

National Aeronautics and  
Space Administration



# Heliophysics Division

Heliophysics Advisory Committee (HPAC), Summer Meeting

Dr. Nicky Fox, Director, Heliophysics

June 30, 2020

# Coronavirus (COVID-19) Response – Agency

- Agency leadership continues to monitor developments regarding coronavirus (COVID-19) around the nation, closely following the advice of health professionals and the White House Coronavirus Task Force to **keep our workforce safe**
- Effective March 17, all centers and facilities elevated to Stage 3 of NASA's Response Framework. All employees and contractors moved to mandatory telework until further notice. Mission-essential personnel will continue to be granted access onsite
- Some Centers have been elevated to Stage 4 of NASA's Response Framework:

## NASA Facilities Status

Ames - Stage 4	Armstrong - Stage 4	Ellington - Stage 3	GISS - Stage 4	Glenn - Stage 4	Goddard - Stage 4
IV&V - Stage 3	JPL - Stage 3	Johnson - Stage 3	Kennedy - Stage 3	Langley - Stage 3	Marshall - Stage 4
Michoud - Stage 4	NASA HQ - Stage 3	Plum Brook - Stage 4	Stennis - Stage 4	Wallops - Stage 4	WSTF - Stage 3

See the [NASA Response Framework](#) to learn more about the stages of the agency's coronavirus response.

A space-themed background featuring a curved view of Earth at the bottom left, with various celestial bodies including Mars, Saturn, and Jupiter in the upper left. The background is a deep blue with scattered stars and nebulae.

# Coronavirus (COVID-19) Response – Science Mission Directorate (SMD)

- There will be impacts, and we don't yet know the extent. We're working with each mission and project in detail based on where they are in development process
- **Priority is everyone's safety and protecting hardware and integrity of data for operating missions**
- Conducted status assessment of all 47 flight projects in the SMD Portfolio
- Most missions are in development phases early enough (phases A-B-early C) that bulk of the work can be done virtually
- Missions in integration and testing (I&T) will continue to the extent possible with small teams
- Will work with our domestic and international partners to refine the prioritization of our projects, especially those in I&T
- Have consulted with the NASA Chief Medical Officer and have protocols for working in clean rooms



# Coronavirus (COVID-19) Response – ROSES 2020

- We know that progress on funded research may slow, and in some cases, even stop due to necessary telework and lack of access to facilities and labs, and other family obligations
- SMD understands this potential outcome and will work with the research community and its institutions to mitigate any impacts and to make plans, when possible, for a way forward
- NASA has instituted a number of grant administration flexibilities to ease the burden on grant recipients during the COVID-19 emergency
- SMD's policy on late proposals will be applied leniently on a case-by-case basis
- Encouraging all to continue to pay graduate students, post-docs, and lab staff
- **Watch the NSPIRES email lists for up-to-the-minute changes in due dates or policies**



# Heliophysics: COVID-19 Impacts

## Missions

- Formulation: Minimal impacts so far but teams are concerned about inefficiencies related to telework and are tracking possible impacts if delays occur with ordering parts that require long lead times.
- Operational: Space Science Missions Operations (SSMO) management and HPD continue to monitor mission operations – many operations centers have reduced staffing and are working under mandatory telework. Multiple sounding rocket missions have been postponed.

## Research

- Minimal impact so far. Many panels have been completed or went/will go virtual. Some Step-1 and Step-2 dates for ROSES-20 have been delayed by two weeks.

## Other

- SMD and HPD continue to monitor the ability of SCA-N to provide communications and navigation requirements for operating missions. To date, all missions are being supported as needed, and daily status updates are being provided.



# Coronavirus (COVID-19) Response – R&A FAQs

- OMB has issued guidance in Memo M-20-17 (available at <https://www.whitehouse.gov/wp-content/uploads/2020/03/M-20-17.pdf>)
- Allows for paying soft-money researchers as well as graduate students, post-docs, and other lab staff during the COVID-19 epidemic, if the institution's own policies allow for it
- Allows for institutions to charge restart costs to their grants
  - SMD will make use of this modification to allow other costs associated with resuming funded grant activities to be charged to currently active grants
  - SMD has not yet determined in detail its policy regarding augmentations to awards negatively impacted by the COVID-19 epidemic; it is likely that any policy on augmentations will not be issued until the full extent of the impacts of the epidemic are more clearly understood

A space-themed background featuring a large blue circular graphic on the left. Inside and around this circle are images of celestial bodies: Saturn with its rings, Mars, the Moon, and a portion of Earth. The background is a deep blue with scattered white stars and a bright yellow sun or star in the bottom left corner.

# Coronavirus (COVID-19) Response – Stay Updated

- This is a new and unprecedented situation
- We recognize everyone’s personal and professional challenges at this time
- As the situation evolves, we will continue to communicate with all of you, whether through Town Halls, NSPIRES notices, or other modes
- In the meantime, please continue to follow agency updates:
  - Web: [nasa.gov](https://nasa.gov) and [nasapeople.nasa.gov/coronavirus](https://nasapeople.nasa.gov/coronavirus)
  - Twitter: [@NASA](https://twitter.com/NASA) and [@JimBridenstine](https://twitter.com/JimBridenstine)

# Thoughts on recent events...

- Now is the time to re-commit to and step up our efforts against racism. I ask that we all 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.
- I want to reaffirm that at NASA, we will continue to provide a model of unity—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.
- Let's do more than have a conversation...
- The work is on us...



The image is a screenshot of a Facebook post from the official page of NASA Sun Science. The post is dated June 16 at 10:09 AM and is public. The text of the post is a letter from NASA Heliophysics Division Director Nicky Fox to the heliophysics community. The post includes a 'See More' link and shows engagement metrics of 1.2K reactions, 45 comments, and 53 shares. The reaction icons include a thumbs up, a heart, and a smiley face with a tongue sticking out.

**NASA Sun Science** ✓  
June 16 at 10:09 AM · 🌐

A letter from NASA Heliophysics Division Director Nicky Fox to the heliophysics community:

Friends –

It has been a few weeks since we last communicated but I wanted to share some personal thoughts and reflections on recent events in our communities around the country. I am outraged but not shocked. I am angry but not hateful. I am saddened but not despaired. To put it bluntly, it has been an exhausting few weeks and months, but for many of us, our exhaustion pales in compa... [See More](#)

👍❤️😄 1.2K      45 Comments 53 Shares

👍 Like      💬 Comment      ➦ Share



The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space filled with numerous small white stars and a prominent, bright blue nebula on the right side. The bottom half features a bright orange and yellow space filled with many small white stars and a greenish-yellow nebula on the right side. A dark blue horizontal band runs across the middle of the slide, containing the text.

# Mission Highlights



# Solar Orbiter



*Launched: Feb. 9 on Atlas V rocket from KSC.*

Solar Orbiter, an ESA-led mission with strong NASA participation, will provide the first views of the Sun's uncharted polar regions, giving unprecedented insight into how our parent star works.

It will also investigate how intense radiation and energetic particles being blasted out from the Sun and carried by the solar wind through the Solar System impact our home planet, to better understand and predict periods of stormy 'space weather.'

**First perihelion: Jun. 15, 2020**



# Parker Solar Probe



*Parker Solar Probe observed switchbacks — traveling disturbances in the solar wind that caused the magnetic field to bend back on itself — an as-yet unexplained phenomenon that might help scientists uncover more information about how the solar wind is accelerated from the Sun.*  
**Credits:** GSFC Conceptual Image Lab

**New discoveries first published on Dec. 4, 2019, in the journal *Nature***

**Solar Encounters #1-5 Complete:**  
Venus Flyby #3: July 11, 2020

**Perihelion #4:**  
Jan 29, 2020

**Perihelion #5:**  
Jun 13, 2020

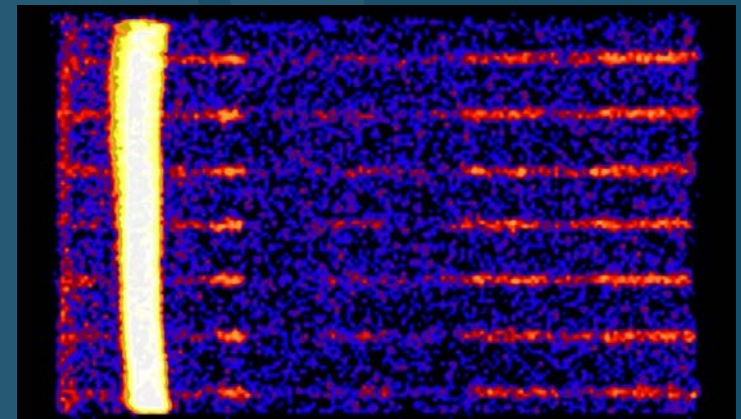
**Records:**  
11.6 million miles to the sun  
244,225 miles per hour



# Ionospheric Connection Explorer (ICON)



*Above: Oct. 10, 2019 - Northrop Grumman's L-1011 Stargazer aircraft, with Pegasus XL rocket attached beneath, takes off from the Skid Strip runway at Cape Canaveral Air Force Station in Florida*



*Above: The ICON team calibrated the Extreme Ultraviolet instrument using the Moon. The bright line on the left is EUV emissions from ionized helium in the solar wind, which fills the solar system. The horizontal stripes are the result of EUV scanning over the Moon, which reflects solar radiation. **Credits:** NASA/ICON/Martin Sirk/Joy Ng*

# HPD at a Glance: Operating Missions

Mission	Launch Date	Phase	Extension	M-3	M-2	M-1	Cur. M.	Remarks
Voyager 1 + 2	8/20/1977	Extended	9/30/2021	G	G	G	G	
Geotail	7/24/1992	Extended	9/30/2021	G	G	G	G	
Wind	11/1/1994	Extended	9/30/2021	G	G	G	G	
SOHO	12/2/1995	Extended	9/30/2024	G	G	G	G	
ACE	8/27/1997	Extended	9/30/2021	G	G	G	G	
TIMED	12/7/2001	Extended	9/30/2021	G	G	G	G	
Hinode	9/23/2006	Extended	9/30/2021	G	G	G	G	
STEREO	10/25/2006	Extended	9/30/2021	G	G	G	G	
THEMIS+Artemis	2/17/2007	Extended	9/30/2021	G	G	G	G	
AIM	4/25/2007	Extended	9/30/2021	G	G	G	G	
IBEX	10/19/2008	Extended	9/30/2021	G	G	G	G	
SDO	2/11/2010	Extended	9/30/2021	G	G	G	G	
IRIS	6/27/2013	Extended	9/30/2021	G	G	G	G	
MMS	3/12/2015	Extended	9/30/2021	G	G	G	G	
GOLD	1/25/2018	Prime	10/17/2020	G	G	G	G	
Parker	8/12/2018	Prime	9/30/2025	G	G	G	G	Parker Solar Probe sent a Beacon Tone 1 on 6/1 and 6/2 indicating nominal spacecraft performance during Solar Encounter #5. On 06/07, Parker passed the perihelion at the distance of 28 Rs (solar radius) from the Sun, and on 06/09, it sent a Beacon Tone 1 indicating a healthy status.. Parker exited Encounter #5 on 06/13.
SET-1	6/25/2019	Prime	7/1/2020	G	G	G	G	
ICON	10/10/2019	Prime	10/10/2021	G	G	G	G	
Solar Orbiter	2/9/2020	Prime					G	Near-Earth Commissioning Phase activities extended until 06/30.

**G**

Mission proceeding to meet science requirements

**Y**

Area of concern - possible reduction in capability

**R**

Significant problem – possible or probable loss of mission

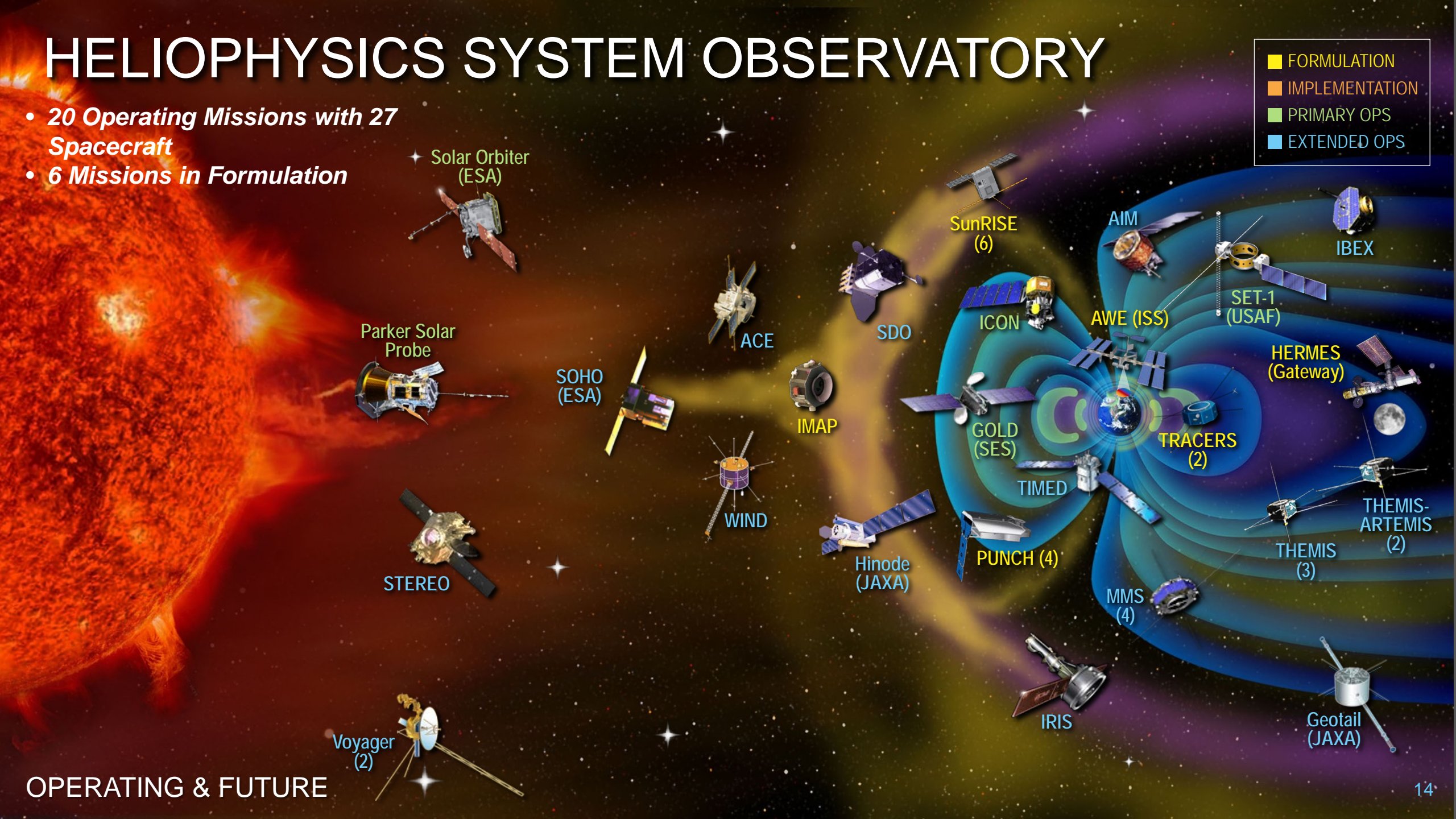
**B**

Mission Decommissioned

# HELIOPHYSICS SYSTEM OBSERVATORY

- 20 Operating Missions with 27 Spacecraft
- 6 Missions in Formulation

■	FORMULATION
■	IMPLEMENTATION
■	PRIMARY OPS
■	EXTENDED OPS

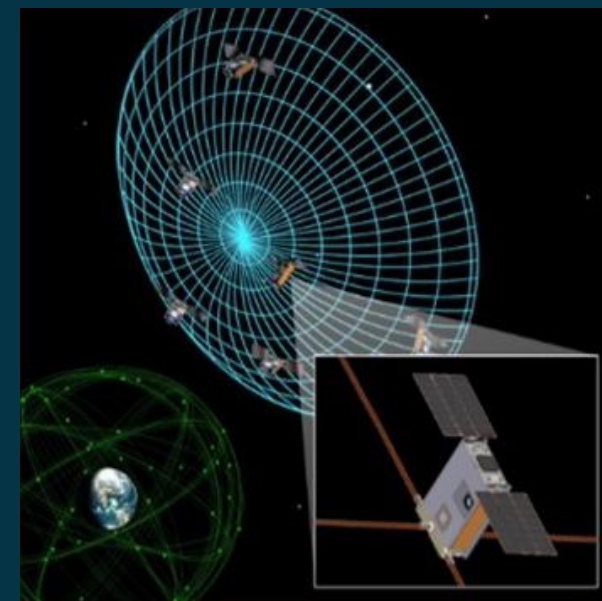
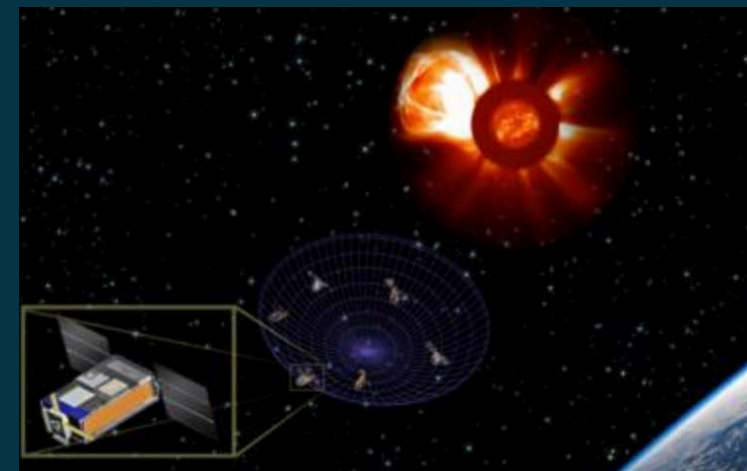


OPERATING & FUTURE

# Heliophysics Selects Sun Radio Interferometer Space Experiment (SunRISE)



- SunRISE will study how the Sun generates and releases giant space weather storms, known as solar particle storms, into planetary space. Not only will such information improve our understanding of how our solar system works, but it ultimately can help protect astronauts traveling to the Moon and Mars by better understanding how the Sun's radiation affects the space environment they must travel through.
- Array of six CubeSats operating as one very large radio telescope.
- Chosen in Aug. 2017 as one of six Mission of Opportunity proposals to conduct an 11-month mission concept study. In Feb. 2019, NASA approved a continued formulation study of the mission for an additional year.
- **Launch:** no earlier than July 1, 2023.
- **Principal Investigator:** Justin Kasper at the University of Michigan in Ann Arbor

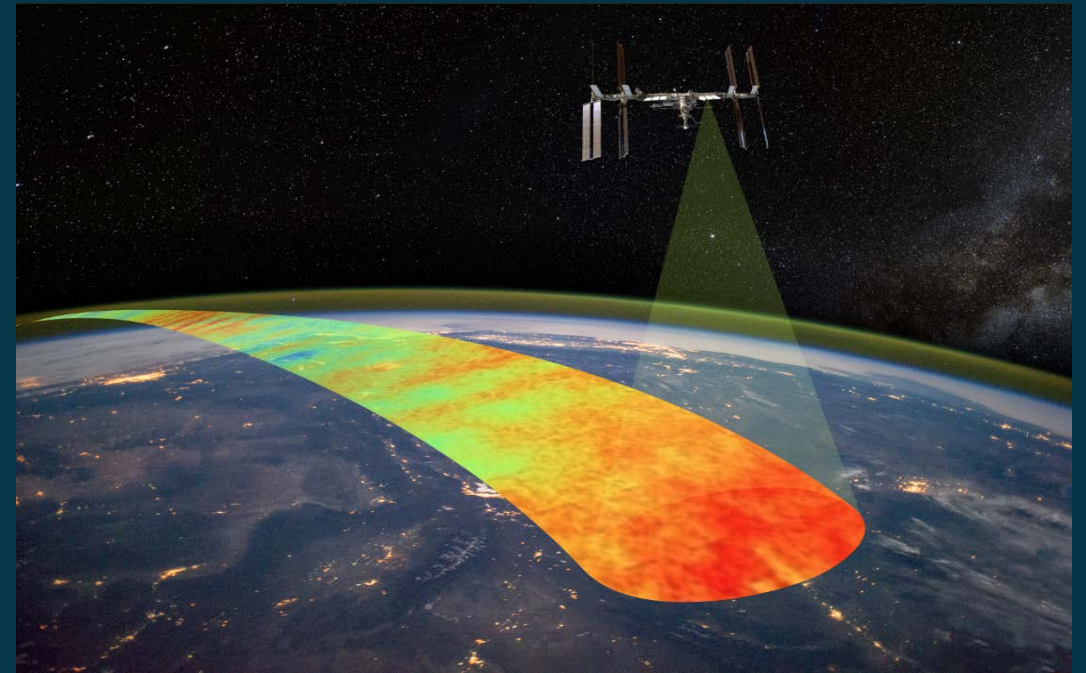


# Atmospheric Waves Experiment (AWE)



## 2016 MO Selection

- **Milestones**
  - SRR/MDR, Feb. 5-6, 2020
  - Science Team Meeting, Mar. 10-12, 2020
  - PDR/CDR, September 2020
  - Launch Readiness Date no earlier than Aug. 2022
- **Principal Investigator:** Mike Taylor at Utah State University







# Heliophysics Explorers Selections

2016 SMEX Selections, LRD NET Feb 2023



## Polarimeter to Unify the Corona and Heliosphere (PUNCH)

- **Milestones**
  - Successful System Requirements Review/Mission Definition Review (SRR/MDR) on April 2.
  - PDR, Fall 2020
  - KDP-C, Fall 2020
- **Principal Investigator:** Craig DeForest at Southwest Research Institute





# Heliophysics Explorers Selections (cont.)

2016 SMEX Selections, LRD NET Feb 2023

## Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites (TRACERS)

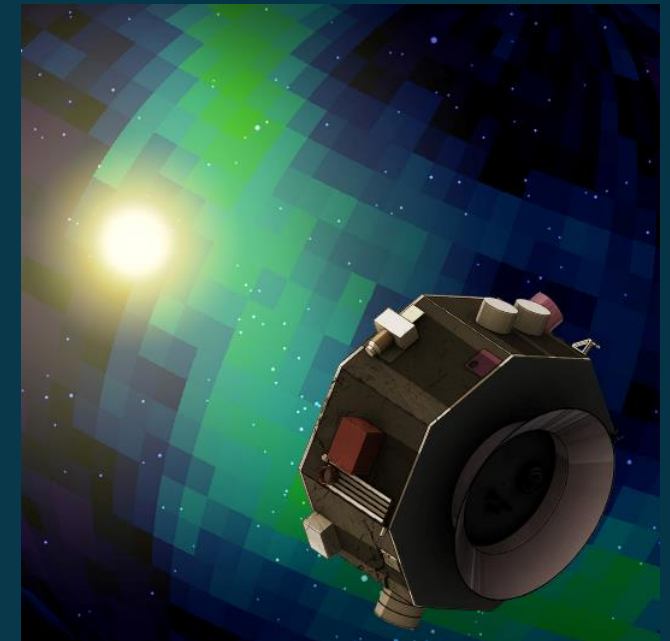
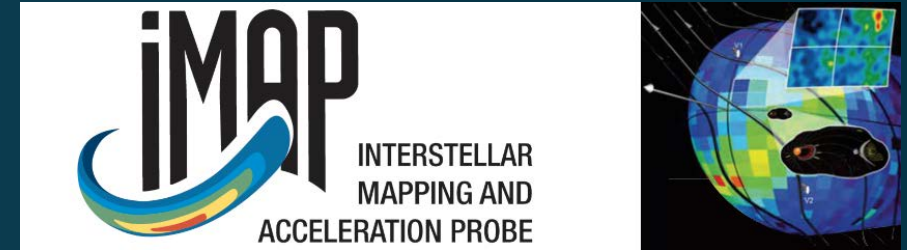
- **Milestones**
  - TRACERS and a Technology Demonstration Opportunity, MAGnetometers for Innovation and Capability (MAGIC) proceeded into Phase B Preliminary Design following the successful completion of an Extended Phase A study on April 24.
- **Principal Investigator:** Craig Kletzing at University of Iowa



**TRACERS**

# Interstellar Mapping and Acceleration Probe (IMAP)

- IMAP successfully completed its Key Decision Point B review on Jan. 28, 2020 which now allows the IMAP team to move forward with preliminary design work on the mission, spacecraft, and instruments.
- **Milestones**
  - Preliminary Design Review, Feb. 2021
  - Confirmation Review, Mar. 2021
  - Launch Readiness Date, Fall 2024
- IMAP will simultaneously investigate the acceleration of energetic particles and interaction of the solar wind with the interstellar medium.
  - **PI:** David McComas of Princeton University





# Living With a Star Program Update

The background of the slide is a dark blue space scene. On the left side, there is a vertical strip showing a bright yellow sun at the bottom, the blue and white horizon of Earth, and several other celestial bodies: a crescent moon, a reddish planet (Mars), and a yellow planet with rings (Saturn). The rest of the background is a deep blue with scattered white stars and a faint nebula.

# LWS Missions Update

## **Recent/Future LWS Missions and their impact on Heliophysics**

- SDO
- Van Allen / BARREL
- HERSCHEL/Sub-Orbital Payload
- Space Environments Testbed
- Parker Solar Probe
- Solar Orbiter
- GDC

## **Recent/Future Missions that will support upcoming LWS Science opportunities**

- GOLD
- ICON
- AWE
- DYNAMIC

# LWS Science

- ROSES opportunities – Focus Science Topics (FSTs)
  - ROSES 2019 - Reviews complete, Sections underway, Announcements by ~mid-July
  - ROSES 2020 - Due dates: Step-1 (Aug. 27) & Step-2 ( Nov. 12)
- ROSES opportunities – Strategic Capabilities (2020) - Develop a model:
  - to specify the global ion and neutral density in the thermosphere, ionosphere and plasmasphere and its variation in time & geomagnetic conditions;
  - of the magnetosphere that extends beyond single-fluid MHD;
  - of CME eruption & propagation, SEP acceleration & transport.
- Revised Strategic Science Areas (SSAs) – used as guidelines for FSTs, etc.
- LWS Program Analysis Group (LPAG) – replaces the LWS Steering Committee
  - Recent LPAG Virtual Workshop: Explain LWS FST website for community input
  - Currently, 18 topics with 31 comments; inputs for FSTs for ROSES 2021 and beyond



# Expanding the Heliophysics Community

- Recent activities sponsored by the LWS Program
  - Frontier Development Laboratory (FDL) – AI/ML programs to provide an innovation forum to address and accelerate solutions to Heliophysics Scientific Problems
  - High End Computing (HEC) resources to support Strategic Capability modeling
  - Heliophysics Summer Schools – training the next generation interdisciplinary scientists
  - Jack Eddy Post Doctoral Fellowships, 34 in total, the next generation heliophysicists
  - LWS Institutes –bridging the gap between science and application
- These programs provide resources necessary to train the next generation of Heliophysicists and sponsor specific topical focus of relevance to science and society to current members of the Heliophysics Community
- All these LWS activities, Missions, Science and Community support, provide direction to new missions
- The next LWS mission is GDC (LWS-7) ...



# Geospace Dynamics Constellation

- Recommended by 2013 Solar and Space Physics Decadal Survey, next mission for Living With a Star (LWS) program (LWS-7)
- GDC is a science mission to dramatically improve our understanding of the upper atmosphere and its strong variability in response to energy inputs from the Sun, from near-Earth space, and from the lower atmosphere.
  - Will inform space weather studies (e.g. radiation effects, navigation/communication disturbances) and Agency exploration goals (e.g. sustained human presence at Mars)
- Following HPAC October 2019 recommendation on conducting an implementation study based on the STDT report, HPD stood up a GSFC Pre-Project Office.
- The Pre-Project Office is planning for a Mission Concept Review (July 2020). In preparation, the office activities have included:
  - Refining science requirements
  - Supporting HPD inter-agency/international collaboration discussions
  - Market survey of s/c and associated engineering services provider(s), make/buy process
- Pending Agency support of project initiation, expect final solicitation NET Dec. 2020



*In-depth briefing to follow.*



The background of the slide is a composite image of space. The top half features a dark blue and black space filled with numerous small white stars and a prominent, bright blue nebula on the right side. The bottom half features a bright orange and yellow space filled with many small white stars and a greenish-yellow nebula on the right side. A dark blue horizontal band runs across the middle of the slide, containing the title text.

# Other SMD and Division Activities

# Suborbital & CubeSats Highlights

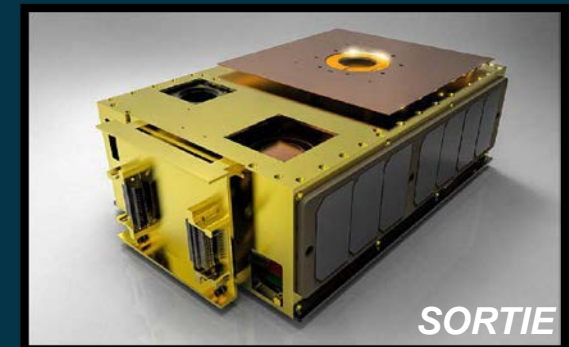
*Providing Low Cost Access to Cutting Edge Research*

## Sounding Rocket Updates

- **Cusp Heating Investigation (CHI)** launched from Svalbard, Norway on Dec. 10, 2019.
  - Measured neutral upwelling and high-resolution electric fields over an extended region in the Cusp.
- **PolarNOx** launched from Poker Flat Research Range, Alaska on Jan. 27, 2020.
  - Designed to measure the intensity of nitric oxide in the mesosphere and lower thermosphere in the polar region by observing starlight with a high spectral resolution UV spectrograph operating near 215 nm.

## CubeSat Updates

- **Scintillation Observations and Response of the Ionosphere to Electrodynamics (SORTIE)**
  - Designed to discover the sources of wave-like plasma perturbations in the F-region ionosphere, and determine the relative role of dynamo action versus direct mechanical forcing in the formation of wave-like plasma perturbations.
  - The spacecraft was released from the International Space Station (ISS) on Feb. 19, 2020.
  - As of late June, the SORTIE mission is well underway, the spacecraft operations are nominal, and the instruments are both working and collecting science data.



# Heliophysics Suborbital & CubeSats (2018-2021)



2018

2019

2020

2021

\*Launches resuming in August through end of year; multiple launches pushed to 2021 due to COVID-19 impacts.

<sup>1</sup>Solar  
<sup>2</sup>Geospace  
<sup>3</sup>Education  
<sup>4</sup>Tech Development  
<sup>5</sup>High Energy Astrophysics  
<sup>6</sup>UV Optical Astrophysics  
<sup>7</sup>Solar and Heliophysics  
<sup>8</sup>Reimbursable  
<sup>9</sup>Lab Astrophysics

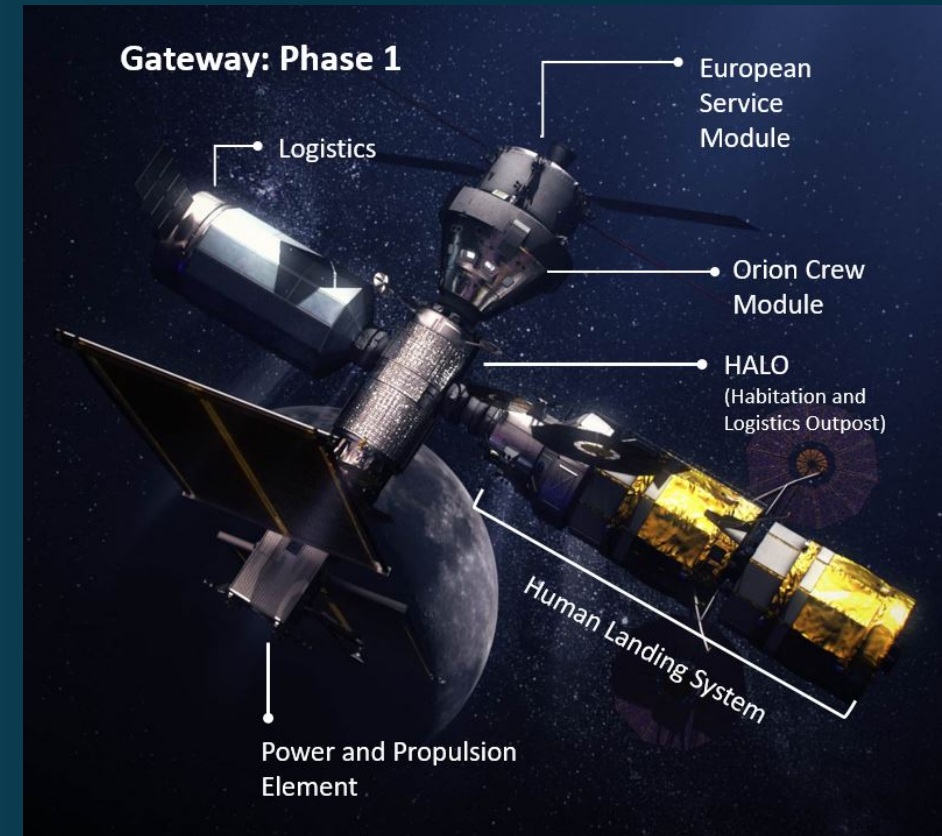
# Gateway: HERMES

## NASA selects first two scientific investigations to fly on Gateway in support of Artemis

- The NASA space weather instrument suite, led by HPD, will observe solar particles and the solar wind. The second scientific investigation is a radiation instrument package, built by the European Space Agency.
  - **HERMES** (NASA - Heliophysics Environmental and Radiation Measurement Experiment Suite)
- **Program Office:** Living With a Star (LWS) Program, Explorers and Heliophysics Projects Division (EHPD), Goddard Space Flight Center (GSFC)
- This payload will enable meaningful science, support Artemis, and be forward looking to crewed missions to Mars.

### Space Weather Instrument RFI

- HPD will be releasing a Request for Information in the coming weeks to seek community inputs on space weather instruments and spacecraft to populate a pipeline for future opportunities.



*In-depth briefing to follow.*

The background of the slide is a vibrant space-themed image. It features a bright yellow sun in the bottom left corner, partially obscured by the blue and white horizon of the Earth. Above the Earth, several celestial bodies are visible: a large, reddish-brown planet (Mars), a smaller, greyish planet (the Moon), and a yellow planet with a prominent ring system (Saturn). The background is filled with a starry field and a blue nebula. A large, semi-transparent blue circle is overlaid on the right side of the image, containing the text.

# Strategic Working Groups

## Strategic Working Groups

- To drive innovation within the upcoming Heliophysics Division's (HPD) Decadal Survey strategy, HPD formed 8 strategic working groups (SWG). Across the working groups, three key themes emerged as priorities for HPD: maximize the impact of HPD missions and research, ensure the sustainable management and innovative expansion of HPD science, and diversify the future of the science community.

## Space Weather

- Define overarching strategy for the Heliophysics Space Weather Science Application program expansion of HPD science, and diversify the future of the science community.

## Archives

- Assess, restructure, and modernize the HPD Archives.

## Technology

- Define technology strategy to enable advances in Heliophysics science.

# Senior Review 2020

- 13 participating missions: AIM, Geotail, GOLD, Hinode, IBEX, IRIS, MMS, SDO, STEREO, THEMIS, TIMED, Voyager, and Wind
  - Received both science and infrastructure proposals
- Changes to Senior Review briefed to HPAC on October 2, 2019 are being implemented
  - Missions may propose either a science investigation or to move into HSO infrastructure
  - Project Data Management Plan vs. Mission Archive Plan
  - Proposals must present plans to move to open source code
  - In-depth evaluation of proposer data archives in Space Physics Data Facility (SPDF) and Solar Data Analysis Center (SDAC)
  - No longer use non-NASA data archives

## Timeline

Senior Review Proposals due

- **June 3, 2020**

Senior Review Kickoff – virtually:

- **July 20, 2020**

Senior Review panel – virtually:

- Week of **August 17, 2020**

Senior Review report due to HQ

- **September 24, 2020**

Publication of the panel's report & results to projects

- **October 2020**

A vibrant space-themed background featuring a large blue and yellow nebula, a bright yellow sun, and several planets including Saturn, Mars, and the Moon. The scene is set against a dark blue starry sky.

# Decadal Activities

## 2013 Decadal Midterm Assessment

- Delivered to HPD in Feb. 2020
- Responses provided to NASEM Apr. 2020

## Planning for the next Decadal

- Heliophysics 2050 Workshop
  - NASA- and NSF-enabled, community-led workshop
  - Develop short-, medium-, and long-term science objectives, including capability needs
- Discussions between sponsoring agencies underway, including NOAA and NSF
- Conversations with NAS, CSSP underway

*In-depth briefing to follow.*



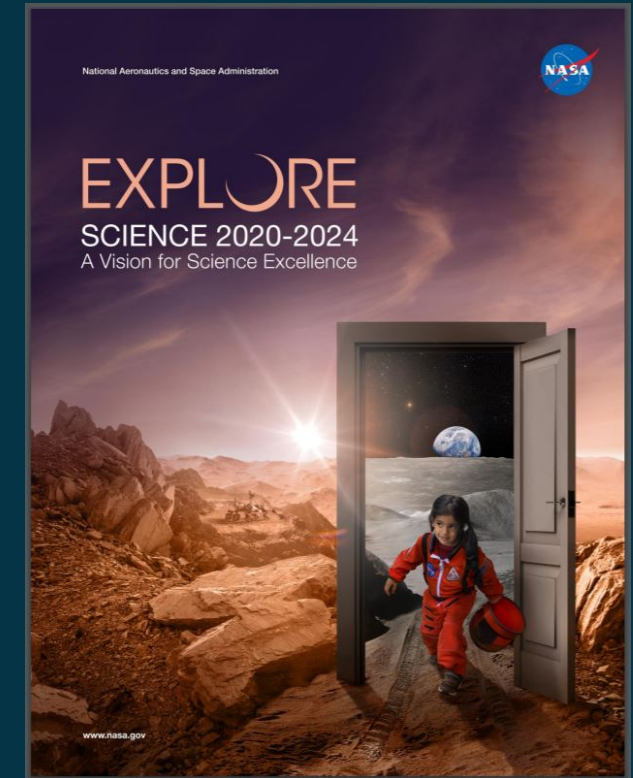
# Collaborations on Missions with International Partners

- 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



# NASA Science Plan Released

- Science 2020-2024: A Vision for Scientific Excellence released May 28, 2020 at [science.nasa.gov/about-us/science-strategy](https://science.nasa.gov/about-us/science-strategy)
- Through close collaboration with the entire Science Mission Directorate leadership team and NASA Center Directors, laid out ambitious program over next five years to build on current activities and drive change in high-priority areas where we can have the greatest impact
- Demonstrated commitment to excellence across SMD portfolio through leadership and strategic engagement with partners
- Consulted with the NAC Science Committee and Space Studies Board ad hoc committee to validate approach
  - Thank you to Jeff Dozier (Chair), Victoria Hamilton (Vice Chair), and members of the ad hoc committee
- Will continually assess progress for transparency and accountability





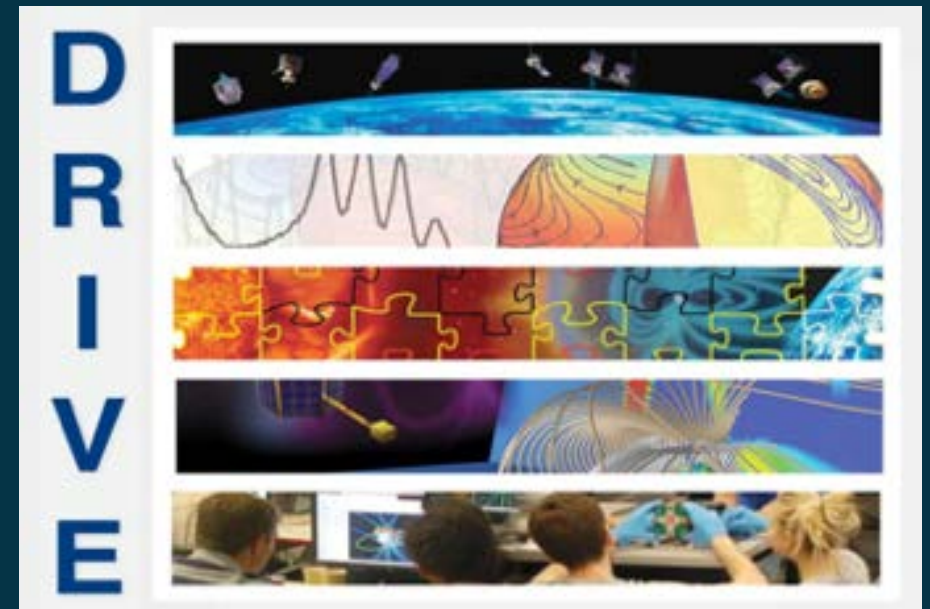
# Research



# DRIVE initiative is now part of the Heliophysics R&A baseline

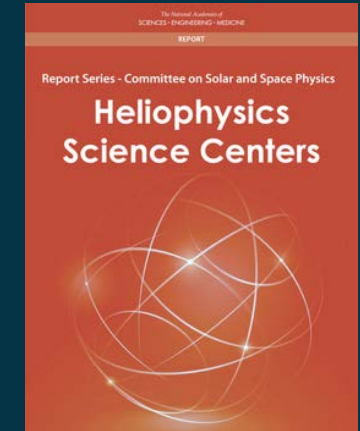
## DRIVE Elements include:

- HTIDs:
  - Instrument Technology Development (ITD) and LNAP
- HFORT:
  - Low Cost Access to Space (LCAS): Sub-orbital and CubeSats
- Guest Investigator
  - Open and mission focused
- Supporting Research
- Heliophysics Science Centers
- Theory, Modeling and Simulation
- Early Career Investigator Program & FINESST
- Living With a Star (LWS) Science
- Space Weather O2R
- Data Environment Emphasis



# Heliophysics DRIVE Science Center Selections – Phase 1

Panel	PI/Institution	Title
SH	James Drake/UMD	Solar Flare Energy Release
MAG	Tamas Gombosi/U Mich	Solar Storms and Terrestrial Impacts Center (SOLSTICE)
MAG	Viacheslav Merkin/JHU	Center for Geospace Storms (CGS)
ITM	Cora Randall/UC Boulder	Wave-induced Atmospheric Variability Enterprise (WAVE)
FP	David Brain/UC Boulder	Do Habitable Worlds Require Magnetic Fields?
SH	Todd Hoeksema/SU	Consequences of Flows and Fields in the Interior and Exterior of the Sun (COFFIES)
FP	Merav Opher/BU	Our Heliospheric Shield
ITM	Daniel Welling/UTA	The Center for the Unified Study of Interhemispheric Asymmetries (CUSIA)
FP	Marco Velli/UCLA	HERMES: HELIOSPHERIC Magnetic Energy Storage and conversion



*In-depth briefing to follow.*

**DRIVE (Diversity, Realize, Integrate, Venture, Educate)**

# ROSES Updates

## High Risk/High Impact

- PIs are being asked to self-certify whether or not their 2020 proposals are high risk/high impact.

## Dual Anonymous

- First test of dual anonymous will be in HGIO 2020. Proposals must be anonymized (guidelines on NSPIRES with this solicitation) and reviewers will not know the identity of the team during the merit evaluation. There will be a reveal at the end for proposals at the top end and reviewers can comment on team qualifications (not expected to change outcome).

## Mock Panel

- Heliophysics conducted a mock ROSES Panel to train new Program Scientists and share best practices for ROSES Panel facilitation.

**Volunteer for a Proposal Review Panel!**

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

# ROSES-19

	ROSES Element		Proposal Due Date	Notify Date	Days Since Received	# Proposals received	# Proposals selected	% selected	# New PI	% New PI
2019	HDEE	Data Environment Emphasis	6/20/2019	10/21/2019	123	15	11	73%	11	100%
	HGIO	Guest Investigators Open	7/17/2019	2/3/2020	201	128	30	23%	24	80%
	HSODS	Heliophysics System Observatory Data Support	8/15/2019	9/30/2019	46	6	4	67%	4	100%
	HTIDS	Technology and Instrument Development for Science	8/28/2019	4/2/2020	218	31	12	39%		
	HSR	Supporting Research	10/18/2019	6/16/2020	242	122	30	25%	19	63%
	HFORT	Flight Opportunities for Research and Technology	11/8/2019	*		42				
	TMS	Theory, Modeling, Simulation	12/3/2019	6/19/2020	199	54	14	25%	10	71%
	OHGI	Outer Heliosphere Guest Investigator	12/10/2019	3/5/2020	86	16	5	31%	3	60%
	SWO2R	Space Weather Applications Operations 2 Research	2/13/2020	*		48				
	LWS Science	Living With a Star Science	2/27/2020	^		65				
HSO Connect	Heliophysics System Observatory Connect	3/13/2020	6/23/2020	102	14	4	29%	4	100%	

+ Panel(s) to be scheduled

^ Panels scheduled

\* Selection pending

# Welcome Amy Winebarger!

- Detail in place Apr. 2020 – Nov. 2020
- **Mission Unstoppable: Sounding Rockets with Amy Winebarger**
  - The CBS show Mission Unstoppable recently [featured](#) the ESIS rocket launch with Amy Winebarger, a solar astrophysicist based in NASA's Marshall Space Flight Center in Huntsville.



Mission Unstoppable  
@CBSUnstoppable

3, 2, 1... blast off! 🚀

This week on @CBSUnstoppable, witness a rocket launch that will help this @NASA #scientist study the sun. #SheCanSTEM @AmyRWinebarger @WSMissileRange





# Headquarters Updates

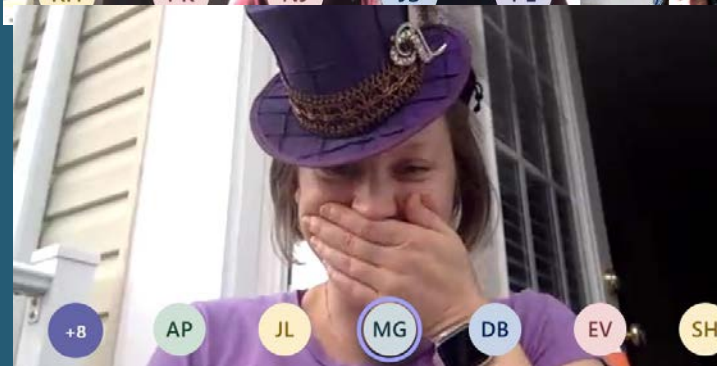
## Program Executives

- 3 new PEs hired – welcome **Jamie Favors, Heather Futrell, and David Cheney!**
- 1 new PE to be hired via direct hire authority
- 2 new PEs to be brought on via detail

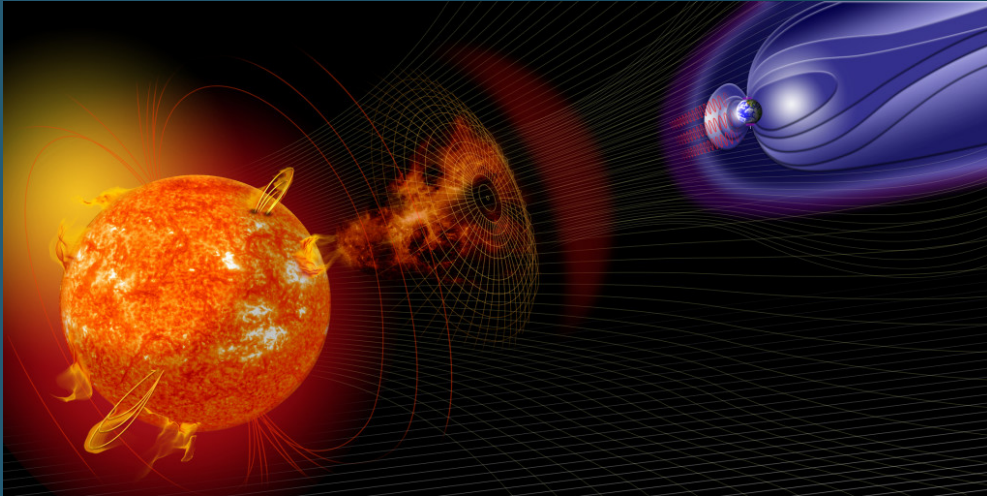
## Program Scientists

- 3-4 new PSs to be brought on via Intergovernmental Personnel Act (IPA)
- 3 new PSs to be hired via direct hire authority Summer 2020
  - Job announcement released 6/29



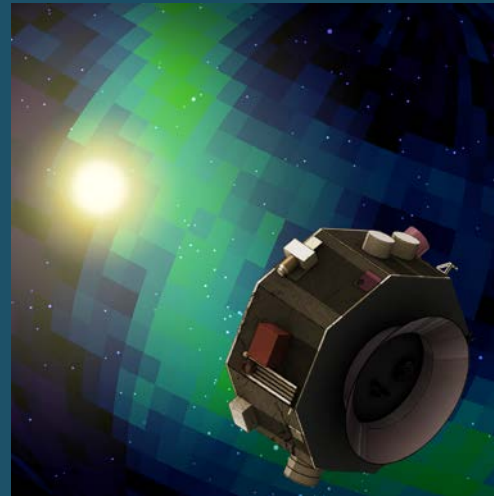


# It is a Great Time to be a Heliophysicist!



## 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 ride share 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 cosmic scene. The top half features a dark blue and black space filled with numerous small, bright stars. A prominent, glowing blue nebula with wispy, filamentary structures is visible in the upper right quadrant. The bottom half of the image transitions into a warmer, golden-yellow and greenish glow, also filled with stars. A faint, glowing greenish nebula is visible in the lower right, blending into the starry field.

**BACKUP**

# Highlights

- **Interstellar Mapping and Acceleration Probe**
  - Successfully completed its Key Decision Point B review on Jan. 28.
- **Geospace Dynamics Constellation**
  - The Pre-Project Office at GSFC is planning for a Mission Concept Review (July 2020).
- **Parker Solar Probe**
  - Perihelion #4: Jan. 29, 2020, Perihelion #5: Jun. 13, 2020
  - Records: 11.6 million miles to the sun, 244,225 miles per hour
  - 4 *Nature* and 56 *ApJ* science papers in print, data from first three orbits publically available.
- **Solar Orbiter**
  - Launched Feb. 9, 2020
  - First perihelion: Jun. 15, 2020.
- **Sun Radio Interferometer Space Experiment (SunRISE)**
  - Selected on Mar. 27, project kick-off held June 2020.
- **Polarimeter to Unify the Corona and Heliosphere (PUNCH)**
  - Successful System Requirements Review/Mission Definition Review (SRR/MDR) on Apr. 2.
- **Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites (TRACERS)**
  - TRACERS and a Technology Demonstration Opportunity, MAGnetometers for Innovation and Capability (MAGIC) proceeded into Phase B Preliminary Design following the successful completion of an Extended Phase A study on April 24.

# Global-scale Observations of the Limb and Disk (GOLD)

- Making observations of the American hemisphere ~18 hours per day with essentially no interruption since October 2018
- First simultaneous upper-atmosphere global-scale temperatures and composition measurements from GEO orbit.
  - Separation of spatial and temporal variability
  - Development & evolution of geomagnetic storms, upwardly propagating waves, and effects of solar radiation
- During this time of rapid commercialization of space, It is important to understand the region in which critical space-based resources will operate. Assimilation of GOLD data into a thermospheric model can:
  - Reduce the bias in model temperatures (ensemble mean) by 70% under quiet & disturbed conditions.
  - Reduce model uncertainty (ensemble spread) by 50%

## Unique Features:

First mission to study the weather of the thermosphere-ionosphere rather than its climate

First NASA mission to fly as a hosted payload on a commercial communications satellite



## Measurements:

On the disk, temperature and composition during the day, and electron densities at night.

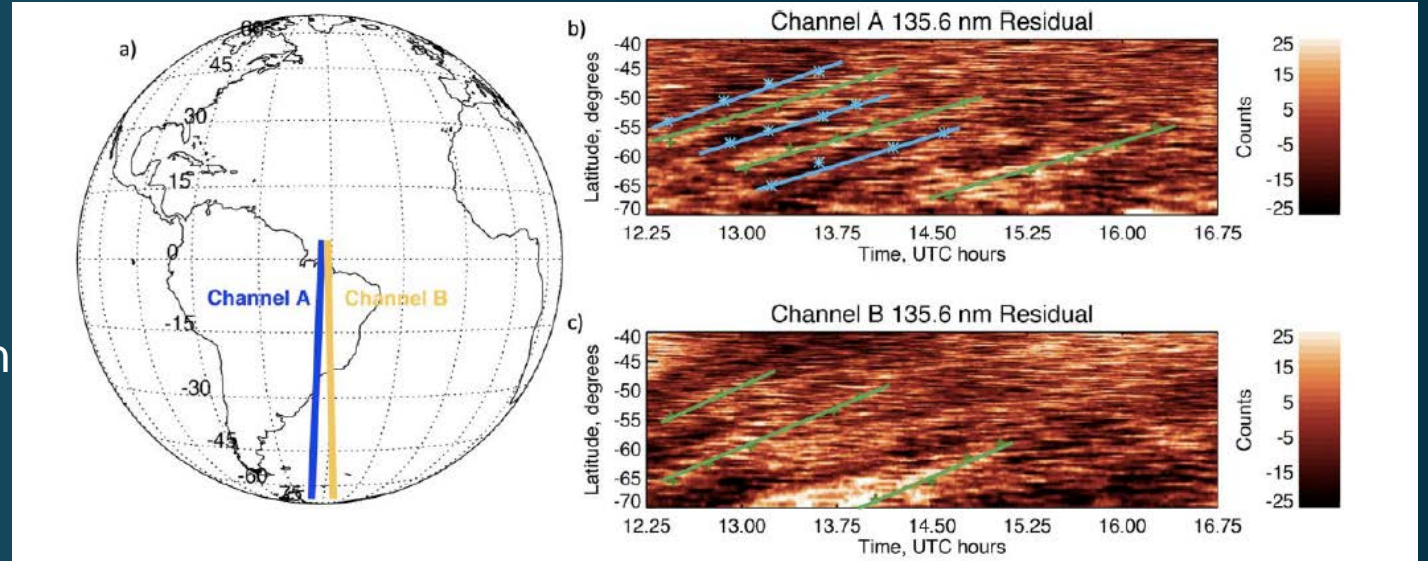
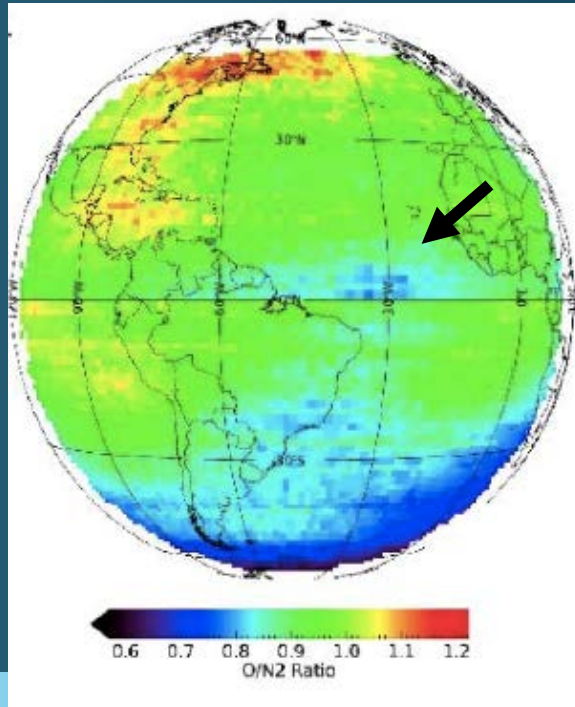
On the limb, exospheric temperatures and O<sub>2</sub> density profiles.

\*Data available through the SPDF & GOLD Science Data Center

# GOLD Highlights

## First Observations Linking Thermospheric Composition Changes to Polar Vortex

- GOLD's global-scale images captured a dramatic change in the thermospheric composition (decrease of O/N<sub>2</sub>) at ~100 km resulting from a sudden stratospheric warming (SSW) in the north [Oberheide et al., GRL, 2020].

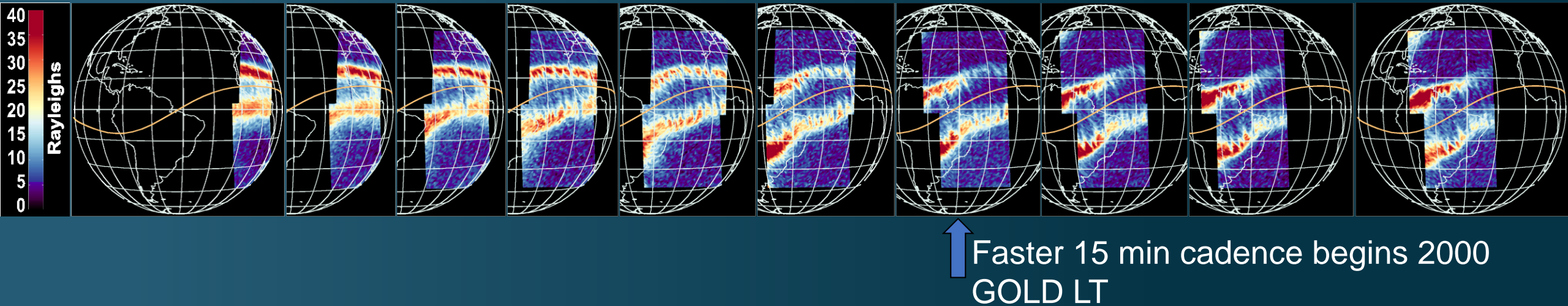


## First Gravity Wave Campaign with GOLD

- GOLD resolved atmospheric gravity waves in the airglow as periodic variation moving northward, possibly away from the southern aurora. [England et al., 2020 – JGR Special Collection].
- Future campaigns to focus on gravity waves from hurricanes, convective storms, orography

# GOLD: Nighttime EIA is Dynamic

Nightside Observing Sequence (Example); 2018-10-17; 20:10 - 23:35 UT



***Observations of the equatorial ionization anomaly (EIA) at night have far exceeded expectations.***

GOLD has the ability to observe both the northern & southern crests over a wide range of longitudes from South American to North Africa. GOLD can:

- Follow the temporal and spatial development of individual bubbles
- Compare drifts in longitude at the two EIA crests and at the equator
- Observe the development and evolution of asymmetries in the EIA crests
- Increase knowledge of triggers for bubble onsets

# ICON Updates

#ICAN!

**ICON team released scientific data collected during the spacecraft's first eight months in orbit to the public on 6/22/2020.**

- The data release features observations from ICON's four instruments — MIGHTI, FUV, EUV, and IVM
- ICON science payload is working exceptionally well
  - Challenging MIGHTI observations of airglow down to 90 km in the daytime working perfectly.
  - EUV observations by ICON EUV as sensitive as expected and producing daytime ionospheric data
  - FUV observations by ICON FUV also extremely sensitive and producing outstanding day and night airglow images.
  - ICON IVM producing remarkable measurements of local plasma environment including high precision velocities.



Nicky Fox  
@SolarGirl2018

Go ICON Go!!! @NASASun @ucbssl #ICON mission in the pad right before launch with the project and program team telling her to Go, GO, GOOOOO #HelioRocks #GoICON #ICAN #ILovemyjob #obsessedwithspace #spaceweather



2:13 AM · Oct 11, 2019 from Cocoa Beach, FL · Twitter for iPhone



# Rideshare

- CSSP Short report on rideshare delivered to HPD, Feb. 2020
  - Briefed to Science Committee, NASA Advisory Council
- Agile Access 2 Space Workshop, Feb. 2020
  - Splinter groups focused on:
    - Science that Drives the Pipeline Based on Destination
    - Instrument Types and Configurations that Drive the Pipeline Based on Science
    - Launch Vehicle Barriers and Issues that Hinder the Pipeline
    - Small Spacecraft Technology Challenges that Hinder the Pipeline
    - Programmatic Challenges that Hinder the Pipeline
- All Rideshare opportunities on IMAP ESPA Grande identified
- Supporting accommodation of rideshare payloads selected under the SIMPLEX call

## Rideshare Office

- SMD has established a full-time Rideshare office housed within the Heliophysics Division that will be staffed with a permanent lead and support team.
- Teams are advised to consult with this office for questions on deliverables and deadlines, policies and processes.



The background of the slide is a composite of two astronomical images. The top half features a dark blue and black space filled with numerous bright, multi-pointed stars and a large, wispy blue nebula on the right side. The bottom half features a bright orange and yellow space filled with many smaller, multi-pointed stars and a large, wispy orange and yellow nebula on the right side. A dark blue horizontal band runs across the middle of the slide, containing the title text.

# 2020 Science Plan Backup

# NASA Science Strategic Approach

## VISION

Lead a globally interconnected program of scientific discovery that encourages innovation, positively impacts people's lives, and is a source of inspiration

## MISSION

Discover the secrets of the universe

Search for life elsewhere

Protect and improve life on Earth

## VALUES

Excellence

Leadership

Integrity

Teamwork

Safety

## FOCUS

Exploration and Scientific Discovery

Innovation

Interconnectivity and Partnerships

Inspiration



## Exploration and Scientific Discovery

Seeking to discover the secrets of the universe, search for life, and protect and improve life on Earth. We utilize a balanced portfolio approach that is informed by Decadal Surveys and is responsive to Administration priorities and direction from Congress to make progress and enhance opportunities for cross-disciplinary science.

## Innovation

Fostering a culture that recognizes innovation and measured risk-taking as the cornerstones of a forward-looking program of scientific discovery. We encourage innovation, entrepreneurship, and collaboration in pursuit of common goals and to capitalize on the rapid evolution of commercial capabilities.

## Interconnectivity and Partnerships

Forming strategic partnerships that leverage each contributor's strengths to yield advances for mutual benefit. We recognize and support the important role NASA Centers, Federal agencies, private industry, academia, non-profits, community-based organizations, and international partners play in helping make our scientific vision a reality.

## Inspiration

Building opportunities to encourage as wide an audience as possible to engage in our work. We seek to reduce barriers to entry, in order to allow people of all ages and backgrounds to join us for the benefit of the entire scientific and engineering community, as well as the world.

## VISION

To lead a globally interconnected program of scientific discovery that encourages innovation, positively impacts people's lives, and is a source of inspiration

## MISSION

Discover the secrets of the universe. Search for life elsewhere.  
Protect and improve life on Earth

### PRIORITY 1: Exploration and Scientific Discovery

**STRATEGY 1.1:** Execute a balanced science program based on discipline-specific guidance from NASEM, Administration priorities, and direction from Congress

**STRATEGY 1.2:** Participate as a key partner in the agency's exploration initiative, focusing on scientific research of and from the Moon, lunar orbit, Mars, and beyond.

**STRATEGY 1.3:** Advance discovery in emerging fields by identifying and exploiting cross-disciplinary opportunities between traditional science disciplines

**STRATEGY 1.4:** Develop a Directorate-wide, target-user focused approach to applied programs, including Earth Science Applications, Space Weather, Planetary Defense, and Space Situational Awareness

### PRIORITY 2: Innovation

**STRATEGY 2.1:** Foster a culture that encourages innovation and entrepreneurship across all elements of the SMD portfolio.

**STRATEGY 2.2:** Foster a culture that encourages collaboration in pursuit of common goals.

**STRATEGY 2.3:** Enhance our focus on high intellectual risk/high impact research investments.

**STRATEGY 2.4:** Drive innovation in focused technology areas to capitalize on the rapid evolution of commercial capabilities

### PRIORITY 3: Interconnectivity and Partnerships

**STRATEGY 3.1:** Actively engage with the NASA Centers to make more informed strategic decisions that further NASA's scientific goals and are aligned with each Center's unique capabilities.

**STRATEGY 3.2:** Actively seek collaborations with international partners based on their unique capabilities and mutual scientific goals.

**STRATEGY 3.3:** Actively engage with other federal agencies to make more informed decisions, cooperate in scientific research, and pursue partnerships that further national interests.

**STRATEGY 3.4:** Provide increasing opportunities for research institutions, including academia and non-profits, to contribute to SMD's mission.

**STRATEGY 3.5:** Pursue public-private partnerships in support of shared interests with industry.

### PRIORITY 4: Inspiration

**STRATEGY 4.1:** Increase the diversity of thought and backgrounds represented across the entire SMD portfolio through a more inclusive environment.

**STRATEGY 4.2:** Purposefully and actively engage with audiences and learners of all ages to share the story of NASA's integrated science program.

A vibrant space-themed background featuring a blue and green nebula, a bright yellow sun, and several celestial bodies including Saturn, Mars, and the Moon. A large, semi-transparent blue circle is overlaid on the right side of the image, framing the text.

# 2024 Future State

- Implement recommendations of Decadal Surveys in concert with national priorities and needs through creative partnership models that go beyond traditional ways of developing and executing missions
- Challenge assumptions about what is technically feasible and enable revolutionary scientific discovery through a deliberate focus on innovation, experimentation, and cross-disciplinary research
- Create a more collaborative culture within SMD and across science community, encouraging diversity of thought, sharing best practices, and informed risk-taking to improve operations
- Develop future leaders and inspire learners of all ages through new opportunities and hands-on experiences
- **Read the full document at [science.nasa.gov/about-us/science-strategy](https://science.nasa.gov/about-us/science-strategy) to understand our priorities and how we will continue to interact with the community**