National Aeronautics and Space Administration

# Dynamic Neutral Atmosphere-Ionosphere Coupling (DYNAMIC) Solicitation

Pre-Proposal Conference
*Science Review*

Jared Leisner – Lead Program Scientist, Solar Terrestrial Probes Program
Heliophysics Division
Science Mission Directorate, NASA Headquarters

*June 6, 2023*

# Glossary

| | |
|---|---|
| **AO** | Announcement of Opportunity |
| **EP** | Evaluation Plan |
| **GDC** | Geospace Dynamics Constellation |
| **NOI** | Notice of Intent |
| **PMW** | Potential Major Weakness |
| **PPC** | Pre-Proposal Conference |
| **RPL** | Rideshare Payload |
| **SPA** | Secondary Payload Adapter |
| **TMC** | Technical, Management, and Cost |
| **TRL** | Technology Readiness Level |
| **VADR** | Venture-Class Acquisition of Dedicated and Rideshare |

# Outline

# References Annotation

- Discussions may reference relevant solicitation documents/materials
  - AO §#.# AO Section
  - AO Req. ## AO Requirement
  - EP ## AO Evaluation Plan slide
  - PL *XYZ* Program Library document
  - PPC *XYZ* ## Pre-Proposal Conference presentation, slide
  - Q&A *X*-## AO Questions & Answers entry

# 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, Backup AM
Omar Torres, Backup AM
NASA Science Office for Mission Assessments (SOMA)

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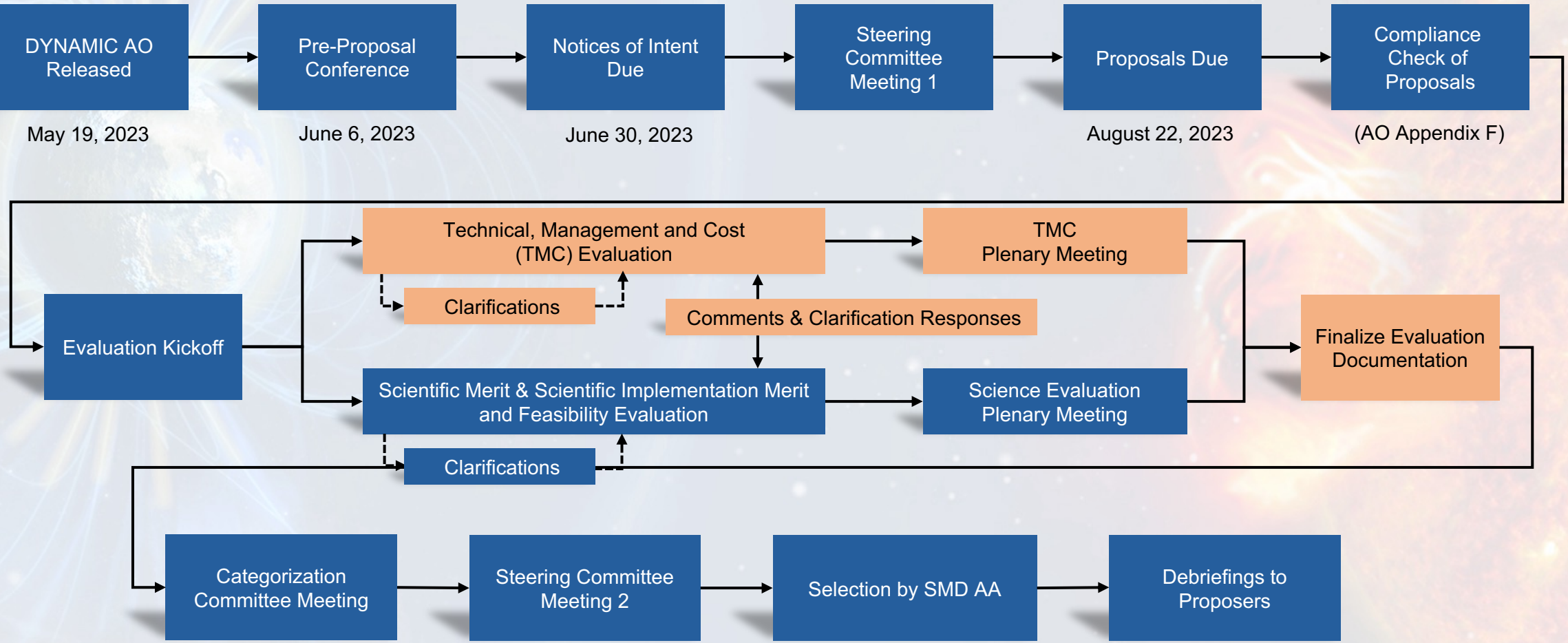
# Process, Solicitation Flow



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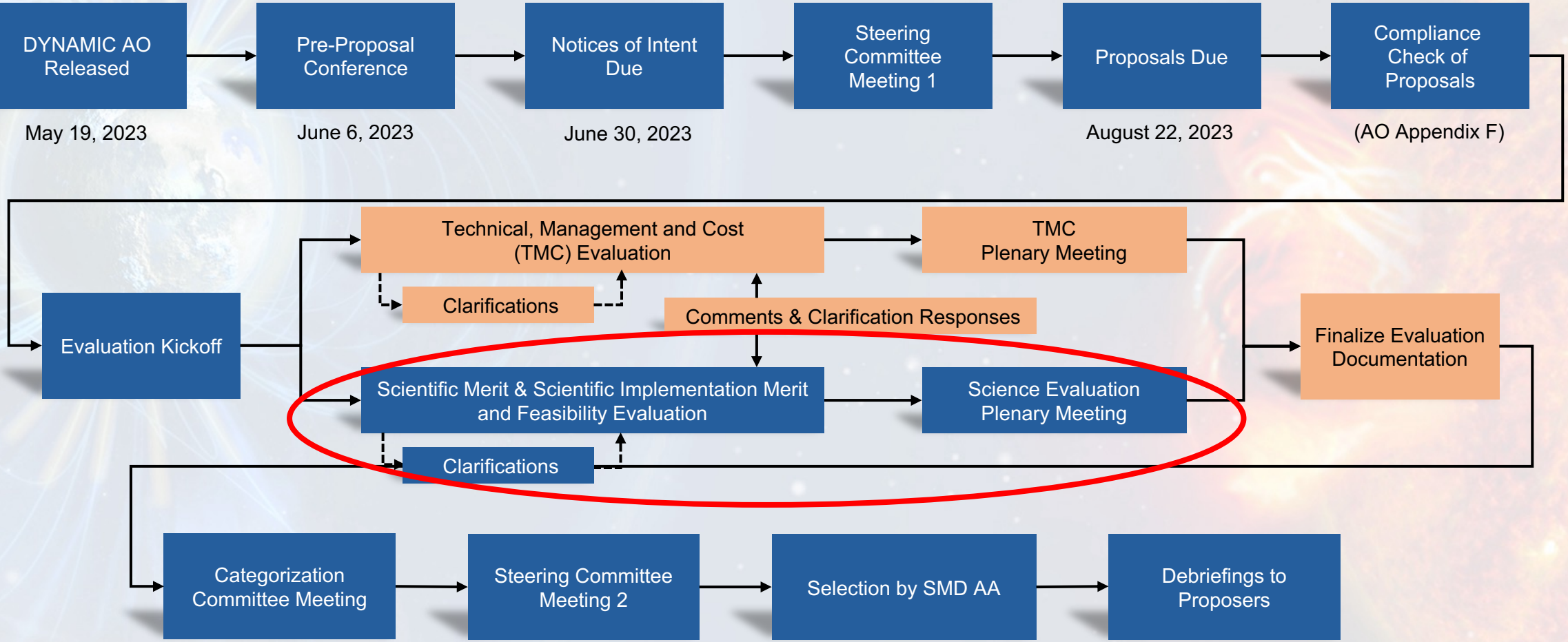
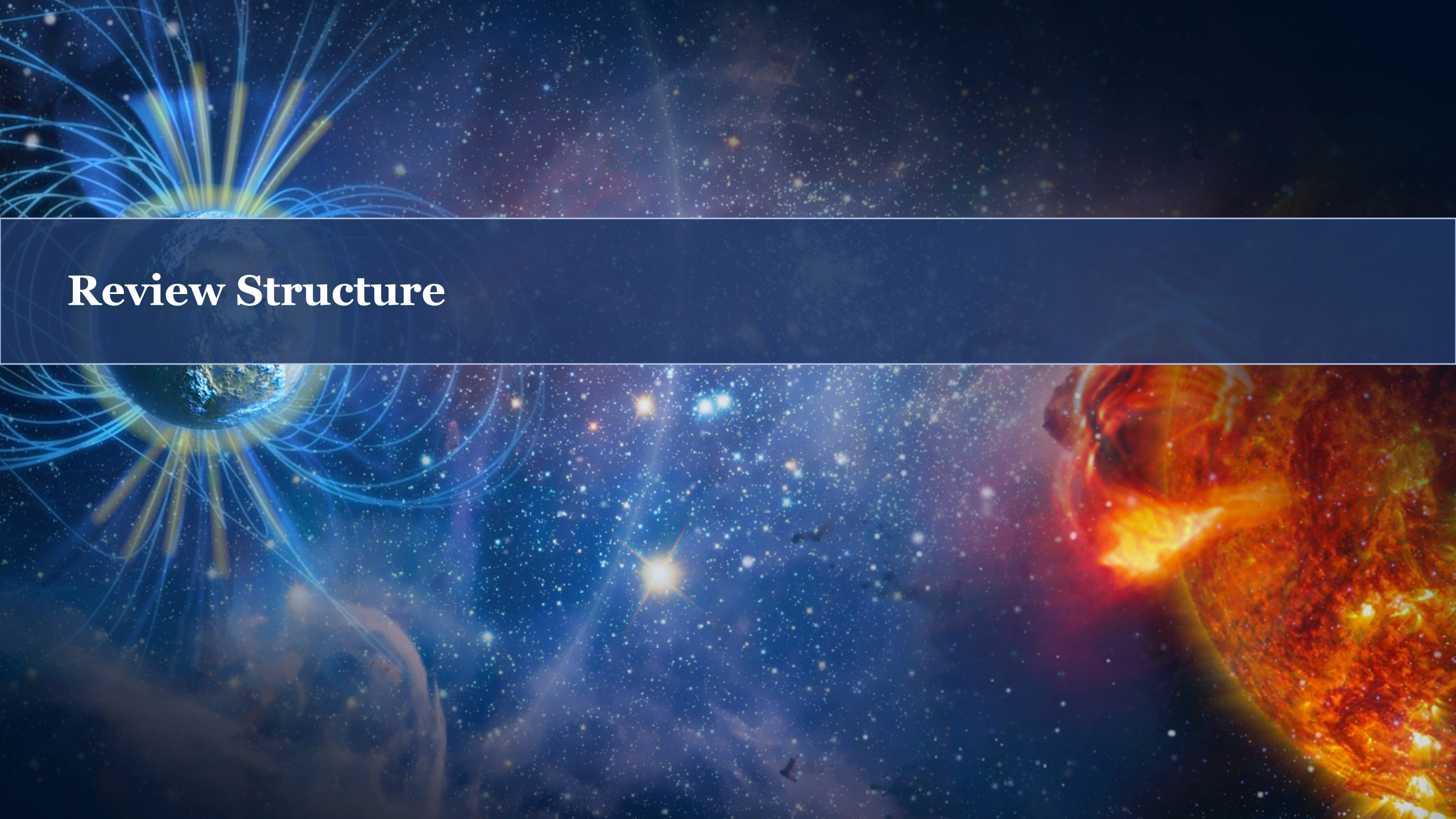


# Review Structure



# Science Review, TMC Review

- Step-1 Science Review and TMC Review are conducted independently
  - Evaluators in one review do not interact with evaluators for or participate in other review

- Exchanges between Science and TMC Reviews are permissible but limited
  - Exchanges are informational, non-evaluative
  - Exchanges are documented in writing, facilitated through Program Scientist and Acquisition Manager

# Evaluators, Science Review

- Program Scientist is responsible for managing the science evaluators
  - Identifies and invites individual evaluators
  - Ensures evaluators sign and adhere to Non-Disclosure Agreement (or equivalent)

- Science evaluators are selected based on proposal content, avoiding disqualifying conflicts of interest
  - Individuals with necessary expertise in at least one of the relevant scientific, technical areas
    - *Req. B-1:* […] [A proposal] shall contain all data and other information that will be necessary for scientific and technical evaluations; provision by reference to external sources, such as Internet websites, of additional material that is required for evaluation of the proposal is prohibited.
  - Individual, institutional conflicts of interest are defined by SPD-01A, Handling Conflicts-of-Interest for Peer Reviews

# Evaluation Criteria

# Evaluation Criteria

- Proposals are evaluated on four criteria [AO §7.2.1]
  - 35% *Scientific merit of the proposed investigation* (Form A): 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.
  - 30% *Scientific implementation merit and feasibility of the proposed investigation* (Form B): 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 observatories, 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.
  - 30% *Technical, management, and cost (TMC) feasibility of the proposed mission implementation* (Form C): 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.
  - 5% *Programmatic value of the proposed investigation* (Form D): 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.

# Evaluation Criteria

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  - *Scientific merit of the proposed investigation* (Form A): 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.
  - *Scientific implementation merit and feasibility of the proposed investigation* (Form B): 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 observatories, 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.
  - *Technical, management, and cost (TMC) feasibility of the proposed mission implementation* (Form C): 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.
  - *Programmatic value of the proposed investigation* (Form D): 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.

Evaluation criteria are mutually exclusive

# Evaluation Criteria

- Proposals are evaluated on four criteria [AO §7.2.1]
  - *Scientific merit of the proposed investigation* (Form A): 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.
  - *Scientific implementation merit and feasibility of the proposed investigation* (Form B): 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 observatories, 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.
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  - *Programmatic value of the proposed investigation* (Form D): 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.

Evaluation criteria assume merit/feasibility in other criteria

# Scientific Merit… (A Factors)

- 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.

# Scientific Merit… (A Factors) [A-1]

- 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.
  - Are the **investigation goals** clear and specific enough to measure progress against?
  - How well does progress on the **investigation goals** translate to progress on **program priorities**?
- 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.

# Scientific Merit… (A Factors) [A-2]

- Factor A-1. Scientific value and priority of the proposed investigation's goals.
  - Are the **investigation goals** clear and specific enough to measure progress against?
  - How well does progress on the **investigation goals** translate to 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.
  - Are the **investigation objectives** clear and specific?
  - How well does completion of the **investigation objectives** translate to progress on **investigation goals**?
- 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.

# Scientific Merit… (A Factors) [A-3]

- Factor A-1. Scientific value and priority of the proposed investigation's goals.
  - Are the **investigation goals** clear and specific enough to measure progress again?
  - How well does progress on the **investigation goals** translate to progress on **program priorities**?
- Factor A-2. Compelling nature and scientific value of the proposed investigation's science objectives.
  - Are the **investigation objectives** clear and specific?
  - How well does completion of the **investigation objectives** translate to progress on **investigation goals**?
- 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.
  - Is the **research plan** clear, robust, and able to complete the **investigation objectives**?
  - Can the **research plan** be completed using the **anticipated data sets**?
- Factor A-4. Scientific value of the Threshold Science Investigation.

*Link to Factor B-1*

# Scientific Impl… (B Factors)

- 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.
- 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.
- 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.

# Scientific Impl… (B Factors) [B-1, -2]



- 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.
  - Given the ability to acquire all the **anticipated measurements**, do the measurements lead to the **anticipated data sets**?
  - Given the measurement technique's abilities to produce an anticipated scientific measurements, does the **mission architecture and design** enable the acquisition of **all the anticipated measurements**?
  - Given the instrument's ability to make the anticipated observations, can the **measurement techniques take an anticipated observation** and produce the **anticipated scientific measurement**?

*Link to Factor A-3*

- Factor B-2. Merit of the proposed instruments for providing the anticipated observations.

# Scientific Impl… (B Factors) [B-1, -2]



- Factor B-1. Merit of the proposed mission design and measurement techniques for providing the anticipated data sets.
  - Given the ability to acquire all the anticipated measurements, do the measurements lead to the anticipated data sets?
  - Given the measurement technique's abilities to produce an anticipated scientific measurements, does the mission architecture and design enable the acquisition of all the anticipated measurements?
  - **Given the instrument's ability to make the anticipated observation**, can the measurement techniques take an anticipated observation and produce the anticipated scientific measurement?
- 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.
  - Given the ability to succeed in the mission design and operating environment, **does the instrument have the ability to make the anticipated observation**?
  - Given the ability of the development and operation teams, does the plan adequately calibrate the instrument?
  - Given the ability of the development and operation teams, can the instrument succeed in the mission design and operating environment?
  - Do the development and operation teams have the ability to implement the calibration and observation plans?

# Scientific Impl… (B Factors)[B-3, -4, -5]

- 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.
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# Scientific Impl… (B Factors)[B-3, -4, -5]

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  - Are there opportunities to observe multiple targets that would each enable completion of the science objectives?
  - Are there multiple opportunities to observe the same target that would enable completion of the science objectives?
- 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.

# Scientific Impl… (B Factors)[B-3, -4, -5]

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  - Does the science team leadership have the necessary capabilities to execute their responsibilities?
  - Is the science team organized in a way that enables its management and the execution of the science investigation?

# Scientific Impl… (B Factors) [B-6]

- 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.

- Diversity and Inclusion Plan is a recent addition to SMD AOs [AO Req. 52; PPC Overview 19]
- Evaluation will be led by individuals with practical and/or research experience in IDEA topics and application of IDEA principles to teams [EP 29]

# Programmatic Value… (D Factors)

- 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.

- Assessment of a limited selection of programmatic aspects of the investigation
  - "beyond the completion of the proposed science objectives" [AO §7.2.5]
  - "as discussed by the proposal" [AO §7.2.1]

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- 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.

- Assessment of a limited selection of programmatic aspects of the investigation
  - "beyond the completion of the proposed science objectives" [AO §7.2.5]
  - "as discussed by the proposal" [AO §7.2.1]


Questions?

All further questions pertaining to the DYNAMIC AO MUST be addressed by email to:

Dr. Jared Leisner
DYNAMIC Program Scientist
Science Mission Directorate
NASA Headquarters
Washington, DC 20546
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Elisabeth L. Morse
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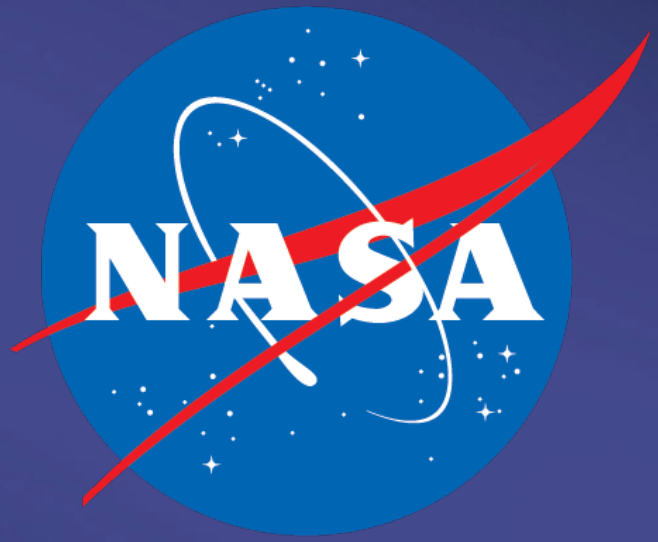
Science Office for Mission Assessments

elisabeth.l.morse@nasa.gov

(subject line to read “DYNAMIC AO")


NASA