

National Aeronautics and  
Space Administration



# EXPLORE SCIENCE


## SMD Community Townhall

April 19, 2022

**Dr. Thomas H. Zurbuchen**

Associate Administrator

NASA Science Mission Directorate

 @Dr\_ThomasZ





NEWS &  
UPDATES



PROGRAMS &  
RESEARCH

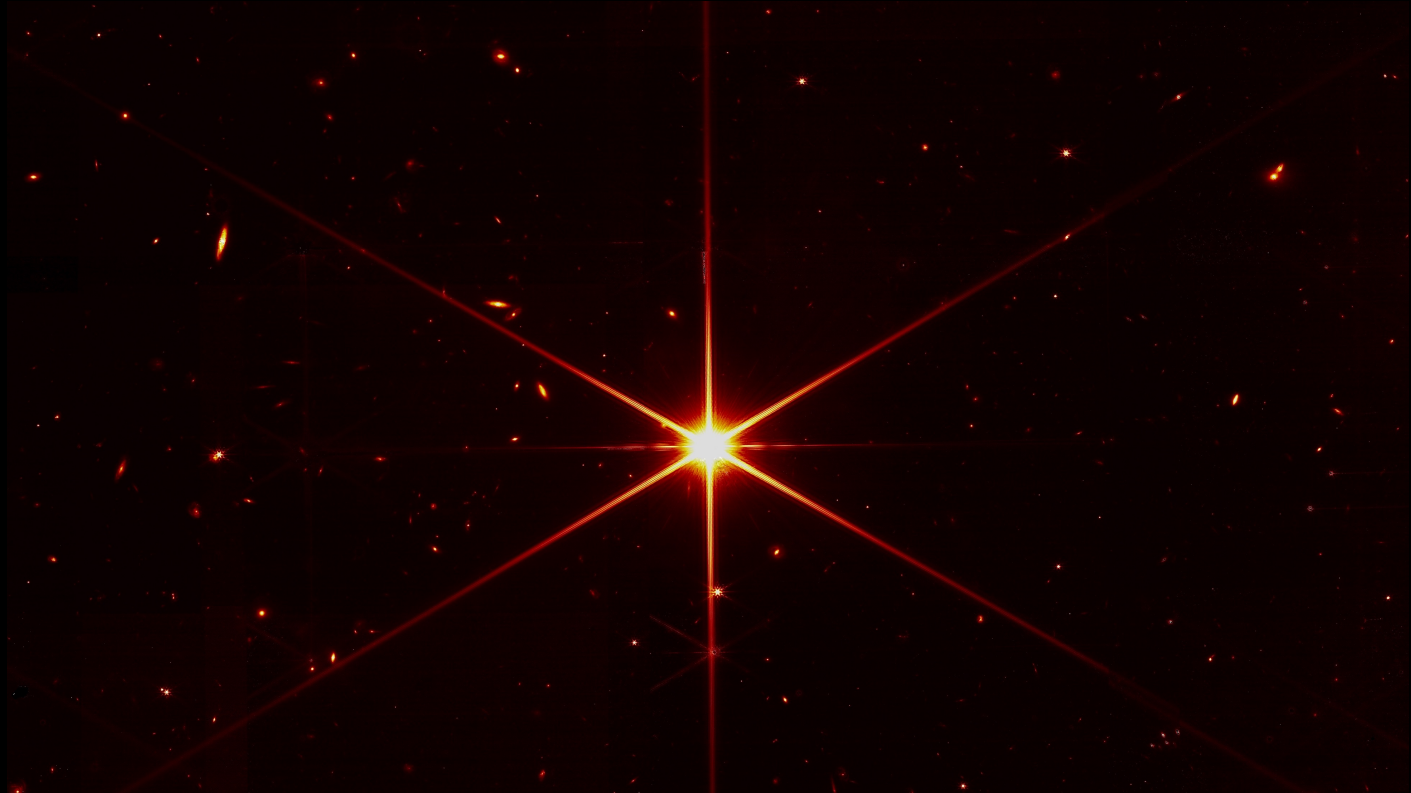


DIVISION  
HIGHLIGHTS

# WEBB

## SPACE TELESCOPE

Webb has successfully worked through the second and third out of seven total phases of mirror alignment. On the right, you can see the completion of the third phase – Image Stacking. The individual segment images now fall precisely at the center of the field to produce one unified image instead of 18. After future alignment steps, the image will be even sharper.





# Artemis 1 Wet Dress Rehearsal

On April 4<sup>th</sup>, the Artemis 1 wet dress rehearsal ended at 5 pm due to technical and safety issues.

The next attempt, held on April 14<sup>th</sup>, was concluded at approximately 5:10 pm after teams observed a liquid hydrogen (LH2) leak on the tail service mast umbilical.





# Psyche

NASA's Psyche spacecraft just completed a series of electromagnetic, thermal-vacuum, vibration, shock, and acoustic tests at the Jet Propulsion Laboratory. Psyche was deemed healthy and ready to proceed toward launch.

Engineers are putting the final touches on the spacecraft, which is set to launch from Cape Canaveral, Florida, in August on its journey to a metal-rich asteroid of the same name.







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DIVISION  
HIGHLIGHTS





# SMD FY23 Budget Strategy

*Promote US leadership in Earth system science and addressing the climate crisis*

*Lead Artemis Science*

*Champion Inclusion, Diversity, Equity and Accessibility*

*Build a balanced and innovative program driven by the highest national priorities*

*Advance open science for all by leveraging cutting edge data science techniques*



# FY2023 Science Budget Request Summary (\$M)

Request Summary (\$M)		Actual	Enacted	Request	Out-Years			
		FY21	FY22	FY23	FY24	FY25	FY26	FY27
Science		\$7,290.7	\$7,614.4	\$7,988.3	\$8,148.1	\$8,311.1	\$8,477.3	\$8,646.8
Earth Science		\$1,996.5	\$2,064.7	\$2,411.5	\$2,460.3	\$2,589.0	\$2,722.3	\$2,782.0
Earth Science Research		\$484.3		\$534.9	\$575.6	\$597.5	\$609.6	\$622.1
Earth Systematic Missions		\$773.1		\$998.1	\$979.3	\$1,061.3	\$1,119.6	\$1,034.5
Earth System Explorers		\$0.0		\$23.4	\$36.3	\$92.0	\$150.2	\$251.3
Earth System Science Pathfinder		\$286.8		\$308.4	\$274.8	\$237.5	\$219.3	\$230.4
Earth Science Data Systems		\$299.6		\$366.1	\$406.7	\$383.9	\$399.1	\$414.8
Earth Science Technology		\$83.7		\$102.3	\$105.9	\$114.1	\$117.7	\$119.0
Applied Sciences		\$69.0		\$78.2	\$81.8	\$102.8	\$106.7	\$109.9
Planetary Science		\$2,693.2	\$3,120.4	\$3,160.2	\$3,186.1	\$3,197.4	\$3,176.4	\$3,299.0
Planetary Science Research		\$304.1		\$298.6	\$299.4	\$309.3	\$324.9	\$342.3
Planetary Defense		\$158.1		\$87.7	\$116.5	\$181.5	\$242.5	\$247.7
Lunar Discovery and Exploration		\$443.5		\$486.3	\$458.3	\$458.3	\$458.3	\$468.3
Mars Sample Return		\$241.6		\$822.3	\$800.0	\$700.0	\$600.0	\$612.1
Discovery		\$447.7		\$230.0	\$369.6	\$540.5	\$594.7	\$686.4
New Frontiers		\$150.9		\$478.4	\$415.0	\$453.8	\$409.6	\$401.1
Mars Exploration		\$339.5		\$233.9	\$223.8	\$211.7	\$226.8	\$242.1
Outer Planets and Ocean Worlds		\$461.5		\$356.8	\$313.8	\$130.3	\$120.5	\$127.9
Radioisotope Power		\$146.3		\$166.3	\$189.7	\$212.1	\$199.2	\$171.0



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Science		\$7,290.7	\$7,614.4	\$7,988.3	\$8,148.1	\$8,311.1	\$8,477.3	\$8,646.8
Astrophysics		\$1,770.9	\$1,568.9	\$1,556.0	\$1,597.0	\$1,578.5	\$1,620.5	\$1,625.6
Astrophysics Research		\$249.3		\$329.8	\$350.8	\$345.5	\$348.4	\$350.1
Cosmic Origins		\$618.5		\$298.5	\$316.5	\$316.3	\$316.6	\$316.6
JWST (non-add)		\$414.7		\$172.5	\$187.0	\$187.0	\$187.0	\$187.0
Physics of the Cosmos		\$146.4		\$159.9	\$188.1	\$182.4	\$182.2	\$177.6
Exoplanet Exploration		\$552.4		\$522.2	\$450.2	\$423.0	\$388.4	\$258.0
Astrophysics Explorer		\$204.4		\$245.6	\$291.4	\$311.3	\$385.0	\$523.2
Heliophysics		\$751.0	\$777.9	\$760.2	\$802.6	\$842.0	\$851.9	\$831.9
Heliophysics Research		\$280.8		\$225.4	\$224.7	\$226.2	\$226.0	\$226.0
Living with a Star		\$110.8		\$137.3	\$133.1	\$224.1	\$241.3	\$200.4
Solar Terrestrial Probes		\$133.3		\$188.8	\$199.1	\$117.5	\$77.2	\$61.4
Heliophysics Explorer Program		\$162.7		\$157.9	\$190.9	\$222.6	\$270.2	\$307.5
Heliophysics Technology		\$19.2		\$28.4	\$23.0	\$17.3	\$13.0	\$14.0
Space Weather		\$44.3		\$22.3	\$31.9	\$34.5	\$24.2	\$22.7
Biological and Physical Sciences		\$79.1	\$82.5	\$100.4	\$102.1	\$104.1	\$106.2	\$108.4

# FY 2022 Enacted Budget

	<i>\$million</i>	FY 2021 actual	FY 2022 Request	FY 2022 Enacted	FY22 Delta to Request	FY22 Delta to FY21
<b>Science</b>		<b>\$7,290.7</b>	<b>\$7,931.4</b>	<b>\$7,614.4</b>	<b>(\$317.0)</b>	<b>\$323.7</b>
Earth Science		\$1,996.5	\$2,250.0	\$2,064.7	(\$185.3)	\$68.2
Planetary Science		\$2,693.2	\$3,200.0	\$3,120.4	(\$79.6)	\$427.2
Astrophysics		\$1,770.9	\$1,575.2	\$1,568.9	(\$6.3)	(\$202.0)
Heliophysics		\$751.0	\$797.2	\$777.9	(\$19.3)	\$26.9
Biological and Physical Sciences		\$79.1	\$109.1	\$82.5	(\$26.6)	\$3.4

NASA's FY 2022 appropriation showed strong support for Science

- 4% growth over FY21 budget
- Support for high priority activities/missions such as Mars Sample Return, Europa Clipper, Roman, and Lunar Exploration and Discovery Program, Explorer Program, space weather and Earth System Observatory



# Status of SMD Programs

- The state and health of the SMD Flight Portfolio is **Good**
- SMD has a total of 126 missions in formulation, implementation, primary mission operation, and extended mission operations
- In March 2022, SMD successfully launched GOES-18
- Several launches are planned for 2022, including TROPICS (3), Psyche, JPSS-2, EMIT, and SWOT
- Technology and SmallSats/CubeSats efforts are advancing and enabling science
  - SMD and STMD engaged in many fruitful conversations leading to selections of SMD-relevant Space Technology Research Institute and SBIR Sequential topics
  - The [2021 Small Spacecraft Virtual Forum Report](#) was recently released. The 2021 Small Spacecraft Forum was held last year, ran over a 2-month period, and included 26 panels. Greater than 200 participants attended some of the panels.
- Portfolio Management:
  - SMD is working with the Agency in the enhancement of programs and projects management and oversight
  - Rolled out the Large Missions Implementation Plan, incorporating recommendations from the Large Mission Study
  - Released the SMD Class D MAR; SMD Class D Implementation Guide and the Class D Compliance Matrix coming soon

# NASA I-Corps Pilot

## Program Development Updates:

- SMD and STMD are working together to advance entrepreneurial development in academia through an inclusive, evidence-based design of a NASA I-Corps Program.
- Estimated release of the solicitation is April 25 - May 6.
- Implementing this program will create an actionable and strong connection to the SMD strategic plan.
  - 2020-2024: A Vision for Scientific Excellence; Innovation - Priority 2.1: Foster a culture that encourages innovation and entrepreneurship across all elements of the SMD portfolio.
- NASA Pilot Program will have 2 phases:
  - Phase 1: Regional I-Corps Course for up to \$10K amounts; 2-4 weeks in duration
  - Phase 2: National I-Corps Course for up to \$40K; 7 weeks in duration. Participants will likely start as soon as October 2022.







NEWS &  
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DIVISION  
HIGHLIGHTS

# Division Highlights

- James Webb Program Office (Webb) – Eric Smith
- Exploration Science Strategy and Integration Office (ESSIO) – Joel Kearns
- Astrophysics – Paul Hertz
- Biological and Physical Sciences (BPS) – Craig Kundrot
- Heliophysics – Nicky Rayl
- Planetary Science – Lori Glaze
- Mars Sample Return Program Office – Joe Gasbarre
- Earth Science Division – Karen St. Germain

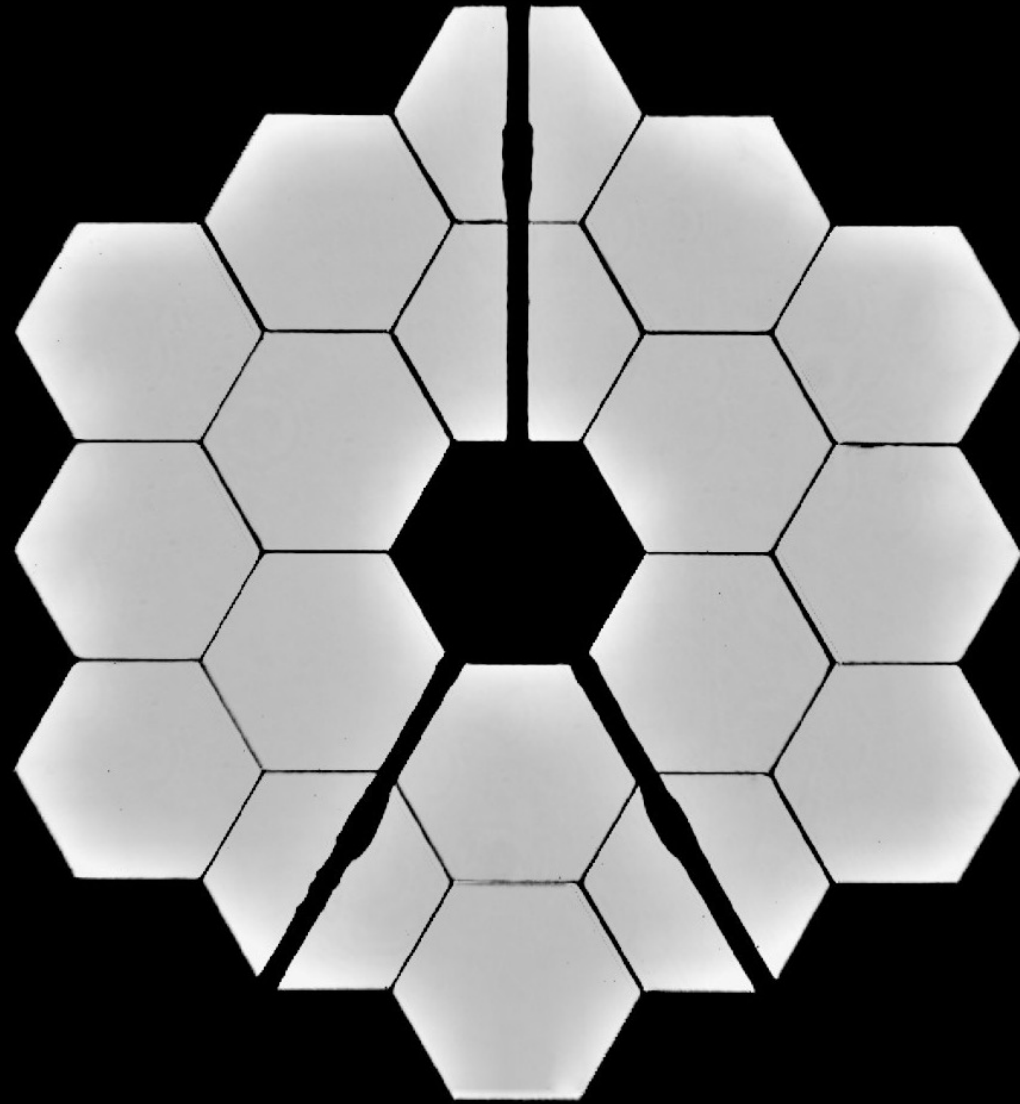


# WEBB

## SPACE TELESCOPE

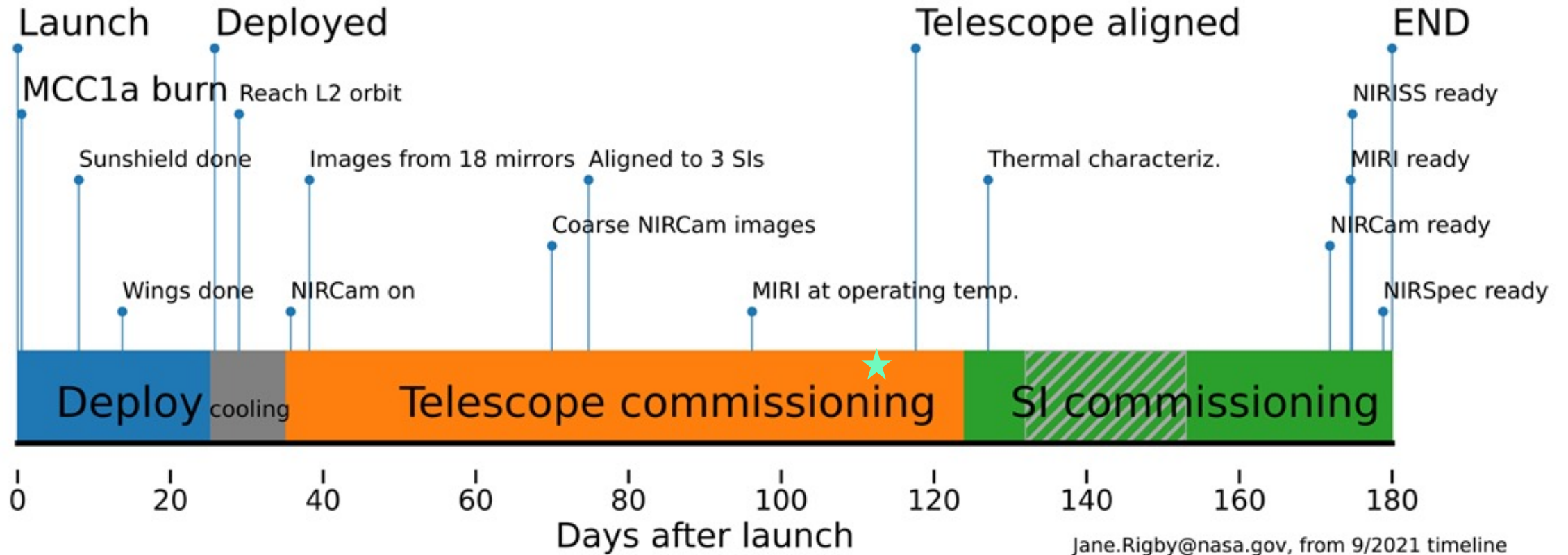
This was a “selfie” picture of the primary mirror taken in a special engineering configuration mode of the NIRCAM instrument.

The NIRCAM instrument was led by University of Arizona Principal Investigator Marcia Rieke and built by Lockheed Martin in Palo Alto, Ca.



# Commissioning

Commissioning begins at launch and is ~ 180 days\* long marked by the following key events:



★ We are here

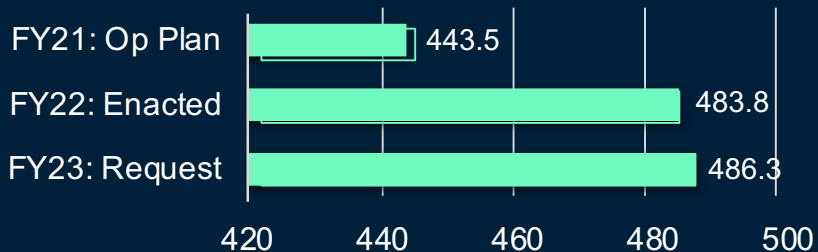


# ESSIO Highlights

- ESSIO would like to introduce Dr. Brad Bailey as our new Assistant Deputy Associate Administrator for Exploration
- Apollo Next Generation Sample Analysis development: one of the last preserved lunar core samples from Apollo (73001) has been successfully extruded under the careful direction of processors and curators [at JSC](#)
- Exploration Science Workshops
  - May 4-6: Science Objectives for Human Exploration of Mars Workshop
  - May 10: Lunar Surface Science Workshop centered on updates from NASA HQ
- PRISM 2 selections: May 2022
- CLPS VIPER Delivery: Astrobotic's Griffin lander Structural Test Model (STM) completed acoustic testing in March; STM vibration testing will begin in April

## LDEP Budget

■ Budget in \$ Millions



## Growth from FY22:

▲ \$2.5M  
▲ 0.5%



ANGSA:  
Apollo 17 lunar  
core sample  
73001 being  
taken out of its  
drive tube for  
the first time  
since 1972



C. KRYSHER | A. MOSIE |  
J. GROSS | R. ZEIGLER

ANGSA:  
processing  
team for 73001  
in front of the  
newly opened  
core sample at  
JSC



Astrobotic  
Griffin lander  
STM; acoustic  
testing

# Astrophysics Division Highlights

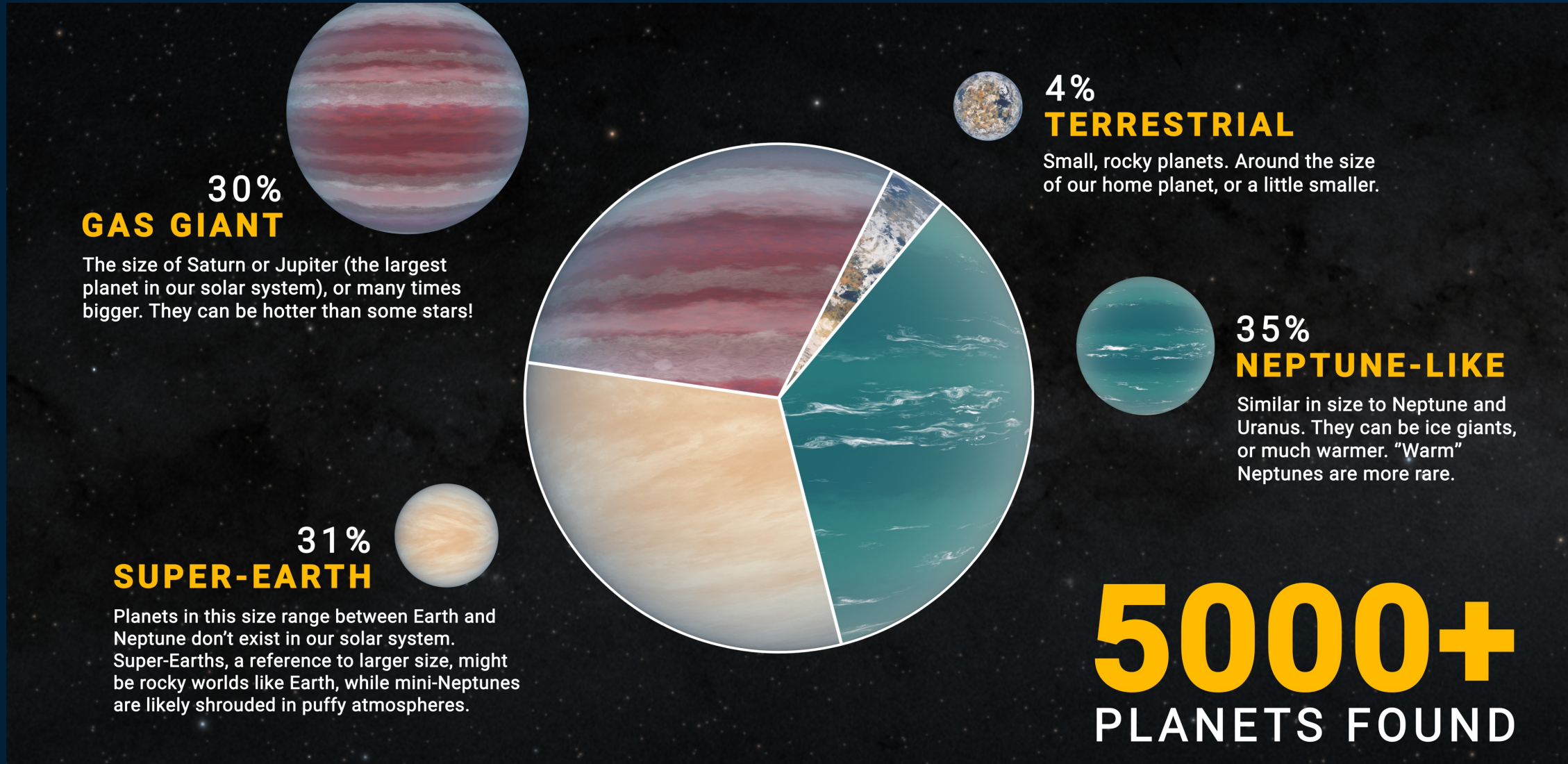
- NASA's Imaging X-ray Polarimetry Explorer (IXPE), launched Dec. 9, 2021, has observed 17 celestial objects to date, confirming detection of X-ray polarization in at least three sources and verifying the basic functionality of IXPE X-ray telescope
- NASA has selected 24 new Fellows for the NASA Hubble Fellowship Program (NHFP).
- For the first time, NASA's Neutron star Interior Composition Explorer (NICER) has observed the merging of multimillion-degree X-ray spots on the surface of a magnetar.
- NICER team won the 2022 Rossi Prize for its revolutionary insights about the extreme environments of neutron stars and black holes, including the first accurate measurement of a pulsar's mass and radius from detailed modeling of its pulsed waveform.
- Next Astrophysics Town Hall on implementing the Decadal Survey will be on May 3 at 1 pm ET / 10 am PT.



Zaven Arzoumanian & Keith Gendreau



# Cosmic Milestone: NASA Confirms 5,000 Exoplanets



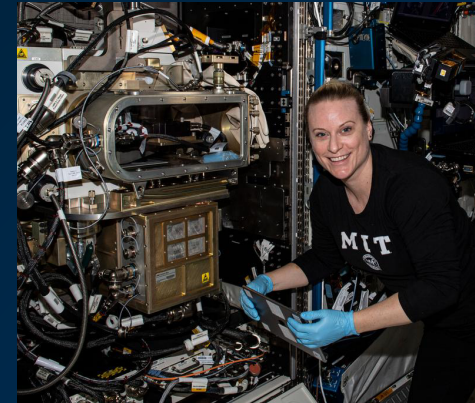
# BPS Division Highlight

- 8 contracts were awarded in a multi-agency collaboration that will extend longevity of 3D tissue chips to 6 months.
- The Advanced Combustion in a Microgravity Environment (ACME) insert to the ISS Combustion Integrated Rack completed over 4 years of investigations in February.
- 1 Space Biology experiment, 4 Physical Sciences experiments, and 1 facility launched on Cygnus NG-17 to support Thriving in Deep Space (TIDES), including improving a spacecraft's safety (fire control), growing plants without soil (human sustenance), and environmental microbes (human health and environmental control).

- Budget -

FY22	FY23	FY24	FY25	FY26	FY27
82.5	100.1	102.1	104.1	106.2	108.4

  - Maintain focus on Quantum Science and Thriving in Deep Space; developing use of human commercial platforms: sub-orbital and new Commercial LEO Destinations
- John Howard joined BPSD as Space Biology Deputy Program Manager
- Two GeneLab members, Dr. Sylvain Costes and Jamie L Bales, as well as the GeneLab team received NASA Honor awards



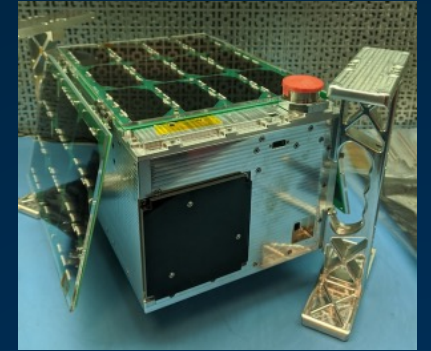


# Heliophysics Division Highlights

- **Congratulations!**
  - **TRACERS:** Confirmed for flight (KDP C) March 31
  - **MAGIC:** Successfully passed its Project Approval to transition from Formulation to Implementation on March 8
- On March 17, NASA selected 3 DRIVE Centers:
  - Hoeksema/Stanford; Merkin/JHU/APL; Opher/Boston University
- On Feb. 10, NASA selected 2 new science missions to improve understanding of the dynamics of the Sun and the Sun-Earth connection:
  - **Multi-slit Solar Explorer (MUSE)** (DePontieu/LMATC)
  - **HelioSwarm** (Spence/UNH)
- MinXSS-3 CubeSat, launched on Feb. 13, achieved first light on March 7
- Sounding Rockets
  - BOLT2/Holden (Reimbursable, AFRL) launched on March 21 from WFF
  - LAMP/Halford (Geospace) launched from PFRR (Poker Flat Research Range) on March 5
  - HERSCHEL/Tun (Solar) launched from WSMR (White Sands Missile Range) on March 9



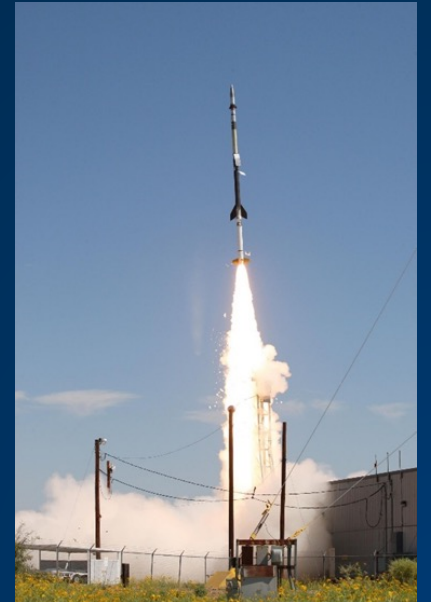
*Artist's impression of  
TRACERS in flight.  
Credits: NASA*



*Inspiresat-1 satellite,  
which contains the  
MinXSS-3 instrument*



*LAMP/Halford launch*



*HERSCHEL/Tun launch*

# Planetary Science Division Highlights

- **Artemis Science Updates:**
  - LPSC Artemis Town Hall available on LPI YouTube page
  - Lunar Surface Science Workshop (LSSW) on May 10, 2022
    - *Artemis: We are going! Updates from HQ*
  - Forthcoming calls:
    - ANGSA 2.0
    - Artemis III Geology Team
    - Artemis III/IV Deployed Instruments
    - Analog Activities to Support Lunar Operations
- **Psyche:** Significant progress in ATLO; Launch Readiness Date August 1, 2022
- **Europa Clipper:** ATLO started March 2022; launching 2024
- **Planetary Science and Astrobiology Decadal Survey:** Public release by NASEM is today, April 19 (2 to 4 pm Eastern Time)
  - Initial PSD public response will be within 90 days (community townhall)
  - Full written response will be provided later



OSIRIS-Rex Mission Team received 2022 John L. "Jack" Swigert Jr. Award for Space Exploration at NSS



Psyche on shaker table for dynamics testing

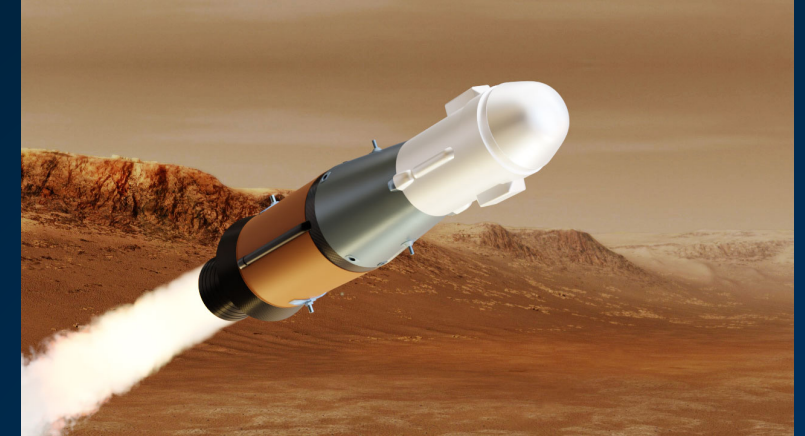


Europa Clipper Ultraviolet Spectrometer (E-UVS) delivered



# Mars Sample Return (MSR) Highlights

- Perseverance has begun collection of a scientifically-selected sample set; recently completed the Jezero Crater Floor science campaign—8 rock core samples sealed, including samples that can be dated and have organic compounds.
- The MSR Program has performed the studies and taken actions recommended by the Independent Review Board findings prior to Phase A
  - Completed the lander architecture trade study – decision to implement dual lander architecture (SRL-MAV and SRL-SFR) and align launches to 2028 launch opportunity with ERO/CCRS launch aligned to 2027
  - Architecture approach jointly agreed upon by NASA and ESA; builds off heritage successes and can be completed in the 2020s.
- ESA's planned September launch of their ExoMars mission has been impacted by the invasion of Ukraine. Potential impacts to the NASA/ESA MSR campaign are being evaluated with our partners.
- Completed Earth Entry System (EES) demonstration unit drop tests at Utah Test & Training Range in early March
- Program System Requirements Review is planned for June 2022 with KDP-B to follow in late Summer 2022
- Presidents FY23 Budget Request supports MSR formulation activities
- Solicitation for membership on MSR Campaign Science Group – Phase 1 has been sent out to the science community. Letters of application are due April 26.



*Mars Ascent Vehicle Concept Drawing*



*EES Drop Test*



# Earth Science Division Highlights

- **Earth Observations:**

- NASA ESD visited SWOT integration and testing team at Thales facility in France
- Sentinel-6 Michael Freilich now the global reference satellite for sea level measurements
- 5 new ICESat-2 datasets on sea ice, water extent, and vegetation now available about 72 hours after satellite observation
- NACHOS-1 CubeSat to measure trace gasses in the atmosphere launched to ISS; deployment expected June 2022
- IMPACTS and Air-LUSI airborne missions in the field

- **Of Note:**

- ESD exhibit at Commodity Classic (large agriculture conference)
- NASA-NOAA report: Sea level could rise 1 foot by 2050
- NASA National Snow and Ice Data Center: 2022 Arctic winter sea ice is 10<sup>th</sup> lowest recorded since 1979
- Studies examined effect of “green roofs” on urban heat; impact of melting permafrost; connections between local humidity and flu outbreaks; runoff from wildfires and water quality; and new data on sea ice and volcanoes are collected by science drones



*ESD team visits SWOT integration and testing facility*



*NASA team at the Commodity Classic and the virtual exhibit*



A surreal landscape featuring a glowing, ethereal river that flows from the foreground into the distance. The river is surrounded by lush green fields and rolling hills. In the background, majestic mountains are visible under a dark, starry sky. A large, pale moon hangs in the upper left corner. A vibrant aurora borealis in shades of green and blue dances across the upper right portion of the sky. The sun is setting or rising on the horizon, casting a warm, golden glow over the scene. The overall atmosphere is dreamlike and magical.

# EXPLORE

With Us