



National Aeronautics and
Space Administration

EXPLORE SCIENCE

Dr. Thomas H. Zurbuchen
Associate Administrator
NASA Science Mission Directorate

 @Dr_ThomasZ

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MARS 2020



DART



Landsat 9



Webb



IXPE

2021 – A Year of Science



O-REx



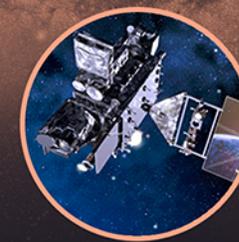
Peregrine



Nova-C



Lucy



GOES-T

- LAUNCH
- LANDING
- DEPARTURE



Welcome, Dr. Joel Kearns

- Effective February 1, 2021 Dr. Joel Kearns will serve as Deputy Associate Administrator for Exploration (DAAX)
- Dr. Kearns has more 32 years of experience in leadership roles at multiple NASA centers and in private industry
- Currently the director of Facilities, Test and Manufacturing at NASA's Glenn Research Center
- I would like to give my appreciation and thanks to Dr. Dave Burns, who has done an excellent job in keeping the Exploration Science Strategy and Integration Office (ESSIO) portfolio moving forward



BUDGET
UPDATE

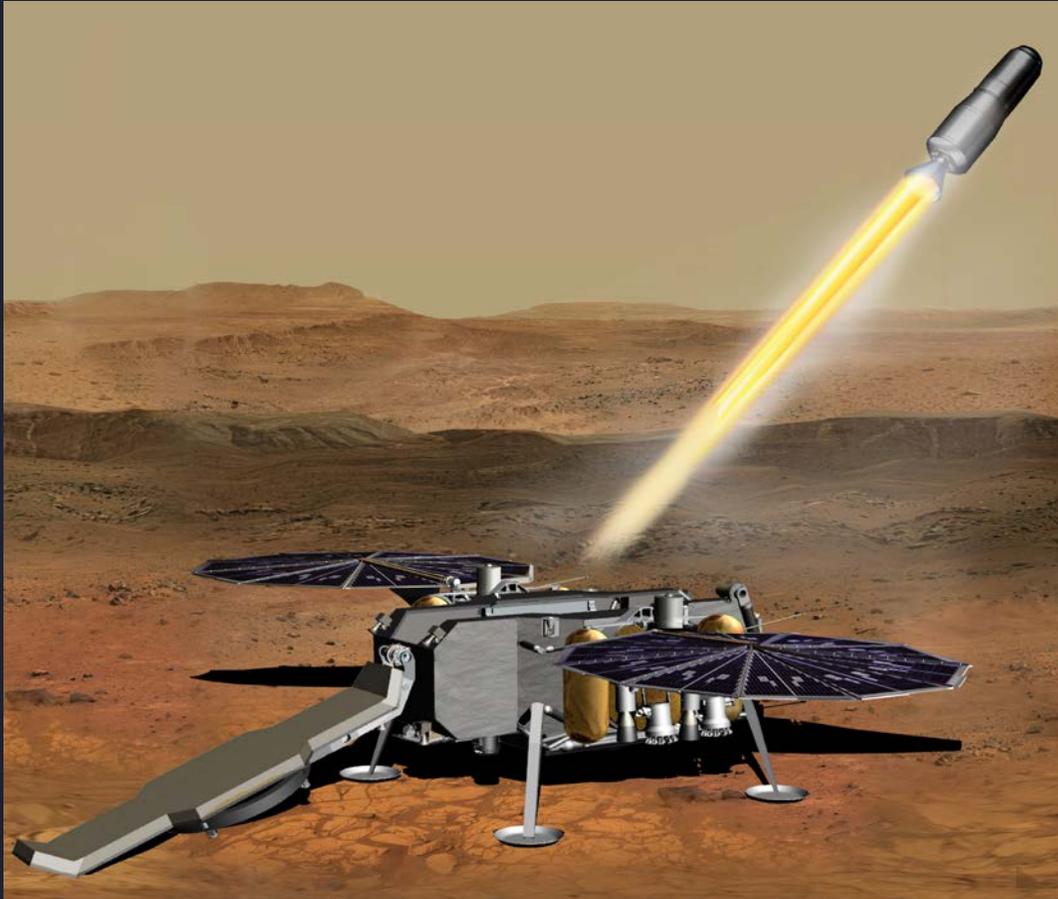


PROGRAMS &
RESEARCH



DIVISION
HIGHLIGHTS

FY21 Science Appropriations Highlights



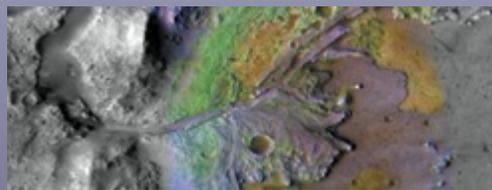
- FY 2021 Consolidated Appropriations Act signed into law December 27, 2020
- Continued strong support for Science with a \$7.3 B budget
 - \$994 M above the FY21 President's Budget request
 - \$162 M above the FY 2020 enacted level
- Continued funding for Roman, PACE, CLARREO PF, SOFIA
- Funding to support decadal priorities such a Mars Sample Return mission, Europa Clipper, and development of new Earth observation missions
- Includes funding for new Biological and Physical Science Division

FY 14-21 Science Appropriations Summary

									FY21 Omnibus Bill
	(\$M)	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	
Science		5,140.2	5,243.0	5,584.1	5,762.2	6,211.5	6,816.6	7,143.1	7,301.0
Earth Science		1,822.1	1,784.1	1,926.6	1,907.7	1,921.0	1,931.0	1,971.8	2,000.0
Planetary Science		1,342.3	1,446.7	1,628.0	1,827.5	2,217.9	2,746.7	2,712.6	2,700.0
Astrophysics		677.1	730.7	762.4	782.9	850.4	1,121.6	1,306.2	1,356.2
JWST		658.2	645.4	620.0	569.4	533.7	304.6	423.0	414.7
Heliophysics		640.5	636.1	647.2	674.7	688.5	712.7	724.5	751.0
Biological & Physical Science								5.0	79.1

FY21 Science Appropriations Division Highlights

Planetary Science



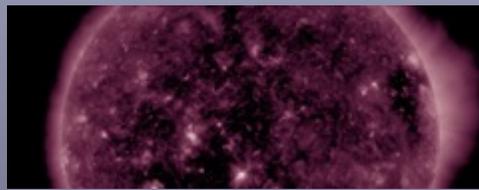
- \$40M above the FY21 Request
- Additional funds for Planetary Defense supporting DART and Near Earth Object Surveillance Mission
- Additional funding for Mars Sample Return and New Frontiers/Dragonfly
- Strong support for Lunar Discovery and Exploration, as well as Commercial Lunar Payload Services
- Europa Clipper given permission to use CLV in the event of SLS incompatibility

Astrophysics



- \$525M above the FY21 Request
- Restores funding to continue development of Nancy Grace Roman Telescope
- Additional funding for SOFIA
- Strong support for Science Activation, an SMD-wide education program

Heliophysics



- \$118M above the FY21 Request
- Additional funds for Research
- Increased funding for Living with a Star, including space weather applications and GDC
- Additional funds for Solar Terrestrial Probes, including MMS and DYNAMIC
- Additional funds for Heliophysics Explorers

Earth Science



- \$232M above the FY21 Request
- Strong support for Earth System Science Pathfinder Missions and Venture-class missions, including GLIMR and GeoCARB
- Restores funding for PACE and CLARREO PF
- Additional funds for Research
- Strong support for Designated Observable missions, as recommended by decadal survey



BUDGET
UPDATE



PROGRAMS &
RESEARCH



DIVISION
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Status of SMD Flight Projects

- All SMD missions in Formulation are proceeding and most missions in Implementation are accomplishing hands-on work. Centers and Industry Partners are working as efficiently and safely as possible in this COVID environment. However,
 - SMD continues to experience some disruptions to missions due to COVID-related restrictions; we assume these disruptions will continue for foreseeable future
 - Despite best efforts, we are not always able to successfully develop missions within cost and schedule as planned (e.g., Mars 2020, Webb, NISAR)
 - We are worried about and focused on some missions' ability to maintain cost and schedule as planned
 - We continue to work diligently and as hard as possible during these challenging times
- Life Cycle Reviews (LCR) and Key Decision Points (KDPs) continued to virtually report
 - Challenges/limitations of operating in a virtual environment are being addressed
- At the portfolio level, SMD is considering a series of actions to mitigate COVID impacts in order to ensure mission success and the overall health of our portfolio
 - Within current budget, employing the use of HQ-held reserves and/or adjustment of launch date
 - Where additional funds are necessary, SMD will consider delays or cancellations to planned missions in order to restore overall portfolio risk to acceptable levels

Implementing SMD's Priorities

- SMD does not want the pandemic to derail careers of future leaders; we continue to focus on mitigating impacts
- All-virtual review panels for ROSES programs will continue until June 1, 2021
- First round of Post-COVID Recovery funding requests are being looked over
 - Received over 100 requests for a total of ~\$13M
- Given our current funding constraints, SMD will continue to support 124 NPP fellowships and does not plan to support new term hires at Centers
 - Note that some of the “slots” previously intended for new Fellows may be used to support current Fellows in need of extensions
 - We will run the March call limited to those who already have permission to work in the US because of the inaccessibility of J-1 visas; this will change as J-1 visas become available
 - Since some slots will be used to support current Fellows, SMD will supplement the funding for the NPP so that it does not become even more competitive
 - These decisions will be revisited if supplementary funding is made available to SMD



Virtual PI Launchpad

- Another PI Launchpad is (finally) happening
 - Virtual sessions over 2 weeks: 1 week asynchronous content, 1 week interactive, ~2-3 hours per day
- Key Dates:
 - Application posted on NSPIRES in the next week- be on the lookout!
 - Deadline for applications is March 22nd
 - Notifications by May 3rd
 - Launchpad will be From June 14th to Jun 25th
- Content from 2019 workshop is online now!
 - <https://science.nasa.gov/researchers/pi-launchpad>



BUDGET
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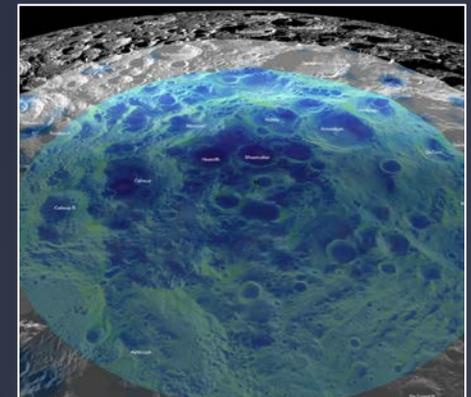
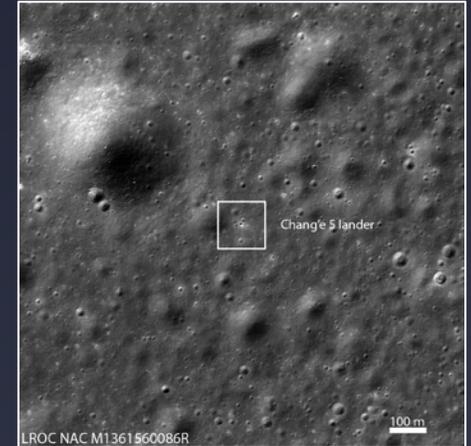
DIVISION
HIGHLIGHTS

Exploration Science and Division Updates

- Exploration Science Strategy and Integration (ESSIO) – David Burns
- Astrophysics – Paul Hertz, Greg Robinson (Webb)
- Biological and Physical Sciences (BPS) – Craig Kundrot
- Earth Science Division – Karen St. Germain
- Heliophysics – Nicky Fox
- Planetary Science – Lori Glaze, Jeff Gramling (Mars Sample Return)

ESSIO Highlights

- Interface guidance for future CLPS payloads in development
- NPLP Instruments are nearing completion
 - Complete: LRA, SEAL, MSolo, PILS, NSS, SCALPSS, LN-1, and NMLS
 - Complete by early February: LETS, NIRVSS, and MAG
 - Still in progress: ROLSES, NDL, LETS, NIRVSS, MAG, and PITMS.
 - Complete as of Jan. 22: FlatSat testing (Intuitive Machines) and Payload Interface Mobile Simulator (Astrobotic) testing for all payloads
- Many LSITPs nearing Key Decision Point Reviews; some have passed PDRs and/or CDRs and are moving forward with development
- 2021 Lunar deliveries:
 - Intuitive Machines and Astrobotic progress toward launch, following successful completion of CDR and FlatSat testing campaigns
- The Lunar Surface Science Workshop (LSSW) on space biology held Jan. 20-21



Astrophysics Division Highlights

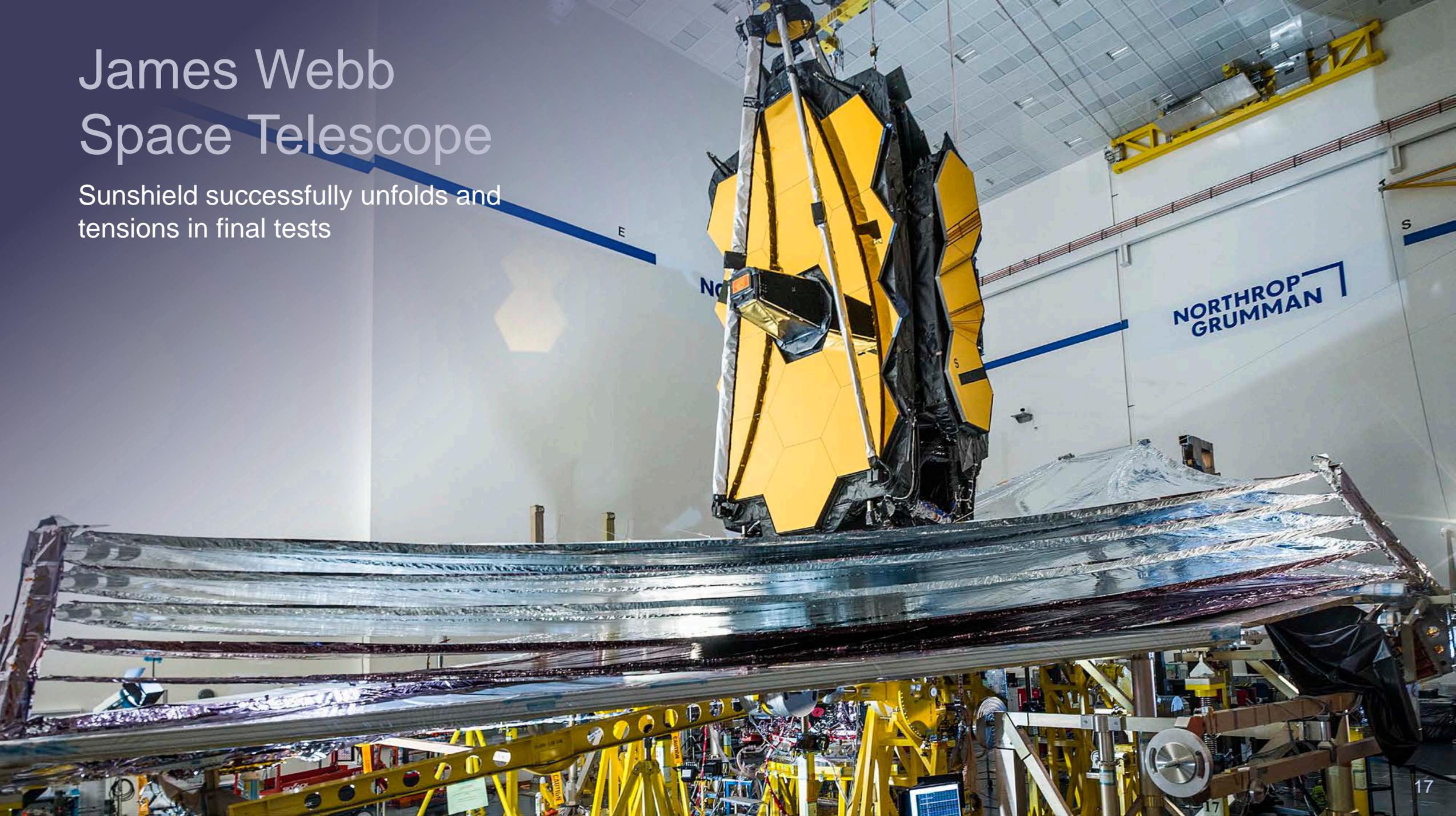
- HaloSat, NASA's first astrophysics cubesat, completed its 2-year mission to constrain the mass and geometry of the Galactic halo and re-entered in January
- The first 4 Astrophysics Pioneers smallsat missions were selected in January; the missions address exoplanets, kilonovas, missing baryons, and neutrinos
- SPHEREx, the next astrophysics MIDEX, was confirmed in December and has begun the implementation phase toward launch in 2024
- Roman Space Telescope is making excellent progress on its most urgent elements; the mission Critical Design Review is planned for end of this summer
- Fermi and other missions in the Interplanetary Network identified the short (140 ms) gamma-ray burst GRB 200415A as a giant flare from a magnetar in the disk of the galaxy NGC 253



NASA/GSFC (left), NASA/JPL (right)

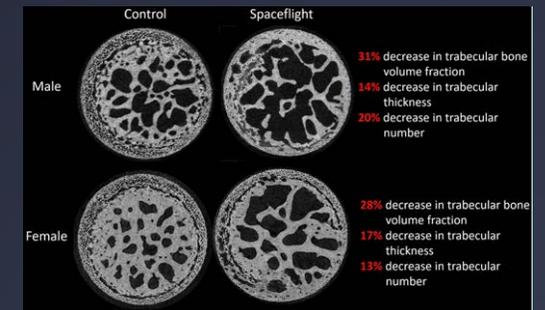
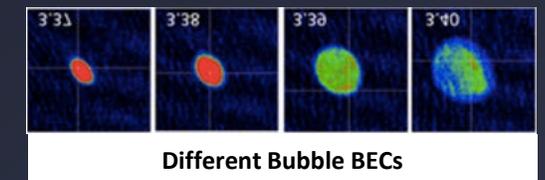
James Webb Space Telescope

Sunshield successfully unfolds and
tensions in final tests



BPS Division Highlights

- Decadal Survey
 - NASEM call for Committee and Panel member nominations imminent
 - BPS hosted CLPS seminar to provide research community with information to guide planning of hardware development and experiment design
- Physical Sciences
 - Ring Shear Drop (amyloid fiber study) 0-G campaign successfully deployed drops with prototype hardware and is using the data to redesign the flight hardware
 - CAL produced a range of spherical bubble Bose-Einstein Condensates. This geometry cannot be produced on Earth
- Space Biology
 - 29 scientific papers using or inspired by GeneLab published simultaneously 11/25/20 in five *Cell Press* journals and online (<https://www.cell.com/c/the-biology-of-spaceflight>)
 - Completed PH-02 (Radish), Bioscience-04 (neural stem cells), RR-10 (mice), and Micro-14A (yeast) on Orbit. RR-10 samples returned on 1/13
 - ROSES 2020 Space Biology Step 2 Proposals due 3/23/21



Earth Science Division (ESD) Key Achievements

Sentinel-6 Michael Freilich launched and commissioned

- Launched Nov. 21, Vandenberg Air Force Base
- First sea level measurements in early December
- Orbit raising on Dec. 18 to tandem orbit with Jason-3 for 9-month cross-calibration campaign
- Public data available post calibration

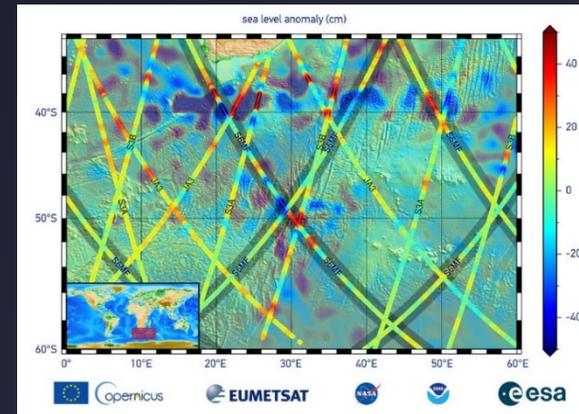
Global Temperature Report released Jan. 14 with NOAA

- Tied with 2016 as the warmest on record
- Press and interviews in English and Spanish
- Feature story and video explaining Earth heating

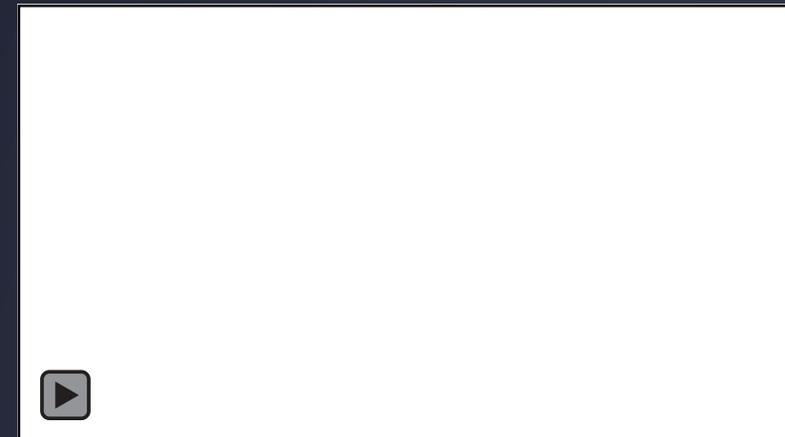
@NASAEarth social media accounts growth

- Increase of nearly 1.5 million followers on Twitter, Facebook, Instagram from 2019-2020

End of mission for RainCube and CubeRRT



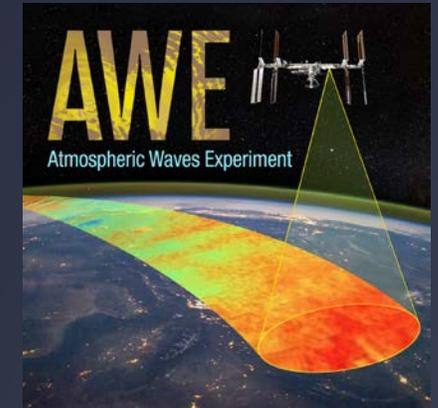
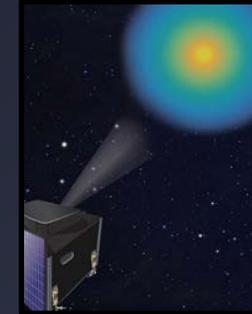
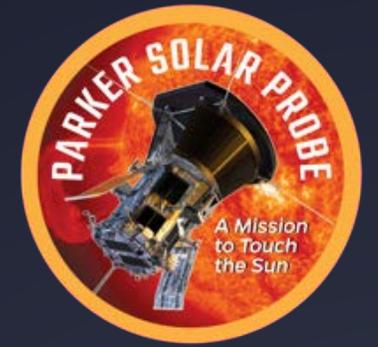
The first Sentinel-6 Michael Freilich sea surface height data show the ocean off the southern tip of Africa. Red indicates higher sea level; blue lower. (Image credit: Eumetsat)



Global surface temperatures (Celsius), 1880-2020. (Credit: NASA Scientific Visualization Studio, svs.gsfc.nasa.gov/4882)

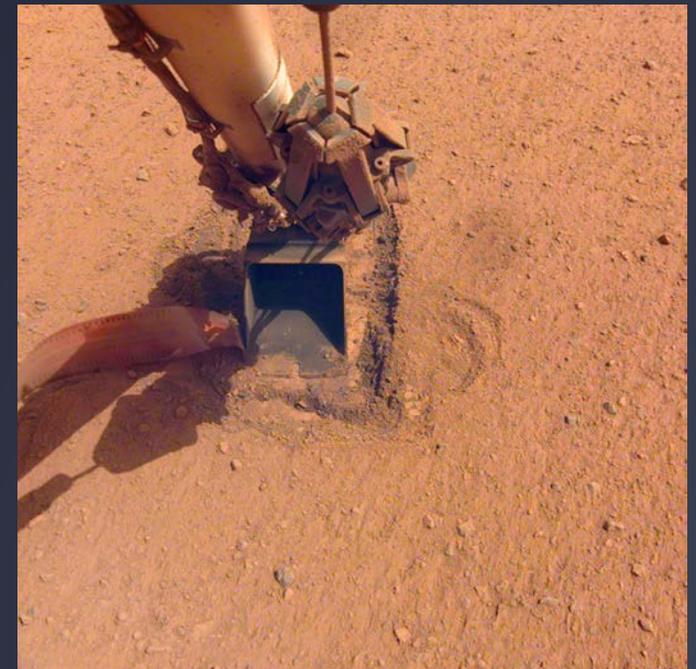
Heliophysics Division Highlights

- Parker Solar Probe: Completed perihelion #7 on Jan. 17. Encounter ended Jan. 23
 - Distance: within 8.4 million miles of the Sun's surface, Top speed: 289,927 miles per hour, Venus flyby #4: Feb. 20, 2021
- Congratulations to our STP Mission of Opportunity selections (rideshares w/IMAP):
 - Solar Cruiser & GLIDE (Global Lyman-alpha Imagers of the Dynamic Exosphere)
- Congratulations to our Explorer Mission of Opportunity selections:
 - Extreme Ultraviolet High-Throughput Spectroscopic Telescope Epsilon Mission (EUVST) & Electrojet Zeeman Imaging Explorer (EZIE)
- AWE successfully passed KDP C on Dec. 22
- On Jan. 14, NASA and the Ministry of Science and Higher Education of the Republic of Poland announced their agreement to cooperate on IMAP. The agreement will allow the Space Research Center of the Polish Academy of Sciences (CBK PAN) to design and build the Global Solar Wind Structure (GLOWS) instrument
- Welcome to new staff!
 - Ezinne Uzo-Okoro (Program Executive)
 - Jesse Woodroffe, John McCormack, Kelly Korreck (Program Scientists)
- Healthy FY21 appropriations: Leaning forward to accelerate mission selections and cadence as outlined in the 2013 Decadal Survey. Heliophysics currently has 11 missions in formulation and another 7 under study, representing the largest increase in missions in the history of the Division



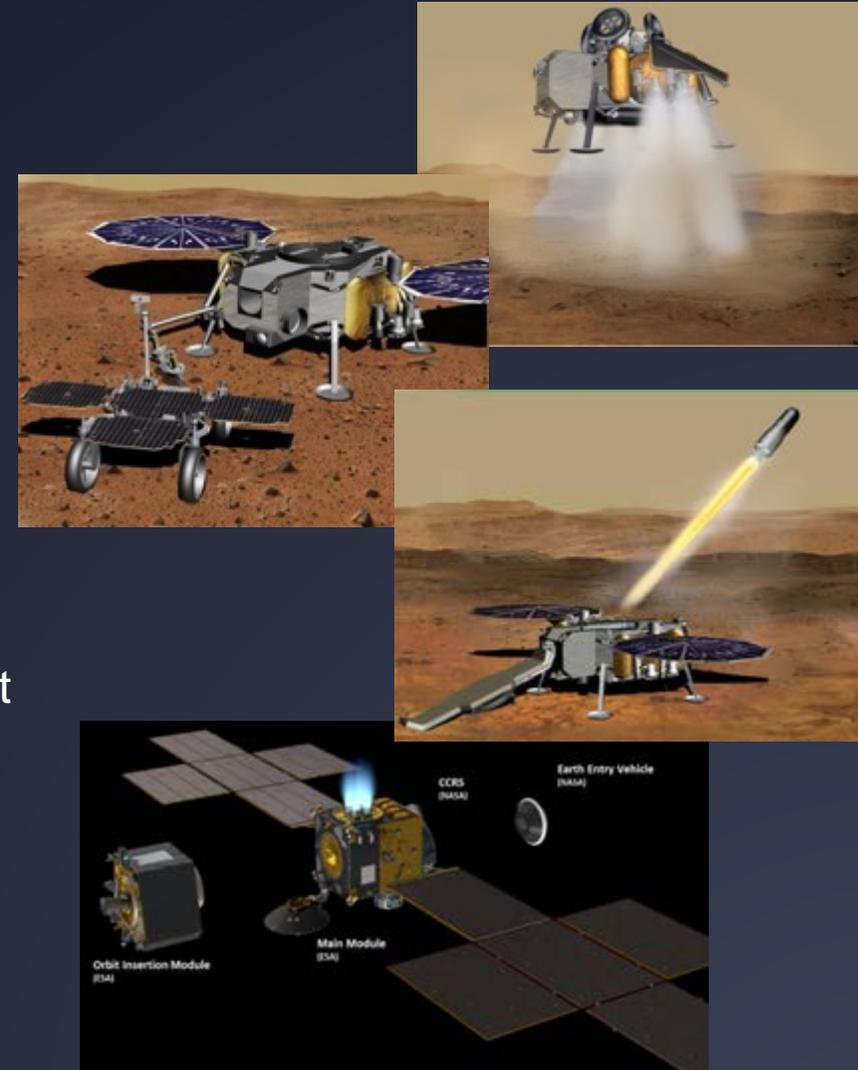
Planetary Science Division Highlights

- Juno & Insight:
 - Extended missions approved
 - Insight 'Mole': Recovery efforts have ended despite valiant efforts of the team; this was an important endeavor, and we learned a lot
- Mars2020/Perseverance:
 - Landing in Jezero Crater on Feb.18
 - L-22 to Landing Day [briefing live stream](#) Jan. 27
- Q-PACE (SIMPLEx-1):
 - Launched on Virgin Orbit's LauncherOne Jan. 17
 - As of Jan. 22 the spacecraft's beacon has not been detected despite multiple attempts
- Lunar Trailblazer (SIMPLEx-2): KDP-C passed in November and confirmed; will launch on IMAP
- R&A No Due Dates (NoDD): Community townhall held Jan. 21, [more info](#)
- Decadal Survey: additional concept studies list received, and started



Mars Sample Return Highlights

- Good News!! MSR transitioned into Phase A as of Dec. 16th!!
- Participated in Caching Strategy Workshop on Jan. 21st
 - Over 200 participants met to collect recommendations for the Caching Strategy Steering Committee
- First Joint Steering Board with ESA held on Jan. 25th
- Public presentations to Decadal Survey Steering Committee and MEPAG on Jan. 22nd and 27th respectively
- Lindsay Hays joined MSR team on Jan. 8th as Deputy Program Scientist



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With Us

