Guidance for the Driving Requirements Appendix for 2026 Astrophysics Small Explorer Proposals

National Aeronautics and Space Administration (NASA)
Science Office of Mission Assessments (SOMA)

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Notice to Proposal Teams

This document is provided for informational purposes as supplemental guidance for teams responding to the Science Mission Directorate (SMD) single-step 2026 Astrophysics SMEX AO. It does not establish binding or definitive NASA policy. This document is only applicable to the 2026 Astrophysics SMEX AO. It is anticipated that updated guidance will be provided for any future AO with a similar requirement.

The 2026 Astrophysics SMEX AO calls for providing driving Level 2 requirements. What requirements are captured at Level 2 versus Level 3 has varied slightly between organizations, therefore this document captures guidance regarding the expectations of what constitutes "driving Level 2 requirements" for the purpose of the 2026 Astrophysics SMEX AO.

Guidelines for Writing the Driving Requirements Appendix

The Appendix should include the mission's driving requirements for the instrument, spacecraft, mission design, operations, and ground system. While a detailed definition of the ground system is not required for proposals submitted to this AO, any ground system requirements which have the potential to drive aspects of the mission design and/or operations plans should still be included in the draft Appendix.

For the purposes of the guidance in this document, driving requirements are defined as those which directly impact cost, schedule, and/or technical performance characteristics of the mission. Driving requirements often directly flow from the science goals and objectives but may also represent design and implementation decisions made when multiple options are available to satisfy mission objectives.

The requirements that are driving will vary from mission to mission. Some judgement is necessary to determine whether a requirement is driving. The set of requirements in the Appendix should be sufficient so that a proposal that demonstrates that the design can satisfy those requirements within the proposed resources would be deemed feasible. Requirements that do not significantly impact the design of the mission or the resources required to implement the mission do not need to be included in the Appendix.

The requirements in the Appendix serve to establish a baseline set of performance measures against which the mission concept is evaluated. Proposal teams should note that the Technical, Management, and Cost (TMC) evaluation panel evaluates whether the required performance for key aspects of the investigation can be achieved with supporting elements of the project meeting their required performance instead of their expected performance. For example, if a mission has a requirement to maintain a telescope at less than 50 K, the TMC panel will evaluate instrument measurement performance when operating at 50 K even if at the Current Best Estimate (CBE), the thermal system's performance achieves 45 K.

The requirements in the AO provide guidance for the content that should be included in the Appendix. AO Requirements 7, 19, 20, 21, 33, 98, B-19, B-21, B-22, B-23, B-24, B-30, B-33, B-34, B-35, B-36, B-39, and B-71 all specify aspects of the project that are required to be specified in the proposal. These specifications are required elements of the proposal because they often strongly influence a project's feasibility.

When identifying requirements that should be included in the Appendix, proposal teams should consider all aspects of the project that are described in these AO requirements. If any of these aspects of the project are subject to constraints that must be met in order to demonstrate that the mission is feasible, these constraints should be included as requirements in the Appendix. The Appendix should also include any applicable driving requirements for any aspects of the mission that are not identified in these AO requirements.

The page limit for the Appendix is intended to provide a constraint on the overall level of detail that can be included. Proposal teams are cautioned that while the TMC evaluation panel will not issue weaknesses when requirements that are not driving are included, excessively long lists of requirements will not lead to strengths.

Threshold Mission
The Appendix should denote any changes to requirements that occur when descoping to the Threshold Mission.

Requirement Types that are Frequently Driving
Examples of the types of requirements that have historically been driving are provided below. For each major category (instrument, mission design, spacecraft, operations, and ground system), the list of potential requirements has been organized into similar topic areas. Due to the expected maturity of the ground system design, the scope of the ground system topic areas has been limited to providing examples of types of ground system requirements that could impact either the mission design, spacecraft design, or operations planning sufficiently to warrant inclusion in the Appendix.

Proposing teams should be aware that the examples provided are neither necessary nor sufficient for every mission that will be proposed in response to this AO. Many of these examples are not applicable to all missions proposed in response to this AO. These types of requirements may not be driving for some proposed missions. Requirement types that are not specified in these lists may be driving for some proposed missions.

Instrument

Data quality factors
- Spatial resolution
- Wavelength range
- Spectral resolution
- Half-Power Diameter (HPD)
- Point Spread Function (PSF)
- Energy resolution
- Energy range
- Signal to Noise Ratio (SNR)
- Precision
- Accuracy
- Sensitivity

Data quantity factors
- Number of events
- Amount of coverage (geospatial coverage, percentage sky coverage, etc.)
- Observation cadence
- Field of View (FOV)
- Field of Regard (FOR)
- Instrument data generation rates

Environmental factors
- Thermal constraints on detectors and/or other sensitive components
  - Operating temperature
  - Temperature stability
  - Pointing constraints
- Radiation tolerance
  - Total Ionizing Dose (TID)
  - Total Non-Ionizing Dose (TNID)
  - Single Event Effects (SEE)
- Angular constraints
  - Solar keep-out angles (powered and unpowered operations)
  - Radiator keep out angles
- Contamination control
  - AI&T environments and handling
  - Launch site environments and handling

Deployable Items

Consumables

Mission Design

Observatory mass

Launch period

Delta-v

Launch vehicle dispersion tolerances

Orbital targets and tolerances
- Altitude
- Local Time of the Ascending Node (LTAN)
- Inclination

Maximum eclipse duration
Spacecraft state knowledge requirements
Constellation requirements
    Relative positioning
    Number of observatories
    Allowable upset rates / Return to service times

Spacecraft
Pointing knowledge, control, and stability
Slew rate and settling time
Observatory power (End of Life)
Battery capacity (End of Life)
Thermal (allowable flight temperature, stability expectations)
Radiation tolerance
    Total Ionizing Dose (TID)
    Total Non-Ionizing Dose (TNID)
    Single Event Effects (SEE)

Need to support downlink without interrupting data collection
Downlink volumes and storage capacity

Operations
Mission duration
Downlink and uplink constraints
    Frequency
    Duration
    Locations
    Temporal constraints
Target of Opportunity (ToO) response timeline
Staffing timelines for the MOC and SOC (24x7, 8x5, etc.)
Latency for collected data

Ground System
Level of Automation
    Autonomous command generation
    Autonomous constraint checking and command validation
    Autonomous uplink and downlink
Allocations of Target of Opportunity or Transient Alert Timelines to Ground System functions

Record of Revisions

Revision	Date	Description of changes
	May 2026	Initial release