

National Aeronautics and
Space Administration



EXPLORE SCIENCE

NAC Science Committee

Dr. Meenakshi Wadhwa, Chair

March 1, 2022



NAC Science Committee Members

Dr. Meenakshi Wadhwa, Chair, Arizona State University

Dr. Michael Liemohn, University of Michigan, Chair, Heliophysics Advisory Cmte (HPAC)

Dr. Amy Mainzer, University of Arizona, Chair, Planetary Science Advisory Cmte (PAC)

Dr. Charles “Chick” E. Woodward, University of Minnesota, Chair, Astrophysics Advisory Cmte (APAC)

Dr. Sara Tucker, Ball Aerospace & Technologies Corp., Chair, Earth Science Advisory Cmte (ESAC)

Dr. Noël Bakhtian, Berkeley National Laboratory

Dr. Vinton Cerf, Google

Dr. Linda M. Godwin, University of Missouri

Dr. Willie E. May, Morgan State University

Mr. Marc Weiser, RPM Ventures



SMD Updates & Highlights



Science Vision 2020-2024

Excellence Through Inclusive, Diverse Teams



SMD believes its ability to build excellent teams – where diversity of thought, backgrounds and perspectives are welcomed and celebrated - is critical to mission success.

As articulated in the [2020-2024 Science Vision](#) and in alignment with the [NASA Core Values](#), SMD seeks to increase the diversity of thought and backgrounds represented across the entire SMD portfolio and models the principles of inclusion, diversity, equity and access (IDEA) in all policies, systems, and programs.

SCIENCE 2020-2024: A Vision for Scientific Excellence

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 and in Space

VALUES

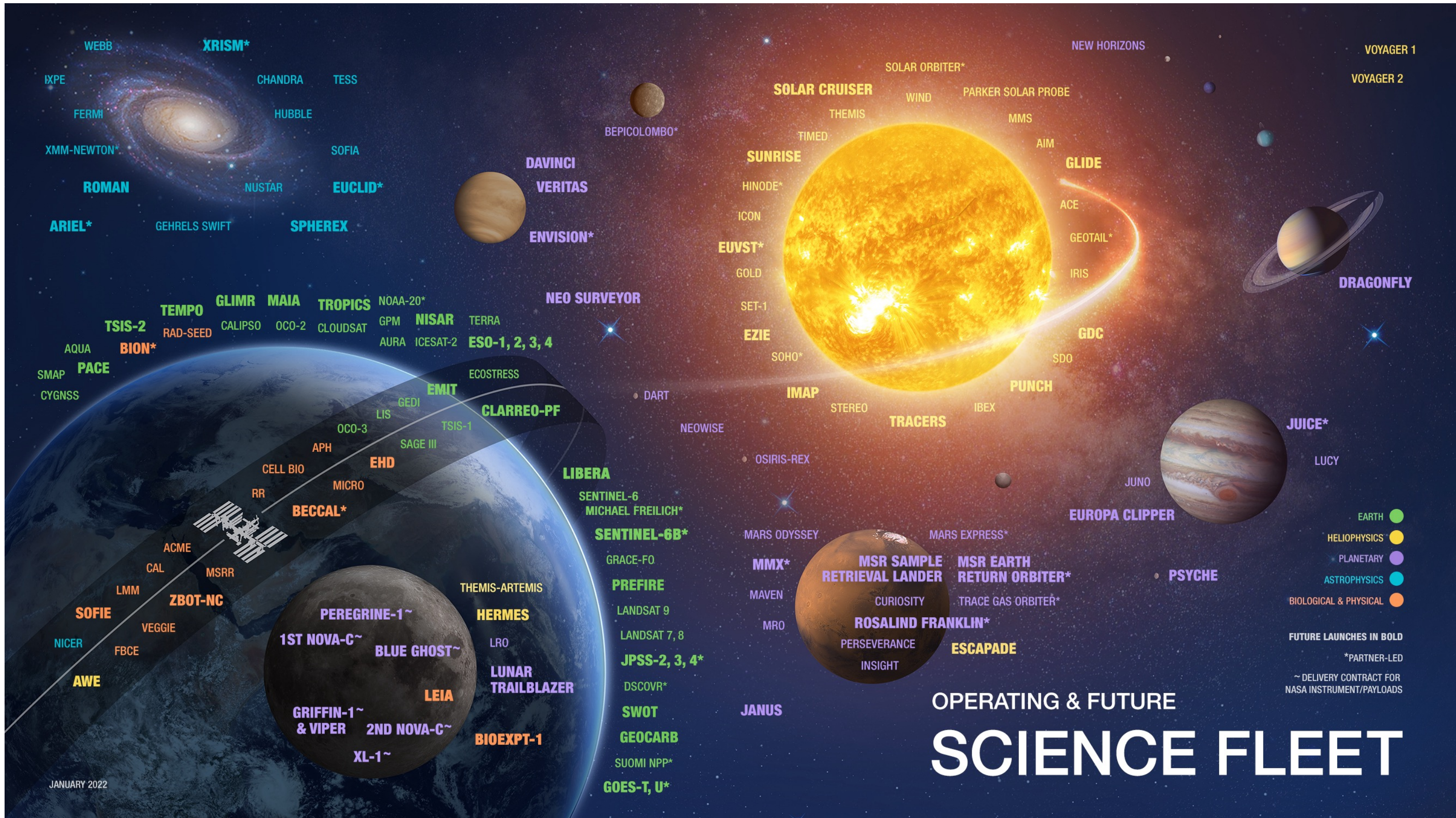
Excellence
Inclusion
Leadership
Integrity
Teamwork
Safety

PRIORITIES

Exploration and Scientific Discovery
Innovation
Interconnectivity and Partnerships
Inspiration

IDEA Into Action

- **Anti-Racism Action Group (ARAG):** Short-term effort aimed at addressing the lack of equity and inclusion of the Black, Indigenous and People of Color community in SMD and across SMD stakeholders
- **Inclusion, Diversity, Equity and Accessibility (IDEA) Working Group:** Long-term group that builds on the work of ARAG to address lack of equity and inclusion across all axes of diversity in SMD, its stakeholders, the scientific community, and beyond
- **SMD Engagement Strategy:** SMD-wide focus as an opportunity to expand our strategy through intentional engagements with more diverse audiences
- **SMD Division & Program Workshops:** IDEA-focused Planetary Undergraduate Student Program, Astrophysics Black, Indigenous and People of Color Engagement Workshop, PI Launchpad Workshop
- **Research & Analysis Changes:** Working group modifying requirements for Announcements of Opportunities to align with NASA's new core value of Inclusion; Dual Anonymous Peer Reviews, offering Planetary Science ROSES-2021 programs without due dates, etc.
- **Community Discussions:** Partnering with AGU, Aerospace Scholarships to Challenge and Educate New Discoverers Guiding Coalition, Association of American Universities, National Academies, and others to understand gaps and address career inequity across the space science community
- **And more...**



JANUARY 2022

OPERATING & FUTURE SCIENCE FLEET

- EARTH
- HELIOPHYSICS
- PLANETARY
- ASTROPHYSICS
- BIOLOGICAL & PHYSICAL

FUTURE LAUNCHES IN BOLD
 *PARTNER-LED
 ~ DELIVERY CONTRACT FOR NASA INSTRUMENT/PAYLOADS



Mars 2020



Landsat 9



DART



Webb



IXPE

2021 – A Year of Science



O-REx



Lucy



Peregrine



Nova-C



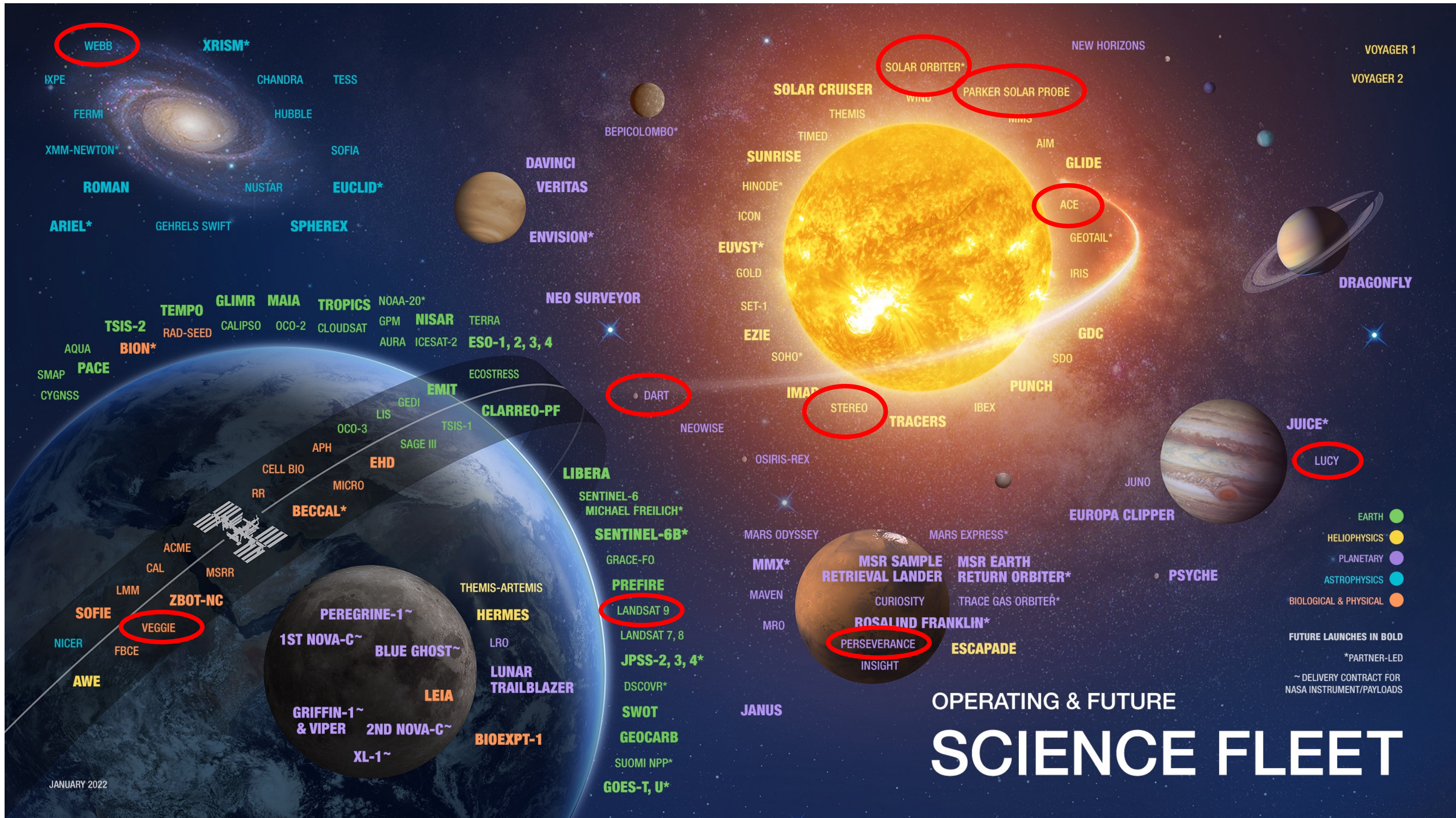
GOES-T

- LAUNCH
- LANDER
- DEPARTURE

TBL 2022

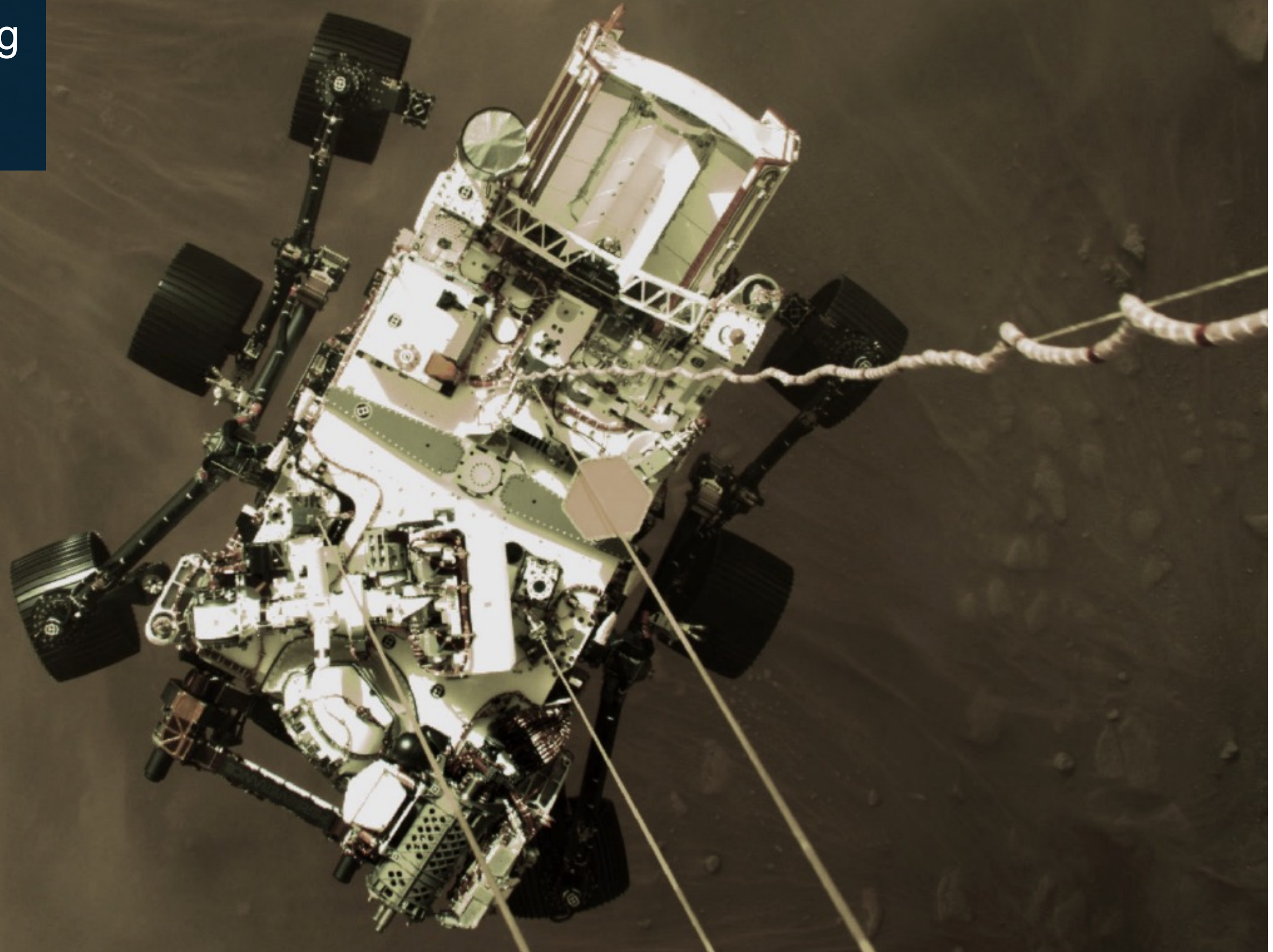
TBL 2022

TBL 2022



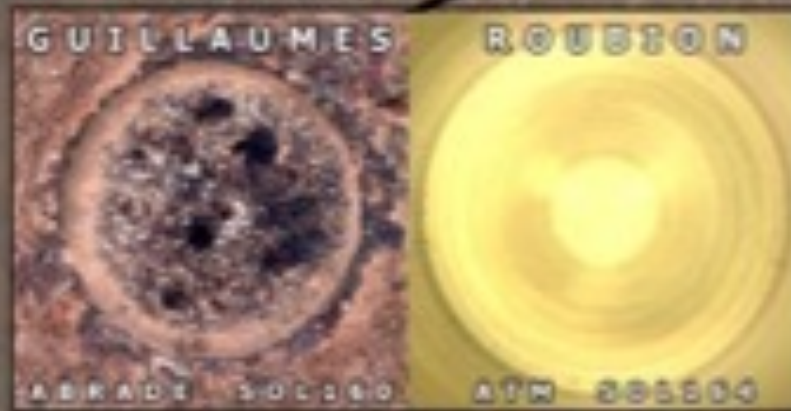
Perseverance Landing

February 18, 2021
Jezero Crater, Mars

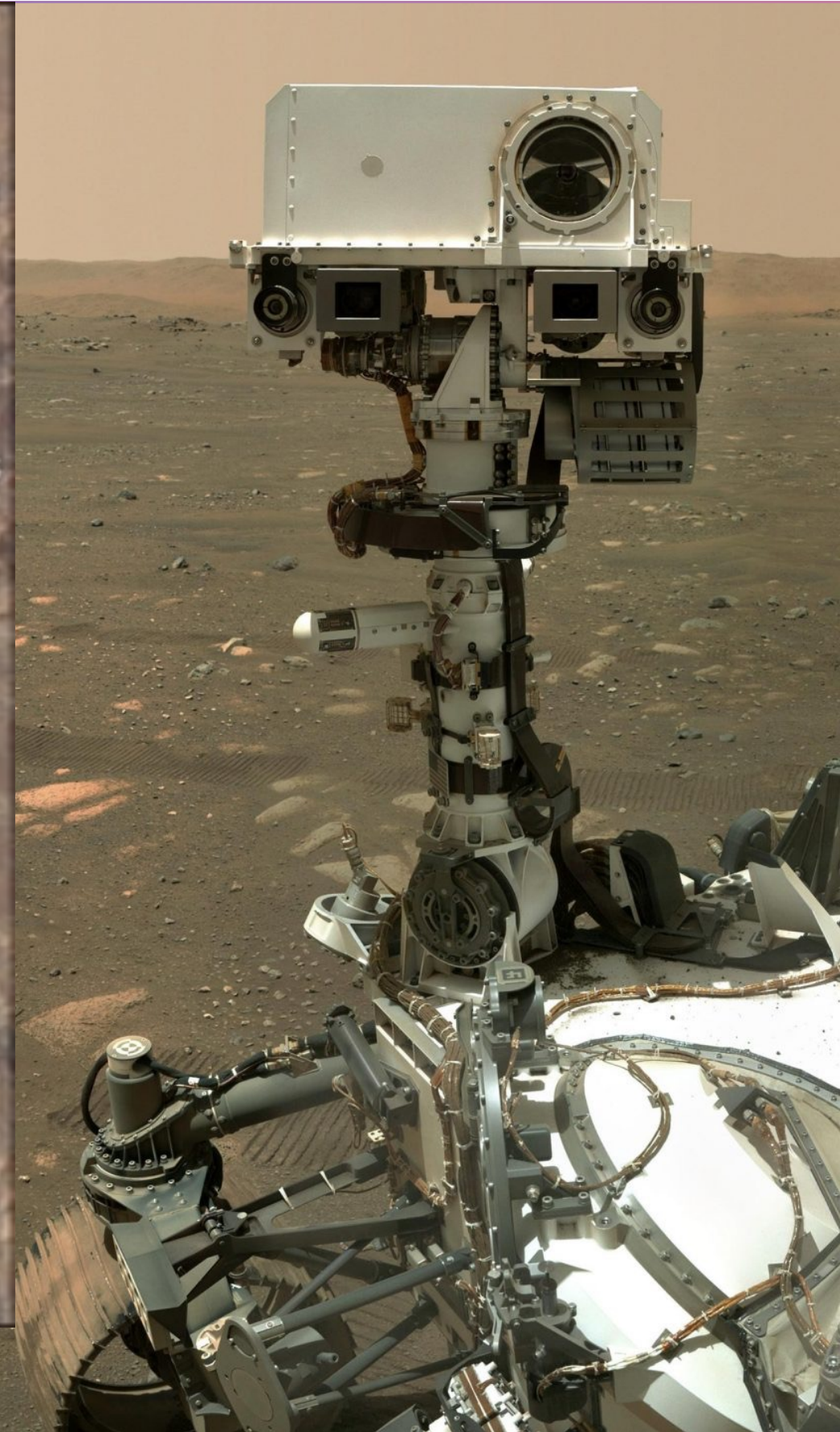


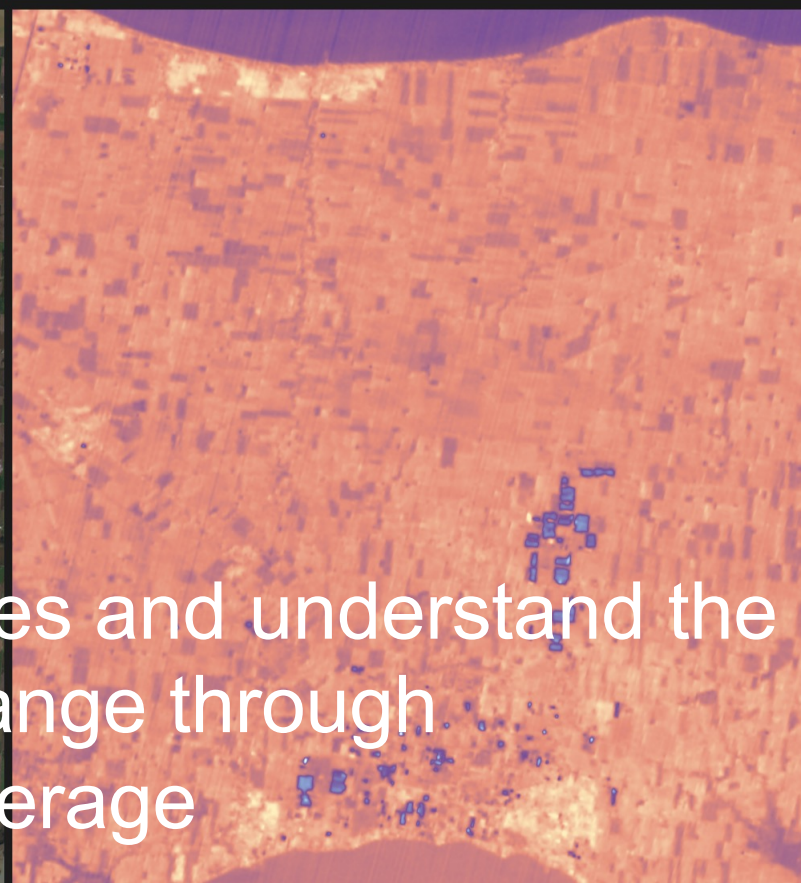
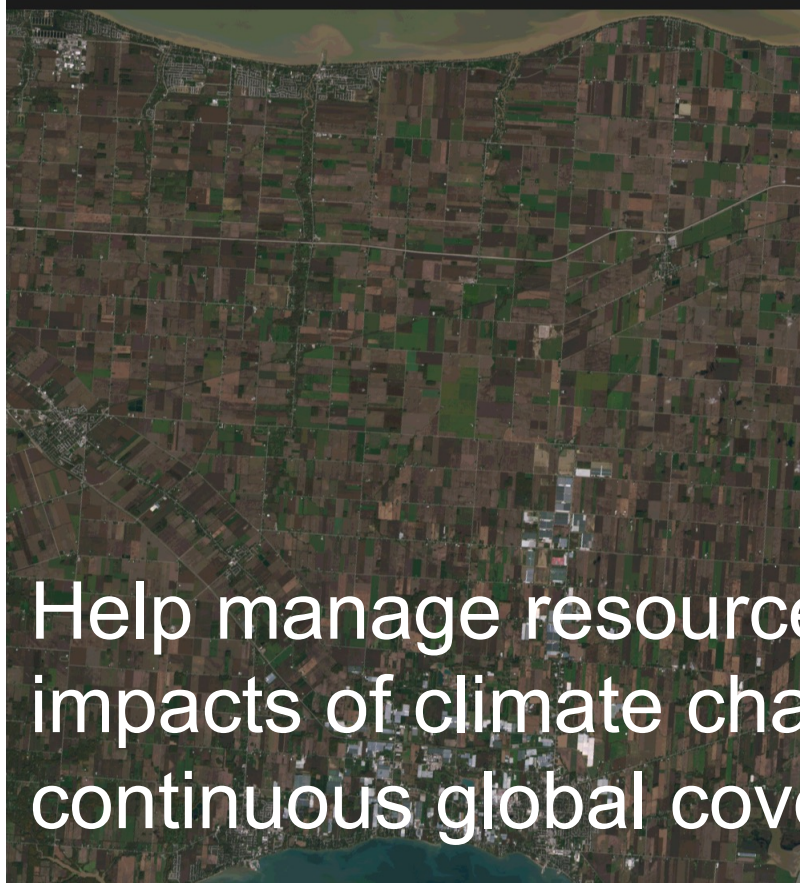
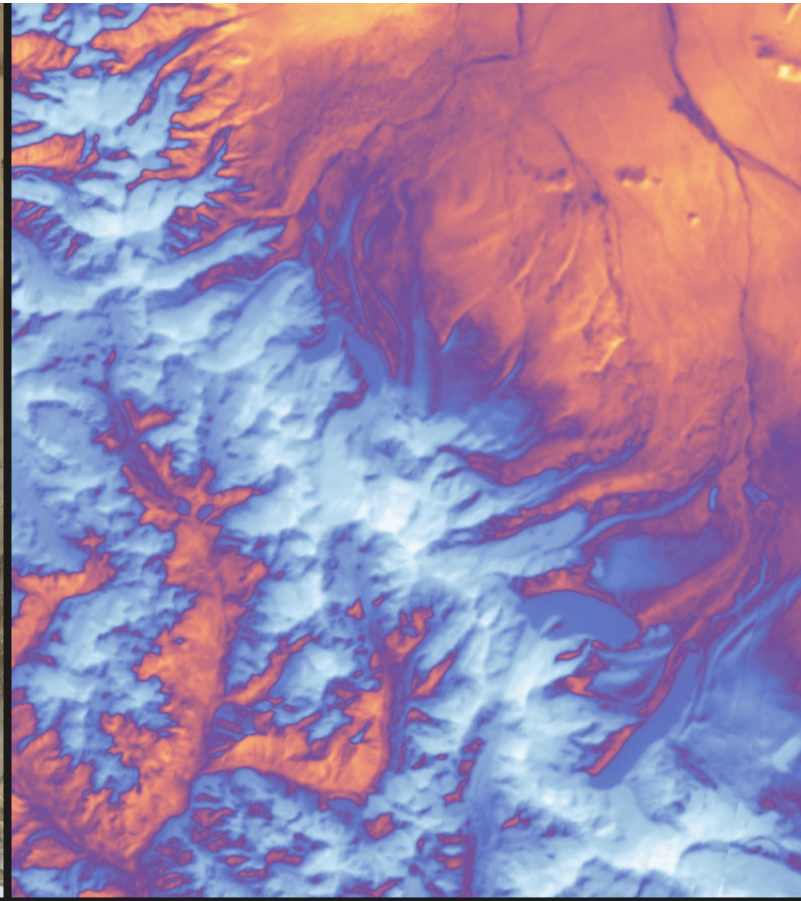
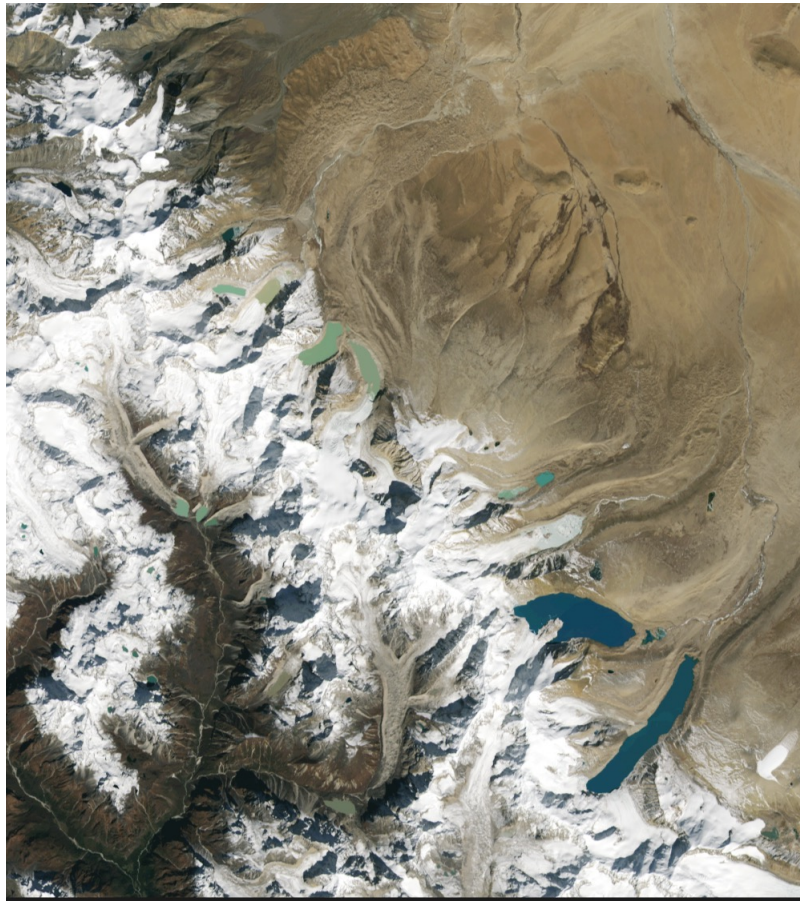


MARS 2020 PERSEVERANCE **Sample Collection Map: Cores 1-6**

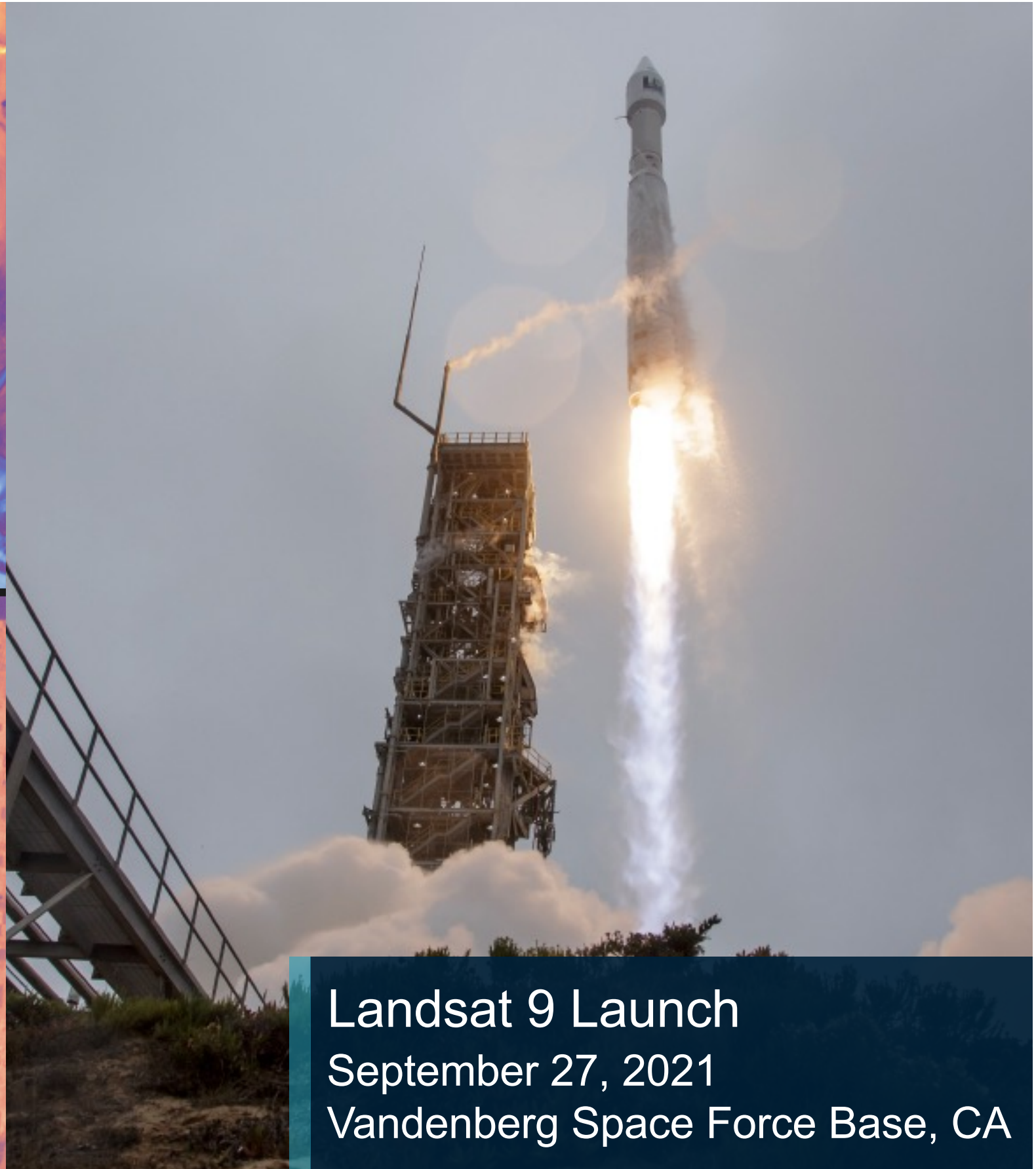


The Perseverance rover has collected one witness (blank), one atmosphere, and six core samples during the Crater Floor campaign out of a total of 38 possible samples. Abrasions spots are 5 cm across and core are 1.3 cm wide. Map Production & Image Credits: NASA/JPL, Caltech, Univ. of Az, MSSS.





Help manage resources and understand the impacts of climate change through continuous global coverage



Landsat 9 Launch
September 27, 2021
Vandenberg Space Force Base, CA

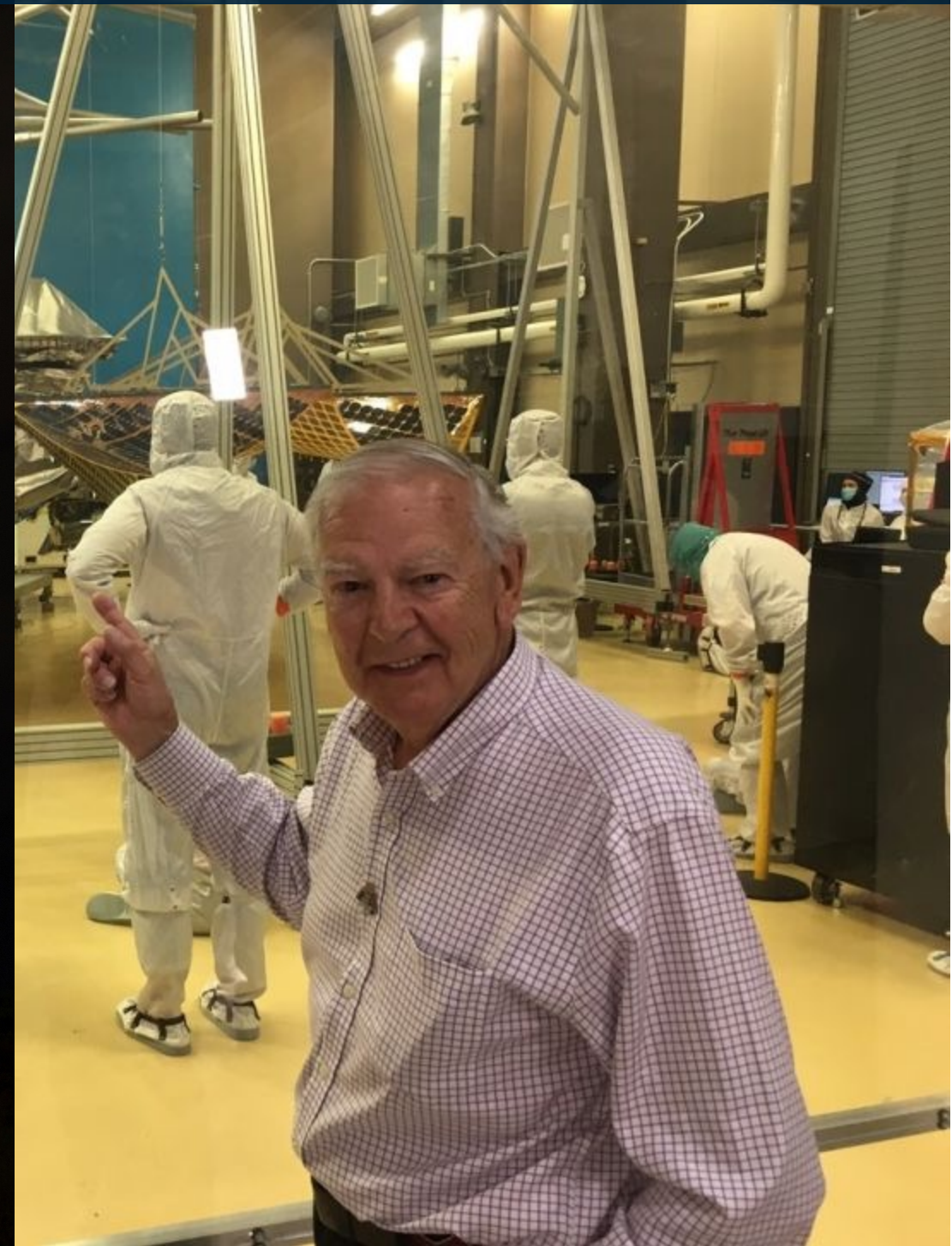
Lucy Launch

October 16, 2021

Cape Canaveral Space Force Station, FL

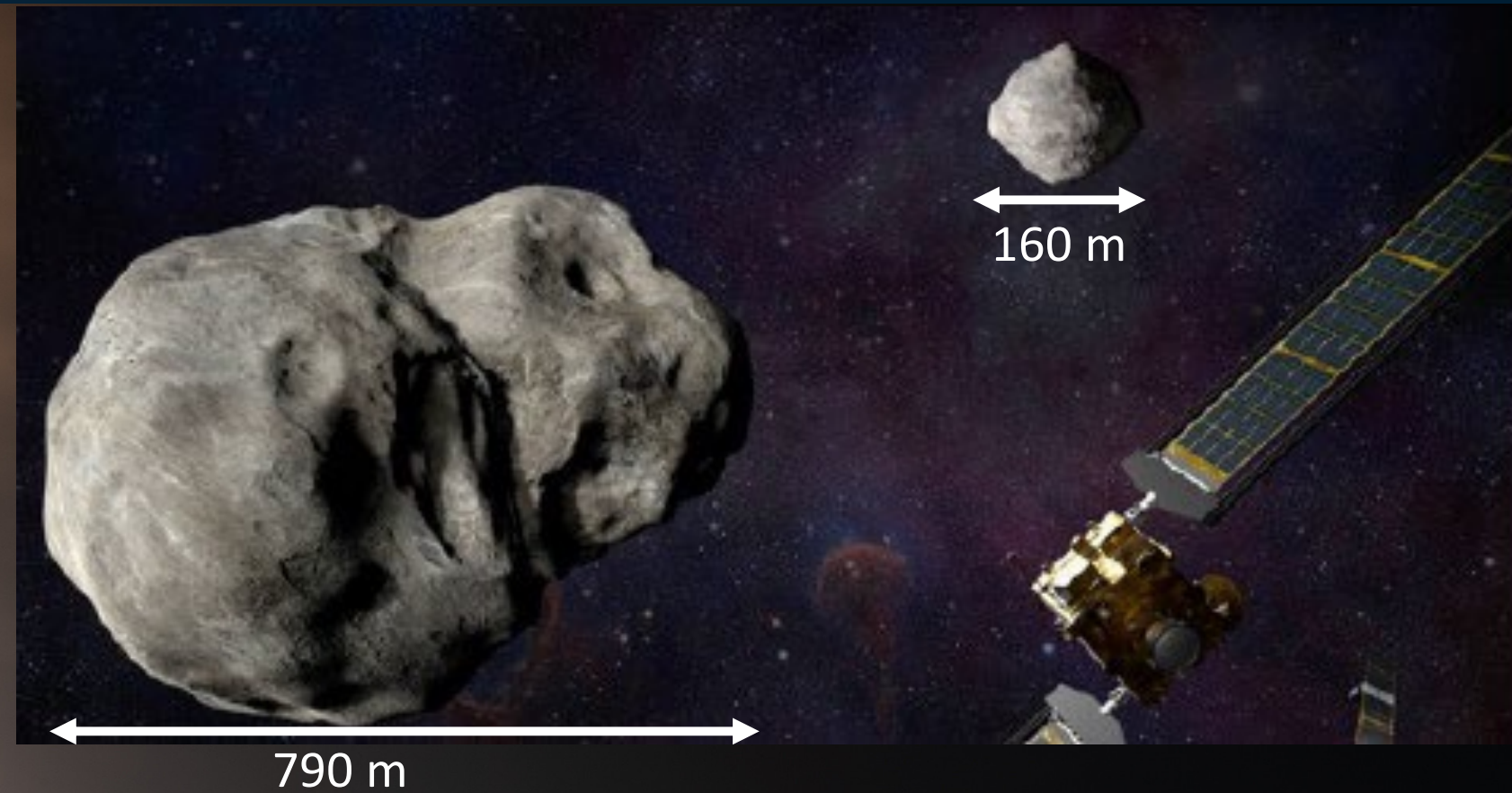
A long-exposure photograph of the Lucy spacecraft launch on October 16, 2021. A bright, curved streak of light arcs across a dark night sky filled with clouds, starting from the horizon over the ocean and ending in the upper left. The launch site is visible on the horizon with some lights.

Encounter with main belt Asteroid 52246
Donaldjohanson in 2025; First flyby of a
Trojan asteroid in 2027



Double Asteroid Redirection Test (DART) Launch

November 23, 2021
Vandenberg Space Force Base, CA



DART is managed by the NASA's Planetary Defense Coordination Office and SMD. It will arrive at Didymos binary asteroid system September 2022 and will test the kinetic impactor technique.

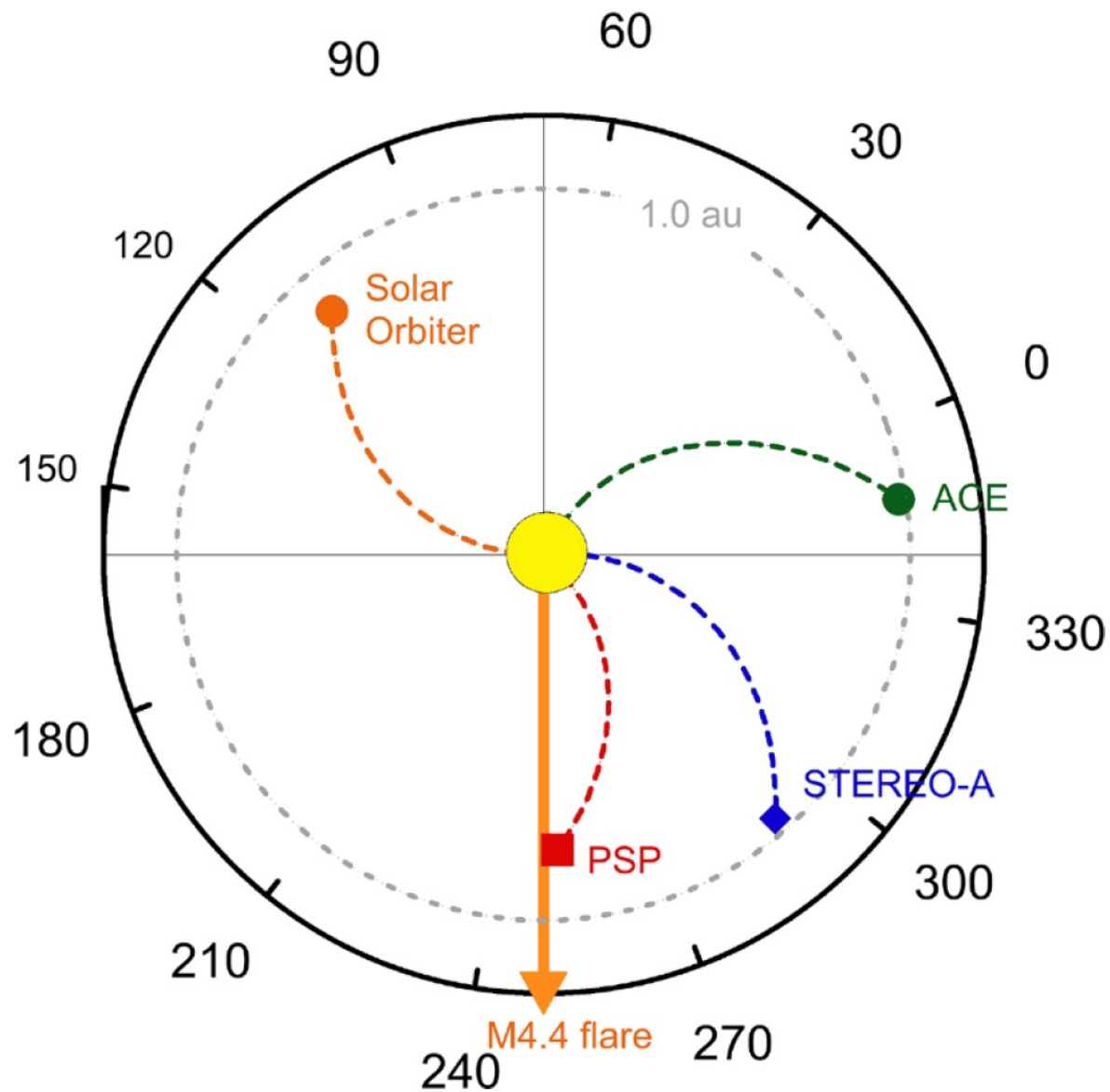
PRIMARY MIRROR SELFIE

Since launch: reached L2; solar array, high speed antenna, secondary mirror deployed; six primary mirror sections unfolded; sunshade extended; mirror alignment in process.

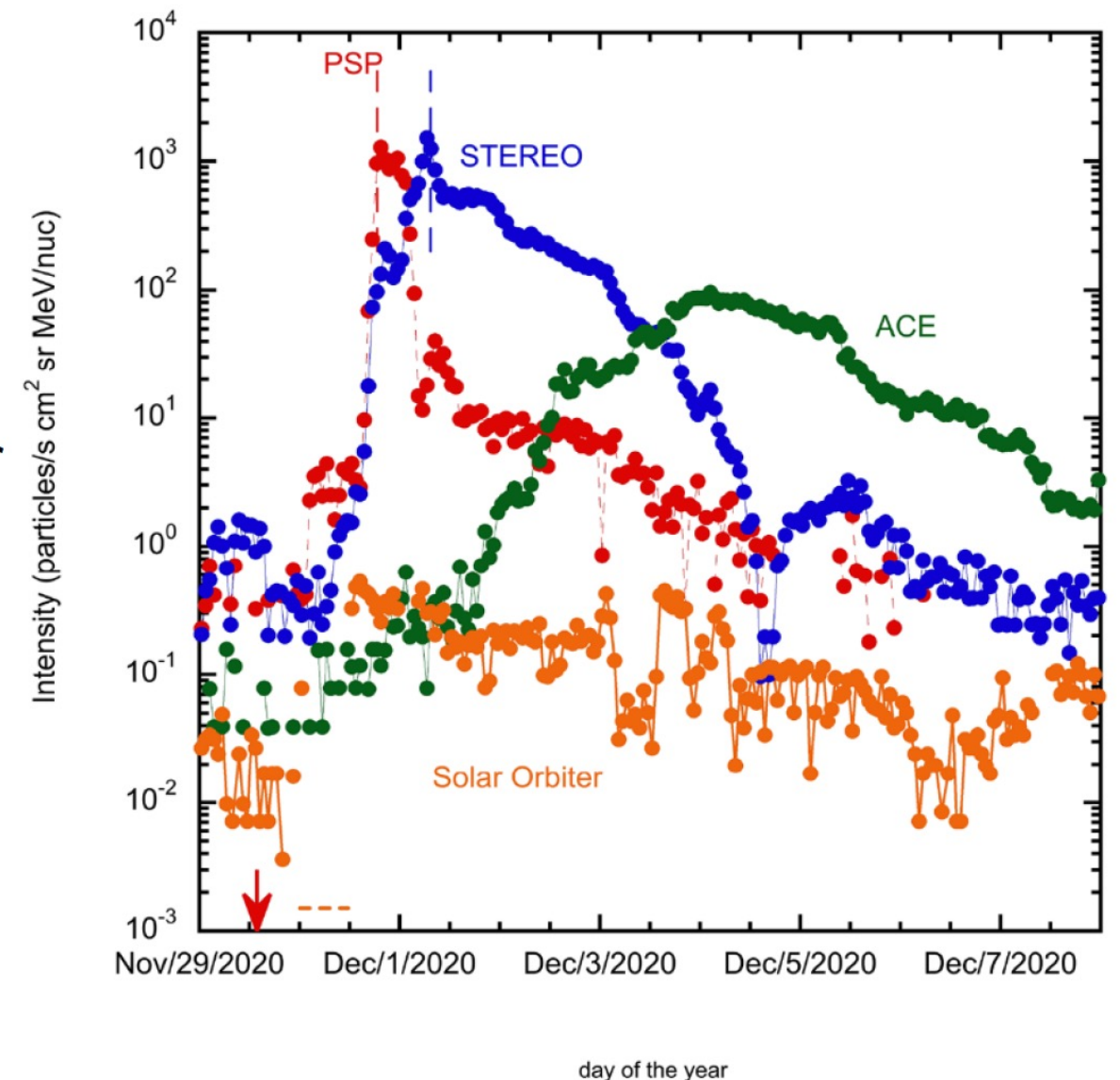


James Webb Space Telescope Launch
December 25, 2021
French Guiana, South America

Coordinated measurements around the Sun



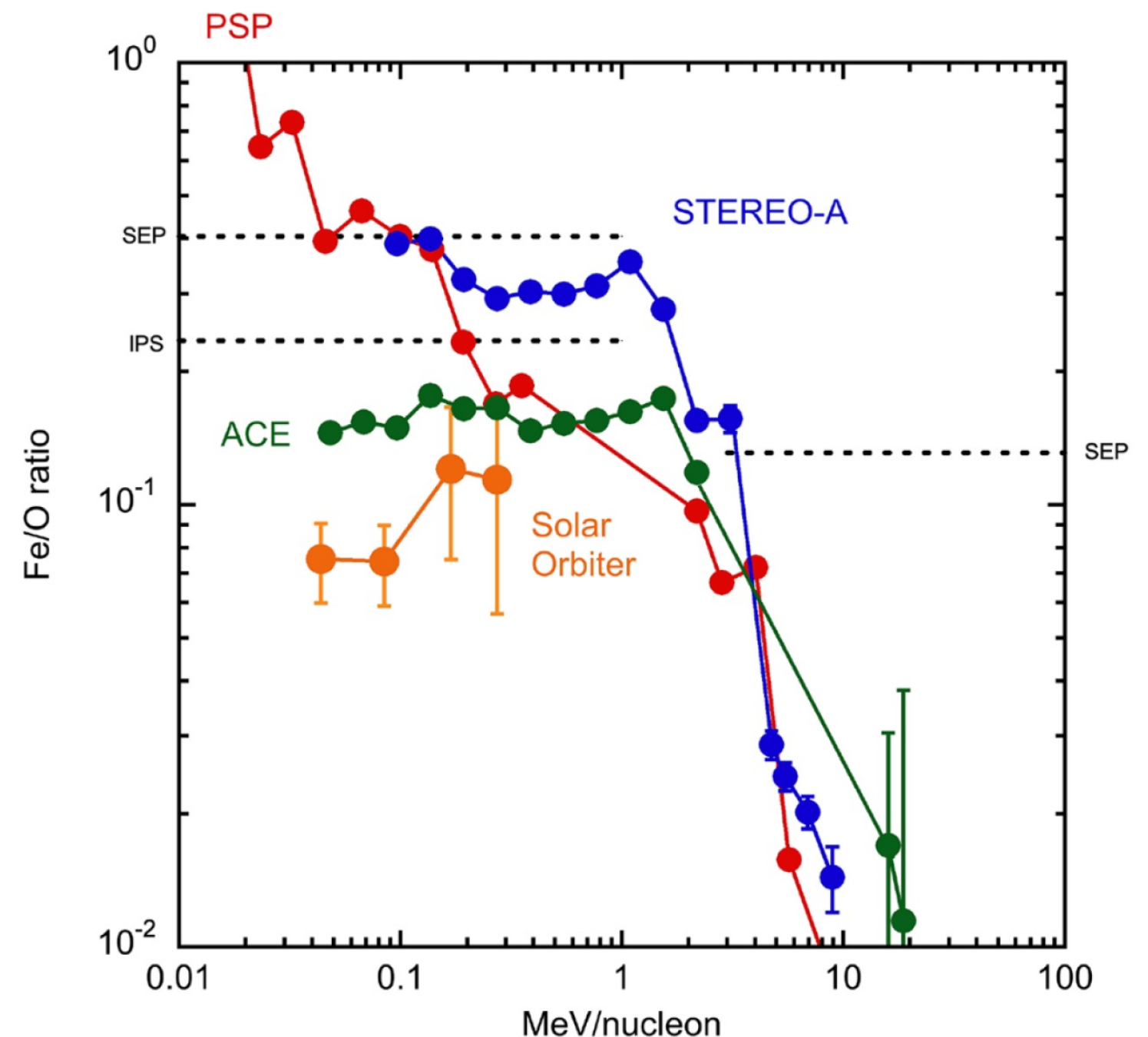
- A blast of energetic particles into the heliosphere
 - Released by a solar flare
 - After the magnetic field of a sunspot pair gets twisted and undergoes explosive magnetic reconnection
- It was seen by 4 different spacecraft
 - Yes, even spacecraft on the “backside” of the Sun observed SEPs from the flare



Composition tells us about the source region

- These instruments not only measure energy but also composition of the SEPs
 - Spectral shape tells us about the acceleration process
 - Composition tells us about the temperature of the source region
- Change in these between satellites reveals structure of flare region

Mason et al., Astronomy and Astrophysics, 2021
From the Solar Orbiter First Results special collection
<https://doi.org/10.1051/0004-6361/202141310>





The Vegetable Production System (Veggie) experiment VEG-03I on the ISS: demonstrated transplanting plants can be successful in microgravity; implications for space crop production.



NAC Science Committee Virtual Meeting November 9-10, 2021

- SMD Update
- Discipline Advisory Committee Reports
- SMD Transform to Open Science
- Report from the AA for Office of Diversity and Equal Opportunity
- SCaN: Commercialization and Support of Lunar Science/Artemis
- Large Strategic Mission Study and Implementation Plan



Findings & Recommendations



SC Finding: Diversity, Equity, Inclusion, and Accessibility Initiatives

The NAC Science Committee commends NASA SMD for its recent efforts to promote and expand the diversity of its workforce along a multitude of axes. The SC finds that NASA's efforts in this area, particularly those that are anticipated to diversify its mission teams, are anticipated to pay dividends in promoting the best and most innovative science.

The SC noted that assessment of the impacts of the many pilot programs in various divisions (such as the Here to Observe, or H2O, pilot program which will bring students into science team meetings to encourage young people from under-represented groups to pursue careers in science) will be important for determining which of these many programs are most effective over the long term.

SC Finding: Unintended Consequences of SMD Open Science Policy

The NAC Science Committee finds that there could be unintended negative consequences, especially to PIs from underrepresented groups and smaller institutions with limited institutional infrastructure support, resulting from potentially inadequate funding for the implementation of SMD's Open Science Policy SPD-41.

SC Finding: SMD Open Science Policy as it Relates to Open Source Software and Data

The NAC Science Committee recognizes that screening and validation for safety, security and functionality of any open source software and data will be required prior to introduction into NASA's systems. It is important to ensure that processes will be in place for this purpose.

SC Finding: SMD Effectively Addressing COVID-19 Pandemic Challenges

NASA SMD is effectively addressing challenges presented by the COVID-19 pandemic and continues to prudently develop a success-oriented trajectory given the uncertainties of the ongoing pandemic environment.

The COVID-19 impacts on NASA SMD programs and mission activities are sobering. The SC is grateful that NASA has continued operating most current missions and identified and enabled launch-window critical missions to be prioritized, while continuing the proposal solicitation and review process for funding proposals. That so much mission and programmatic work is continuing during this pandemic is a testament to the dedication and commitment of the NASA workforce.

The NASA SMD leadership team has provided frequent and forthright communication to the community as it has attempted to mitigate deleterious effects to the portfolio and to maintain a trajectory for continued scientific success. These actions highlight how NASA SMD can provide novel leadership approaches to coordinate and to drive innovative action from the community to respond and manage threats to the Nation.

SC Recommendation: RFI on grant augmentations to mitigate impacts of COVID-19 Pandemic

The NAC Science Committee appreciates NASA's recently implemented strategy to assist the most vulnerable members of the community (graduate students, post-docs and early career researchers who are supported via grant funds) via the RFI on grant augmentations required to support such personnel. Given that the impacts of the COVID-19 pandemic are still continuing, the SC recommends that NASA SMD consider issuing another such RFI in the near term.

SC Recommendation: Management of Translunar/Lunar Environment

In the spirit of the Artemis Accords, the SC recommends that SMD initiate a dialogue with ESDMD, commercial entities, and other stakeholders to ensure best-practices and protocols are developed to enable beneficial, shared-use of the lunar environment.

Use of the electromagnetic spectrum, access to orbital platforms, and mitigation of debris clutter must be proactively managed (via coordination between NASA, commercial interests, and other stakeholders) to protect and enable full utilization of the lunar environment for science and exploration.



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