
National Aeronautics and
Space Administration
EXPLORE
SCIENCE
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November 17, 2020

2021:THE YEAR OF SCIENCE

PROGRAMS & RESEARCH

DIVISION HIGHLIGHTS

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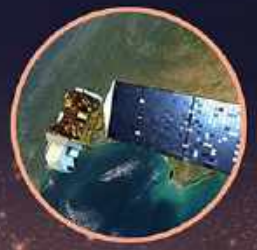
MARS 2020

DART



Landsat 9

Webb

IXPE

2021 – A Year of Science

O-REx

Peregrine

Nova-C

Lucy

GOES-T

- LAUNCH
- LANDER
- DEPARTURE

National Aeronautics and Space Administration

2021 EXPLORE SCIENCE

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2021
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2021 NASA Science Calendar Distribution

- An online request form will be available through the AGU NASA Science virtual exhibit. Virtual visitors will learn how to request a calendar
- For 2021 virtual AAS, conference organizers requested calendars be available as an incentive for early registration. To that end, anyone who registers before December 1, will receive a calendar
- Other distribution plans at major conferences are in work for early next year, such as AMS, after application of any lessons learned from AGU and AAS distributions.
- Stay tuned to future townhalls and the conference websites for updates on how to get a calendar
- For those not participating in AGU or AAS, an online request form will be available for the duration of this meeting. **Please only fill out one request (either during this meeting or at a conference) as calendar supplies are limited**
- Calendars are available in English or Spanish

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Status of SMD Flight Projects

- All SMD missions in Formulation are proceeding and most missions in Implementation are accomplishing some hands-on work. However, SMD continues to experience disruption to all missions due to COVID-related restrictions; we assume these disruptions will continue for the time being
  - Reduced efficiency achieved at work sites and for those working from home, including reduced availability of workforce and reduced leave usage
  - Travel restrictions, reduced availability of NASA facilities
  - Disruptions to supply chain for current and future procurements
- Life Cycle Reviews (LCR) and some Key Decision Points (KDPs) have continued to virtually report
  - Some challenges/limitations, such as review team members unable to have in-depth sidebar conversations, have been observed
- At the portfolio level, SMD is considering a series of short- and medium-term actions to mitigate COVID impacts in order to ensure mission success and the overall health of our portfolio
  - Within current budget, the use of HQ-held reserves and/or adjustment of launch date are being employed
  - Where additional funds are necessary, SMD will consider delays or cancellations to planned missions in order to restore overall portfolio risk to acceptable levels

Financial Impacts to SMD Flight Projects

- Many missions will likely stay within ABCs (Agency Baseline Commitments) including Psyche, JUICE, Mars 2020, Janus, MEGANE, XRISM, Euclid, Sentinal-6, Landsat-9, PREFIRE, and Tropics
  - Some missions present challenges with cost and schedule, impacts expected including Clipper, Webb, Roman, NISAR, SWOT, MAIA, and IXPE
- Astrophysics: With the exception of Roman impacts to date can be largely mitigated within current mission reserve levels, resulting in increased programmatic risk
- Earth Science: Mitigation for impacts will fall most heavily in FY22 and out; near-term available funding has been sufficient to cover immediate issues. ABC cost and schedule commitments are threatened in over half of the missions in development
- Heliophysics: Most missions are in formulation and have been able to adapt to the COVID-related work disruptions with only moderate loss of efficiency and are able to accommodate schedule delays given lack of external commitments and launch vehicle contracts
- Planetary Science: Near-term impacts are most severe given launch window constraints; will require mitigation or acceptance of out-of-family risk levels to make Launch Readiness Dates (LRD)

Implementing SMD's Priorities

- SMD does not want the COVID-19 epidemic to derail careers of future leaders; we continue to focus on mitigating impacts of the epidemic
- Given current funding constraints, SMD will prioritize augmentation and funded extension requests up to 15% of the R&A funding available for new awards that:
  - are in their last year (or the last year of their first NCE);
  - have costed their funds in a timely manner; and
  - for the explicit support of near-finishing graduate students and post-docs (including third-year NPPs), and
  - for non-tenured and soft-money early career researchers
- Given our current funding constraints, NASA will offer 124 NPP fellowships and does not plan to support new term hires at Centers
  - These decisions will be revisited if supplementary funding is made available to SMD

Virtual Panel Reviews

- By all accounts, virtual review panels for ROSES solicitations are still going well
- All-virtual review panels for ROSES programs will continue until June 1, 2021
- SMD is thinking about continuing the practice, at least in part, even after in-person meetings cease to pose a health hazard
- There have been 6 virtual site visits for Step-2 mission evaluations
  - Allotted 10 hours over 2 days
  - Positive reaction from evaluators
  - Initiating a lessons learned activity to determine if virtual site visits should become the new standard

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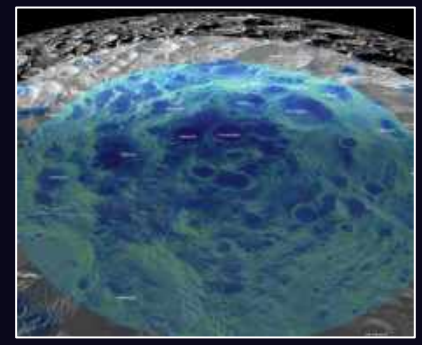
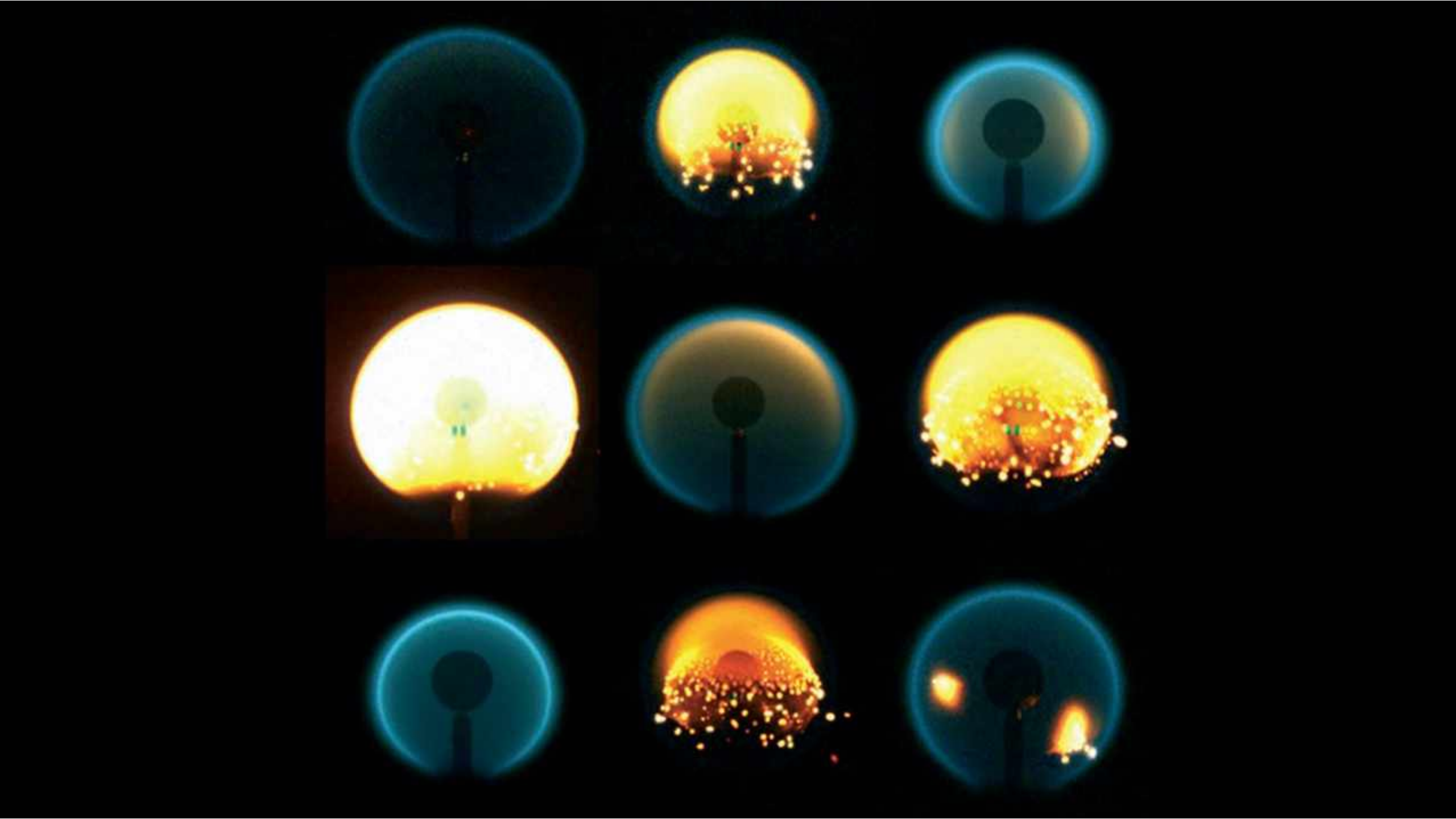
Exploration Science and Division Updates

- 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)
- Joint Agency Satellite Division – John Lee

ESSIO Highlights

- Payloads and Research Investigations on the Surface of the Moon (PRISM) solicitation released as program element in ROSES on Nov. 5, soliciting payloads for delivery to lunar surface in 2023 (Reiner Gamma) and 2024 (Schrodinger Basin)
  - Step 1 proposals due Dec. 11, 2020; Step 2 proposals due Jan. 19, 2021
- Task Order PRIME-1 awarded to Intuitive Machines on Oct. 16
  - Will be delivered to the South Pole of the Moon in late 2022 in order to drill lunar ice samples and study them in the vacuum of the lunar environment
- All LSITP instruments (11) have been fully awarded their Payload Prep Phase contracts, except NGLR which is working under a no cost extension until mid-Feb. 2021
- Task Order 2 – Intuitive Machines (IM)
  - FlatSat testing for NASA Provided Lunar Payloads (NPLPs) is set for Nov. and Dec.
  - NOVA Operations Control Center is complete; operations teams training begins this month
- Task Order 2 – Astrobotic (AB)
  - Payload Interface Mobile System (PIMS) finalized and NPLP testing has started
  - PIMS Testing at KSC and ARC complete (MSolo, NSS, and NIRVSS)
- The Lunar Surface Science Workshop (LSSW) on surface mobility was held on Oct.20
- LROC's Lunar QuickMap has received a major fall update, including new interactive features and a collection of new data layers





Astrophysics Division Highlights

- Roman Space Telescope primary mirror, secondary mirror, and tertiary collimating assembly mirrors all coated and complete
- SOFIA detected water on the sunlit surface of the Moon
- IXPE entered Phase-D, observatory integration and test; on track for launch in late Fall 2021
- SPHEREx passed PDR, on track for Confirmation Review in December
- Two sounding rockets launched from White Sands New Mexico in the past two months
- On April 28, a fast radio burst (FRB) was observed from the magnetar SGR 1935+2154; first FRB observed from within the Milky Way Galaxy

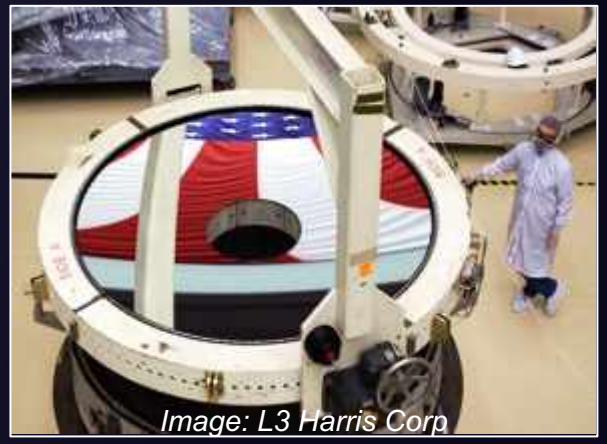
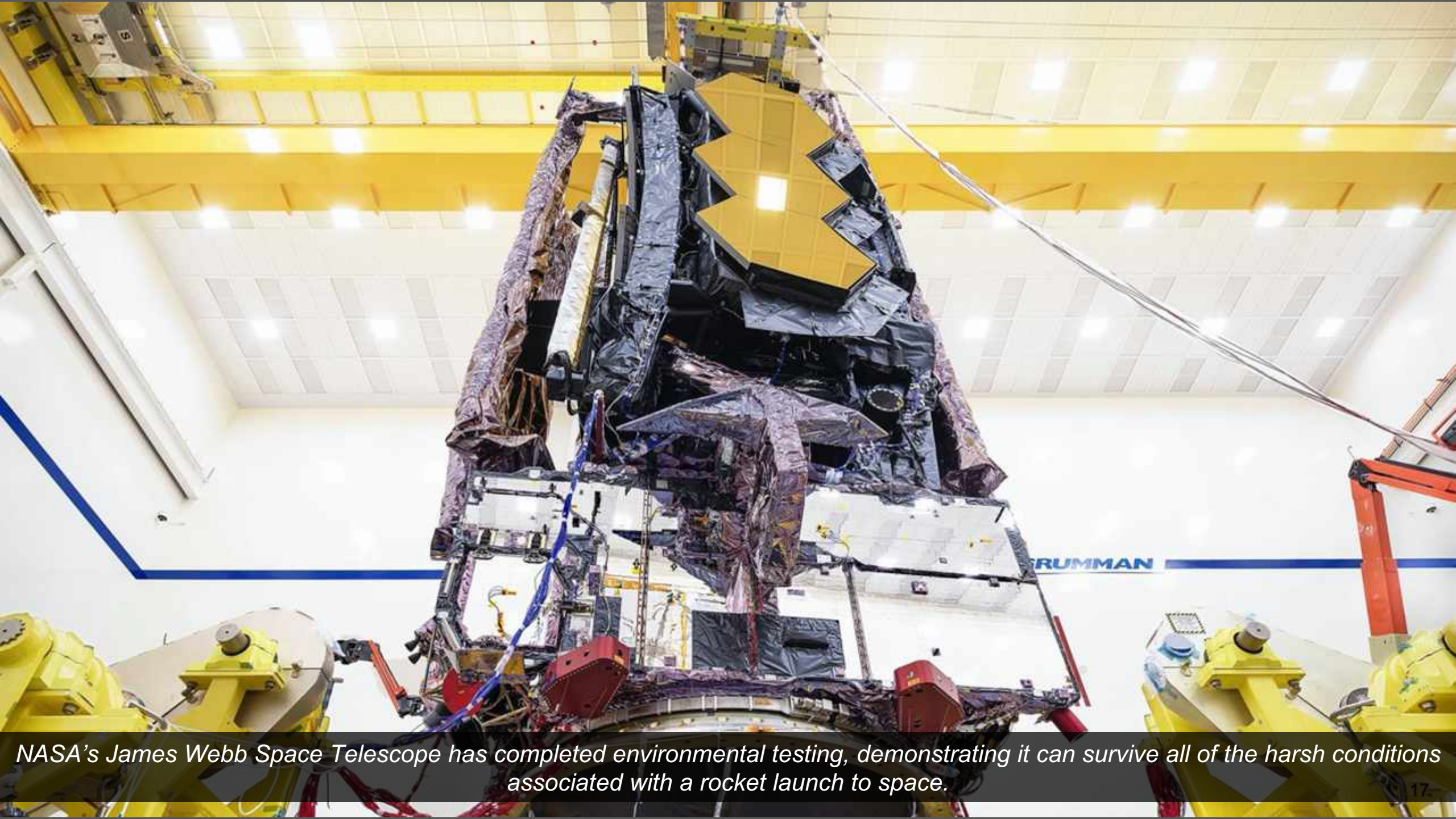


Image: L3 Harris Corp

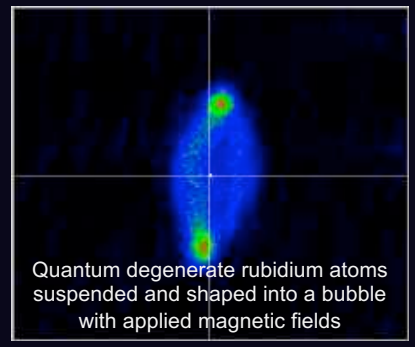

Image: Ball Aerospace



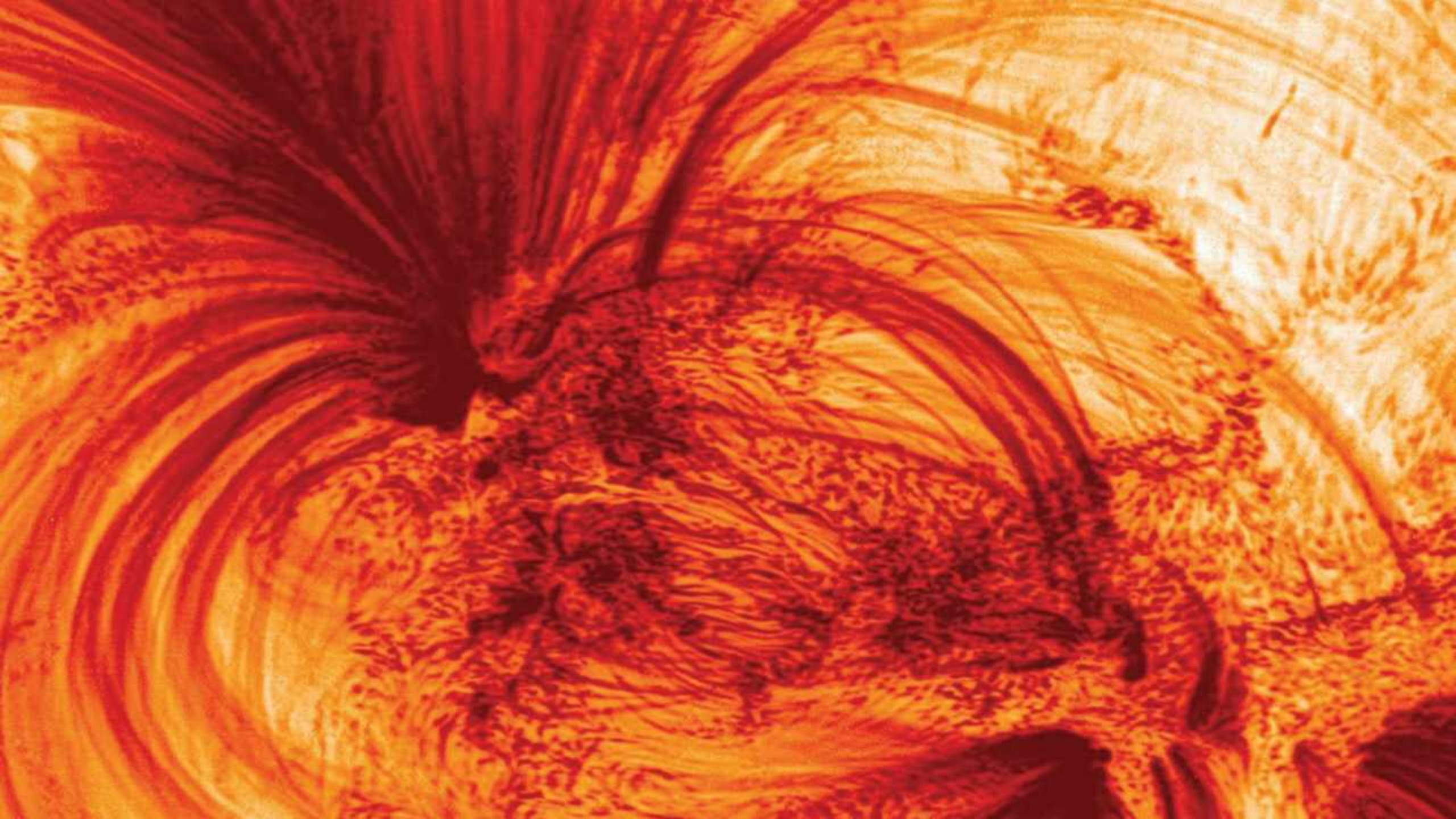
NASA's James Webb Space Telescope has completed environmental testing, demonstrating it can survive all of the harsh conditions associated with a rocket launch to space.

BPS Division Highlights

- **Decadal Survey**
  - Reddit AMA Friday Nov. 13
  - ASGSR-hosted Town Hall series started Nov. 12 (https://asgsr.org/decadal-survey/)
- **Physical Sciences**
  - Final preparations for executing the Ring Shear Drop (RSD) parabolic flight campaign to test improved fluid drop delivery designs
  - CAL continues to produce robust, reliable, condensates, allowing us to typically perform nearly 150 PI experiments each day.
  - SpX-21 launch: BRAINS (Al brazing) and DFM (Pb-Sn dendrites)
- **Space Biology**
  - Plant Habitat-02 (PH-02) radish experiments initiated
  - Artemis-I BioExpt-1 Experiment Verification Test Initiated
  - ROSES 2020 Space Biology NRA scheduled for release between Nov. 17 –24
  - SpX-21 launch: Bioscience-04 (neural stem cells), RR-10 (mice), Micro-14A (yeast)
- American Society for Gravitational and Space Research (ASGSR) 2020 annual meeting Nov. 5-6, 2020



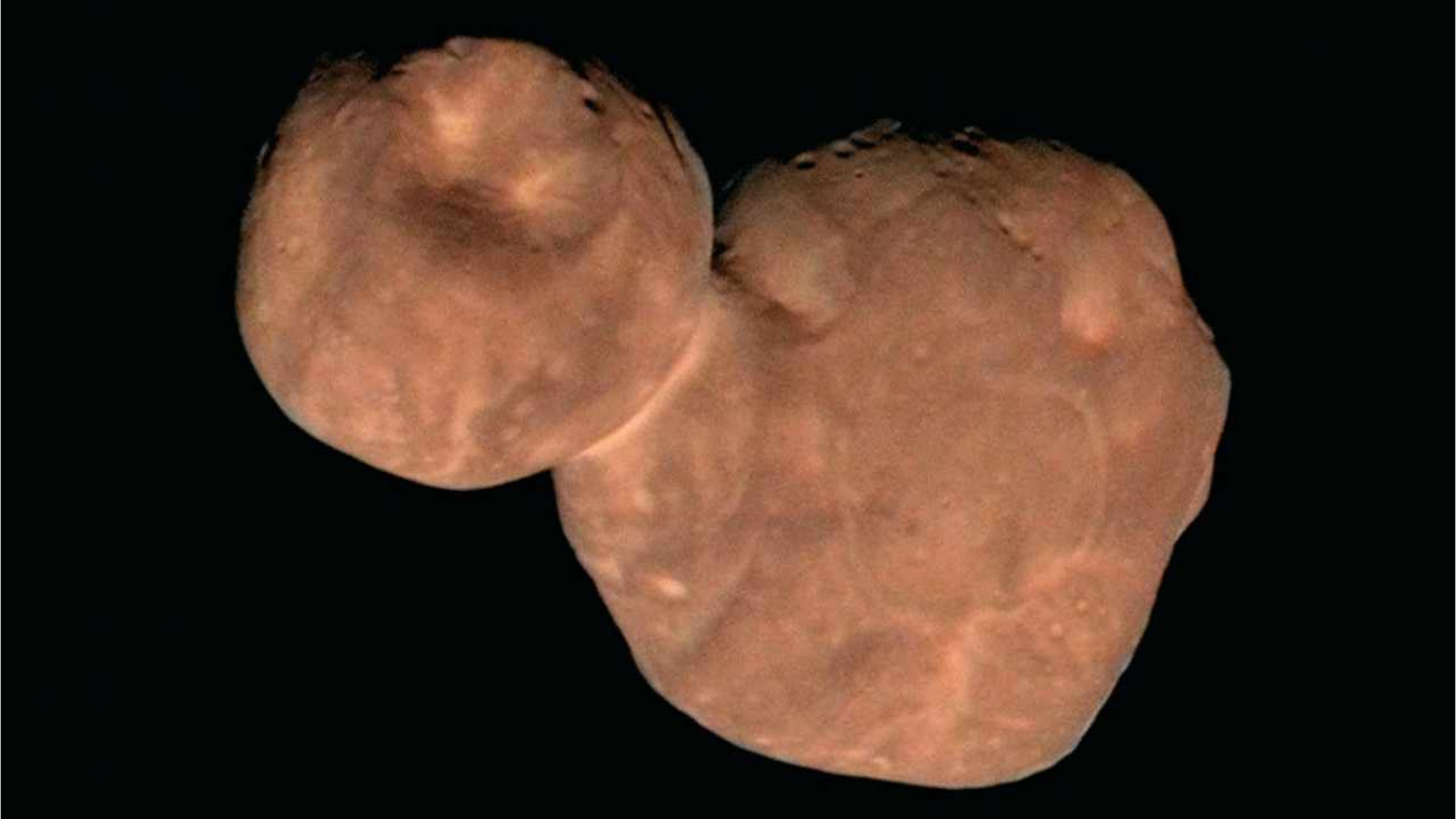
Quantum degenerate rubidium atoms suspended and shaped into a bubble with applied magnetic fields



Earth Science Division Highlights

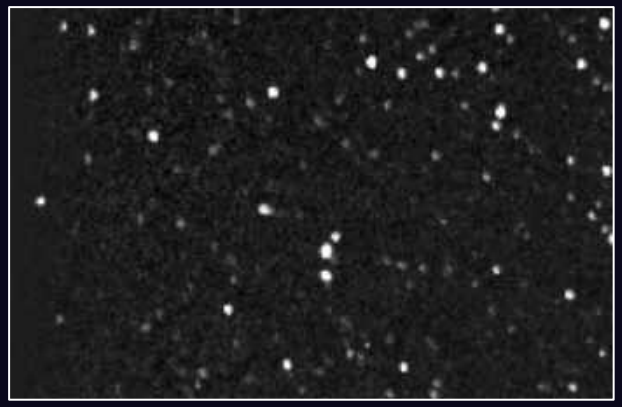
- **Sentinel-6 Michael Freilich** delivered to VAFB
  - Successfully completed KDP-E Oct. 13
  - Launch date NET Nov. 21
- **Sea Level Rise Campaign**
  - Special web page (www.nasa.gov/specials/sea-level-rise-2020) supports launch of Sentinel-6 Michael Freilich
  - Coordinated with “NASA Science Live,” social media outreach
- **NASA International Space Apps Challenge 2020**
  - First all-virtual annual event held Oct. 2-4
  - 26,000+ registered participants from some 150 countries; 251 local virtual events plus the universal event
  - Five international space agencies: NASA, CSA, CNES, JAXA, ESA
- **Committee on Earth Observation Satellites (CEOS)**
  - Karen St. Germain became CEOS for the 2021 term
- **Other activities:**
  - NASA-ISRO Synthetic Aperture Radar (NISAR) System Integration Review held Oct. 26-30
  - Satellite Needs Working Group started third production cycle

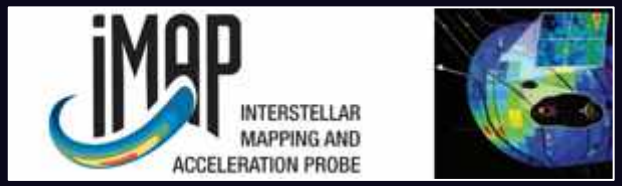
Sentinel-6 Michael Freilich prepared for launch

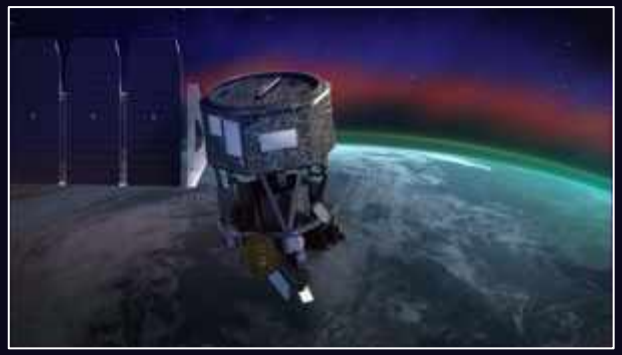


Heliophysics Division Highlights

- **Parker Solar Probe**: Completed its sixth perihelion on Sept. 27. Encounter ended Oct. 2
  - Distance: within 8.4 million miles of the Sun's surface
  - Top speed: 289,927 miles per hour
  - Data from Parker's sixth orbit, captured Sept. 13, shows first sungrazer observed by the spacecraft (pictured right)
- **Solar Orbiter**: First data was released to the public on Sept. 30
- **IMAP**: Falcon 9 Full Thrust Rocket announced as launch vehicle for IMAP and rideshare on Sept. 25; LRD replanned to Feb. 2025 due to impacts from COVID
- **HERMES** (HPD payload for Lunar Gateway) instruments currently conducting Single Design Review Nov. 16-19; Authority to Proceed anticipated upon successful completion
- Happy Anniversary **ICON**!
  - Launched Oct. 10, 2019
  - First data was released to the public in June 2020
- The Committee on Solar and Space Physics met on Oct. 19
  - HPD presented on Division Activities, Space Weather, Technology, LWS and STP Strategies, and Decadal Planning
- Oct 31, **Voyager 2** confirmed it had received commands from the upgraded DSN





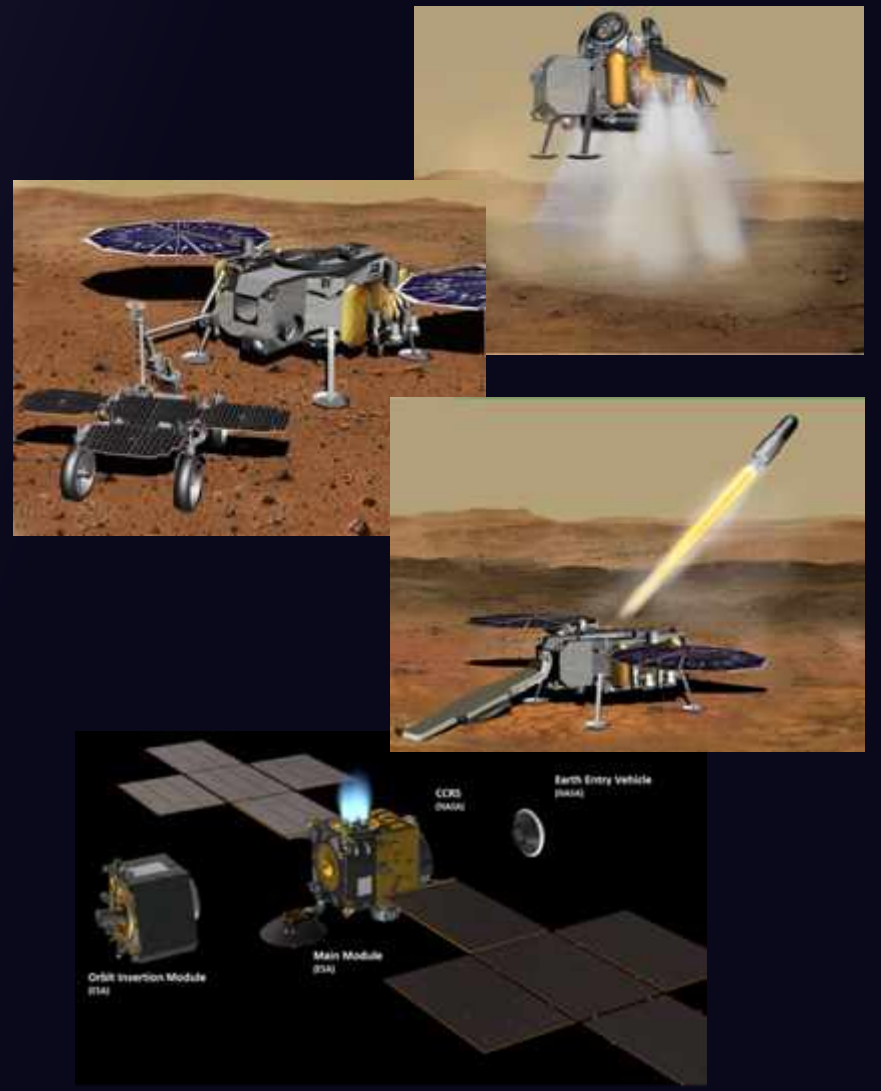


Planetary Science Division Highlights

- OSIRIS-REx:
  - Successful TAG on October 20 at Nightingale Crater
  - Sample safely stowed on Oct. 28
- Mars2020/Perseverance: now more than halfway to Mars!
- Q-PACE integrated into Virgin Orbit LauncherOne Oct.13
- Lunar Trailblazer: PDR completed, KDP-C scheduled for Nov. 24
- VIPER: KDP-C scheduled for Dec. 10
- New Frontiers 5 Community Announcement released Nov. 5
- InterdisciplinaryConsortia for Astrobiology Research (ICAR): 8 teams selected
- Decadal Survey Committee and Panel meetings have begun are progressing well

Mars Sample Return Highlights

- Initiating Mars Sample Return (MSR) was the highest priority of the last Planetary Decadal Survey
- Mars Sample Return is a multi-Center endeavor and includes a significant partnership with the European Space Agency
  - MOU establishing the ESA/NASA MSR program partnership was signed by the NASA Administrator and the ESA Director General on Oct. 5th
- Based on lessons-learned from past SMD Flagship missions, an Independent Review Board was established in August to review the program prior to KDP-A
  - Board provided insightful recommendations which are being incorporated into Phase A plans
- A successful Mission Concept Review was completed on Oct. 19th
- Program is ready to begin Phase-A following an Agency Program Management Council meeting in December




QUESTIONS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