

National Aeronautics and
Space Administration



EXPLORE SCIENCE

2025 Astrophysics Senior Review

Astrophysics Advisory Committee | July 23, 2024

Linda Sparke **Janet Letchworth**

Program Scientist

Program Executive





2025 Senior Review

NASA's Science Mission Directorate (SMD) regularly conducts independent, comparative reviews of its operating missions. NASA uses the review findings to define an implementation strategy and give programmatic direction to those missions and projects for the next five fiscal years. Congress has directed that the review be held every 3 years.

The process is always slightly different for each cycle:

For the 2022 Senior Review, APD appointed the review panel as a subcommittee of the APAC. The Terms of Reference for the review were approved by the APAC and panel members became Special Government Employees.

APD has chosen to use a contracted task for the 2025 Senior Review. review, following the practice for Senior Reviews in Heliophysics and other SMD divisions. Reviewers will be under contract through CTS (the same contractor that we use for Explorers reviews) and the report will be a contract deliverable. Panel members are not Special Government Employees.

Missions in the 2025 Senior Review

Mission	Launch	Years since launch	First SR Year
Hubble	1990-04-24	35	2012
Chandra	1999-07-23	25	2006
XMM (ESA)	1999-12-10	25	2000
Swift	2004-11-20	20	2006
Fermi	2008-06-11	17	2012
NuSTAR	2012-06-13	13	2014
TESS	2018-04-18	7	2019
IXPE	2021-12-09	3	2025

Neutron Star Interior Composition Explorer (NICER) is not included.

A planned Extra-Vehicular Activity from ISS in November 2024 will repair damage to sunshades of some X-ray concentrators, returning NICER to nearly full capacity. NICER will be reviewed once its repaired characteristics are understood. Assuming a successful repair, NICER will be invited to the 2028 Senior Review.

Review Schedule

Draft Proposal Call Issued	July 11, 2024
Preproposal Conference	July 25, 2024
Comments on draft call due to NASA	July 29, 2024
Final Call for Proposals Issued	NLT August 12, 2024
Senior Review Proposals Due	December 12, 2024
Kick-Off Panel Meeting	Week of December 16, 2024
Panel Meetings	February 2025
Initial Outbrief to APD Director	NLT February 28, 2025
Senior Review Panel Report Delivered to NASA	NLT March 14, 2025
NASA Response and Direction to Missions	March 2025 ahead of PPBE
Publication of Senior Review Panel Report	March 2025

The December proposal due date means the review report will be available earlier, so APD can give missions timely guidance for budget submission.



2025 Senior Review Charge

The Senior Review panel will:

- Grade each mission on the three review criteria listed in Section 7 of the Call for Proposals;
- Rank the proposed mission overguide requests in order of science priority;
- Assess risks (both hardware and operations) that may affect the mission's ability to return science in the Senior Review period; and

All proposals will be assessed by a single panel.



Proposal Content: Prioritized Mission Objectives

- Projects must define a set of Prioritized Mission Objectives (PMOs) for FY26-FY28, with a possible extension to FY29-FY30.
- These PMOs should elucidate the project's scientific, technical, and/or budgetary priorities. They will also allow subsequent Senior Reviews to assess the success of each mission in achieving its stated goals.
- For missions that are primarily driven by GO/GI-type investigations, the PMOs should primarily focus on stewardship and efficiency. A project may opt to state as a PMO the expected science return of one or more current or future 'key projects,' and/or the expected science return from other discretionary allocations of observing time.

Proposal Content: Focus Areas (CfP Section 5.2)

The proposal should address the following areas specifically, and in conjunction with the PMOs identified for the next 3-5 year planning cycle:

1

- Promise of future impact and productivity

2

- Achievements since 2022, impact of past science results

3

- Inclusion; develop team members; broaden user community

4

- Data: widely accessible, usable, useful?

5

- Progress towards PMOs identified in 2022 review

6

- Level and quality of observatory stewardship

7

- Spacecraft & instrument health and safety



Proposal Content: Sections and Page Limits

The proposal shall contain the following sections:

1. Science and Implementation
2. Technical (including Health and Safety)
3. Management
4. Budget narrative, with in-guide, under-guide and (optionally) over-guide plans
5. Project Data Management
6. Appendices, including the budget spreadsheets

Sections 1 through 5 combined (including figures, figure captions, tables, and other graphics) should not exceed 30 pages (40 pages for Chandra and Hubble).

The pdf appendices of section 6 should not exceed 30 pages.

The 2025 Senior Review website provides the mandatory budget spreadsheet templates.



Proposal Content: Budget Narrative (CfP Sec 6)

Each project should provide a plan for at least the first and second of these three budget plans:

In guide
(required)

- Budget consistent with NASA-defined levels.

Under-guide
(required)

- Minimum funding level (below in-guide budget) that would allow for continued operations.
- The project indicates that no further reduction is tenable: terminate if this funding is not available
- Address reduced scope, difference in science return, and added risk compared to in-guideline plan.

Over-guide
(optional)

- Submit only if the in-guide budget poses a significant risk to continued operations.
- Submit in cognizance of the tight NASA budget.
- Explain risk posed by in-guide budget and how the overguide mitigates that risk. Identify added return versus in-guideline plan.



Review Criteria (CfP Section 7) – Slide 1/2

Criterion A: Scientific Merit (50% weighting)

- Factor A-1: Expected scientific output and science productivity given the costs over the requested funding period.
- Factor A-2: Quality of data collection, archiving, distribution, and usability.

Criterion B: Relevance and Responsiveness (25% weighting)

- Factor B-1: Relevance to research objectives and focus areas described in the SMD Science Plan and 2020 Astrophysics Decadal Survey.
- Factor B-2: Relevance to NASA's core value of Inclusion and alignment to SMD Science Plan Strategy 4.1. Specifically, the quality of plans for building and maintaining an inclusive environment within the project team and the project user community.
- Factor B-3: For missions included in the 2022 Senior Review, progress toward achieving PMOs in the 2022 Senior Review proposal, and towards addressing any findings from that Review.



Review Criteria (CfP Section 7) – Slide 2/2

Criterion C: Technical Capability and Cost Reasonableness (25% weighting)

Factor C-1: Overall operating cost and cost efficiency of the mission's operating model for proposed scientific goals.

Factor C-2: Health of the spacecraft and instruments, and suitability of the mission's operating model (e.g., governance, science team, instrument team, inclusion, diversity of thought and backgrounds represented) to maximize its scientific return.

For each of the three criteria above, the standard scale will be used to map the number and significance of the strengths and weaknesses to an adjectival description. Half-step grades may be used (e.g. Excellent/Very Good).



2025 Senior Review – NASA actions

NASA will use the findings from the 2025 Senior Review to:

- Provide programmatic direction to the missions and projects concerned for FY26, FY27 and FY28; and
- Issue initial funding guidelines for FY29 and FY30 (to be revisited in the 2028 Senior Review); and
- Understand where any funding that becomes available in excess of the in-guide budgets could most effectively be applied.

NASA actions resulting from the Senior Review could include:

- Maintaining the status quo;
- Significantly restructuring a project; or
- Terminating an ongoing science mission.

The APD Director will develop a response to the Senior Review Report.

- APD will provide each mission with its individual letter of direction before the Senior Review Report, and NASA's response, are published on the review website.

A decorative background on the left side of the slide featuring a curved view of space. It includes a large blue planet (Earth) at the bottom, a grey moon, a yellow planet with rings (Saturn), and a reddish planet (Mars) against a starry blue and green nebula.

Reference Links

Senior Review Call for Proposals

<https://science.nasa.gov/astrophysics/resources/documents/2025-senior-review-of-operating-missions/> (might not be ready yet)

SMD Science Plan is available at

<https://science.nasa.gov/about-us/science-strategy/>

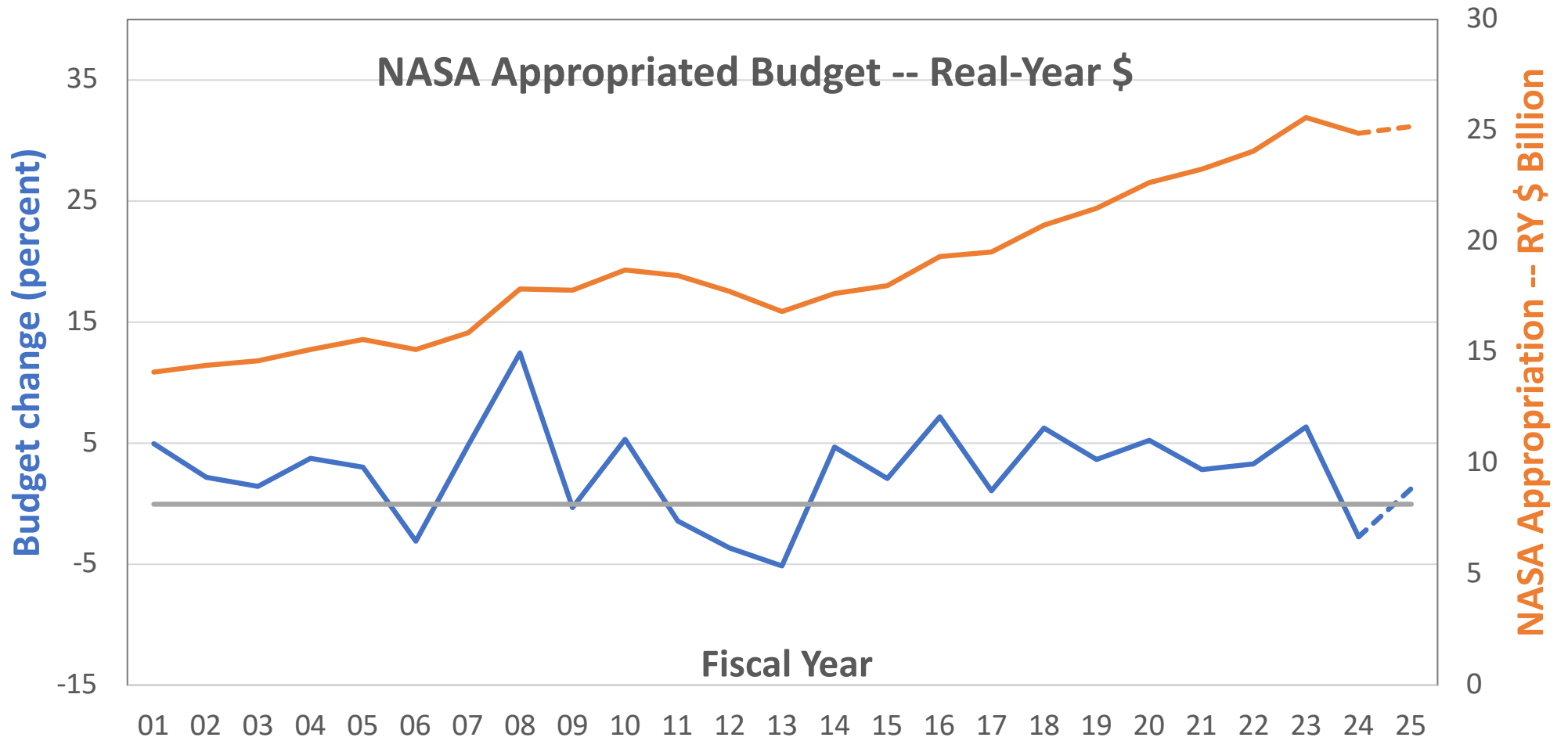
Pathways to Discovery (Decadal Survey)

<https://www.nap.edu/catalog/26141/pathways-to-discovery-in-astronomy-and-astrophysics-for-the-2020s>

A large graphic on the left side of the slide depicts a space scene. It features a large, dark blue planet in the foreground, a bright yellow sun in the lower left, and a blue and white Earth in the lower right. Other celestial bodies, including a ringed planet and a reddish planet, are visible in the background against a starry sky. A white curved line separates this graphic from the main white area of the slide.

Backup / For Missions

NASA appropriated budget



Science appropriated budget

Budget \$M	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	FY2025 house	FY25 change
Science	\$6,887	\$7,143	\$7,291	\$7,611	\$7,792	\$7,334	\$7,334	
Earth Science	\$1,931	\$1,972	\$1,997	\$2,061	\$2,175	\$2,195	\$2,000	-8.9%
Planetary Science	\$2,747	\$2,713	\$2,693	\$3,120	\$3,217	\$2,717	\$2,930	7.8%
Astrophysics & JWST	\$1,496	\$1,729	\$1,771	\$1,569	\$1,510	\$1,530	\$1,532	0.1%
Heliophysics	\$713	\$725	\$751	\$778	\$805	\$805	\$787	-2.3%
Biological & Physical Sciences		\$5	\$79	\$83	\$85	\$88	\$85	-3.4%
	\$8,383	\$8,873	\$9,062	\$9,180	\$9,302	\$8,865	\$8,866	