

National Aeronautics and  
Space Administration



# EXPLORESCIENCE

**Space Weather Discussion**

*Decadal Survey Space Weather Panel Meeting #1*

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Science Mission Directorate

# National Space Weather Guidance

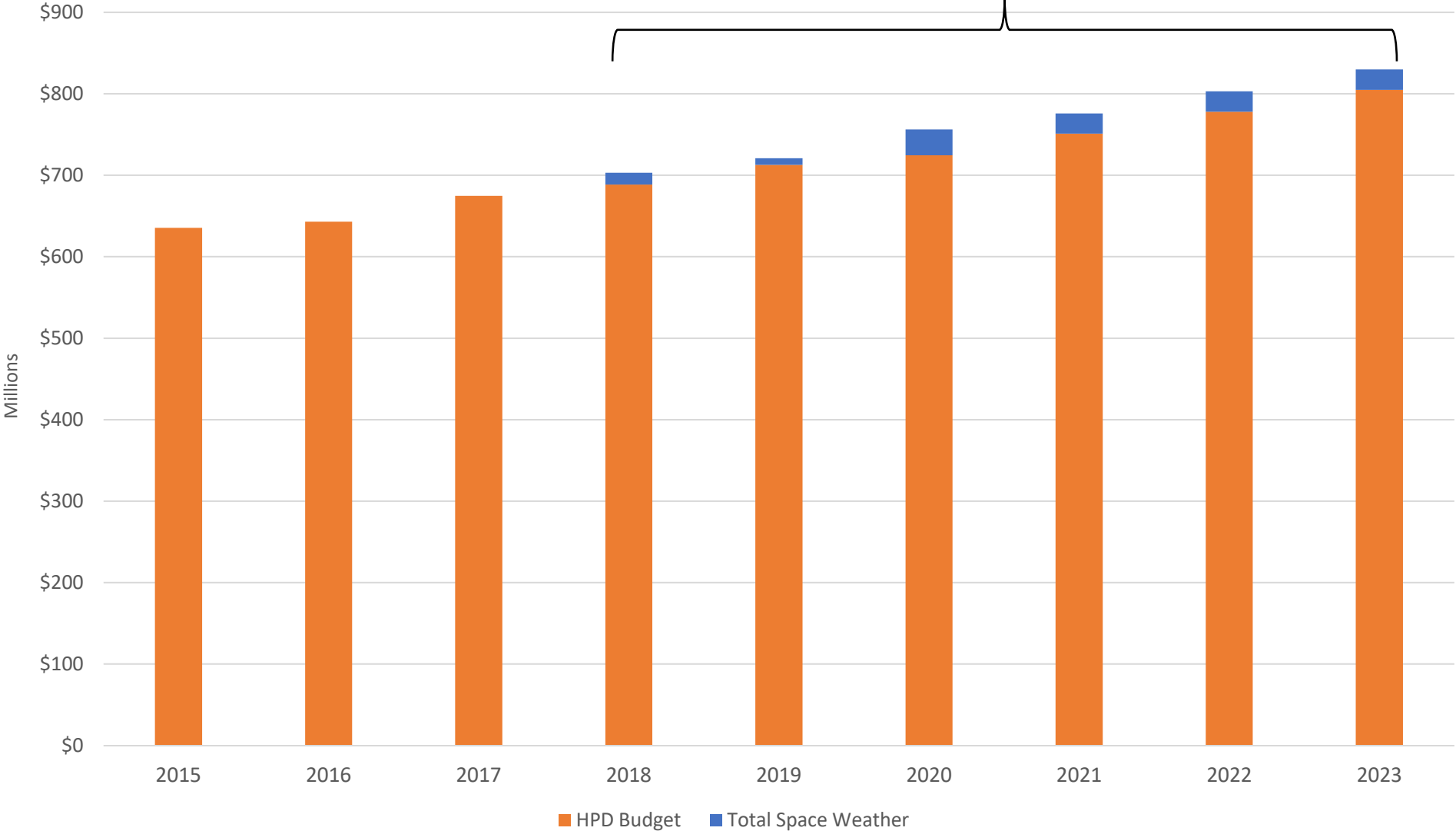
- The [Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow \(PROSWIFT\) Act](#) (2019)
  - “It shall be the policy of the United States to prepare and protect against the social and economic impacts of space weather phenomena by supporting actions to improve space weather forecasts and predictions including:
    - Sustaining and enhancing critical observations,
    - Identifying research needs and promoting opportunities for research-to-operations and operations-to research collaborations both within and outside of the Federal Government,
    - Advancing space weather models,
    - Engaging with all sectors of the space weather community, including academia, the commercial sector, and international partners
    - Understanding the needs of space weather end users”
- The [Space Weather Operations, Research, and Mitigation \(SWORM\) Interagency Working Group \(IWG\)](#) (2019)
  - Federal interagency body organized under the Space Weather, Security, and Hazards Subcommittee, which is part of the U.S. [National Science and Technology Council](#), under the Committee on Homeland and National Security.
  - Governing documents:
    - Goals and objectives: [National Space Weather Strategy \(NSWS\) \(October 2015\)](#)
    - Activities: [National Space Weather Action Plan \(NSWAP\) \(October 2015\)](#)

# Inter-Agency Collaborations

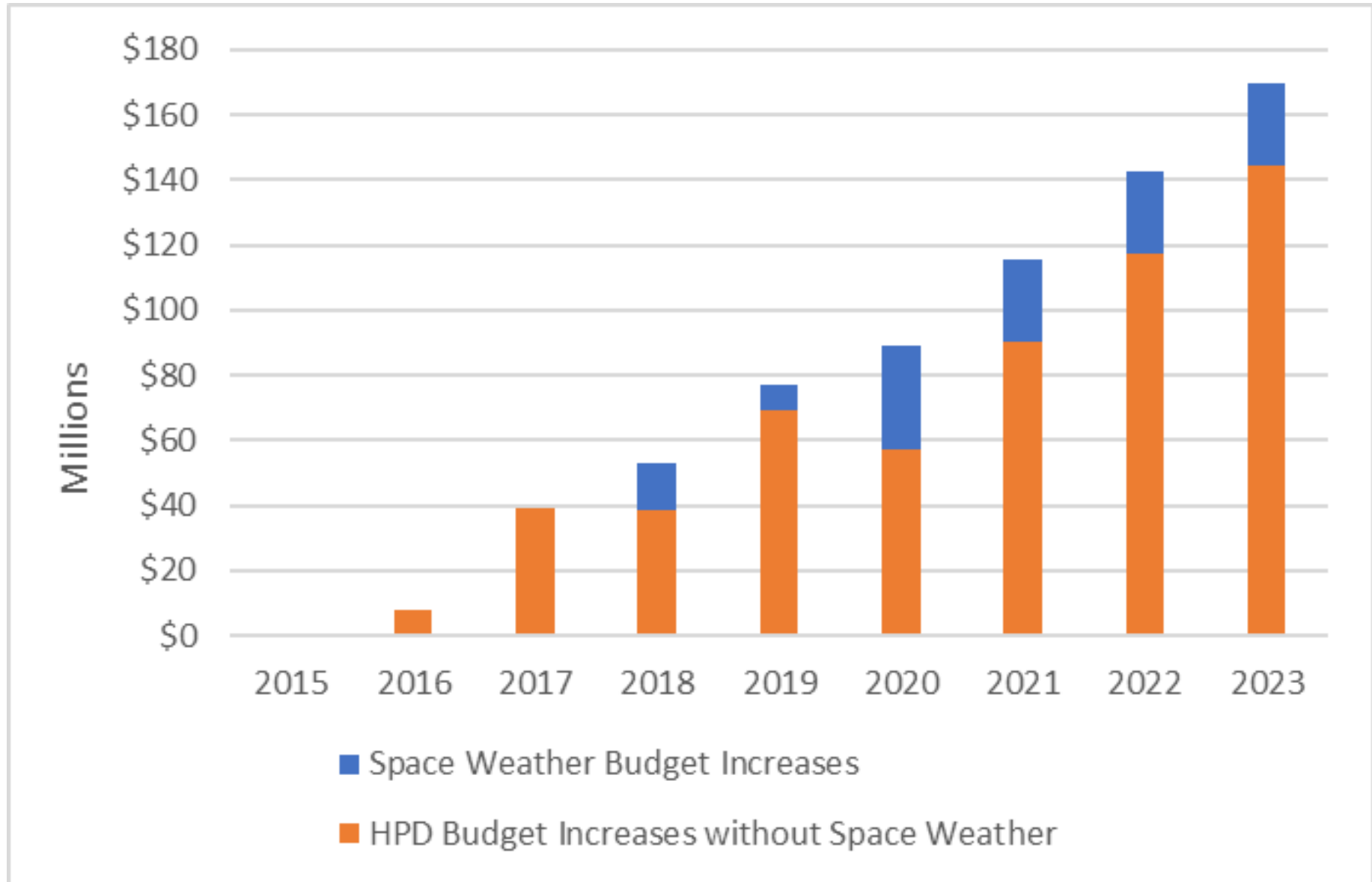
- NOAA, NASA and NSF work jointly to observe and understand space weather and how it impacts the solar system, Earth, and humanity. The roles of each agency are clearly delineated in the PROSWIFT Act of 2019:
  - NOAA: "...maintains ground-based and space-based assets to provide observations needed for space weather forecasting, prediction, and warnings, provides research to support operational responsibilities, and develops requirements for space weather forecasting technologies and science."
  - NASA: "...provides increased understanding of the fundamental physics of the Sun-Earth system through basic research, space-based observations and modeling and developing new space-based technologies and missions, and monitoring of space weather for the [NASA] space missions."
  - NSF: "...provides increased understanding of the Sun-Earth system through ground-based measurements, technologies, and modeling."
- Key Points
  - NASA takes the lead role in basic space weather research which is subsequently developed into applied models and technologies for refinement before transitioning them to partner agencies for use as operational capabilities.
  - NASA is responsible for the success of its missions. The extent to which NASA relies on other Federal Agencies to monitor space weather for its space missions is NASA's responsibility.
  - NASA primarily, but not exclusively, observes space weather phenomena through space-based platforms. Coordination with partner organizations on ground-based observations.

# Space Weather in the Division Budget [1]

Space Weather averages less than 3% of the 2018-2023 HPD Budgets



# Space Weather in the Division Budget [2]



# Space Weather Program

## Space Weather Research to Operations / Operations to Research (R2O2R)

- ROSES-23 focused topics:
  - Data Assimilation for Neutral Density Forecasting
  - Open Call

**Space Weather Grand Challenge** Identify the next low-latency data stream to enable a significant advancement in space weather forecasting

## HERMES & Gateway

- HERMES: space weather instrument suite will observe solar particles and the solar wind (led by HPD)
- HERMES Payload I&T is expected to begin in April/May 2023
  - LRD Oct. 2025 for the first Gateway launch (which will include HERMES)
  - HPD working with the Gateway Program on future opportunities for competitive science payloads

## Space Weather Pipeline

- Constructing four instruments for future flight opportunities: SPAN-E, SST, ECP-Lite, Faraday Cup
- Solicitation is planned as an addendum to ROSES-23

## Vigil (ESA L5 Mission)

- Vigil Draft AO released February 2023, Final AO expected April/May 2023



This photo was taken from the ISS on Feb. 28<sup>th</sup> and shows the sweeping scale of the aurora during a geomagnetic storm **Credits: NASA/Josh Cassada**



# Helpful Resources, Governing Documents

- Decadal Survey documents
  - [Space Weather Supplemental Presentation](#)
  - [Space Situational Awareness/Orbital Debris \(SSA/OD\) Supplemental Presentation](#)
- NASA documents
  - [NASA's Efforts to Mitigate the Risks Posed by Orbital Debris](#) [OIG Report]
  - [NASA Space Weather Strategy and Implementation Plan](#)
  - [Space Weather Gap Analysis](#) [HPD-sponsored]
- Advisory Committees/Groups
  - [Planning the Future of Space Weather Operations and Research Infrastructure: Proceedings of a Workshop](#) (National Academy of Sciences)
  - [Space Weather Roundtable](#) (National Academy of Sciences)
  - [Space Weather Council](#) (NASA)
- National Guidance
  - [National Space Weather Strategy](#) [2015]
  - [National Space Weather Strategic and Action Plan](#) [2019]
  - [PROSWIFT Act](#)
  - [Space Weather Operations, Research and Mitigation Subcommittee \[SWORM\] publications](#)