

National Aeronautics and
Space Administration



Heliophysics Division

Astronomy and Astrophysics Advisory Committee

Dr. Nicky Fox
Heliophysics Division Director
Jan 26, 2021



Heliophysics COVID-19 Impacts

- **Formulation:** Impacts related to inefficiencies stemming from telework and reduced staffing are creating some schedule impacts, but missions have sufficient funding and schedule margin. Project teams are tracking possible impacts if delays occur with ordering parts that require long lead times, and are communicating with HQ regularly.
- **Operational:** many operations centers have reduced staffing and are working under mandatory telework; HPD continues to monitor missions.
- Everyone's safety is our priority
- We recognize everyone's personal and professional challenges at this time
- Thank you for your patience, understanding, and flexibility

Science Mission Directorate Updates

Collaborations on Missions with International Partners

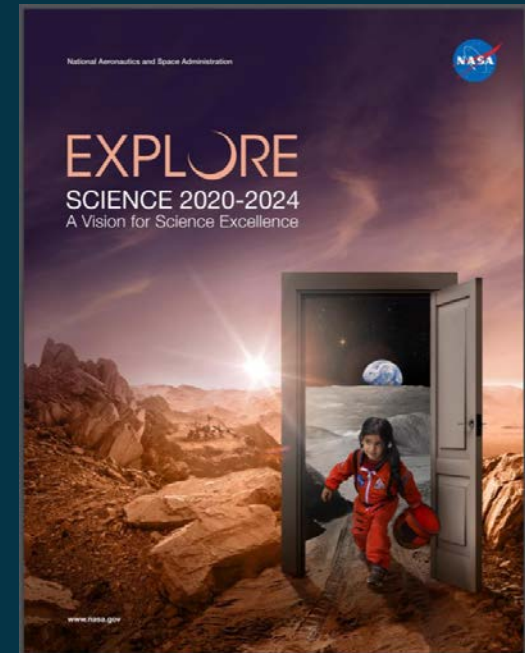
- NASA establishes partnerships with international space agencies to advance its strategic objectives in science
- PI proposed partnerships have not been an effective manner of establishing NASA contributions to partner-led missions
 - These are “Partner Mission of Opportunity” (PMO) proposals
 - We have concluded that the PMO process is not a successful or efficient process for establishing partnerships
- SMD will no longer solicit PMO proposals
 - SMD will still allow PI-led Explorers missions to be proposed that include a partner contribution, generally limited to be $<1/3$ of the mission per the AO
- SMD will continue to seek community input on potential partnerships

Science 2020-2024: A Vision for Scientific Excellence

- The Heliophysics Division is working to advance and communicate priorities of 2020-2024 Science Plan to our scientific community and beyond

SMD Rideshare Office

- Located within the Heliophysics Division and supports all SMD Divisions
- Aly Mendoza-Hill is the Rideshare Lead for SMD
- Currently developing a robust rideshare program to utilize excess mass to orbit and enable additional launch opportunities for the science community



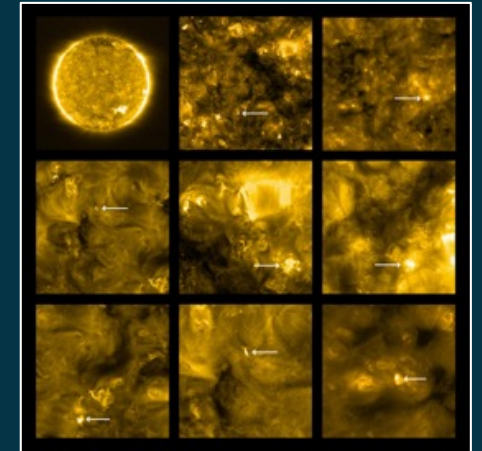
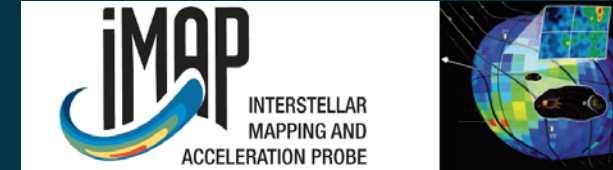
2020 Year in Review: Heliophysics is Experiencing Incredible Growth



- 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.

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. KDP-C, Mar. 2021.
- **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



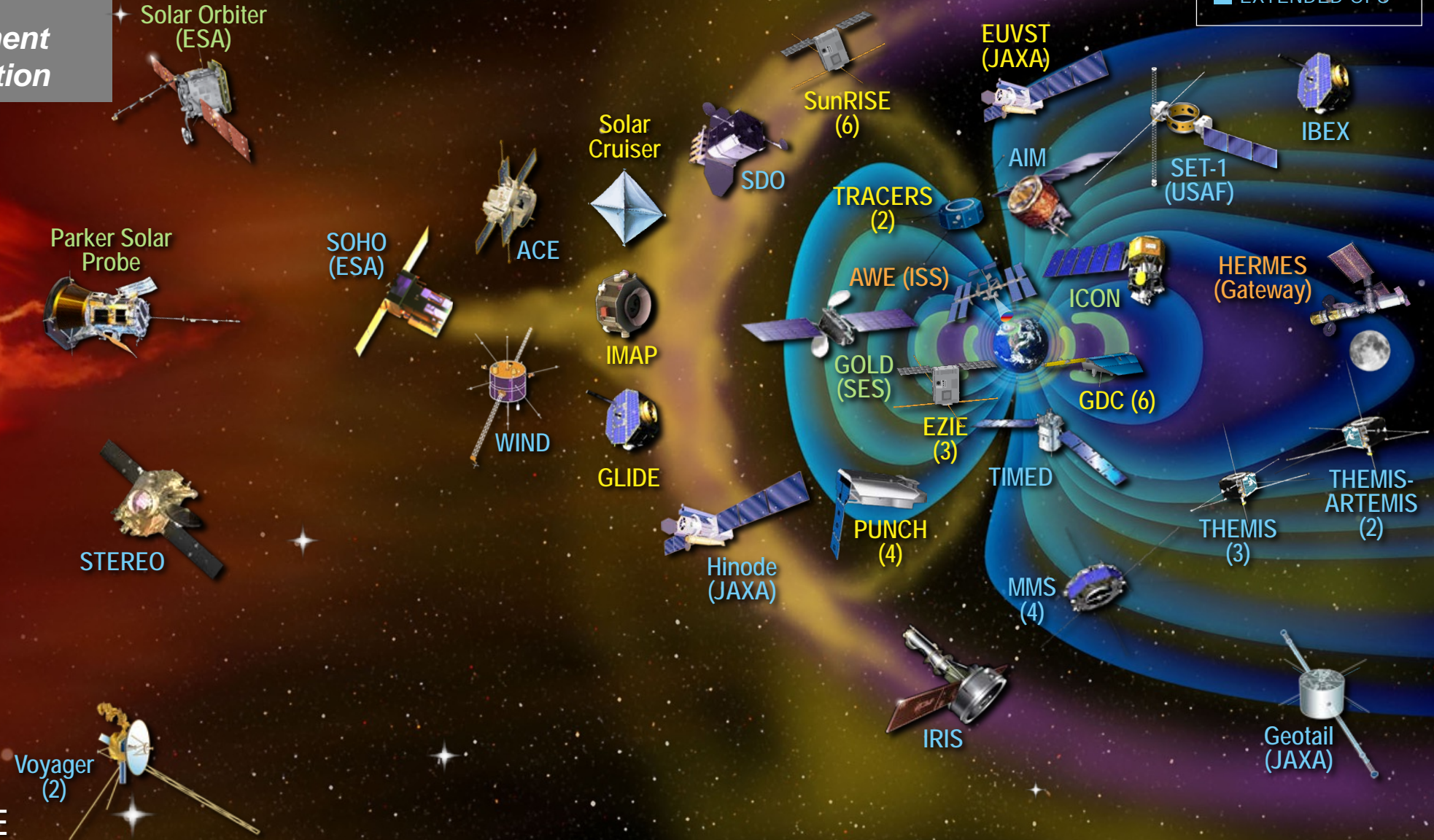
2020 Heliophysics Division Highlights

- **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



- *20 Operating Missions with 27 Spacecraft*
- *2 Missions in Development*
- *10 Missions in Formulation*

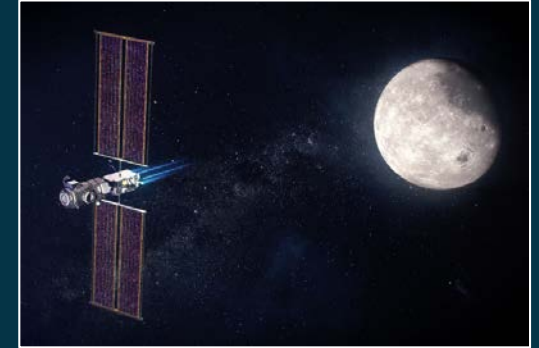
- ## OPERATING & FUTURE



Upcoming Opportunities

HERMES Interdisciplinary Science Teams (IDS) – solicitation released Nov. 17

- Non-U.S. PIs are permissible on a no-exchange-of-funds basis (one U.S. Co-I required)
- International collaboration will be an evaluation factor
- Theory and modeling support proposals are especially encouraged and science of the Moon is also possible
- Step-1 (NOI): Jan. 7, 2021, Step-2: Feb. 25, 2021



GDC Instrument Call and IDS

- Instrument: Investigations with cost-effective, resource-efficient instruments (no suites). Evaluation emphasis on constellation-specific technical points.
 - **Draft in January, final end of Q1.**
- Interdisciplinary Scientists: Work with instrument teams in Phase A-D (develop modeling/analysis tools, optimize constellation, refine data archiving plans, etc.).
 - **Information shared via NSPIRES in January, final via ROSES.**



Upcoming Opportunities (cont.)

DYNAMIC: PI-led Mission of Opportunity w/GDC

- Small mission, leveraging GDC measurements.
 - Science planning resources released in Q1 2021, draft in August, final in 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.

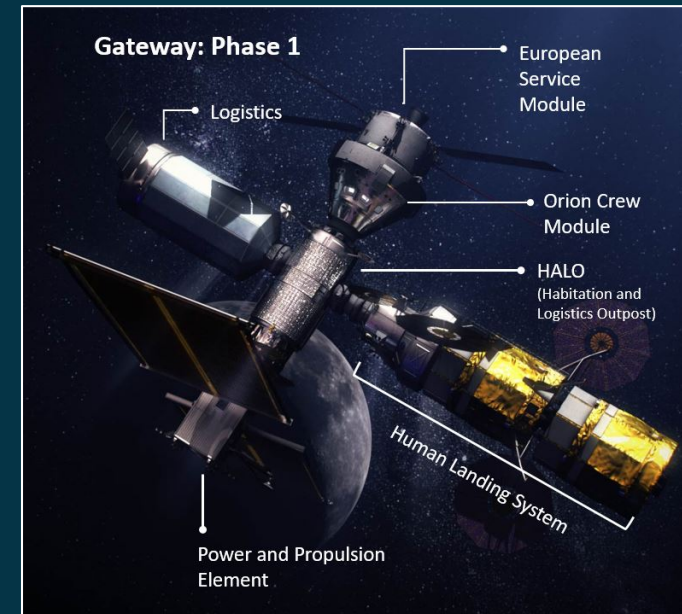
Living With a Star

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



NASA Space Weather Activities

- **Promoting Research and Observations of Space Weather to Improve the Forecasting of Tomorrow Act (PROSWIFT)**
 - Many steps identified for NASA are already underway
- **Space Weather Council**
 - Subcommittee to HPAC as a means to secure the counsel of community experts across diverse areas, on matters relevant to space weather in support of HPD
- **Operations to Research (O2R)**
 - 2020 ROSES Focus: Satellite Drag and Ionospheric Disturbances
 - NOAA and NASA are jointly leading the Framework initiative
- **International**
 - ESA L5 and CSA Arctic mission conversations ongoing
- **Heliophysics Environmental and Radiation Measurement Experiment Suite (HERMES)**
 - Interdisciplinary Science Teams (IDS) solicitation released
 - Milestones
 - Single Design Review: Nov. 2020
 - KDP C: Spring 2021
- **Space Weather Instrument RFI**
 - Helps inform future solicitations for instruments, instrument suites, or small complete missions that could be flown on secondary payload adapters or as hosted payloads on a satellite or other platform



Learn more about NASA Space Weather:
<https://science.nasa.gov/heliophysics/space-weather>

Research and Analysis Update

COVID Impacts

- All panels are now virtual. Some Step-1 and Step-2 dates for ROSES-20 were delayed by a few weeks in response to community requests.
- **Post-COVID-19 Recovery:** Existing awardees may submit proposals through NSPIRES at any time until the final due date of **March 5, 2021**.

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:** SORTIE launched from ISS in Dec. 2019, 16 HPD CubeSats in development.



2020 Jack Eddy Fellows



Lindsay Goodwin
NJIT



Murong Qin
BU



Camilla Scolini
UNH

Research Opportunities in Heliophysics

ROSES-19

- Selections completed
- Selection rates increasing

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-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.



Decadal Activities

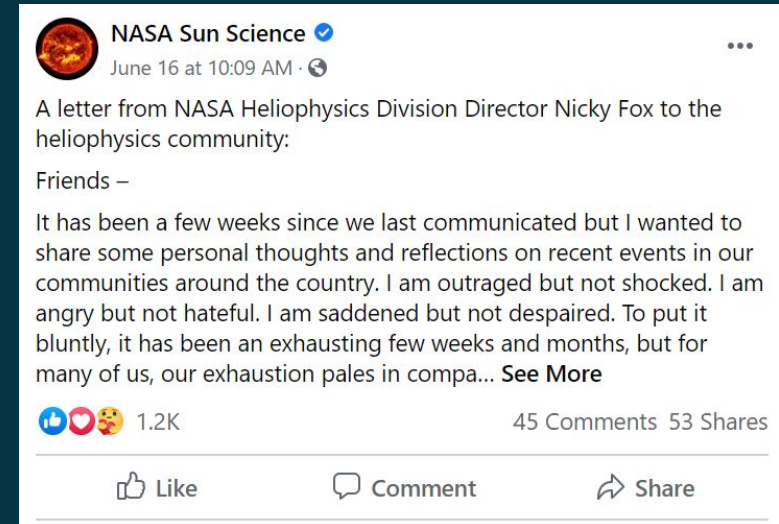
Planning for the next Decadal

- **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
 - Expect draft solicitation, with March/April due date
- Conversations between NAS, CSSP and Agencies (NASA, NSF, NOAA)
 - Decadal preparation, community insight/involvement
 - Defining decadal survey scope, focus



Diversity, Equity, Inclusion, and Accessibility (DEIA)

- Now is the time to re-commit to and step up our efforts against racism.
 - Take a stand against the small injustices and the big injustices in our communities, in our classrooms and labs, in our Zoom and Teams meetings, and in our homes.
 - The work is on us. Let's do more than have a conversation.
- We will continue to provide a model of unity at NASA—demonstrating the value of equal opportunity, diversity, and inclusion to our mission accomplishment.
- Thanks to those of you who have been thinking further about how to step up our diversity efforts across our communities.
- Anti-Racism Action Group (ARAG) was established in SMD to identify short- and medium-term actions
 - ARAG activities being transferred to long-term working groups
- Diversity, Equity, Inclusion, and Accessibility (DEIA) Initiatives in SMD recognized as a long-term effort, but immediate action and problem solving will advance initiatives in parallel with systemic, enduring activity.
- Nicky Fox serving on SMD DEIA working group which will focus on long term actions

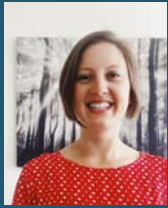


Headquarters Staffing Update

Farewell!



Darcia Brown
Grants Mgmt.



Heather Futrell
Program Executive



Doug Lenhardt
Program Executive,
Detailee



Ezinne Uzo-Okoro
Program Executive



Bill Stabnow
Program Executive



Willis Jenkins
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!

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)

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:

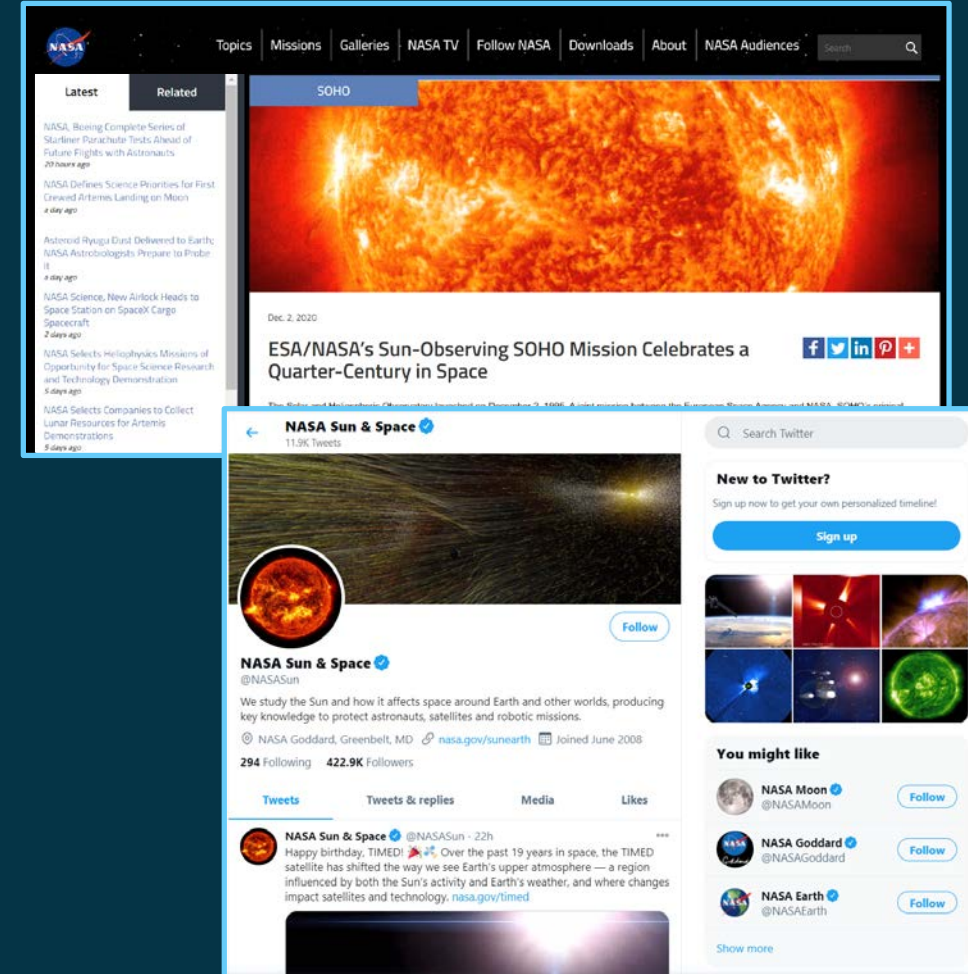
- bit.ly/SubmitHelioScience

Web and social media:

- NASA.gov/sunearth
- blogs.nasa.gov/sunspot
- [@NASASun](https://twitter.com/NASASun)
- facebook.com/NASASunScience

Volunteer for a panel:

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



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
- 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



The background of the slide is a composite of two cosmic images. The top half features a dark space filled with numerous small, bright stars and a prominent, wispy blue nebula on the right side. The bottom half shows a similar star-filled space, but with a large, vibrant orange and yellow nebula on the left and a greenish-blue nebula on the right. A solid dark blue horizontal band runs across the middle of the image, serving as a backdrop for the text.

#HelioRocks!