

National Aeronautics and
Space Administration



EXPLORE SCIENCE

Exploration Science Strategy and Integration Office

Commercial Lunar Payload Services

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Program Executive to the Deputy Associate Administrator of
Exploration (DAAX)

Science Mission Directorate, NASA

ESSIO Full Organizational Chart



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Deputy Associate
Administrator for Exploration



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Program Support: Mackenzie Howard
Program Support: Kathryn Martin
Comm. Specialist: Chris Calabrese
Admin. Assistant: Amy Treat

Program Executives

Jay Jenkins



Angela Melito



Dr. Zachary Pirtle



PSD

- PESTO (NPLP & DALI)
- PMPO (lunar surface payloads)

Program Scientists

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Dr. Ryan Watkins



Dr. Kennda Lynch



Dr. Sarah Noble



Dr. Amanda Nahm



JSC

- CLPS Office:
 - Chris Culbert



Joint with PSD

Commercial Lunar Payload Services (CLPS)



- CLPS is an innovative, service-based, competitive acquisition approach that enables rapid, affordable, and frequent access to the Lunar surface via a growing market of American commercial providers
 - To the greatest legal and practical extent CLPS attempts to model common terrestrial deliveries such as FedEx, UPS, etc
- Service task orders are Firm Fixed Price (FFP) for the full scope of payload delivery: from payload hand-over to delivery (and often operation) on the lunar surface or in CIS lunar space
- NASA wants to be one of many customers for CLPS services
 - Ideally, CLPS contractors will eventually deliver manifests that include no NASA payloads
- CLPS deliveries are CLPS Contractor missions (not NASA missions); NASA imposes no NASA policies that would normally apply to a NASA mission
- CLPS providers secure all necessary hardware, systems, facilities and services to perform the delivery; including launch vehicle and comm/nav systems
 - NASA has no oversight and limited insight into CLPS vehicle/mission designs and processes
 - NASA LSP (Launch Services Program) is not engaged in launch vehicle acquisition
- CLPS launches are commercial launches acquired/provided by CLPS provider and approved/licensed by the U.S. Gov't FAA , FCC, and other agencies (not NASA)

CLPS IDIQ Contract and Portfolio



- 14 domestic companies eligible to compete for Lunar surface delivery task orders
- 8 awarded lunar surface deliveries actively in work with initial deliveries as soon as Q1 2023
- NASA expects to continue cadence of ~2 flights per year
- CLPS contractors are encouraged to sell lunar delivery services outside of the CLPS IDIQ to non-NASA and non-USG customers

Initial CLPS companies (Nov 2018):

- Astrobotic
- Deep Space Systems
- Draper
- Firefly Aerospace
- Intuitive Machines
- Lockheed Martin Space
- Masten Space Systems
- Moon Express
- Orbit Beyond

First On-Ramp (Nov 2019):

- Blue Origin
- Ceres Robotics
- Sierra Nevada Corporation
- SpaceX
- Tyvak Nano-Satellite Systems, Inc.

Awarded Deliveries:

TO2 2024
Astrobotic
Peregrine



TO2/20C 2024
Intuitive Machines
NOVA-C



TO PRIME-1 2024
Intuitive Machines
NOVA-C



CP-11 2025
Intuitive Machines
NOVA-C



TO19D 2024
Firefly Aerospace
Blue Ghost



TO20A 2024
Astrobotic
Griffin



CP-12 2025
Draper
Series-2



TOCS3/CS4 2026
Firefly Aerospace
Blue Ghost



Payload Accommodations



- CLPS Providers are required to “accommodate” the needs of NASA payloads, including:
 - Utilities: power, data, commanding, etc.
 - Mounting: fields of view, alignments, co-locations, etc.
 - Environments: thermal, vibe, EMI/EMC, etc.
 - Operations: conops, mission phases, etc.
- CLPS Task Orders are generally awarded competitively; payloads should therefore not be designed for a specific CLPS provider
- Firm Fixed Price (FFP) Task Orders necessitate stable definition of interfaces and requirements PRIOR to release of the Request for Task Plan (RFTP)
 - If it is not defined in the RFTP then it is defined de facto by the CLPS provider, or else is a “new” requirement at a cost
 - If requirements cannot be finalized, RFTP should specify achievable envelope for both sides to work toward
 - “Requirements” in an FFP procurement environment are what you are going to get, so RFTP requirements should align with what is needed for mission success

CLPS Payload Services



- NASA-owned and sponsored payloads are:
 - Manifested by a CLPS Manifest Selection Board (CMSB) with multi-Directorate representation
 - Assigned Payload Integration Managers and Project Scientists to guide integration and maximize science
 - Designed to advance science, technology, and exploration through investigations
- After payload handover, CLPS providers are responsible for integration, delivery, deployment and/or operation of customer payloads on the lunar surface
- CLPS providers secure all necessary hardware, systems, facilities and services to perform the delivery
 - NASA LSP (Launch Services Program) is not engaged in launch vehicle acquisition
 - DSN (Deep Space Network) (if required by contractor) is acquired by provider via RSAA (Reimbursable Space Act Agreement)
- Payload service tasks may include:
 - Physical operation, release/deployment with or without wireless/tethered services, passive delivery, and/or direct delivery into specified lunar orbit, mobility as a service, augmented insight

Payload Selections for CLPS Deliveries



- NASA Provided Lunar Payloads (NPLPs)
 - NASA Internal Call
 - In 2018, NASA selected 13 instruments that were identified as ready or very nearly ready to fly, and would accomplish a mixture of science, technology, and exploration objectives
- Lunar Surface Instrument and Technology Payloads (LSITPs)
 - External Community Call
 - In 2018, NASA selected 12 LSITPs that will address science goals from a variety of NASA's four divisions
- Payloads and Research Investigations on the Surface of the Moon (PRISM)
 - The PRISM solicitation call results in PI-led suites of instruments
 - Currently the Science Mission Directorates primary way of soliciting science-driven suites of instruments to fly to the surface of the Moon
 - To date, six PRISM selections have been awarded
- STMD, ESDMD, and International Payloads
 - Captured by Memorandum of Agreement (MOA) and manifest via CMSB
 - International Partner payloads are generally represented by a “sponsoring” or “representative” mission directorate
 - International payload vendors can work with NASA or go directly to a CLPS provider to acquire a lunar delivery service for their payload

International Payloads Agreements

Partner	Payload Name	CLPS Delivery
ESA	PITMS Contribution	Task Order 2 - Astrobotic
CSA	Leap LRM (Rover)	Future CLPS Task Order
ESA	Retroreflector	Task Order CP-11 – Intuitive Machines
ESA	PROSPECT	Future CLPS Task Order
ESA	Lunar Pathfinder	Task Order CS-3 – Firefly Aerospace
CNES	LuSEE-Lite Search Coil Mag	Task Order CP-12 - Draper
UNiBE	LIMS	Future CLPS Task Order
KASI	LUSEM	Task Order CP-11 – Intuitive Machines
CNES	FSS Contribution	Task Order CP-12 - Draper
Grapevine Productions	Sanctuary	Future CLPS Task Order

CLPS Task Orders



TO2-AB

PM-1



Peregrine Lander



TO2-IM

IM-1



Nova-C Lander



TO19D

**Blue
Ghost 1**

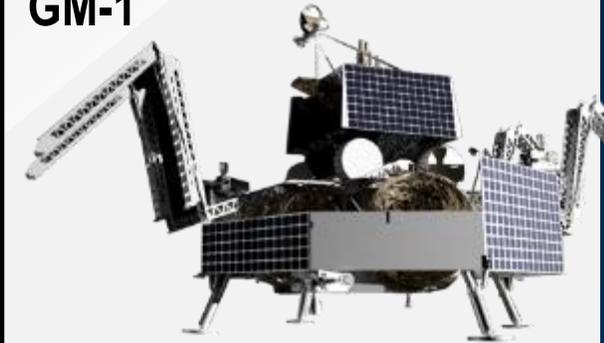


Blue Ghost lander



TO20A – VIPER

GM-1



Griffin Lander



PRIME-1

IM-2



Nova-C Lander



CP-11

IM-3



Nova-C Lander



CP-12

TBA



Series-2 Lander



CS-3 & CS-4

**Blue
Ghost 2**

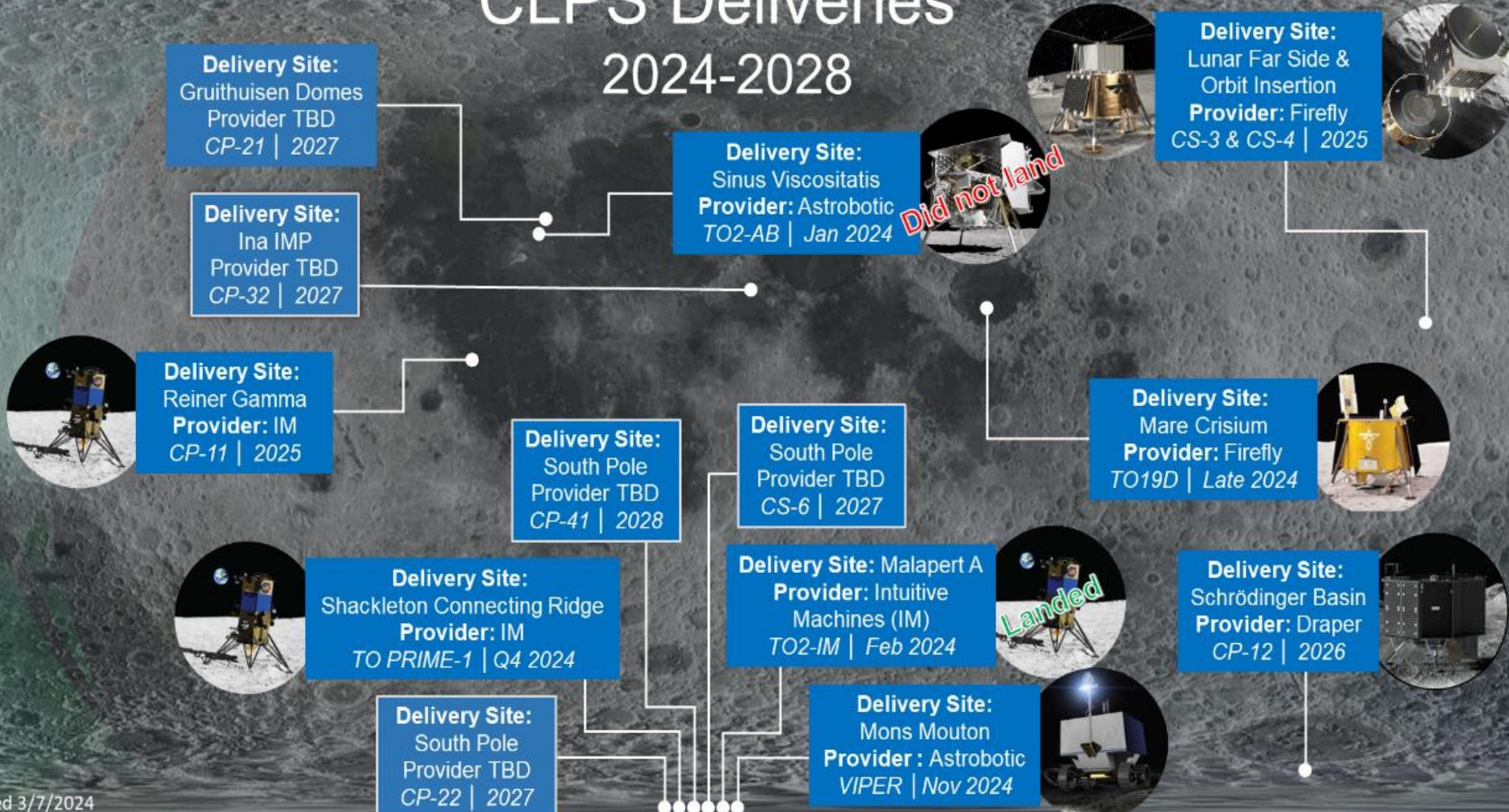


Blue Ghost Lander



CLPS Deliveries

2024-2028



CLPS Deliveries to South Pole 2024-2028



Delivery Site: Malapert A
Provider: Intuitive Machines (IM)
TO2-IM | Feb 2024

Delivery Site: Mons Mouton
Provider: Astrobotic
VIPER | Nov 2024



Delivery Site: Shackleton Connecting Ridge
Provider: IM
TO PRIME-1 | Q4 2024

Delivery Site: South Pole
Provider: TBD
CS-6 | 2027

Delivery Site: South Pole
Provider: TBD
CP-22 | 2027

Delivery Site: South Pole
Provider: TBD
CP-41 | 2028

CLPS Deliveries to Far Side 2025-2026



Delivery Site:
Lunar Far Side &
Orbit Insertion
Provider: Firefly
CS-3 | 2025



Delivery Site:
Schrödinger Basin
Provider: Draper
CP-12 | 2026



Science Highlights of Early Task Orders



TO2 AB

- Characterize volatile composition of regolith and exosphere during and after landing and over the course of the lunar day
- Characterize the local radiation environment

TO2 IM

- Determine the photoelectron sheath density and scale height
- Characterize plume-surface interactions during landing

PRIME-1

- Characterize volatile composition of regolith and exosphere during and after landing and over the course of the lunar day

TO 19D

- Characterize Earth's magnetosphere
- Characterize structure, composition, and thermal properties of the Moon's interior

CP-11

- Study the magnetic and plasma environment within a lunar swirl to address the origin of magnetized crust, origin of swirls, and nature of space weathering on airless bodies

CP-12

- Use geophysical techniques to characterize the Moon's interior to understand how the Moon differentiated and evolved into its current state

CS 3/4

- Pathfinder to understand the Moon's radio environment and to potentially take a first look at a previously unobserved era in our cosmic history

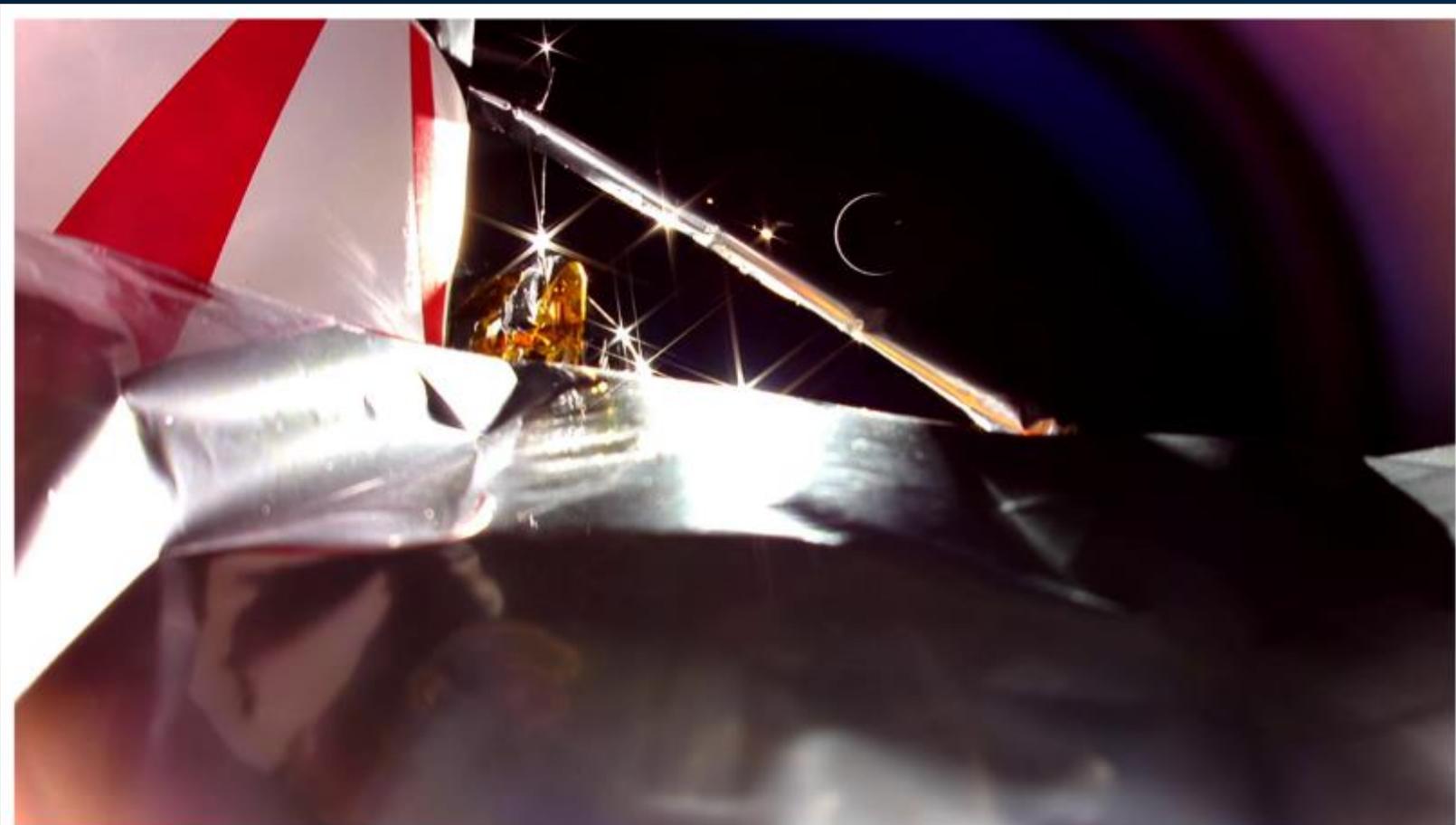
CP-21

- Study the origin and composition of silicic volcanic constructs at Gruithuisen Domes

CP-22

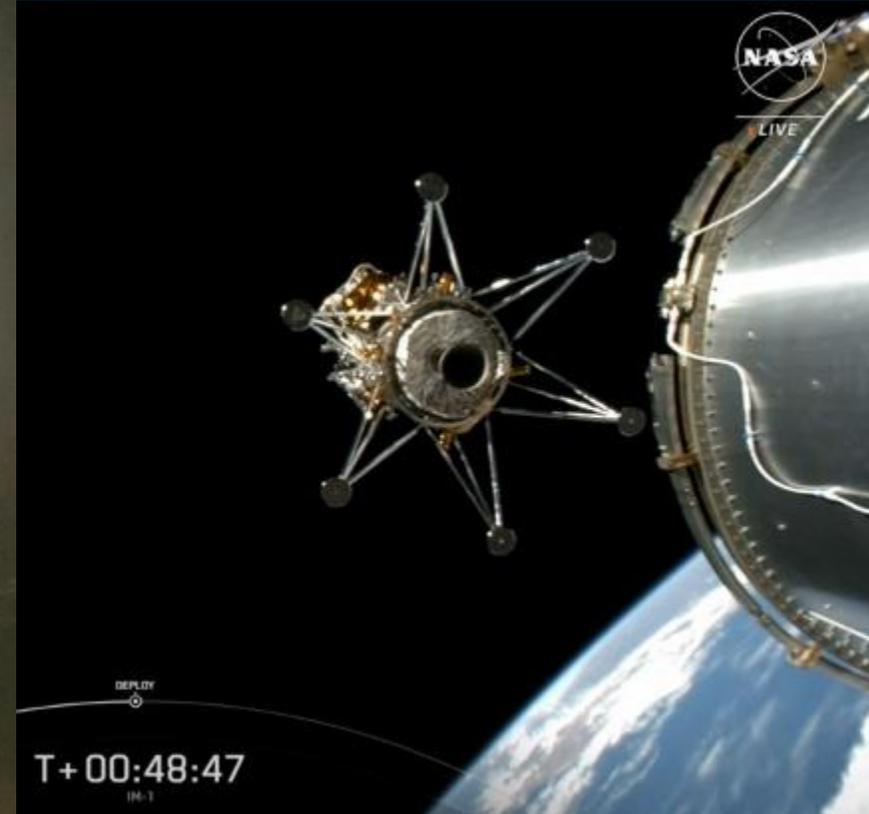
- Study the biological response of yeast to the lunar environment to determine how partial gravity and deep space radiation influence biological processes
- Characterize the terrain, surface mineralogy, composition, and thermophysical properties of the lunar surface

Peregrine Mission 1 – Astrobotic CLPS Task Order 2-AB



By blocking the Sun with one of Peregrine's struts, Astrobotic engineers were able to capture this striking view of the crescent Earth. The company's CEO, John Thornton, identified this photo as his favorite surprise of the mission. Credit: Astrobotic.

Intuitive Machines Mission 1 CLPS Task Order 2-IM



Intuitive Machines Mission 1 Moon Landing



[Enlarge](#) / Intuitive Machines' *Odysseus* lander is shown shortly before touching down on the Moon.

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