National Aeronautics and Space Administration

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EXPLORE SCIENCE

The Heliophysics System Observatory: Extended Operations and Senior Review

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Introduction

- NASA has the largest and most vibrant Heliophysics System Observatory in its history [NASA Science Plan 2023]
  - Missions operate well past their prime mission
  - Increased Explorers cadence, rec'd by 2013 Decadal Survey
  - Number of projects set to double in coming years
- Maximize scientific return within a constrained budget
  - Mature management with growth in portfolio size and complexity
    - Improve management of individual project needs
    - Right-size scope of contracted work effort
    - Simplify/clarify reporting and deliverables
  - Improve data archive accessibility, usability, usefulness
- 2020 Senior Review introduced policy and process changes
  - Discussed at October 2019 Heliophysics Advisory Committee
  - Integrated into requests to 2024 Decadal Survey Committee
- This presentation addresses
  - Current and future HSO, Division perspective
  - Senior Review, what has changed
  - Senior Review, recent decisions

Heliophysics Missions

Extended Operations

2023

Heliophysics Missions

Projected Extended Operations

2026

Heliophysics Missions

Projected Extended Operations

2013 Decadal Survey cadence:
+2-4 new projects per Senior Review

Senior Review Changes

Senior Review Changes (2020, 2023)

- Separated project-*funded* science investigation from project-*enabled* scientific advances
- Science Objectives instead of Prioritized Science Goals
- Strengthened open science requirements
- Simplify/clarify project requirements and budget reporting

Senior Review Changes (2020, 2023)

- Separated project-*funded* science investigation from project-*enabled* scientific advances
  - Projects not responsible for tracking everything the community did with mission data
  - Option to continue operations without project science investigation
    - Division has flexibility to maintain important measurement capabilities
    - Projects not penalized for not having funds for science investigation
      - Older projects not required to continuously reinvent themselves
- Solicited Science Objectives instead of Prioritized Science Goals
- Strengthened open science requirements
- Simplify/clarify project requirements and budget reporting

Senior Review Changes (2020, 2023)

- Separated project-*funded* science investigation from project-*enabled* scientific advances
- Solicited Science Objectives instead of Prioritized Science Goals
  - Projects propose focused science for completion with project funds
  - Projects not responsible for capturing science the community would do with mission data
- Strengthened open science requirements
- Simplify/clarify project requirements and budget reporting

Senior Review Changes (2020, 2023)

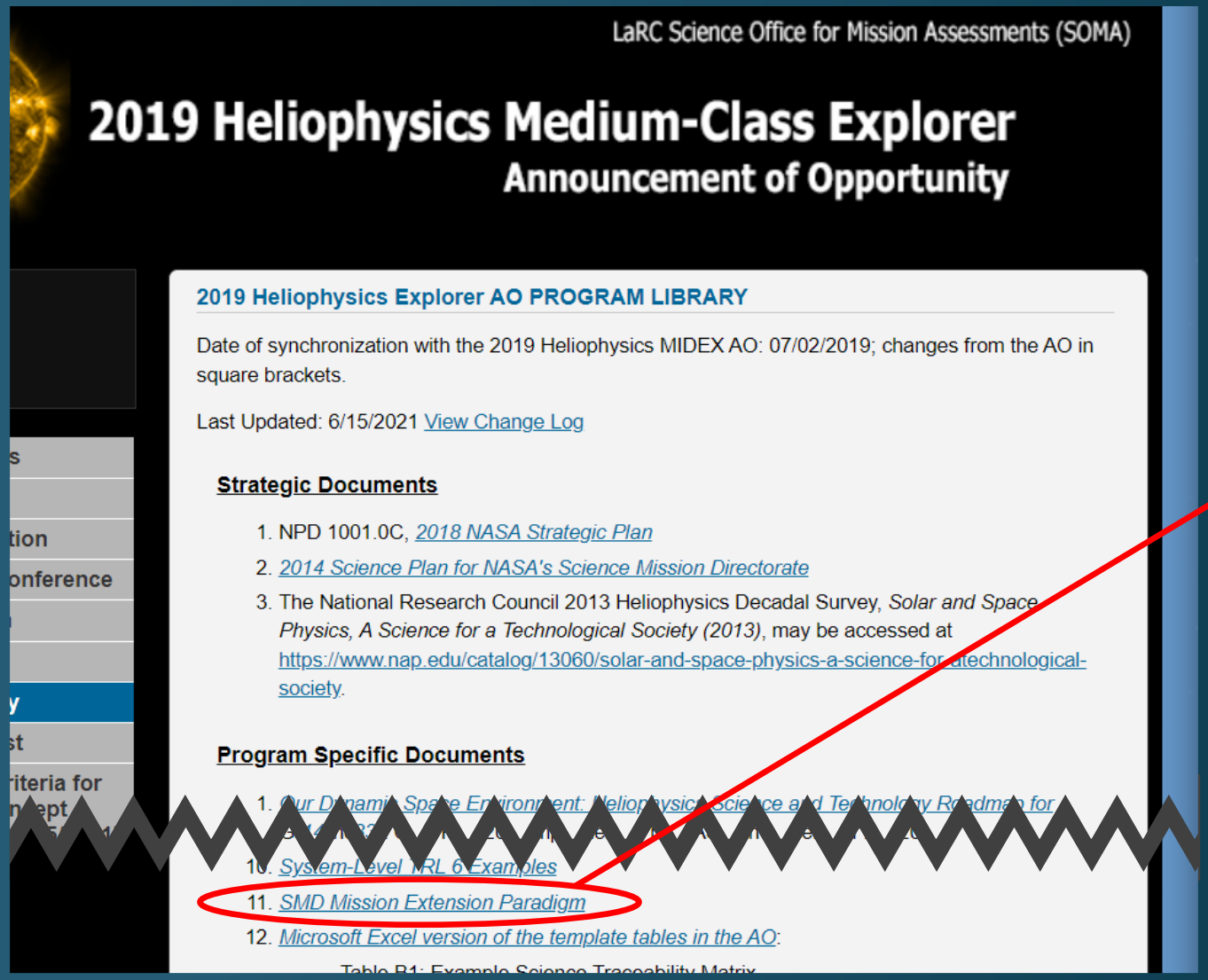
- Separated project-*funded* science investigation from project-*enabled* scientific advances
- Solicited Science Objectives instead of Prioritized Science Goals
- Strengthened open science requirements
  - Project Data Management Plan
  - Calibration and Measurement Algorithm Document
  - Open source code plans
- Simplify/clarify project requirements and budget reporting

Simplified/Clarified Project Budgets

- Project budget categories were consolidated
  - Mission operations: Activities necessary to maintain mission health and safety (s/c or stand-alone instrument, as appropriate), and to maintain and operate necessary mission-support infrastructure (e.g., ground stations, hosting fees). May include the development and/or procurement of new ground assets.
  - Science operations: Activities necessary to plan and execute instrument observations, and to process, calibrate, validate, and archive datasets. Includes any costs that would be incurred independent of a project-funded science investigation(s).
    - Scientific leadership is captured here.
    - Data validation includes analysis *necessary* to understand measurements and to inform data production. HPD expects some science publications will result as a by-product.
  - Science investigation: Activities necessary for the science investigation(s), including but not limited to research activities and publications. This does not include funds for science operations.
    - Only project-funded activities, does not include research grants (e.g., ROSES)

Note: This change both improves Division insight and focuses on how SMD AOs tell proposers how extended operations will be managed.

Mission Extensions, SMD Paradigm



Quote from document

Science Mission Directorate
Mission Extension Paradigm:

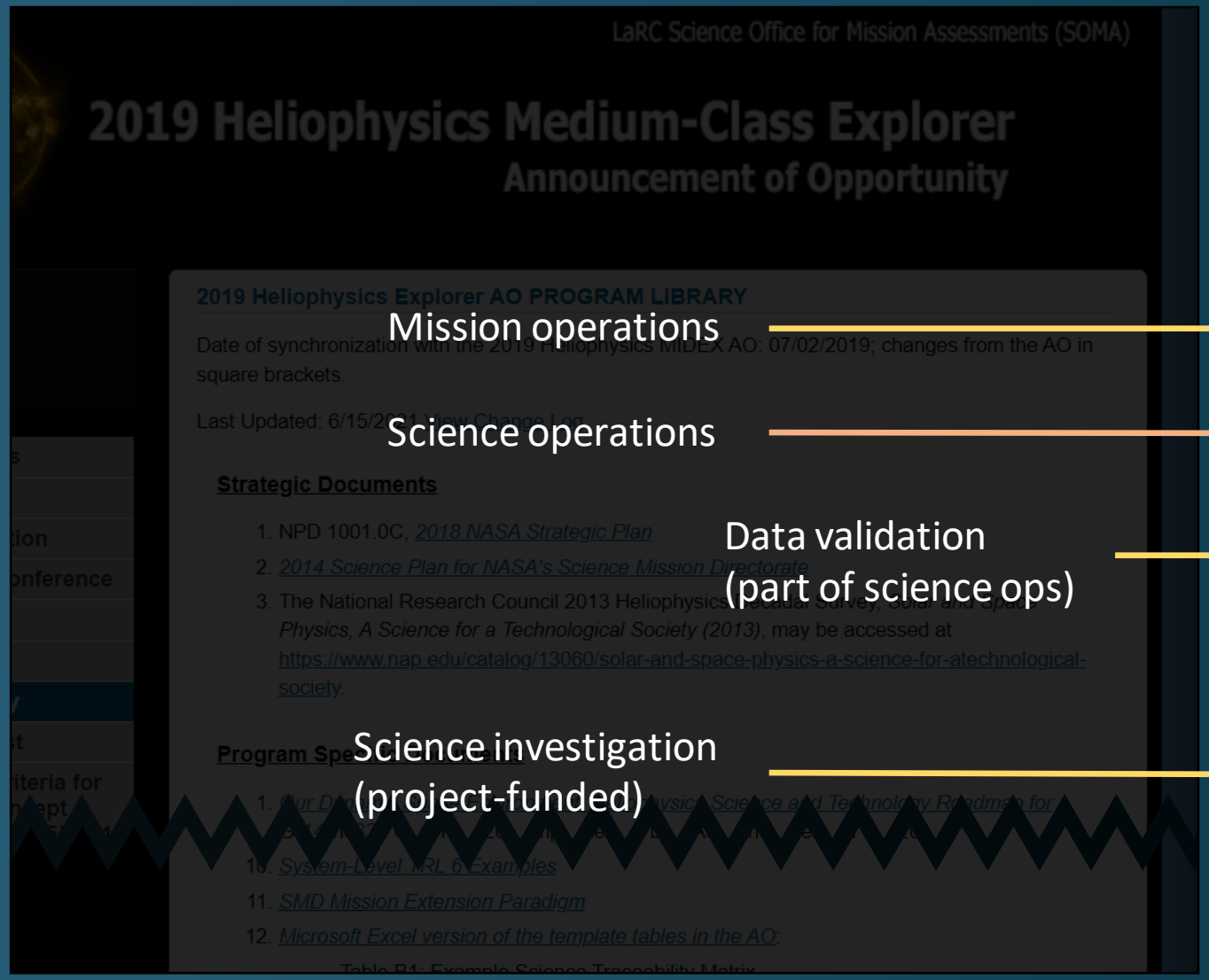
We assume that the conditions for mission extensions, issued in January 1994, will apply as well in the future. According to these instructions, budgets for mission extensions beyond the prime mission lifetime will support:

- Bare-bones mission operation and science operations […]
- Bare-bones data handling, including low-level processing and basic archiving […]
- Minimal science data analysis to maintain understanding of the instrument performance, to monitor progress toward accomplishing the objectives of science observations, and to involve the science community in formulating the mission observing program to make the best scientific use of NASA's operating missions; however, no funds will be available in this "minimal-science analysis mode" for detailed analysis, data fitting, modeling, and interpretation; and
- For science data archive centers: basic, bare-bones operation […]

Quote from document

Note: 2019 MIDEX AO is shown, but file has been standard in Program Libraries

Mission Extensions, SMD Paradigm



Mission operations

Science operations

Data validation
(part of science ops)

Science investigation
(project-funded)

Quote from document

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Quote from document

Senior Review Decisions

2023 Senior Review Cycle

- Two projects terminated due to spacecraft failures

- Four projects were approved for continued operation with a project-funded science investigation
  - Successful completion of previous science investigation
  - Compelling science investigation proposed
  - In-guide budget supports a science investigation

- Nine projects were approved for continued operation without a project-funded science investigation
  - Successful delivery of compelling scientific data sets
  - Senior Review proposal content
    - No project budget for science investigation
    - Statements of not funding a science investigation
    - Statements of funding risks to mission/science operations

Planning for the Future

- Many discussions occurring regarding HSO
  - Heliophysics Division (internal)
  - Senior Review report, ISTP-Next Workshop
  - 2024 Decadal Survey Committee (via Q&A, Working Groups)

go.nasa.gov/HelioDecadal

- Division is thinking about the HSO as a whole system/portfolio
  - Strategic programs (STP, LWS, Space Weather)
    - Decadal Survey was asked for rec's for full range of project sizes
  - Explorers program
  - Science operations
    - Inter-mission coordination
    - Decadal Survey was asked for rec's on balance for extended ops
  - Heliophysics Digital Resource Library (HDRL)
  - ROSES programs
    - Interdisciplinary Scientist, Participating Scientists
    - Data analysis efforts (e.g., Guest Investigator, Supporting Research)

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