National Aeronautics and Space Administration

2024 NASA SCIENCE

CEDAR Workshop
June 11, 2024

Dr. Joseph Westlake
Director, Heliophysics Division

NASA Heliophysics Division Leadership

Joseph Westlake
Division Director

Peg Luce
Deputy Division Director

Nicole (Nicki) Rayl
Associate Director for Flight

Therese Moretto Jorgensen
Director of Research

NASA ROSES Programs Office Hour: Wednesday 6/12 1700-1800

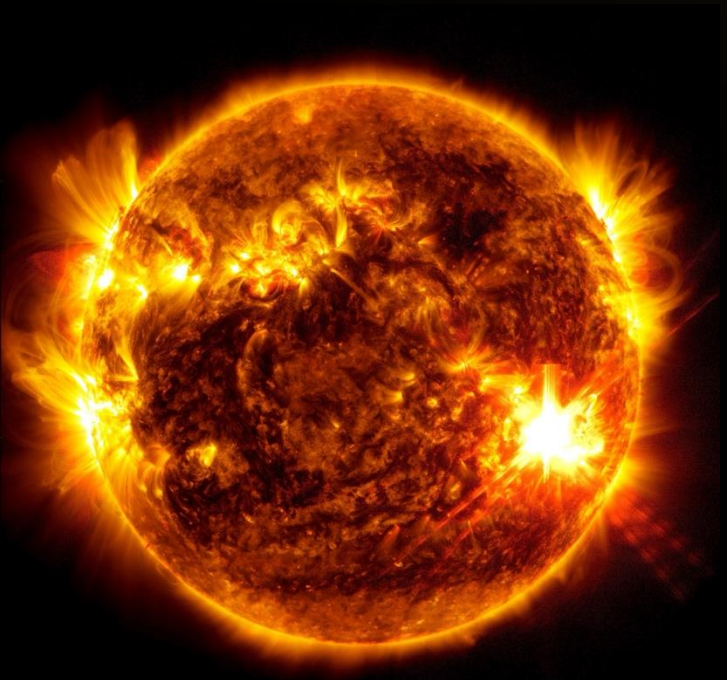
Total Solar Eclipse

- The three live NASA broadcasts had more than 36.9 million cumulative views.
- Over 36,000 individual citizen scientists contributed over 60,000 data submissions.
- Science Activation reached over 2,000 educators across the country

Credits: Yfat Yossifor/KERA

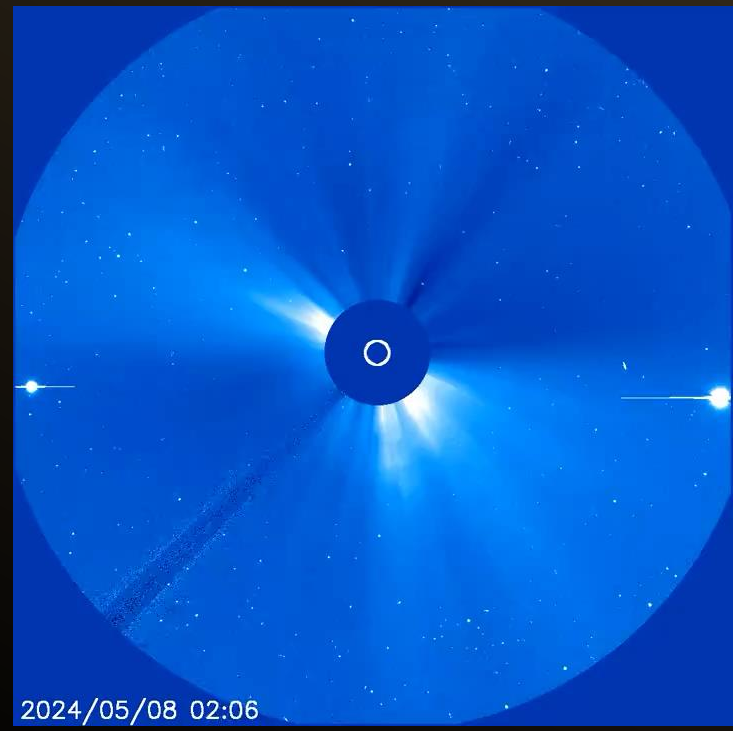
Photo Credit: Nels Garrison (Indianapolis, IN)

Geomagnetic Solar Storm



NASA's Solar Dynamics Observatory (SDO) captured this image of an X5.8 solar flare peaking at 9:23 p.m. EDT on May 10, 2024. The image shows a subset of extreme ultraviolet light that highlights the extremely hot material in flares.
Credit: NASA SDO

A coronal aurora appeared over southwestern British Columbia on May 10, 2024.
Credit: NASA/Mara Johnson-Groh

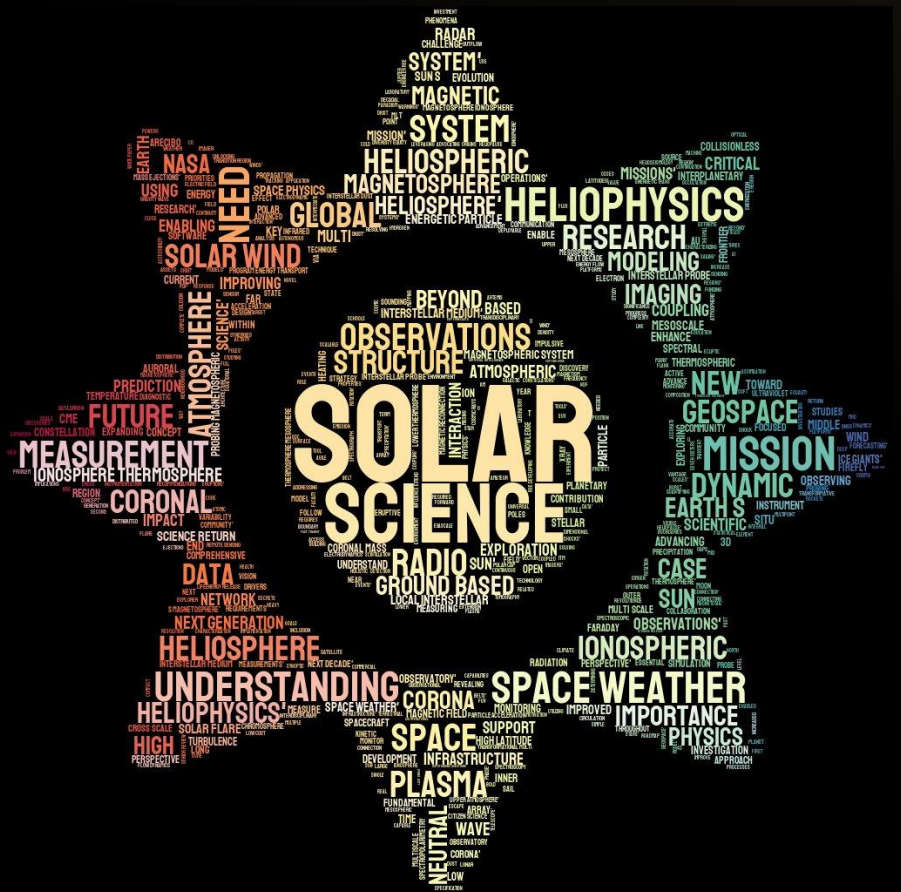


A series of CME's are launched from the Sun on May 8th, as captured by SOHO's LASCO instrument
Credit: NASA SOHO

2024 Decadal Survey is Coming Soon

Expected Summer 2024

250 white papers submitted!



Word cloud of the Heliophysics Decadal White Paper titles.
Credit: James Paul Mason

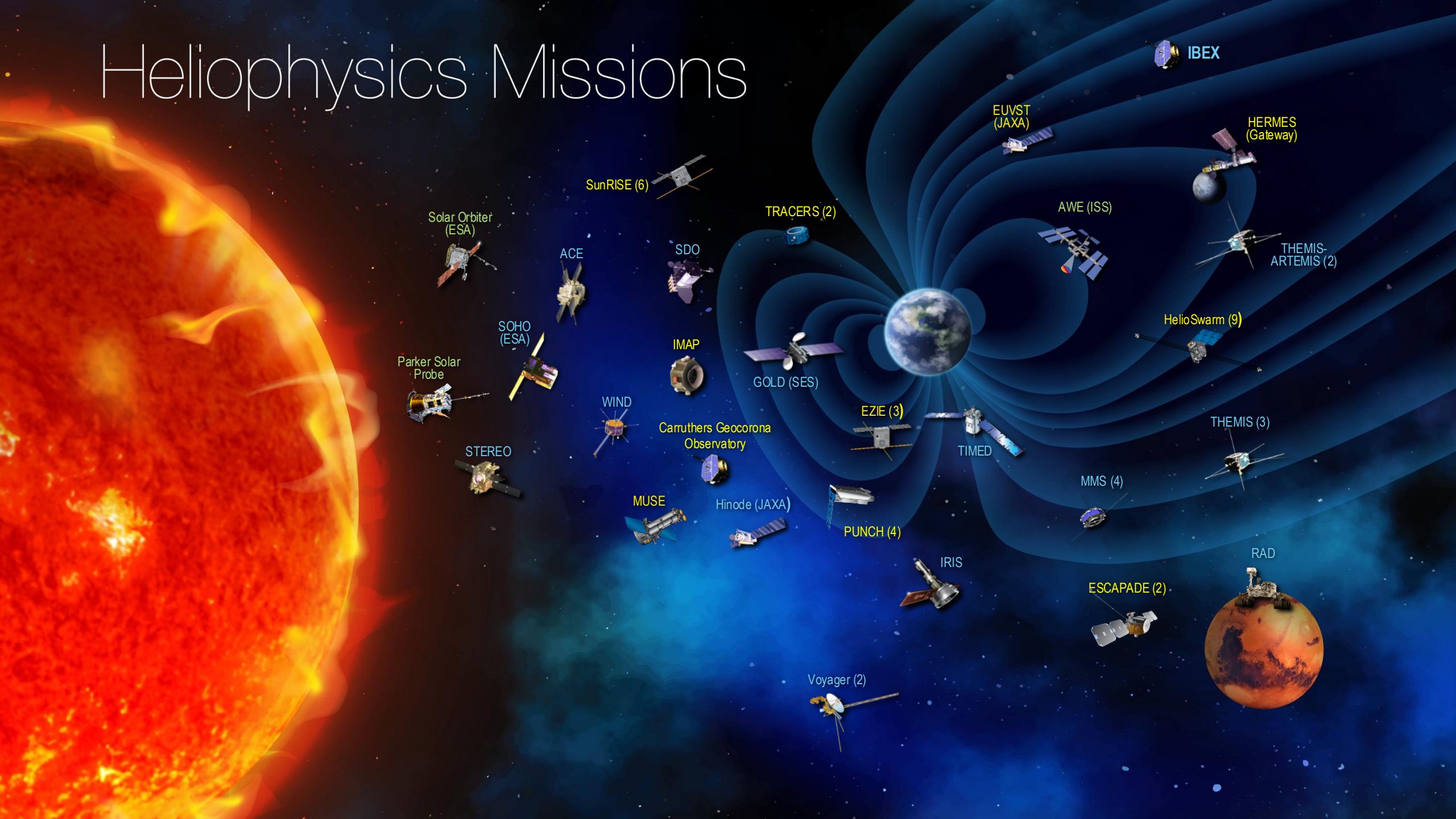
*Importance of the Decadal Survey cannot be overstated. This is **the** opportunity to set a vision for the next decade and beyond!*

The Decadal Survey is charged to "generate consensus recommendations to **advance and expand the frontiers of solar and space physics** in the current decade and **lay the groundwork for continued advances in future decades**." [Decadal Survey, Statement of Task]

- For more information, visit the NASEM website: https://nas.edu/ssphdecadal
- To see supporting information delivered to the Decadal Survey, visit: https://go.nasa.gov/HelioDecadal (Resources → Supplemental Information)

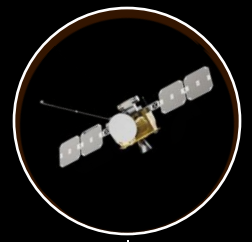
Image credit: National Academies of Science website

Heliophysics Missions



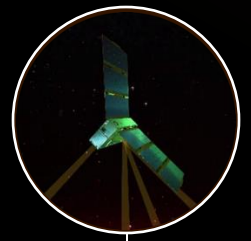
Helio Mission Launch Timeline

ESCAPADE



~October **2024**

EZIE

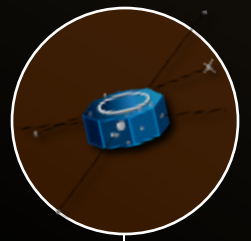


~October **2024**

SunRISE

~March **2025**

TRACERS



~April **2025**

PUNCH

~April **2025**

IMAP

~May **2025**

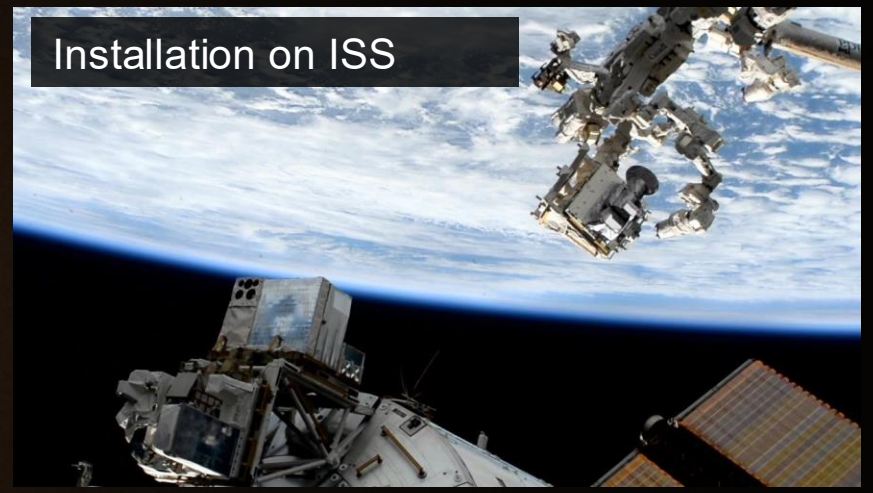
Carruthers Geocorona Observatory

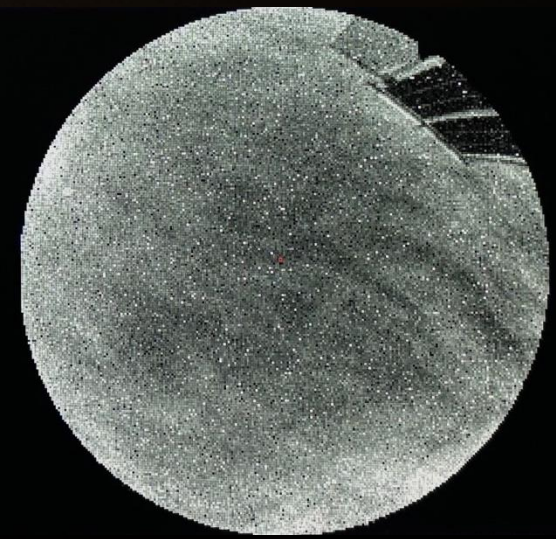
~May **2025**

Heliophysics Mission Highlights

Atmospheric Waves Experiment (AWE)

- AWE is the first NASA mission dedicated to characterizing global properties of atmospheric gravity waves (GWs) at the edge of space.
- AWE is the first Helio mission to fly on the International Space Station.
- AWE is the first HPD mission to launch during the Helio Big Year.





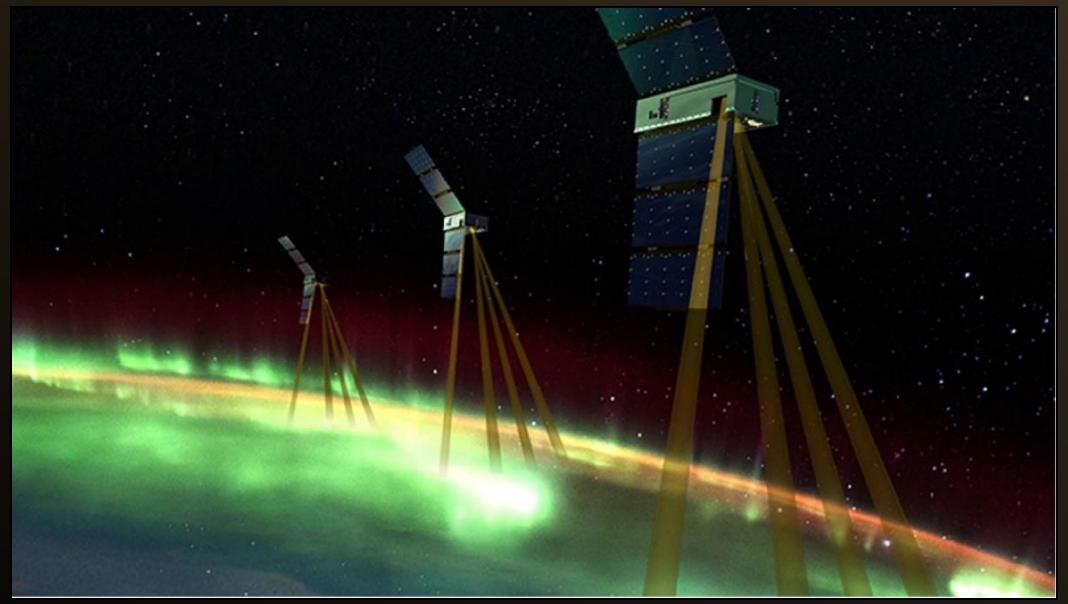
First light from one of four telescopes

Presentation by AWE PI Ludger Scherliess on Friday 6/14 at 0835

AWE launch 10 November 2023

Electrojet Zeeman Imaging Explorer (EZIE)

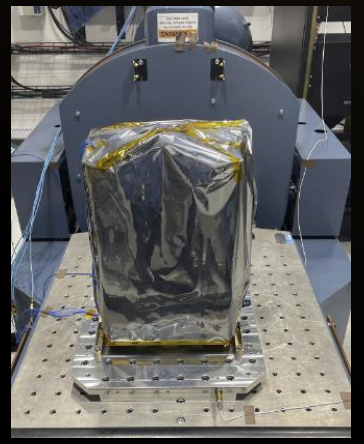
- Three 6U CubeSats will study the auroral electrojets flowing at 100-130 km above the poles, linking Earth's magnetosphere and ionosphere to solar activity and space weather.
- EZIE will employ a Zeeman splitting of 118 GHz O2 emissions to answer decades-long debate on how the auroral electrojet behaves during geomagnetic storms.
- Launch no earlier than October 2024 on SpaceX Transporter 12.



Credit: APL/NASA

Recent Updates

- EZIE is in Phase D (assembly, integration, and testing)
- EZIE-Mag Education & Outreach Program is developing hands-on magnetometer kits for middle & high school students
- More EZIE info at https://science.nasa.gov/missions/ezie



Credit: Blue Canyon Technologies

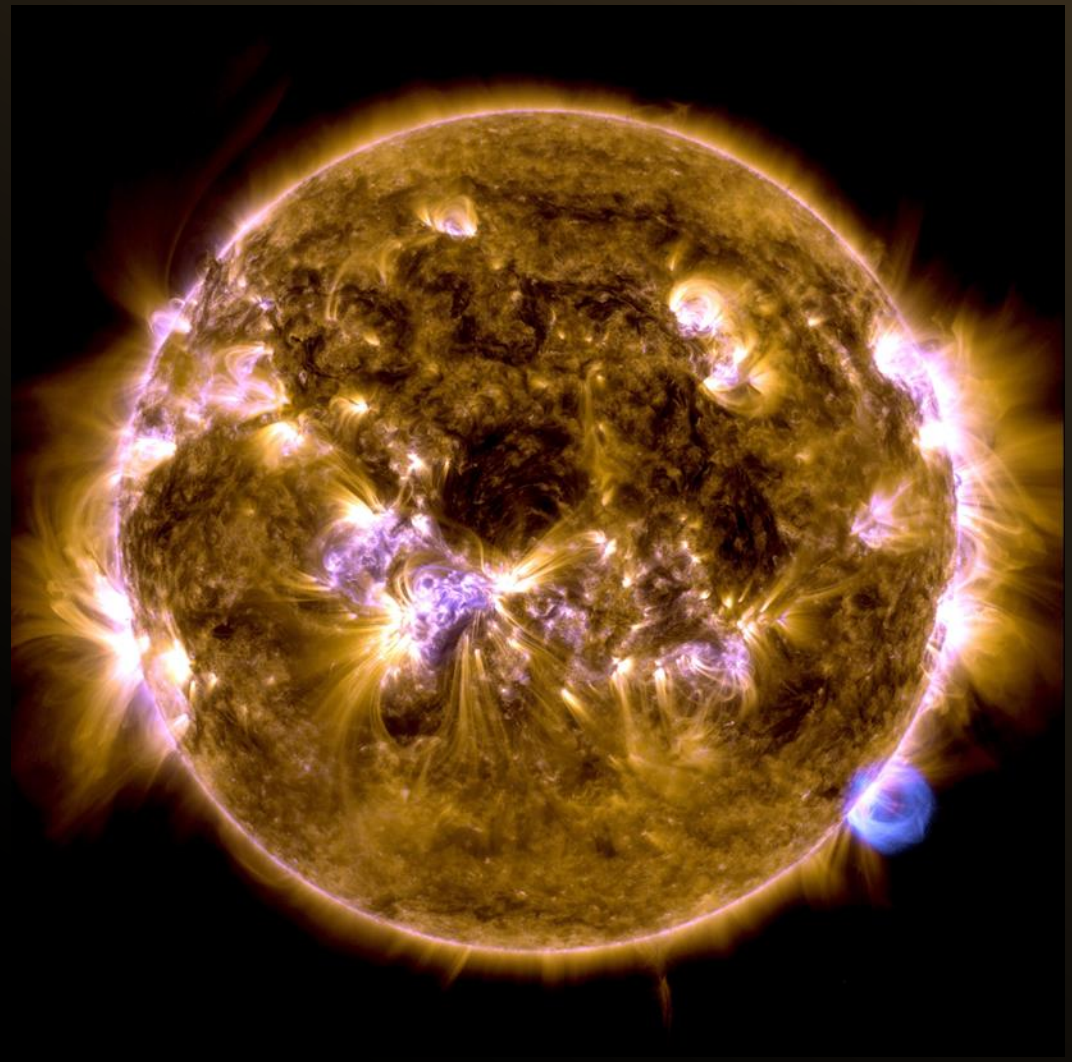
Microwave Electrojet Magnetogram Instrument (MEM) Credit: Jet Propulsion Laboratory

Presentation by EZIE PI Sam Yee on Friday 6/14 at 0850

Science Storytelling

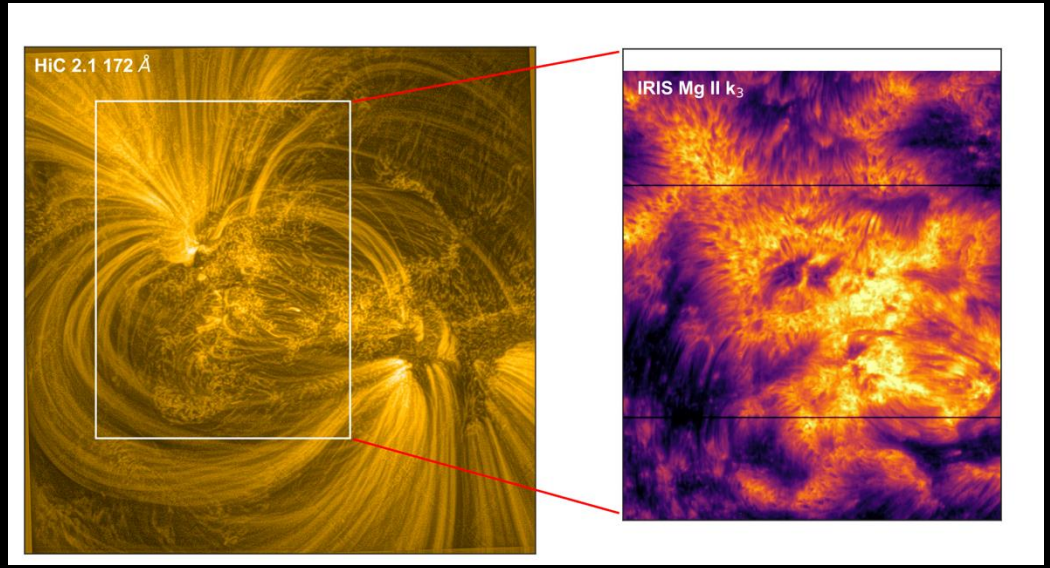
- Share your science!
- We want to advocate for compelling “science nuggets” from the Heliophysics community
- Pull science results and captivating images from reports that can be easily shared
- Highlights can be sent to the HPD Science Highlight inbox:

HQ-HelioHighlights@mail.nasa.gov



Science Nugget

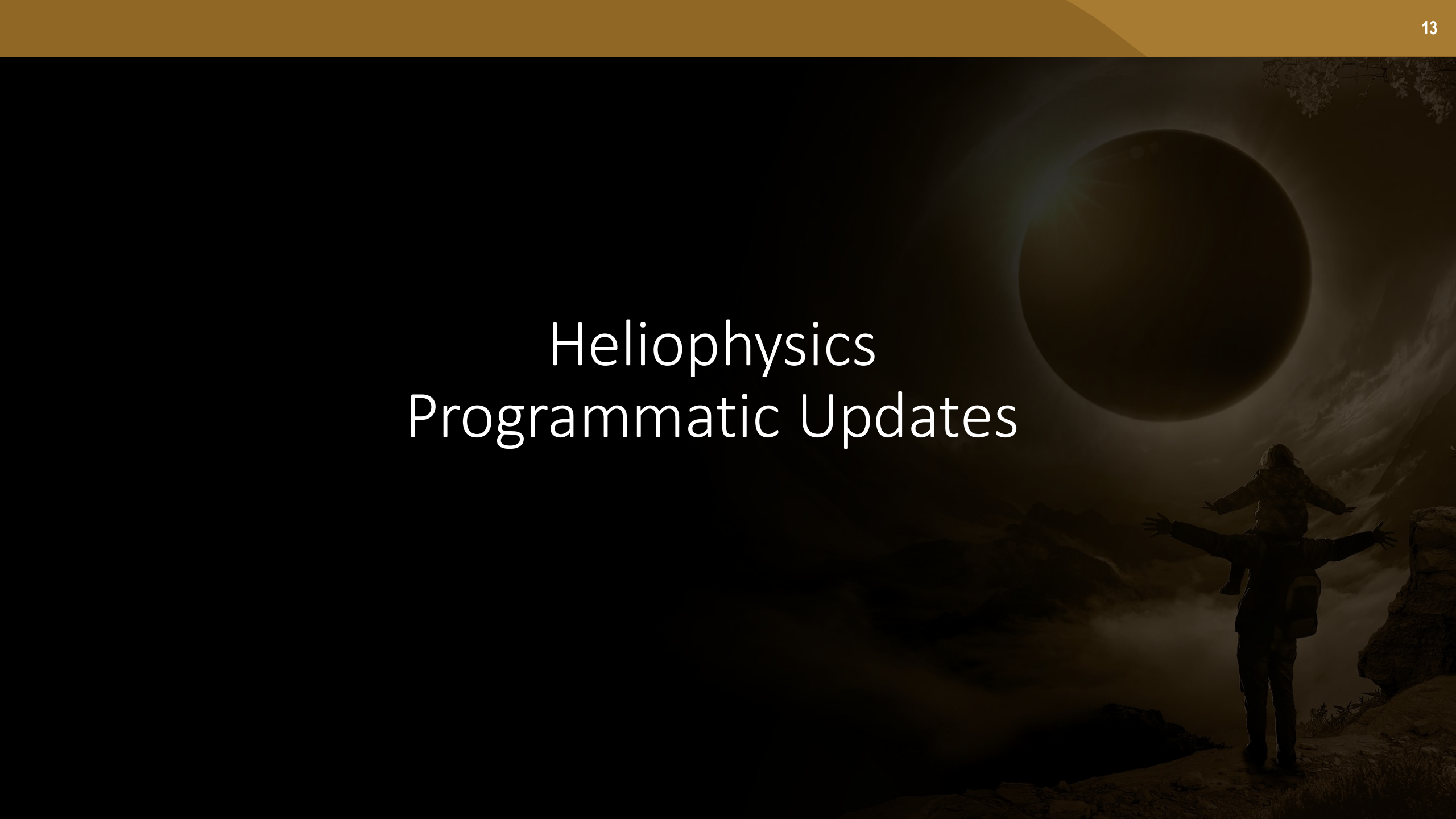
Solar Moss: IRIS and HI-C take a closer look at super heating mechanisms within sunspots



Scientists have named a small-scale, bright, patchy structure made of plasma in the solar atmosphere “moss.” The moss blossoms around the center of a sunspot group, where magnetic conditions are strong. Observations from IRIS and HI-C combined with complex 3D simulations have now revealed that electrical currents may contribute to heating the moss. Throughout this region there is a mess of magnetic field lines, like invisible spaghetti. This tangle of magnetic spaghetti creates electrical currents that can help heat material to a wide range of temperatures from 10,000 to 1 million degrees Fahrenheit.

The Paper can be found here.

Heliophysics Programmatic Updates



Research & Analysis Update

RECENT ROSES-23 SELECTIONS

HSR 2023 (notified 10.20.23)	HGIO 2023 (notified 1.08.24)	HFOS 2023 (notified 1.25.24)	HTIDES 2023 (notified 1.25.24)	LWS 2023 (notified 5.01.24)
• 161 proposals received • 24 selected • 14% selection rate	• 82 proposals received • 19 selected • 23% selection rate	• 6 proposals received • 1 selected • 17% selection rate	• 26 proposals received • 6 selected • 23% selection rate	• 62 proposals received • 16 selected • 26% selection rate

ROSES-2023 solicitation provided the greatest scope ever offered for NASA Heliophysics

- New Technology Program and Space Weather Program
- Growing number of Cross-Divisional programs

Maintaining a robust R&A program through solicitation of 25 ROSES-24 elements

Heliophysics Strategic Technology Office (HESTO)

The Heliophysics Division created the Heliophysics Strategic Technlogy Office (HESTO) to help manage the Heliophysics technology program, which works closely with the Sounding Rocket Program and Balloon program.

Recent Accomplishments:

- Launched the Heliophysics Technology website (www.hesto.smce.nasa.gov)
- Released the first annual Heliophysics Technology report

Looking Ahead:

- The 2024 Heliophysics Technology Symposium will be held on September 18-19, 2024 at the Wallops Flight Facility

NASA's Sounding Rockets Program

- Current motor inventory is healthy
- FY23
  - 11 missions launched
  - Two Norway campaigns – ACES-2 and VortEx (First use of refurbished dual-boom launcher)
- FY24 (as of 4/30/24)
  - 21 missions total – 11 missions launched, 10 missions remaining
  - Two APEP eclipse campaigns with 6 total missions from White Sands and Wallops
  - Solar flare campaign from Poker Flat Research Range
- FY25
  - 15 missions total on manifest
  - **FOUR** campaign deployments (Norway, Poker-x2, Kwajalein)
  - Peru site improvements begin

CAPTION: Tech dev/demo to show low-cost neutral wind instrumentation, as part of Eclipse Rocket Campaign. Aroh Barjatya (PI), six Embry-Riddle Aeronautical University (ERAU) graduate students, and three early career scientists are present during the demonstration.

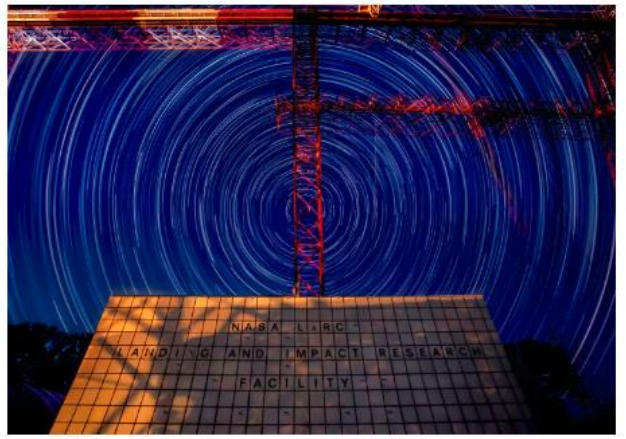
Upcoming Summer Launches

APEP rocket launch from Wallops Flight Facility on April 8, 2024, as part of the total solar eclipse science activities.
Credit: NASA / V.Graham

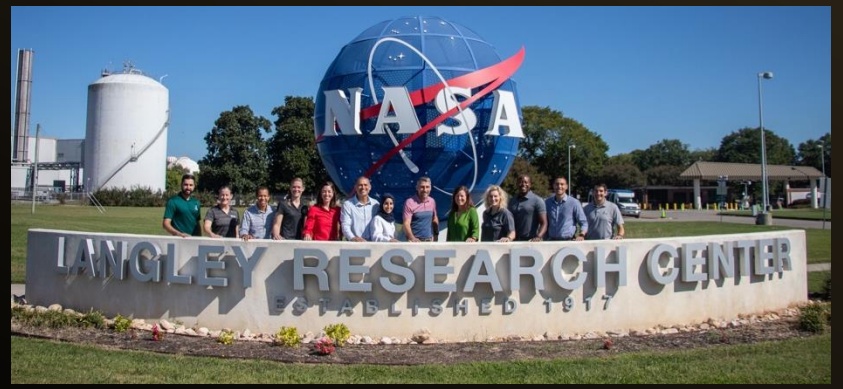
Upcoming Summer Launches

PROJECT	PI	RANGE	DATE	DISCIPLINE
HERSCHEL 3	Tun	WSMR	JUN 18	SOLAR & HELIOSPHERIC
RockOn	Koehler	WFF	JUN 20	STUDENT OUTREACH
MaGIX 2	Winebarger	WSMR	JUL 16	SOLAR & HELIOSPHERIC
FURST	Kankelborg	WSMR	AUG 11	SOLAR & HELIOSPHERIC

NASA Heliophysics Division and Space Weather Program are excited to announce…



The **NASA Langley Research Center** has been selected to host the **NASA Space Weather Program Office**!



LOCATION
Hampton, Virginia

LEADERSHIP
Dr. Trina Dyal & Joe Gasbarre, Director and Deputy Director of the Science Directorate

EXPERTISE
Program Coordination & Implementation, Applied Sciences, Atmospheric Science, Aviation, Human Exploration Technology Development, Flight Mission Management

More information about specific roles & responsibilities of the Space Weather Program Office will be shared in the coming months.

Official kickoff of the Space Weather Program Office will occur later in 2024.

Heliophysics Big Year keeps getting **bigger**!

- 6 Citizen Science projects launched in 2023-2024:
  - More than 36,000 volunteers participated in eclipse citizen science
  - TBs of data like photos, QSO contacts (ham radio) audio, and notes on paper!
  - Calibration and science in process
- Continued observations and campaigns of solar maximum superstorms
- Maintaining community connection & building a stewardship feedback cycle with partners
- Citizen Science in ROSES24:
  - Seed Funding F.9 CSSFP due Nov 2024
  - H-Citizen Science Investigations

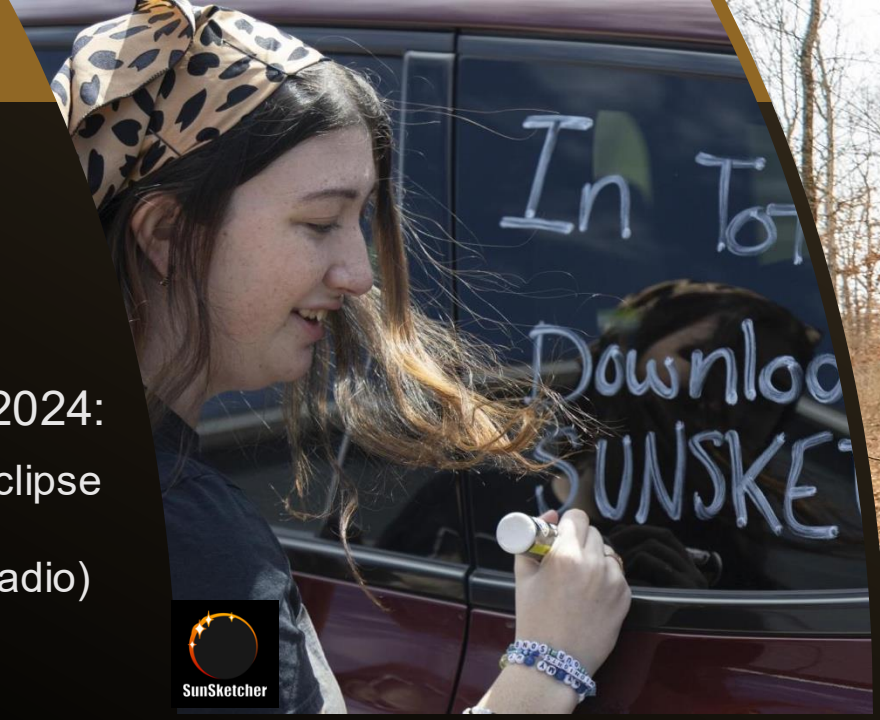


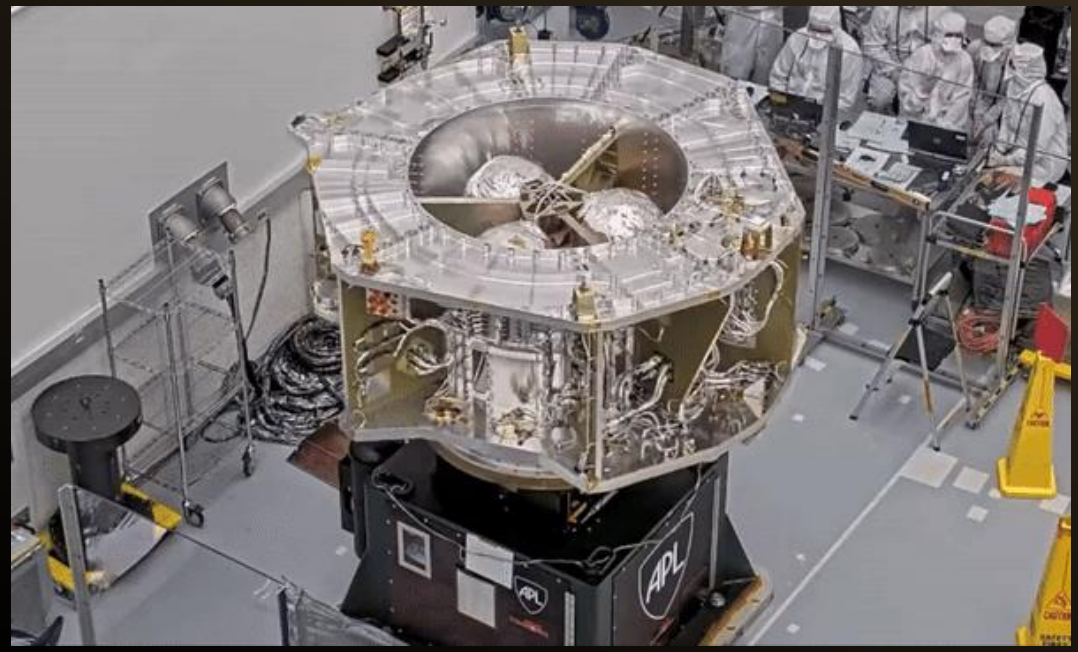
Photo credits: Sunsketcher, Eclipse Soundscapes, DEB Initiative, CitizenCATE

Heliophysics Budget Update

Heliophysics Budget Priorities

Explore/Innovate/Partner/Inspire

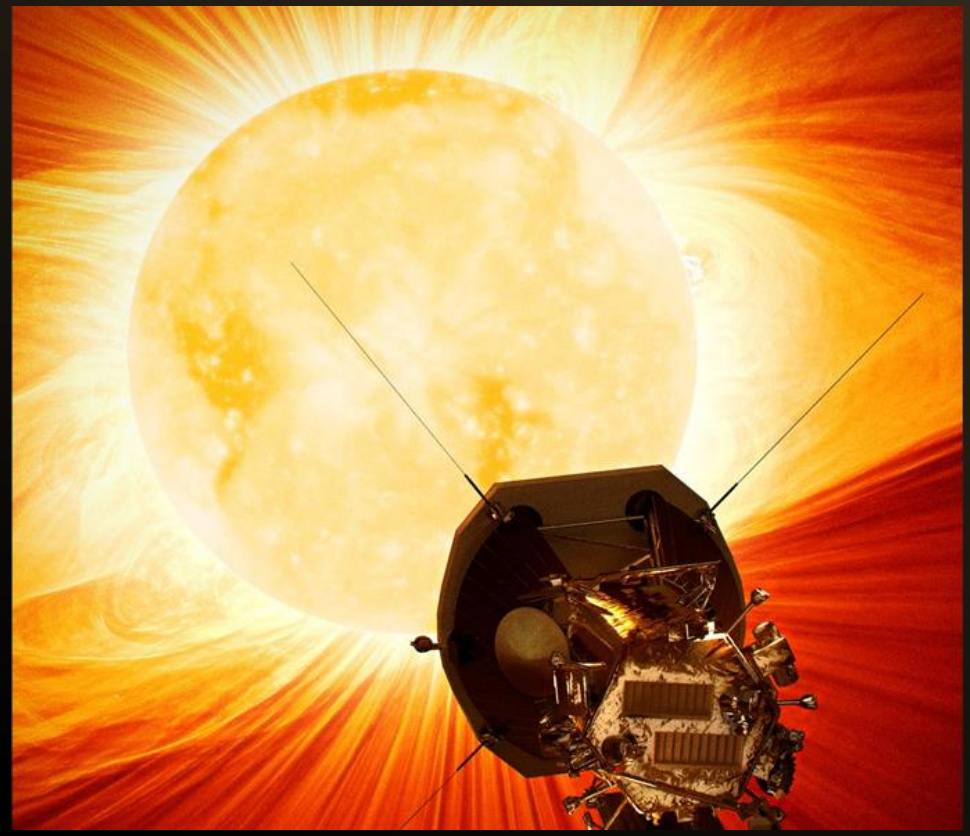
- Maintain a **balanced mission portfolio -** ensuring the success of missions currently in development, stewarding the operating Heliophysics System Observatory, and enabling future missions to the extent possible
- Nurture a vibrant and inclusive **R&A** program
- Support **partnerships** with international space agencies
- Support **National priorities** in Space Weather, Orbital Debris and Space Situational Awareness



CAPTION: IMAP spacecraft integration.

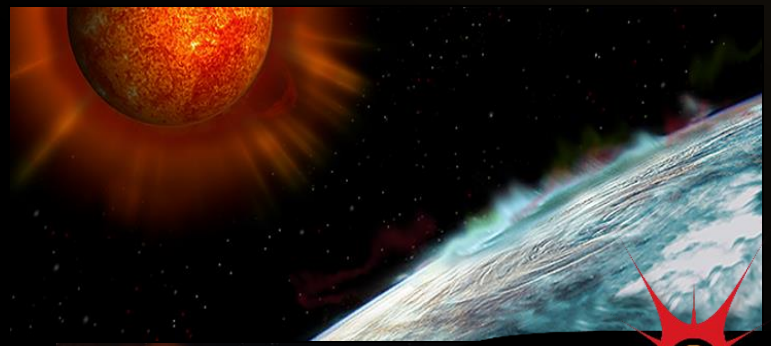
Heliophysics Budget Highlights

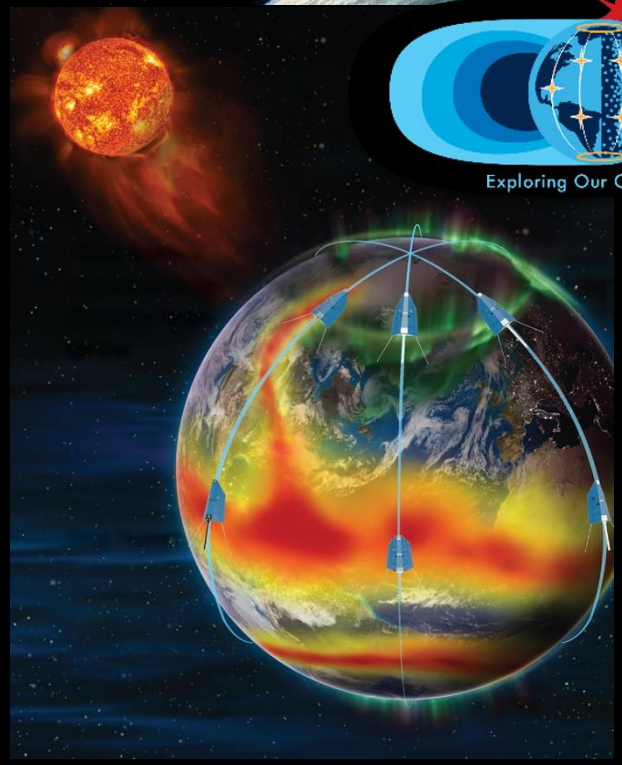
- Advances **ESCAPADE, EZIE, SunRISE, TRACERS, PUNCH, Carruthers,** and **IMAP** toward launch in 2024-2025
- Supports a healthy cadence of PI-led Explorer missions
  - **MUSE** and **HelioSwarm** confirmations in 2024 and 2025
  - Final SMEX selections planned for 2025
  - Future Explorer solicitations in FY25 (MIDEX) and FY28 (SMEX)
- Proposes cancellation of **GDC** rather than a 3 year pause in recognition of outyear budget constraints



observes switchbacks — traveling disturbances in the magnetic field to bend back on itself — an effect that might help scientists uncover more about how it accelerated from the Sun.

Geospace Dynamics Constellation (GDC) and Dynamical Neutral Atmosphere-Ionosphere Coupling (DYNAMIC)





GDC and DYNAMIC provide a whole-system study of upper atmospheric dynamics by combining their scientific and technical capabilities

- In science…
  - GDC: Understand the upper atmosphere's internal processes and dynamics, and response to energy inputs from Earth's space environment (*energy from above*)
  - DYNAMIC: Understand the effect of lower atmosphere variability on the processes and dynamics of the upper atmosphere (*energy from below*)
- In architecture…
  - GDC: Provides in situ measurements above 300 km
  - DYNAMIC: Provides remote sensing of vertical profiles below 300 km altitude, leverages GDC measurements

DYNAMIC AO
- AO released May 2023
- Selections in June 2024

Get Involved and Stay Informed!

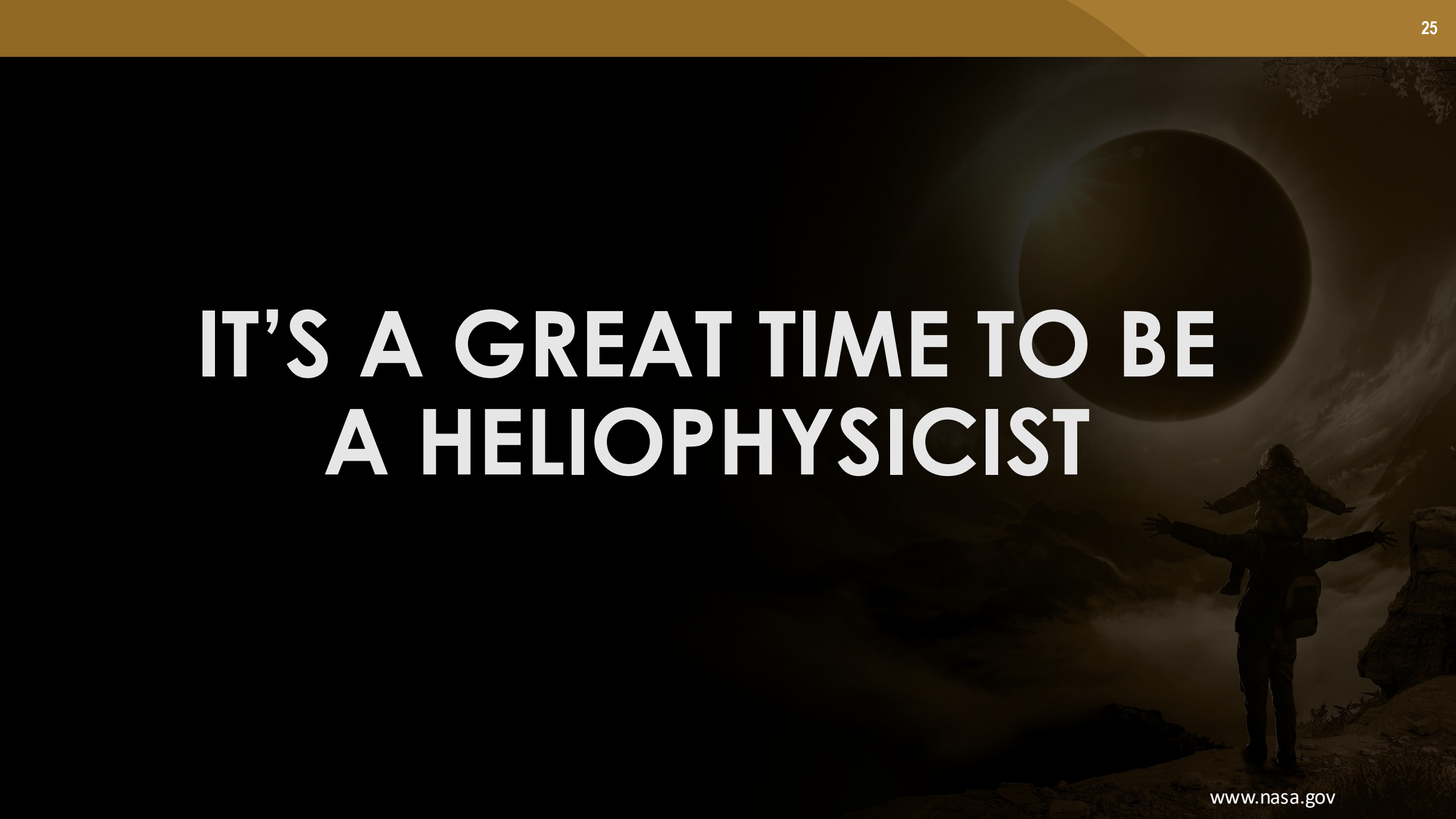
Stay in touch and help us find new ways to highlight your work and keep you in the loop!

Submit science highlights to us here:
HQ-HelioHighlights@hq.nasa.gov

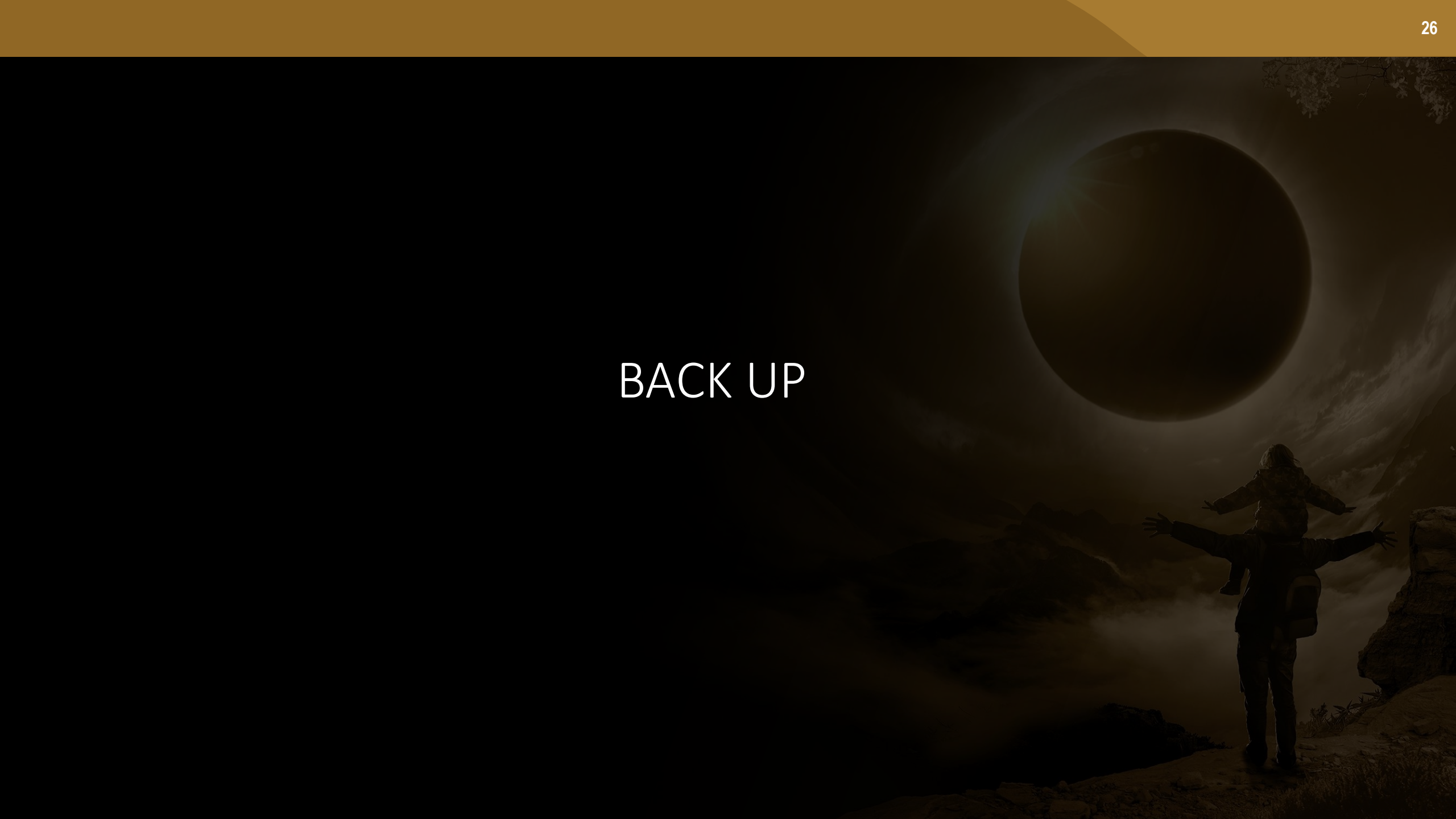
Join us for our next Community Town Hall – *18 June 2024*:
https://science.nasa.gov/researchers/virtual-townhall

NASA.gov/sunearth blogs.nasa.gov/sunspot facebook.com/NASASunScience @NASASun

IT'S A GREAT TIME TO BE A HELIOPHYSICIST



BACK UP



Peru Sounding Rocket Campaign (Cielo)

- Held kickoff meeting March 2024
- Conducted two site visits to Punta Lobos rocket range near Lima, Peru; final site visit scheduled for June 2024
- Preparing MOU between CONIDA and NASA
- Campaign tentatively scheduled for Spring or Fall 2028, with the launch of 10-14 rockets

CEDAR 2024 Workshop: The Peru 2028 Sounding Rocket Campaign Planning on 6/11 at 1000

Heliophysics Budget Highlights

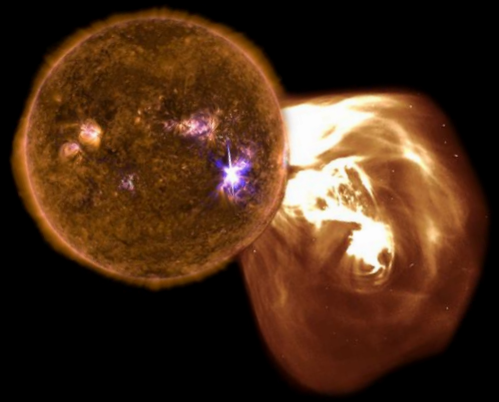
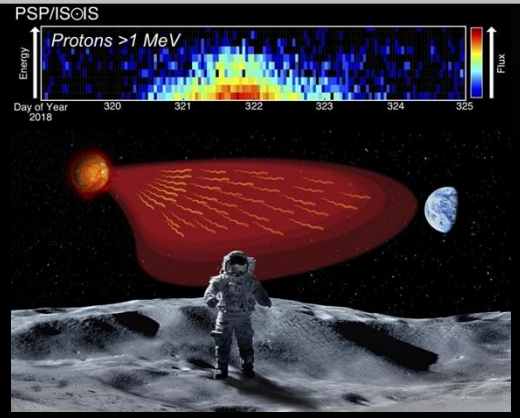
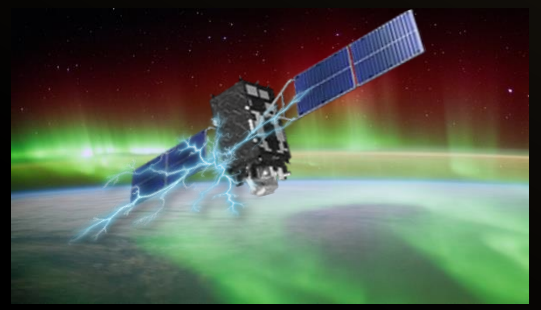
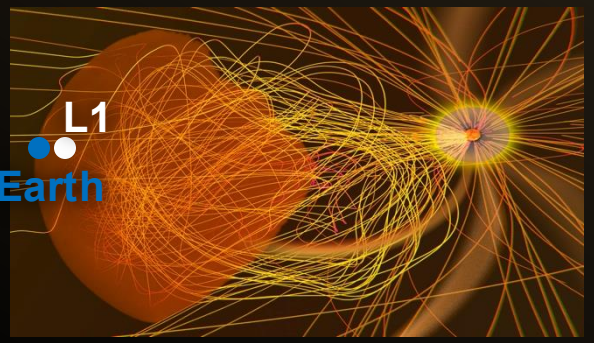
- **Supports** Space Weather Centers of Excellence and quad-agency efforts in R2O2R to advance space weather research and applications within the **Space Weather** program
- Provides agency capabilities in **Research Range** and **Sounding Rockets** in support of innovative small payloads
- Invests in advancement of Heliophysics technologies
- Supports demonstration of technologies for characterizing **orbital debris**
- Supports continued scientific discovery through the Heliophysics DRIVE Science Centers
- Increases funding for **CubeSats** and open science initiatives within R&A

CAPTION: A sounding rocket soars skyward at Launch Complex 36 at White Sands Missile Range in New Mexico on Oct. 14 to capture data on the annular solar eclipse.

Photo Credit: U.S. Army by Judy Hawkins/Released

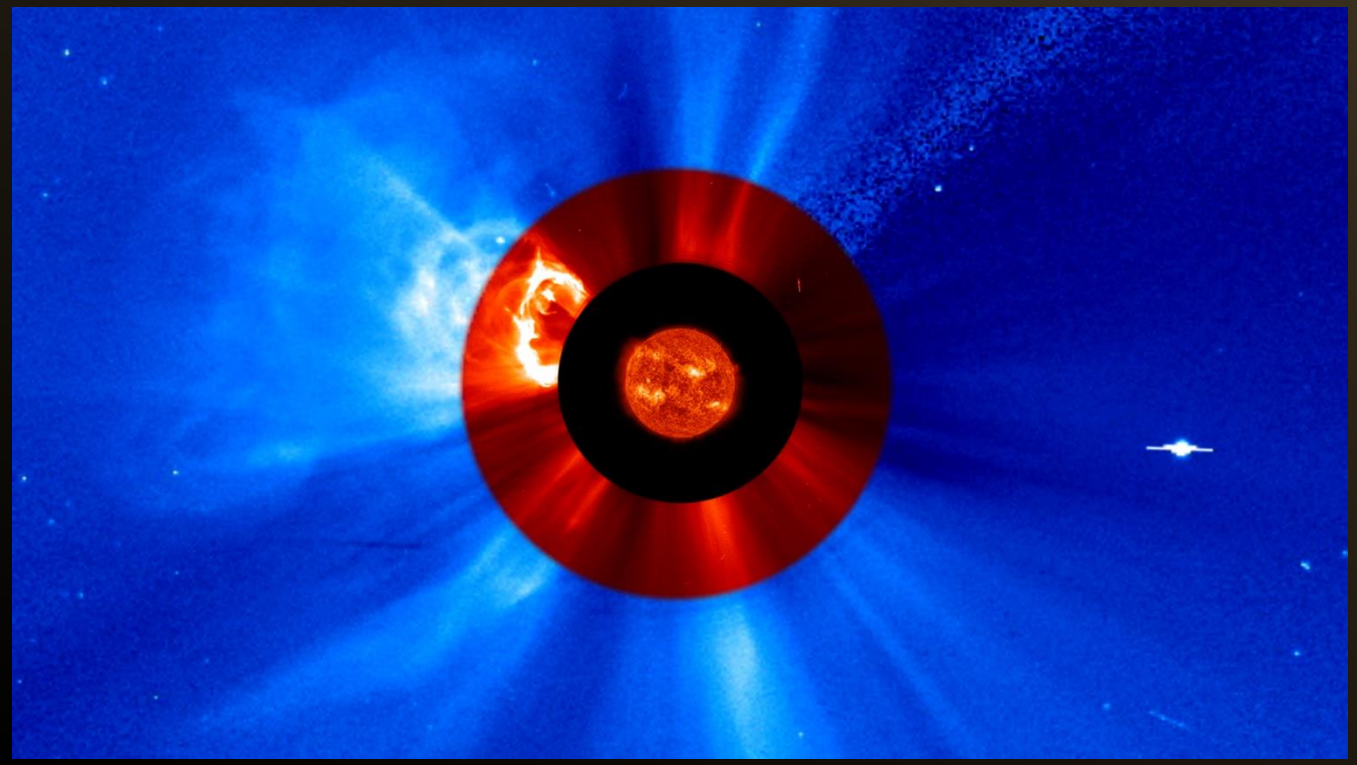
End-to-End Space Weather Tabletop Exercise (TTX)

- New national Space Weather strategy released in Dec 2023
- Section 3.5 calls for exercises to gauge national preparedness & identify gaps
- NASA, NOAA, and NSF are sponsoring Space Weather TTX
- Will be managed, designed, and conducted at APL on May 8th and 9th, 2024
- Will involve multiple federal, state, and local agencies

	Module 1	Module 2	Module 3	Modules 4 and 5
Scenario				
	Solar Drivers	Solar radiation storm	CME impact	Geomagnetic storms and aftermath

VIGIL + JEDI

NASA announced May 21st it selected a new instrument to study the Sun and how it creates massive solar eruptions. The agency's Joint EUV coronal Diagnostic Investigation, or JEDI, will capture images of the Sun in extreme ultraviolet light, a type of light invisible to our eyes but reveals many of the underlying mechanisms of the Sun's activity.



15 May 2024

Heliophysics Division (HPD)

NASA Science Mission Directorate (SMD)

Division Director
Joe Westlake

Deputy Division Director
Peg Luce

Associate Director Flight
Nicki Rayl

Research Program Director
Therese Moretto Jorgensen

Communications & Outreach

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Carolina Ravinskas[1] – Strategic Communications Lead
Sarah Frazier - Comms Manager (GSFC)
Leslie Garrison[1] – Outreach Coordination Lead

Division Operations

Kennedy Novak (XO)[1]
Amy Marshall (EA)[1]
Jess Calles (Flight EA/XO)[1]
Wynette Hoskins (Research EA)[1]

Mission Services Integration
Paulette Woods

Data Systems

Matt McClure
Alan Zide
Alvin Robles[1]

Knowledge Management

Task Monitor
Maria Busuioceanu

Knowledge Management
Tara Roberts[1] - Lead
Julia Kaner[1]
Roger Sanchez[1]

IT: Heliophysics Advanced Library (HAL)/SharePoint Online (SPO)
Aadel Ragaban[1] - Lead
James Bruniany[1]
Mazin Rasmi[1]
Vyjayanthi Sunkara[1]

Program Executives

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David Cheney
Elizabeth Esther
Jamie Favors
Heather Futrell
Skyler Kleinschmidt[2]
Aly Mendoza-Hill
Asal Naseri
Ursula Rick
Ezinne Uzo-Okoro[4]
Brad Williams
Alan Zide

Program Scientists

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Genene Fisher
Galen Fowler
Reiner Friedel
Lika Guhathakurta
Roshanak Hakimzadeh
Patrick Koehn
Kelly Korreck
Janet Kozyra
Jared Leisner
Elizabeth MacDonald[2]
Matt McClure
John McCormack
Dan Moses
Simon Plunkett
Arik Posner
Ennio Sanchez
Esayas Shume[3]
Katya Verner[1]
Amy Winebarger[2]
Lisa Winter[2]

Programs & Technology

Research & Analysis
Patrick Koehn – Lead
Darcia Brown
Vanessa Salazar[1]

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Jamie Favors - Director
Ursula Rick - Program Executive
Walter Twetten[1]

Technology
Dan Moses - Chief Technologist
Roshanak Hakimzadeh - Deputy

Domain Leads
Susanna Finn - Outer Heliosphere
Reiner Friedel - Magnetosphere
Lika Guhathakurta - Inner Heliosphere
John McCormack - Ionosphere, Thermosphere, Mesosphere

Presidential Innovation Fellow
Ha-Hoa Hamano

Cross-Cutting

Cubesats
David Cheney

Resource Management Division (RMD)
David Darbouze
Carol Peterson
Dan Walsh

Rideshare Office
Aly Mendoza-Hill
David Cheney
Alan Zide
Katie Nelson[1]

Sounding Rockets & Range
Jamie Favors
Dan Moses

SMD Interfaces

International & Interagency Interface
Gib Kirkham - SMD Lead
Betsy Goldemen - HPD Lead

Office of Legislative & Intergovernmental Affairs Interface
Andy Rowe - HPD Lead

Policy
Nathan Boll[2]
Kayla Rillo

Key
1: Contractor
2: Detailee
3: IPA
4: Detailed Out

New/Incoming
Outgoing