific specialties.
- Each proposal may be discussed by the evaluators in web conferences.
  - Findings in the form of Strengths and Weaknesses form the basis for initial panel discussions.
  - Each assigned evaluator provides an individual evaluation prior to the web conferences.
  - During the web conference, the proposal and the individual evaluations, including those from non-panelist/mail-in evaluators, are discussed.
  - Following the web conference, the Lead Evaluator captures/synthesizes individual evaluations including discussions and generates a Draft Evaluation Form including draft findings. Draft findings include PMWs to be sent to the proposers for clarification.
  - After PMW clarification responses are received, a web conference is held to consider clarification responses. Draft findings are updated if applicable.
  - No overall merit rating is assigned at the web conferences.

Science Panel Procedures

- A Meeting of the Science Panel or sub-panels is held upon completion of individual evaluations for all proposals.
  - The Science Panel (or sub-panel) compiles all of the findings for each proposal.
  - If the sub-panels meet separately, a web conference of the sub-panel chairs, or of sub-panel members explicitly tasked with consistency, will review the draft findings of all sub-panels for consistency ahead of the sub-panel meetings.
  - For each proposal, the Chair or designated Lead Evaluator leads the discussion, summarizes the proposed investigation, and documents the results.
  - Evaluations of all proposals are reviewed during the Science Panel Meeting to ensure that standards have been applied uniformly and in an appropriate and fair manner.
  - After the discussion, each member of the Panel or sub-panel assigns a rating for Science Merit (Form A), for Science Implementation and Feasibility (Form B), and for Programmatic Value (Form D) to each proposal. Non-panelist evaluators do not assign ratings.
  - The Lead Evaluator synthesizes and documents Panel evaluations.

Science Panel Evaluation Factors

Criterion A: Scientific Merit of the Proposed Investigation. This criterion assesses the extent to which the proposed investigation would represent advances on NASA's strategic scientific objectives. It assumes the provision of the investigation's anticipated data sets and the ability of the investigation team to complete the investigation research plan.

Factors from DYNAMIC AO, Section 7.2.2

- Factor A-1. Scientific value and priority of the proposed investigation's goals.
- Factor A-2. Compelling nature and scientific value of the proposed investigation's science objectives.
- Factor A-3. Likelihood of the research plan to complete the investigation's science objectives.
- Factor A-4. Scientific value of the Threshold Science Investigation.

Factors A-1 through A-3 are evaluated for the Baseline Science Investigation assuming it is implemented as proposed and achieves technical success. Factor A-4 is similarly evaluated for the Threshold Science Investigation.

Evaluation Criterion A

- **Factor A-1. Scientific value and priority of the proposed investigation's goals.** This factor includes the clarity of the investigation goals; the specificity of the investigation goals such that measurable progress could be made against them; how well the goals reflect program priorities, including Agency and National priorities within its scope; and the significance of the investigation goals in making progress on program priorities.
- **Factor A-2. Compelling nature and scientific value of the proposed investigation's science objectives.** This factor includes the clarity and specificity of the investigation objectives; the progress that the objectives' completion would make on the investigation goals; the objectives' completion filling of key knowledge gaps relative to the current state of the art; and the necessity for a space flight mission to realize the investigation objectives.
- **Factor A-3. Likelihood of the research plan to complete the investigation's science objectives.** This factor includes the clarity and robustness of the research plan; the ability of the research plan to complete the investigation objectives; the adequacy of the anticipated data sets to complete the research plan; the sufficiency of the anticipated data sets to complete the research plan; and the appropriateness off the investigation requirements for guiding mission development and ensuring scientific success.
- **Factor A-4. Scientific value of the Threshold Science Investigation.** This factor includes the clarity and specificity of the Threshold Science Investigation; the scientific value of the Threshold Science Investigation using the standards in Factors A-1 through A-3; and whether the value of the Threshold is sufficient to justify the proposed cost of the investigation.

Science Panel Evaluation Factors

Criterion B: Scientific Implementation Merit and Feasibility of the Proposed Investigation. This criterion assesses the investigation's ability to produce the anticipated data sets, complete the investigation research plan, and adequately publish the data sets and research results. It assumes the successful technical development of the instrument complement, spacecraft and ground systems, and observatory(ies), the implementation of the mission design, and the soundness of the investigation research plan; it only assesses the scientific capability of the proposed development and implementation to enable completion of the investigation research plan.

Factors from DYNAMIC AO, Section 7.2.3

- Factor B-1. Merit of the proposed mission design and measurement techniques for providing the anticipated data sets.
- Factor B-2. Merit of the proposed instruments for providing the anticipated observations.
- Factor B-3. Merit of the data analysis, data publication, and data and software management plans.
- Factor B-4. Merit of the investigation design for science resiliency.
- Factor B-5. Merit of science team management and structure.
- Factor B-6. Merit of the Diversity and Inclusion Plan.

Evaluation Criterion B

- **Factor B-1. Merit of the proposed mission design and measurement techniques for providing the anticipated data sets.** This factor includes the ability for the anticipated measurements to lead to the anticipated data sets; the ability for the proposed mission architecture and mission design to support the acquisition of the anticipated measurements; and the degree to which the measurement techniques can use the anticipated instrument observations to provide the anticipated scientific measurements. The mission architecture and mission design include the number and arrangement of spacecraft, the spacecraft trajectories and orbits during science operations, and observation targets.
- **Factor B-2. Merit of the proposed instruments for providing the anticipated observations.** This factor includes the demonstration of the proposed instruments' ability, or clear path to demonstrate the necessary ability, to provide the anticipated observations; the adequacy of the plan to calibrate, cross-calibrate, and inter-calibrate the instruments to provide the anticipated measurements; the likelihood of success for the selected instruments to provide the anticipated observations within the mission design and operating environment; and the ability of the development and operation team(s)—both institutions and individuals—to successfully implement the calibration and observation plans. The instruments' operation within the mission design includes accommodation on the spacecraft and orientation during planned observations.

Evaluation Criterion B

- **Factor B-3. Merit of the data analysis, data publication, and data and software management plans.** This factor includes the merit of plans for data analysis of the anticipated measurements to produce the anticipated data sets; to publish investigation scientific results in the professional literature; and to publicly archive and preserve data and analysis of value to the science community. Considerations in this factor include assessment of planning and budget adequacy and evidence of plans for well-documented, high-level data products and software usable to the entire science community; the adherence of data and software plans to follow open science principles and requirements; assessment of adequate resources for physical interpretation of data; reporting scientific results in the professional literature (*e.g.*, refereed journals); and assessment of the proposed plan for the timely release of the data to the public domain for enlarging its science impact
- **Factor B-4. Merit of the investigation design for science resiliency.** This factor includes both developmental and operational resiliency for providing the anticipated data sets. Developmental resiliency includes the preservation of the investigation's ability to complete some or all of the science objectives with descopes in the mission implementation. Operational resiliency includes the investigation’s inclusion of multiple observation-target options that would enable completion of the science objectives and/or multiple opportunities to acquire measurements of a given observation target; and ability to acquire and calibrate the anticipated measurements in light of adverse circumstances, during mission degradation, and while recovering from anomalies in flight.

Evaluation Criterion B

- **Factor B-5. Merit of science team management and structure.** This factor will be evaluated by assessing the experience, expertise, and organizational structure of the science team in context of the mission design, instruments, and planned investigation. The scientific expertise, project management ability, and demonstrated team leadership ability of the PI and science team leadership will be evaluated in terms of their assigned responsibilities. The organizational structure will be evaluated both in terms of management of the investigation science team and execution of the science investigation. The role of each Co-Investigator will be evaluated for necessary contributions to the proposed investigation; the inclusion of Co-Is who do not have a well-defined and appropriate role may be cause for downgrading during evaluation.
- **Factor B-6. Merit of the Diversity and Inclusion Plan.** This factor includes the alignment of the proposal with NASA's core value of inclusion, the effectiveness of the plan in achieving its objectives in the context of mission success, the inclusion of mentoring and career development opportunities to train the next generation of science leaders, and transparency of annual reporting to NASA.

The review of the merit of the Diversity and Inclusion Plan is led by individuals with practical and/or research experience in IDEA topics and the application of IDEA principles to teams.

Science Panel Evaluation Factors

Criterion D: Programmatic Value of the Proposed Investigation. This criterion assesses the extent to which the proposed project would represent advances on NASA's strategic objectives beyond its proposed goals and objectives, as discussed by the proposal.

Factors from DYNAMIC AO, Section 7.2.5

- Factor D-1. Programmatic value of the proposed science investigation.
- Factor D-2. Programmatic value of the proposed technical implementation.

Evaluation Criterion D

- **Factor D-1. Programmatic value of the proposed science investigation.** This factor includes the unique value of the investigation to enable scientific progress beyond its own objectives; potential scientific synergies with other ongoing and planned projects by NASA and other agencies; scientific duplication and overlap with other ongoing and planned projects by NASA and other agencies; and the scientific relationship to the other elements of NASA's science programs. This factor will not consider programmatic value that this solicitation requires, expects, or incentivizes.
- **Factor D-2. Programmatic value of the proposed technical implementation.** This factor includes the unique value of the project's technical implementation to enable scientific progress beyond the project; implementation duplication and capability overlap with other ongoing and planned projects by NASA and other agencies; the technical implementation's relationship to the other elements of NASA's programs; demonstration of new scientific and technical capabilities; and any planned capability for space weather-relevant measurements. This factor will not consider programmatic value that this solicitation requires, expects, or incentivizes.

Science Evaluation Products: 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 investigation to meet its scientific objectives.
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the investigation's ability to meet its scientific objectives.
- **Minor Strength:** An aspect of the proposal that is judged to contribute to the ability of the investigation to meet its scientific objectives.
- **Minor Weakness:** A deficiency or set of deficiencies taken together that are judged to weaken the investigation's ability to meet its scientific objectives.

Note: Findings that are considered "as expected" are not documented on Forms A and B.

Science Evaluation Grade 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 weaknesses 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 adjectival rating.

Science Evaluation Products

For each proposal, this process results in Form A, Form B, and Form D, each of which includes

- Proposal title, PI name, and submitting organization;
- Proposal summary;
- Based on findings, adjectival median rating for *Scientific Merit of the Proposed Investigation* (Form A), for *Scientific Implementation Merit and Feasibility of the Proposed Investigation* (Form B), and for *Programmatic Value of the Proposed Investigation* (Form D), ranging from “Excellent” to “Poor”*; half-grades (*e.g.* Very Good/Good) are not permitted during polling;
  - If the median rating falls between two grades (*e.g.* Very Good and Good), the median rating will be stated as a mid-point between the grades (*e.g.* Very Good/Good)*;
- Summary rationale for the median rating;
- Narrative findings, identified as major or minor strengths or weaknesses; and
- Comments to the Proposers, comments to the Selection Official*, and comments to the TMC Panel* (optional)

*** Note: Not provided to proposers**

TMC Evaluation

TMC Panel Composition and Organization

- The Acquisition Manager, who is a Civil Servant in the NASA Science Office for Mission Assessments (SOMA) at NASA Langley Research Center (LaRC), leads the TMC Panel.
  - NASA SOMA works directly for NASA Headquarters and is firewalled from the rest of NASA LaRC.
- TMC Panel evaluators are a mix of the best non-conflicted contractors, consultants, and Civil Servants who are subject matter experts in the areas of the proposals that they evaluate.
- The TMC Panel develops findings for each proposal that are based on individual comments and reflect the general agreement of the entire panel.
  - Comments that are *as expected* are not included as findings.
  - Comments that are *above expectations* result in strengths.
  - Comments that are *below expectations* result in weaknesses.
- Additionally, specialist evaluators may be called upon in cases where technical expertise is needed that is not represented on the panel.
  - Specialist Evaluators evaluate only those parts of a proposal that are specific to their particular expertise.
  - Specialist Evaluators provide only findings; they do not participate in polling on Form C.
- Consistency Review for Form C findings ensures similar findings are treated equivalently across different proposals.
- Only TMC evaluators who have participated in the TMC Plenary may participate in polling on Form C.

TMC Panel Evaluation Factors

Criterion C: TMC Feasibility of the Proposed Mission Implementation. This criterion assesses the investigation's ability to develop and implement the proposed mission within its cost and schedule. The assessment includes the technical development of the instrument complement, spacecraft and ground systems, and observatory(ies); the implementation of the mission design; and the project management structure.

Factors from DYNAMIC AO, Section 7.2.4

- Factor C-1. Adequacy and robustness of the instrument implementation plan.
- Factor C-2. Adequacy and robustness of the mission design and plan for mission operations.
- Factor C-3. Adequacy and robustness of the flight systems.
- 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.

The panel also provides comments to the Selection Official. While not considered in the evaluation, they may be considered during selection. Topics can include:

- **Size and nature of contributions,**
- **Fraction of PIMMC expended before KDP-C,**
- **The managerial and spaceflight experience of the PI, and whether appropriate mentoring and support tools are in place,**
- **Career development opportunities to train the next generation of engineering and management leaders.**

Evaluation Criterion C

- **Factor C-1. Adequacy and robustness of the instrument implementation plan.** The maturity and technical readiness of the instrument complement will be assessed, as will the ability of the instruments to meet investigation requirements. This factor includes an assessment of the instrument design, accommodation, interface, heritage, and technology readiness. This factor includes an assessment of the instrument hardware and software designs, heritage, and margins. This factor includes an assessment of the processes, products, and activities required to accomplish development and integration of the instrument complement, including where applicable the approach to multiple builds. This factor also includes adequacy of the plans for instrument systems engineering and for dealing with environmental concerns. This factor includes an assessment of plans for the development and use of new instrument technology and plans for advanced engineering developments to mature systems within the proposed cost and schedule when systems having a TRL less than 6 are proposed.
- **Factor C-2. Adequacy and robustness of the mission design and plan for mission operations.** This factor includes an assessment of the overall mission design and mission architecture, the spacecraft design and design margins (including margins for launch mass, delta-v, and propellant), the concept for mission operations (including communication and, if applicable, constellation management), and the plans for launch services. This factor includes mission resiliency—the flexibility to recover from problems during both development and operations—including the technical resource reserves and margins, system and subsystem redundancy, and reductions and other changes that can be implemented without impact to the Baseline Science Investigation.

Note: Specifics of the ground systems will be evaluated at Step 2 under Factor C-7 (see the *Criteria and Requirements for the Phase A Concept Study* document).

Evaluation Criterion C

- **<u>Factor C-3</u>. Adequacy and robustness of the flight systems.** This factor includes an assessment of the flight hardware and software designs, heritage, and margins. This factor includes an assessment of the plans, products, and activities required to accomplish maturation, development, integration, and verification of all elements of the flight system, including the approach to multiple builds if applicable. This factor includes an assessment of the adequacy of all elements of flight system resiliency, including flight software/hardware fault management, system and subsystem redundancy, and hardware reliability. This factor includes the plans for the development and use of new technology, plans for advanced engineering developments, and the adequacy of those plans to ensure success of the investigation when systems having a TRL less than 6 are proposed. The maturity and technical readiness of the spacecraft and subsystems will be assessed.

Evaluation Criterion C

- **<u>Factor C-4</u>. Adequacy and robustness of the management approach and schedule, including the capability of the management team.** This factor includes: the adequacy of the proposed organizational structure; the management approach including the roles; the commitment, qualifications, and experience of any named Key Management Team members, the implementing organization, and the known partners; the spaceflight experience of any named Key Management Team members (PI excepted); the implementing organization and known partners against the needs of the investigation; the prior working relationships of the implementing organization and known partners; the commitments of partners and contributors; and the scope of work covering all elements of the project, including contributions. Also evaluated under this factor is the adequacy of the proposed risk management approach, including any risk mitigation plans for new technologies, any long-lead items, and the adequacy and availability of any required manufacturing, test, or other facilities. If multiple builds are proposed, this factor includes the ability to build, test, and integrate the required number of flight units with repeatable quality and performance standards on the required schedule, the system design's impact on the repeat manufacturability, the proposer's management of any subcontracted manufacturer, and the ability to capture and apply lessons learned for the effective production of subsequent units. The management of the risk of contributed critical goods and services will be assessed, including the plans for any international participation, the commitment of partners and contributors, as documented in Letters of Commitment, and the technical adequacy of contingency plans, where they exist, for coping with the failure of a proposed cooperative arrangement or contribution. This factor also includes assessment of elements such as the relationship of the work to the project schedule, the project element interdependencies including the resiliency of the production and test schedule to problems appearing in multiple-unit builds if applicable, the associated schedule margins, and an assessment of the likelihood of meeting the proposed delivery readiness date. Also evaluated under this factor are the proposed project and schedule management tools to be used on the project.

Evaluation Criterion C

- **Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.** This factor includes elements such as cost, cost risk, cost realism, and cost completeness including assessment of the basis of estimate, the adequacy of the approach used to develop the estimated cost (including how multiple unit builds are costed), the discussion of cost risks, the adequacy and allocation of cost reserves by phase, and the scope of work (covering all elements of the mission, including contributions). The adequacy of the cost reserves and understanding of the cost risks will be assessed. This factor also includes an assessment of the proposed cost relative to estimates generated by the evaluation team using parametric models and analogies.

TMC Cost Evaluation

- The evaluation assesses the cost risk, cost realism, and cost completeness including the basis of estimate, the adequacy of the approach used to develop the estimated cost, the discussion of cost risks, the adequacy and allocation of cost reserves by phase, and the scope of work (covering all elements of the mission).
- An independent cost verification of the proposed cost for Phases A-D is performed using at least two independent cost models.
- An independent cost verification of the proposed cost for Phase E is performed using at least one cost model.
- The likelihood and cost impact of major weaknesses is assessed.
- Cost threat impacts to the proposed unencumbered cost reserves are assessed.
- The adequacy of the remaining unencumbered cost reserves is assessed.
- All draft Forms C and Cost Evaluation Summaries (CESs) are completed prior to the Plenary Meeting.
- The entire panel participates in the Cost deliberations.
- All information from the entire evaluation process is considered in the final cost assessment.
- All cost findings are included on the Form C and considered in the TMC Risk Rating.

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 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 for Phases B/C/D *and $250K for Phase E*.

				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** $1M < CI ≤ 2.5% *$0.25M < CI < 2.5%*	**Minimal** 2.5% < CI ≤ 5% *2.5% < CI ≤ 5%*	**Limited** 5% < CI ≤ 10% *5% < CI ≤ 10%*	**Moderate** 10% < CI ≤ 15% *10% < CI ≤ 15%*	**Significant** 15% < CI ≤ 20% *15% < CI ≤ 20%*	**Very Significant** CI > 20% *CI > 20%*
Likelihood (L, %)	Almost Certain (L > 80%)							
	Very Likely (60% < L ≤ 80%)							
	Likely (40% < L ≤ 60%)							
	Possible (20% < L ≤ 40%)							
	Unlikely (L ≤ 20%)							

Note: For each proposal, the percentages in the above table will be converted to dollars by the cost estimator depending on the proposed PIMMC.

TMC Evaluation Products: Findings

- **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.
- **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 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*.
- **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 on the Form C.

TMC Evaluation Products: Risk Ratings

Based on the narrative findings, each proposal will be 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 will result in a Form C for Categorization, Steering, and Selection that contains:

- Proposal title, PI name, and submitting organization;
- Based on the findings, an adjectival median risk rating for the TMC Feasibility of the Proposed Mission Implementation of “Low Risk,” “Medium Risk” or “High Risk”;
  - A median score that falls between two risk ratings will be “rounded” to the higher risk rating.
- Summary rationale for the median risk rating;
- Narrative findings, identified as major or minor strengths or weaknesses; and
- Comments to the Proposers, comments to the Selection Official*, and comments to the Science Panel* (optional).

*** Note: Not provided to proposers.**

Clarifications Process

Clarifications Process

Section 7.1.1 of the AO states “Proposers should be aware that, during the proposal 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. NASA will request clarification in a uniform manner from all proposers.”

In particular, before finalizing the proposal evaluation NASA will request clarification on potential major weaknesses (PMWs) in the A, B, C, and D factors that have been identified in the proposal.

PIs whose proposals have no PMWs will be informed that no PMWs have been identified.

All PIs are allowed the same number of pages for Clarifications, including those who have no PMWs.

The full set of clarification responses to the factors above will be considered by the Science Panel and the Technical Management and Cost (TMC) panel. Only the responses will be provided to the other panel but not the PMWs.

Proposers will have at least 48 hours to respond.

Clarification Process Requirements (1 of 3)

Clarifications Responses must conform to the following requirements:

Requirement 1: The clarification response shall consist of two documents: one Clarification Response Document that addresses the PMWs for the A, B and D factors (combined), and one Clarification Response Document that addresses the PMWs for the C-factors.

Requirement 2: Each 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. Comment fields shall not be inserted.

Requirement 3: The Clarification Response Documents 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: For the A-, B-, and D-factors PMWs combined, the Clarification Response Documents shall not exceed eight pages. For the C-factor PMWs, the Clarification Response Documents shall not exceed six pages. Text, table(s) and figure(s) are permitted; however, all material shall be within the page limits specified above and shall abide by limitations in Requirements 2, 3 and 9. Each response file shall not exceed 10MB.

Clarification Process Requirements
(2 of 3)

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

Requirement 6: The Clarification Response Documents shall label each PMW response with the PMW number provided. Each PMW clarification response shall contain only information specific to the PMW. A clarification response may point back to references in the proposal; however, PMWs' references to locations in the proposal indicate that they have already been evaluated and a re-reference alone does not obligate a re-consideration of those data. References to proposal material is expected to use the proposal section numbers and page number on the proposal page (as opposed to the electronic PDF file page number).

Requirement 7: The Clarification Response Document may include 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 additional information counts against the total page limitation for the Clarification Response Document that contains it.

Requirement 8: The Clarification Response Document shall not include more than two new references in support of any single PMW clarification response or of any single additional information response. All references shall be to peer-reviewed literature, or to full conference proceeding papers (not just abstracts) that are published and accessible. References included in the proposal do not constitute new references. References shall be restricted to those with a publication or release date before the PMW sent date.

Clarification Process Requirements
(3 of 3)

Requirement 9: The clarification response may include, outside the two Clarification Response Documents, complete versions of a modified Science Traceability Matrix (STM; Table B1), Mission Traceability Matrix (MTM; Table B2), Total Mission Cost Profile table (Table B3 in Excel format), Master Equipment List (MEL; Table B5 in Excel format), and/or schedule foldout (AO Requirements B-44) and associated table of dates (AO Requirement B-45 in Excel format). These modified fold-out(s)/table(s) shall have modifications clearly marked by the use of a different color font or by a colored-bordered box (labeled “PMW Clarification”). The page-limited Clarification Response Documents shall provide the description of the updates and changes to the modified fold-out(s)/table(s) as text. The complete versions of the modified STM, MTM, Total Mission Cost Profile table, MEL and schedule will not count against the page limit. Any new or other fold-out(s) will each count as two pages against the response page limit.

Categorization, Steering and Selection

Categorization Process and Proposal Categories

Subsequent to the evaluation process, NASA will convene a Categorization Committee, composed wholly of Civil Servants and IPA appointees (some of whom may be from Government agencies other than NASA) and appointed by the Associate Administrator for the Science Mission Directorate. The Categorization Committee will consider the Scientific Merit, Scientific Implementation Merit and Feasibility, TMC Feasibility of the Proposed Mission Implementation and Programmatic Value of the Investigation, and, based on the evaluations, categorize the proposals in accordance with procedures required by NFS 1872.404. The categories are defined in NFS 1872.404(k) as follows:

Category I. Well-conceived, meritorious, and feasible investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

Category II. Well-conceived, meritorious, and feasible investigations that are recommended for acceptance, but at a lower priority than Category I, whatever the reason.

Category III. Meritorious investigations that require further development. Category III investigations may be funded for further development and may be reconsidered at a later time for the same or other opportunities.

Category IV. Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

Evaluation Conclusion and Steering Committee

- Once Categorization has been completed, the Evaluation is considered complete unless any issue is questioned by a subsequent AO Steering Committee review.
- NASA will convene a Steering Committee, composed wholly of CS and IPA appointees (some of whom may be from Government agencies other than NASA), appointed by the Associate Administrator for the Science Mission Directorate.
- The Steering Committee will then review the results of the evaluations and categorizations.
- The Steering Committee conducts an independent assessment of the evaluation and categorization processes regarding their compliance to established policies and practices, as well as the completeness, self-consistency, and adequacy of all supporting materials.

Selection Process

- After the review by the Steering Committee, the sponsoring Division prepares one or more options for the selection decision.
- The sponsoring Division presents the final evaluation results and its selection recommendation to the Associate Administrator for the Science Mission Directorate, who will make the final selection(s).
- As the Selection Official, the SMD Associate Administrator may consult with senior members of SMD and the Agency concerning the selections.
- As part of the selection process, a decision will be made as to whether any Category III proposals will receive funding for technology development.

Selection Factors

A full discussion of the factors considered in the selection process can be found in AO Section 7.3. This includes the following.

- This selection recommendation is based on the proposal categorization and evaluations and is influenced by Division programmatic considerations. These considerations may be project-specific constraints (*e.g.*, accommodation, budget), strategic factors (*e.g.*, portfolio balance, enabling developments for future investigations), and other programmatic factors.
- The Selection Official may consider a wide range of programmatic factors in deciding whether to select any proposals and in selecting among top-rated proposals, including, but not limited to, planning and policy considerations, available funding, career development opportunities, programmatic merit and risk of any proposed partnerships, the size and nature of contributions, and maintaining a programmatic and scientific balance across SMD.
- The overriding consideration for the selection of proposals submitted in response to this AO will be to maximize scientific value (which considers both science return and risk) while advancing NASA's science goals and objectives within the available budget for this program.

Observers

Observers Approval and Compliance

Civil Servants, IPAs, and/or contractors with downstream implementation responsibilities may attend panel meetings as Observers.

- Observer participation must be approved by the Program Scientist and the Deputy Associate Administrator for Research.
- Observers must comply with SMD Policy Document SPD-17, Statement of Policy on Observers at Panel Reviews of Proposals. This policy is provided to all approved observers who have implementation responsibilities.

Approvals

Approval

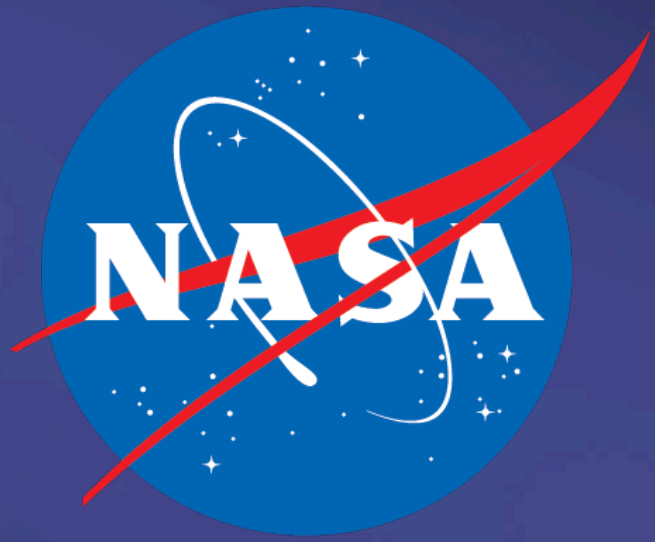
Elisabeth L. Morse
Acquisition Manager
Science Office for Mission Assessments

Cindy Daniels
Director
Science Office for Mission Assessments

Dr Jared S. Leisner
Program Scientist
Heliophysics Division, SMD

Margaret A. Luce
Director, Acting
Heliophysics Division, SMD

Dr Michael New
Deputy Associate Administrator for Research, SMD


NASA