National Aeronautics and Space Administration

Heliophysics Division

Committee on Solar and Space Physics

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Heliophysics Division Director

March 24, 2021

Update on Heliophysics COVID-19 Impacts

We recognize everyone's enormous personal and professional challenges at this time. Everyone's physical safety and emotional wellness remains our priority.

Missions

- Minimal impacts to operating missions
- Many missions in formulation or development have already submitted, and amended, re-plans to accommodate COVID impacts

Research

- NASA instituted a number of grant administration flexibilities to ease the burden on grant recipients during the COVID-19 emergency
- **Post-COVID-19 Recovery:** Heliophysics R&A augmentation requests received in early March and under evaluation

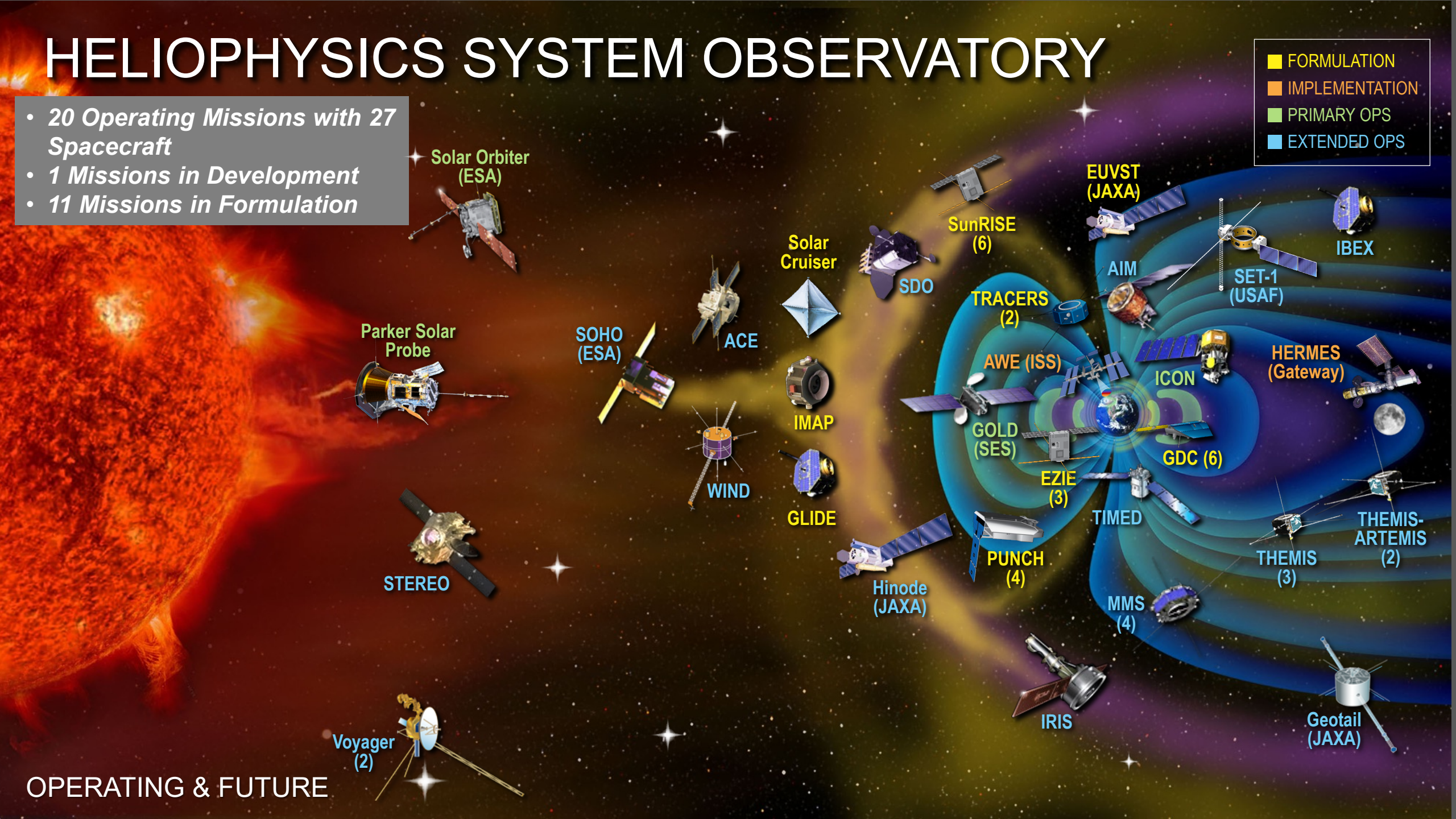
2020 Year in Review: Heliophysics is Experiencing Incredible Growth

- NASEM conducted a mid-term assessment of progress toward implementation of the 2013 Decadal Survey.
- Heliophysics program reflects the results of a concerted effort to successfully launch missions developed over the past decade and to increase cadence of flight opportunities.
- Heliophysics is driving growth in other areas of the program:
  - Space weather, space situational awareness, scientific discovery, application of the revolutionary new capabilities in Artificial Intelligence, Machine Learning, citizen science, data analysis and archiving to enhance data assimilation and modeling, and technology development.
- In 2018-20, HPD successfully launched 5 missions: GOLD, Space Environment Testbeds, Parker Solar Probe, ICON, and Solar Orbiter Collaboration.
- Leaning forward to accelerate mission selections and cadence as outlined in the 2013 Decadal Survey. Heliophysics currently has 12 missions in formulation or development and another 7 under study, representing the largest increase in missions in the history of the Division.
- Developing detailed implementation plans for many of its strategic working groups.
- Senior Review successfully completed – thank you to members of both the mission and data panels.

HELIOPHYSICS SYSTEM OBSERVATORY

- *20 Operating Missions with 27 Spacecraft*
- *1 Missions in Development*
- *11 Missions in Formulation*

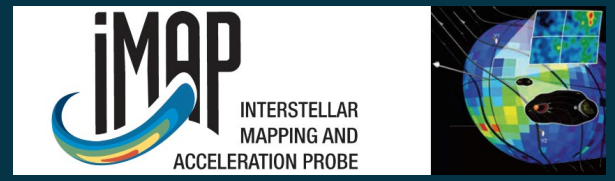
FORMULATION
IMPLEMENTATION
PRIMARY OPS
EXTENDED OPS

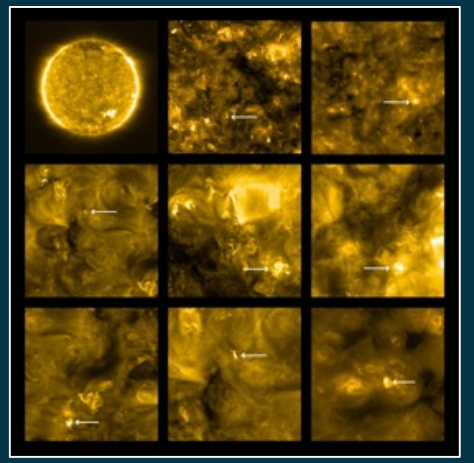


OPERATING & FUTURE

2020 Heliophysics Division Highlights

- **Interstellar Mapping and Acceleration Probe (IMAP)**
  - Proceeded into Phase B in Jan. and a Falcon 9 Full Thrust Rocket was announced as the launch vehicle on Sep. 25; LRD replanned to Feb. 2025 due to impacts from COVID. Student collaboration ongoing.
- **Solar Orbiter**
  - Launched Feb. 9 and first data were released to the public in Sep. and Dec.
- **Atmosphere Wave Experiment (AWE)**
  - Successful SRR/MDR in Feb.; KDP-C in Dec.
- **Heliophysics Environmental and Radiation Measurement Experiment Suite (HERMES)**
  - Selected in Mar. as one of two scientific investigations to fly on Gateway in support of Artemis. Instruments completed Single Design Review Nov. 16-19.
- **Sun Radio Interferometer Space Experiment (SunRISE)**
  - Selected on Mar. 30.
- **Polarimeter to Unify the Corona and Heliosphere (PUNCH)**
  - Successful SRR/MDR in April.



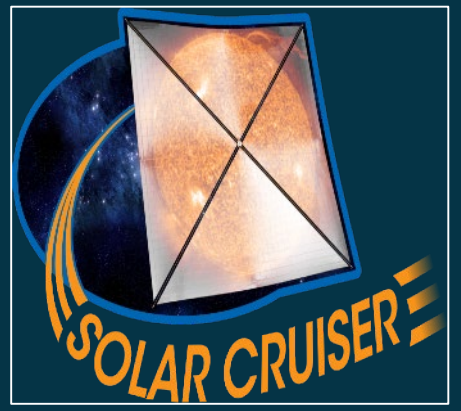


2020 Heliophysics Division Highlights

- **Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites (TRACERS)**
  - TRACERS and a tech. demo., [MAGnetometers for Innovation and Capability (MAGIC)] proceeded into Phase B Preliminary Design following an Extended Phase A study on Apr. 24.
- **Ionospheric Connection Explorer (ICON)**
  - First data released in June.
- **Medium Class Explorer (MIDEX)-19**
  - Step-1 selections announced Aug. 28. Congratulations to STORM, HelioSwarm, MUSE, ARCS, and Solaris!
- **Geospace Dynamics Constellation (GDC)**
  - Successfully passed KDP A on Sep. 8.
- **Parker Solar Probe**
  - Completed 4th, 5th, and 6th perihelia and a Venus gravity assist in July
  - 7th perihelion completed Jan. 17, 2021
  - Closest Distance: within 8.4 million miles of the Sun's surface
  - Top speed: 289,927 miles per hour
  - Venus flyby #4: Feb. 20, 2021

2020 Heliophysics Division Highlights

- **Voyager 2**
  - Confirmed it had received commands on Oct. 31 from the upgraded DSN.
- **STP Missions of Opportunity announced Dec. 3**
  - **Solar Cruiser**
    - **PI:** Les Johnson at MSFC
  - **Global Lyman-alpha Imagers of the Dynamic Exosphere (GLIDE)**
    - **PI:** Lara Waldrop at the University of Illinois at Urbana-Champaign
  - **Spatial/Spectral Imaging of Heliospheric Lyman Alpha (SIHLA)** provided funding toward a final selection decision at a later date based on budget and rideshare opportunities
- **Explorer Missions of Opportunity announced Dec. 29**
  - **Extreme Ultraviolet High-Throughput Spectroscopic Telescope Epsilon Mission (EUVST)**
    - JAXA led mission
    - **PI:** Harry Warren at NRL
  - **Electrojet Zeeman Imaging Explorer (EZIE)**
    - **PI:** Jeng-Hwa (Sam) Yee Johns Hopkins University Applied Physics Laboratory



Opportunities in Heliophysics

GDC Instrument Call and IDS

- Instrument: Investigations with cost-effective, resource-efficient instruments (no suites). Evaluation emphasis on constellation-specific technical points.
  - **DRAFT Mission of Opportunity released** (Final targeted ~Mid-April 2021)
- Interdisciplinary Scientists: Work with instrument teams in Phase A-D (develop modeling/analysis tools, optimize constellation, refine data archiving plans, etc.).
  - **ROSES-21 B.15 GDC IDS released** (Step-1 proposals due Apr. 22, 2021)

DYNAMIC: PI-led Mission of Opportunity w/GDC

- Small mission, leveraging GDC measurements.
  - **Preparatory Community Announcement released**, detailed information by mid-April 2021, final solicitation ~Q3/Q4 2021

SMEX

- Planning to release a SMEX Announcement of Opportunity (AO) in 2022.
- Goal is to alleviate pressure on the community and reviewers and to capitalize on future launch options.

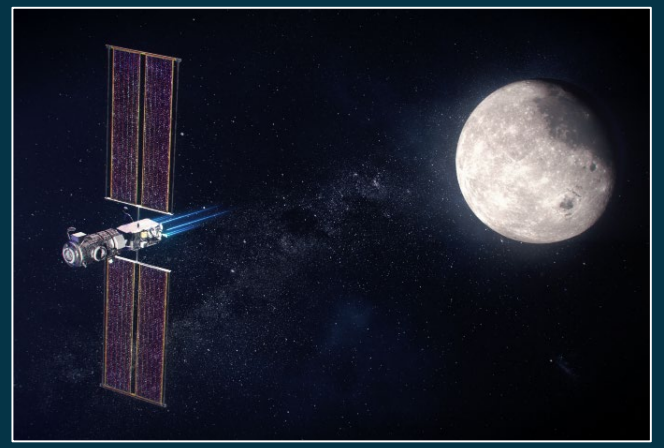
Living With a Star

- Soliciting community input on future program architecture.
- Point of contact: Simon Plunkett, NASA HQ .

NASA Space Weather

Recent Activities

- NASA Space Weather Strategy implementation
- NOAA and DoD Framework to transition NASA research, techniques and technology relevant to space weather operations
- Joint NSF-NASA Space Weather Quantification of Uncertainty (SWQU)
- R2O2R released: Includes additional Transition-Step for efforts that show promise to use in an operational environment at NOAA or DoD
- Rapid turnaround HERMES instrument package in support of Gateway and Artemis
  - Single Design Review: Nov. 2020
  - KDP C: summer 2021
  - Interdisciplinary Science Teams solicitation released



NASA Space Weather (cont.)

Looking Ahead

- PROSWIFT: continue with actions already underway to support interagency efforts, space weather observations, research, modeling, operational forecasting, and applications
  - SOHO, SWFO-L1, R2O2R
- Develop space weather instrument pipeline for future opportunities
- Convene Space Weather Council
- Engage international partners on future collaborations
  - ESA L5, CSA AOM, Daedalus, SNIPE
- Transitioning Radiation Assessment Detector (RAD) instrument on Curiosity rover on Mars from Planetary Science Division to the Heliophysics Division to engage space weather community supporting forecasting research at Mars
- Space Situational Awareness/Orbital Debris coordination

Research and Analysis Update

Overall

- Maintaining healthy R&A Program
- Maintaining DRIVE initiative and establishment of DRIVE Science Centers
- ECIP cadence every 2 years
- Engaging in efforts to increase diversity in research
  - Dual anonymous, high risk high reward
- Cross-Divisional programs – E.3 Exoplanets; E.4 Habitable Worlds (made 2 selections in E.3 for 2020; E.4 upcoming); E.9 Citizen Science Seed Funding program
- AI/ML – strong emphasis in TMS program in ROSES 2019 (compete again in 2022)

Low-Cost Access to Space (LCAS)

- **Sounding Rockets:** Multiple sounding rocket missions in 2020 delayed or cancelled due to COVID-19. Some launches have resumed and projects are rescheduling based on PI and team availability, science window, range availability, science priorities, and SRPO support availability.
- **CubeSats:** 3 HPD CubeSats on orbit and 16 in development.

2020 Jack Eddy Fellows

Lindsay Goodwin
NJIT

Murong Qin
BU

Camilla Scolini
UNH

Research Opportunities in Heliophysics

ROSES - 2019							
ROSES Element	Proposal Due Date	Notify Date	# Proposals Received	# Proposals Selected	% Selected	# New PI	% New PI
HSODS	08/15/2019	09/30/2019	6	4	66%	3	75%
H-FORT	11/01/2019	07/14/2020	42	15	35%	11	73%
HDEE	06/20/2019	10/21/2019	15	11	73%	7	63%
HGI	12/03/2019	03/05/2020	16	5	31%	3	60%
HGIO	07/17/2019	02/03/2020	129	31	24%	31	100%
HSOC	03/13/2020	06/23/2020	14	4	28%	3	75%
HSR	10/18/2019	06/22/2020	121	29	23%	29	100%
HTIDS	08/28/2019	04/02/2020	31	12	38%	5	41%
HTMS	12/03/2019	06/30/2020	54	14	25%	6	42%
LWS Science	02/27/2020	08/04/2020	65	28	43%	27	96%
SWO2R	02/13/2020	07/13/2020	48	13	27%	11	84%

ROSES-19

- Selections completed
- Selection rates increasing

ROSES-20

- New or restructured elements
  - Parker Solar Probe Guest Investigator
  - GIGI: GOLD-ICON Guest Investigators
  - HTIDS: Technology and Instrument Development for Science
  - HLCAS: Low-Cost Access to Space
  - HFOS: Flight Opportunity Studies
  - HFORT: Flight Opportunities for Research and Technology
- DEE, USPI, ECIP, and HGIO selections completed

SMD ROSES Gaps RFI

- Goal of identifying gaps in opportunities for interdisciplinary / interdivisional research issued late last year.
- Driven by HPD feedback from the community
- Actions underway: interdivisional research checkbox for proposers, Technology Festival in 2021, TRL study, SMD data management working group, etc.

ROSES-21

- Released (new or restructured)
  - Living With a Star Tools and Methods
  - GDC IDS
  - Interdisciplinary Science for Eclipse
  - Heliophysics Mission Concept Studies (HMCS)

Planning for the next Decadal

- **Heliophysics 2050 Workshop**
  - NASA- and NSF-enabled, community-led workshop
    - Science Organizing Committee on-board
  - Develop short-, medium-, and long-term science objectives, including capability needs
  - May 3 – 5, 2021, all-virtual meeting
- **Mission concept studies, for decadal survey white papers**
  - Solicitation released, NOI due Apr. 23, 2021
- **Conversations between NAS, CSSP and Agencies (NASA, NSF, NOAA)**
  - Decadal preparation, community insight/involvement
  - Defining decadal survey scope, focus

HELIOPHYSICS 2050 WORKSHOP

https://science.nasa.gov/heliophysics/resources/2024_decadal_survey

Inclusion, Diversity, Equity, and Accessibility (IDEA)

IDEA initiatives in SMD recognized as a long-term effort, but immediate action and problem solving will advance initiatives in parallel with systemic, enduring activity.

Heliophysics Division Goal

- Incorporate theme of Inclusion, Diversity, Equity, and Accessibility (IDEA) into the Heliophysics Division mission, vision, and strategy, resulting in a Division-wide commitment to lasting and specific IDEA goals and objectives.

Ongoing and Exploratory Efforts

- Establish HPD IDEA tiger team to identify potential near-, mid-, and long-term Division actions and to engage with Agency and SMD activities, including training and learning opportunities.
- Identify Division and SMD leadership opportunities for staff.
- Explore best practices for IDEA recruitment efforts, including hiring panels.
- Adopt inclusive R&A code of conduct.
- Sponsor and incentivize enhanced and innovative mission outreach activities with IDEA as a major focus (e.g., PUNCH, IMAP).
- Establish a community-wide mentoring pilot in partnership with other SMD Divisions and external organizations with a focus on providing mentors and mentees training and resources that consider the “whole” STEM individual.
- Develop targeted and innovative R&A solicitations with an IDEA emphasis.

Headquarters Staffing Update

Darcia Brown
Grants Mgmt.

Heather Futrell
Program Executive

Doug Lenhardt
Program Executive, Detailee

Ezinne Uzo-Okoro
Program Executive

David Cheney
Program Executive

Patrick Koehn
Program Scientist

John McCormack
Program Scientist

Amy Winebarger
Program Scientist, Detailee

Jamie Favors
Program Executive

Kelly Korreck
Program Scientist

Aly Mendoza-Hill
Program Executive

Jesse Woodroffe
Program Scientist

Reiner Friedel
Program Scientist, IPA

Welcome!

Farewell!

Bill Stabnow
Program Executive

Willis Jenkins
Program Executive

Thank You Heliophysics Interns!

- **Kaylen Woods:** Assessed and provided recommendations on the layout and content for a Science Mission Directorate Rideshare User's Guide. (Mentor: Alan Zide)
- **Jacob Smith and Becker Han:** Created recommendations on how to increase awareness and interest in the study of nuclear power and propulsion. (Mentor: Joe Smith)
- **Aubrey Donohue:** Analyzed the evolving demographics of research proposers over time. (Mentor: Mona Kessel)
- **Kinga Wrobel:** Parker Solar Probe systems engineering. (Mentor: Joe Smith)
- **Ruth Davis and Matthew Gales:** IMAP Student Collaboration. (Mentors: Joe Smith and Katya Verner)

Heliophysics Division Looking Ahead

- Confirmation of the following missions (in 2021):
  - **HERMES**, **PUNCH**, **IMAP**, **TRACERS**, **SunRISE**, **ESCAPADE**
- Establish Heliophysics **Technology Program**
- Maintain healthy R&A Program
  - Maintaining **DRIVE initiative** and establishment of DRIVE Science Centers (Phase 1 to Phase 2 planning)
  - Enhance the scientific return by innovatively connecting observations from one or more missions with satellite or ground observations from other Divisions, and/or other agencies within or outside the U.S. (HSO Connect, DKIST, etc.)
- Continue pre-formulation activities ahead of a **Dynamical Neutral Atmosphere-Ionosphere Coupling (DYNAMIC)** mission
- Continue planning for 2023 Decadal Survey (Helio 2050 workshop, mission concepts, conversations with NASEM, NSF, and NOAA)
- Implement **inclusion, diversity, equity, and accessibility (IDEA)** actions into the Heliophysics strategy

Heliophysics Division is poised like never before to:

- Capitalize on our unique opportunity to study the Sun and its effects throughout the Heliosphere
- Augment the Heliophysics fleet with new, innovative missions, a robust suborbital program, and an enhanced rideshare program - historic number of missions on orbit and in development
- Make research and technology investments to enable science, e.g. interstellar probe, solar sails
- Develop the next generation of Heliophysicists and engage the public with science knowledge
- Fulfill our responsibility for the Nation enabling advances in space weather
- Play a critical role in Exploration supporting the Artemis mission
- Lean forward for success in the next decade

#HelioRocks!

THANK YOU, HELIOPHYSICS TEAM!

BACKUP

Get Involved and Stay Informed!

We are continuing to work hard to grow the Heliophysics community, especially at a time where we find ourselves so separated. Stay in touch and help us find new ways to highlight your work and keep you in the loop!

Check out our "Nicky Notes" email!

- Sign up for it here

Stay up to date with what's happening at Headquarters:

- https://science.nasa.gov/researchers/virtual-townhall-2020

Let us know what you've been working on:

- bit.ly/SubmitHelioScience

Web and social media:

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

Volunteer for a panel:

- https://science.nasa.gov/researchers/volunteer-review-panels