

The Space Congress® Proceedings

2018 (45th) The Next Great Steps

Feb 28th, 10:45 AM

45thSpace Congress“The Next Great Steps”: Space Policy Directive-1

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Hill, Bill, "45thSpace Congress“The Next Great Steps”: Space Policy Directive-1" (2018). *The Space Congress® Proceedings*. 5.

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45th Space Congress “The Next Great Steps”

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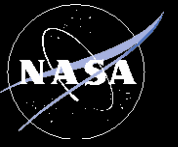
Space Policy Directive-1



“Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities.

Beginning with missions beyond low-Earth orbit, the United States will lead the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations.”

Strategic Principles for Sustainable Exploration



- **FISCAL REALISM**

Implementable in the near-term with the buying power of current budgets and in the longer term with budgets commensurate with economic growth;

- **SCIENTIFIC EXPLORATION**

Exploration enables science and science enables exploration; leveraging scientific expertise for human exploration of the solar system.

- **TECHNOLOGY PULL AND PUSH**

Application of high Technology Readiness Level (TRL) technologies for near term missions, while focusing sustained investments on technologies and capabilities to address the challenges of future missions;

- **GRADUAL BUILD UP OF CAPABILITY**

Near-term mission opportunities with a defined cadence of compelling and integrated human and robotic missions, providing for an incremental buildup of capabilities for more complex missions over time;

- **ECONOMIC OPPORTUNITY**

Opportunities for U.S. commercial business to further enhance their experience and business base;

- **ARCHITECTURE OPENNESS AND RESILIENCE**

Resilient architecture featuring multi-use, evolvable space infrastructure, minimizing unique developments, with each mission leaving something behind to support subsequent missions;

- **GLOBAL COLLABORATION AND LEADERSHIP**

Substantial new international and commercial partnerships, leveraging current International Space Station partnerships and building new cooperative ventures for exploration; and

- **CONTINUITY OF HUMAN SPACEFLIGHT**

Uninterrupted expansion of human presence into the solar system by establishing a regular cadence of crewed missions to cis-lunar space during ISS lifetime.

Earth



Notional Commercial Platform

ISS

Moon



Orion

SLS

Commercial launch Vehicles

Commercial Lunar Lander

Lunar Orbital Platform - Gateway
PPE - Habitat - Airlock - Logistics

Robotic Surface Missions

Mars



Mars robotic exploration,
technology development

In LEO
Commercial & International
partnerships

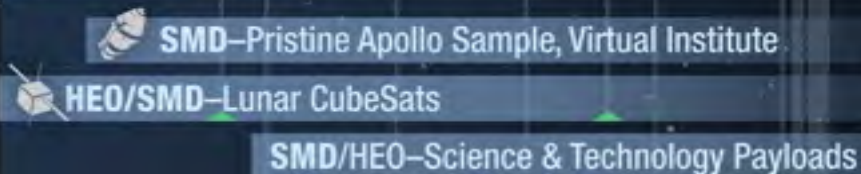
In Cislunar Space
A return to the moon for
long-term exploration

On Mars
Research to inform future
crewed missions

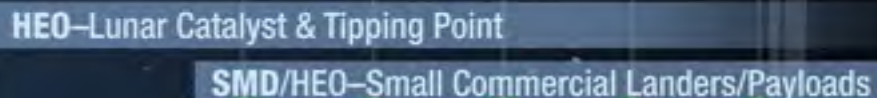
NASA Lunar Exploration Campaign

NOTIONAL LAUNCHES

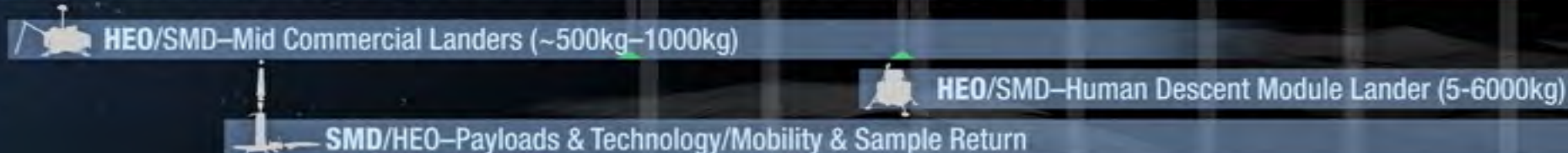
EARLY SCIENCE & TECHNOLOGY INITIATIVE



SMALL COMMERCIAL LANDER INITIATIVE



MID TO LARGE COMMERCIAL LANDER INITIATIVE TOWARD HUMAN-RATED LANDER



LUNAR ORBITAL PLATFORM—GATEWAY



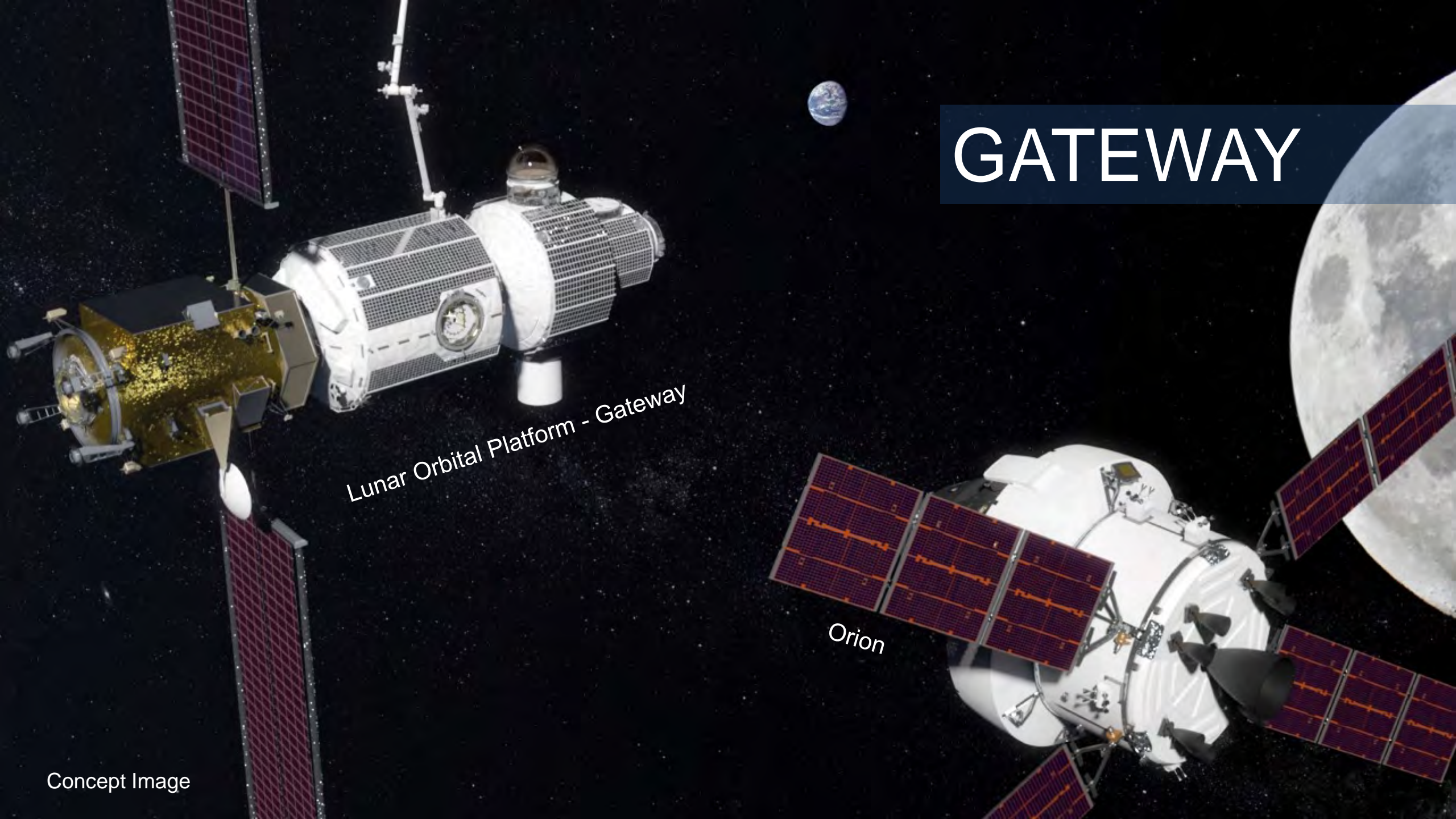
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

GATEWAY

Lunar Orbital Platform - Gateway

Orion

Concept Image



Human Exploration and Operations

Gateway Functionality



- **Assumptions**

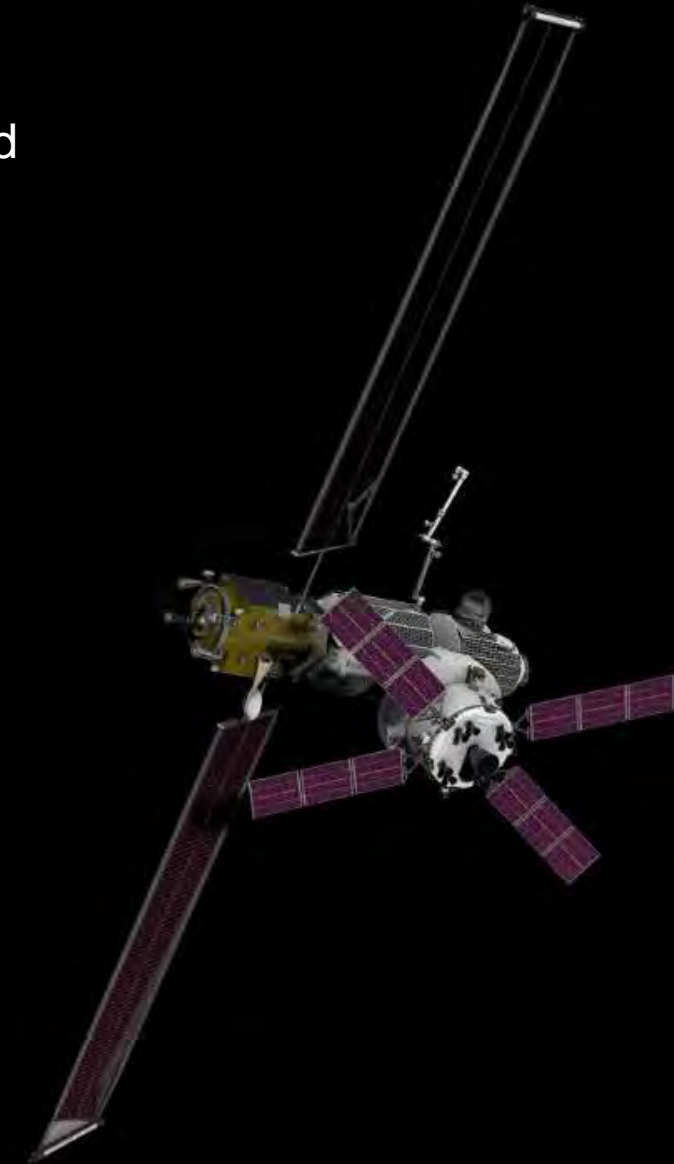
- Lunar Orbital Platform-Gateway provides ability to support multiple NASA, U.S. commercial, and international partner objectives in cislunar space and beyond
- The gateway is designed for deep space environments
 - Supports crew of 4 for a minimum of 30 days
 - Supports staging of other assets including landers

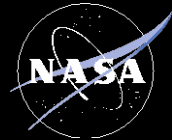
- **Emphasis on defining early elements**

- Power Propulsion Element
- Habitat
- Logistics Strategy
- Airlock

- **Feasibility trades and future work**

- Partner-provided elements
- Deep Space Transport





How Are We Leading Future Exploration?

Maximizing utilization of the International Space Station

Developing LEO commercialization

Resolving the human health and performance challenges

Expanding partnerships with commercial industry

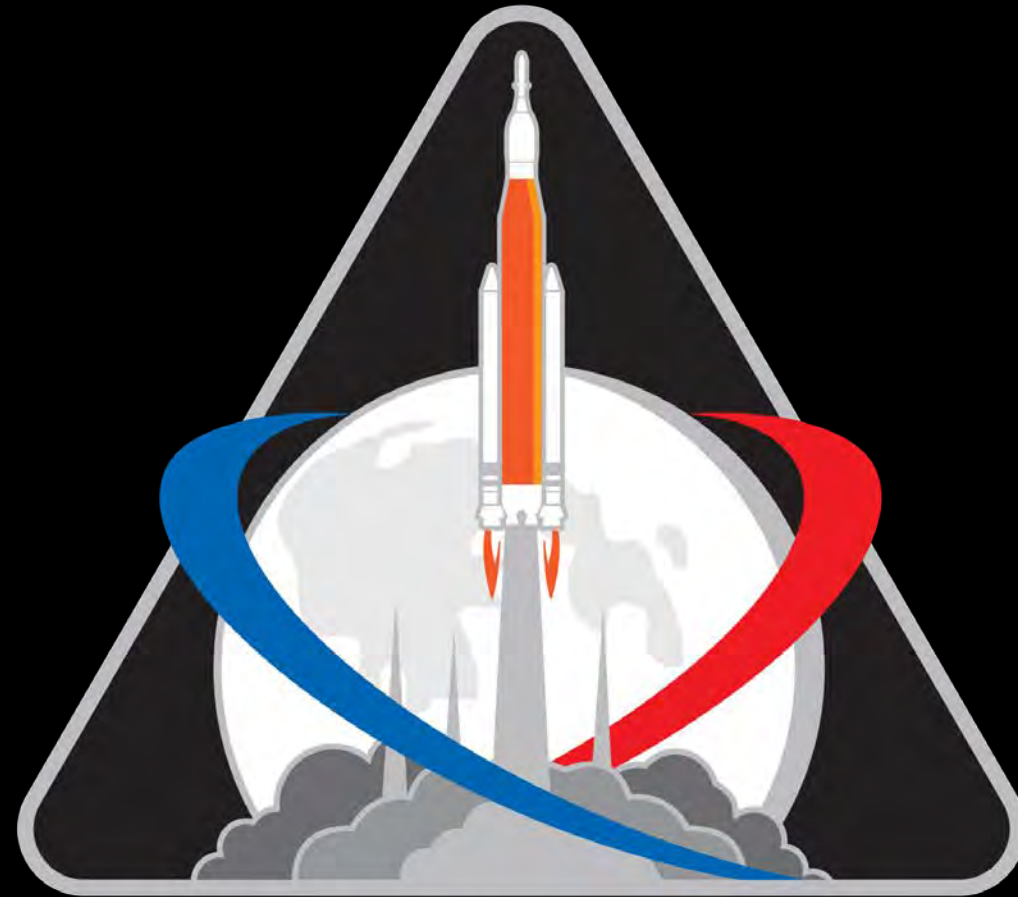
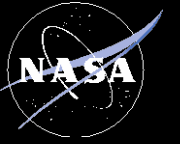
Growing international partnerships

Building the critical Deep Space Infrastructure

Enabling the capabilities to explore multiple destinations



It begins with...



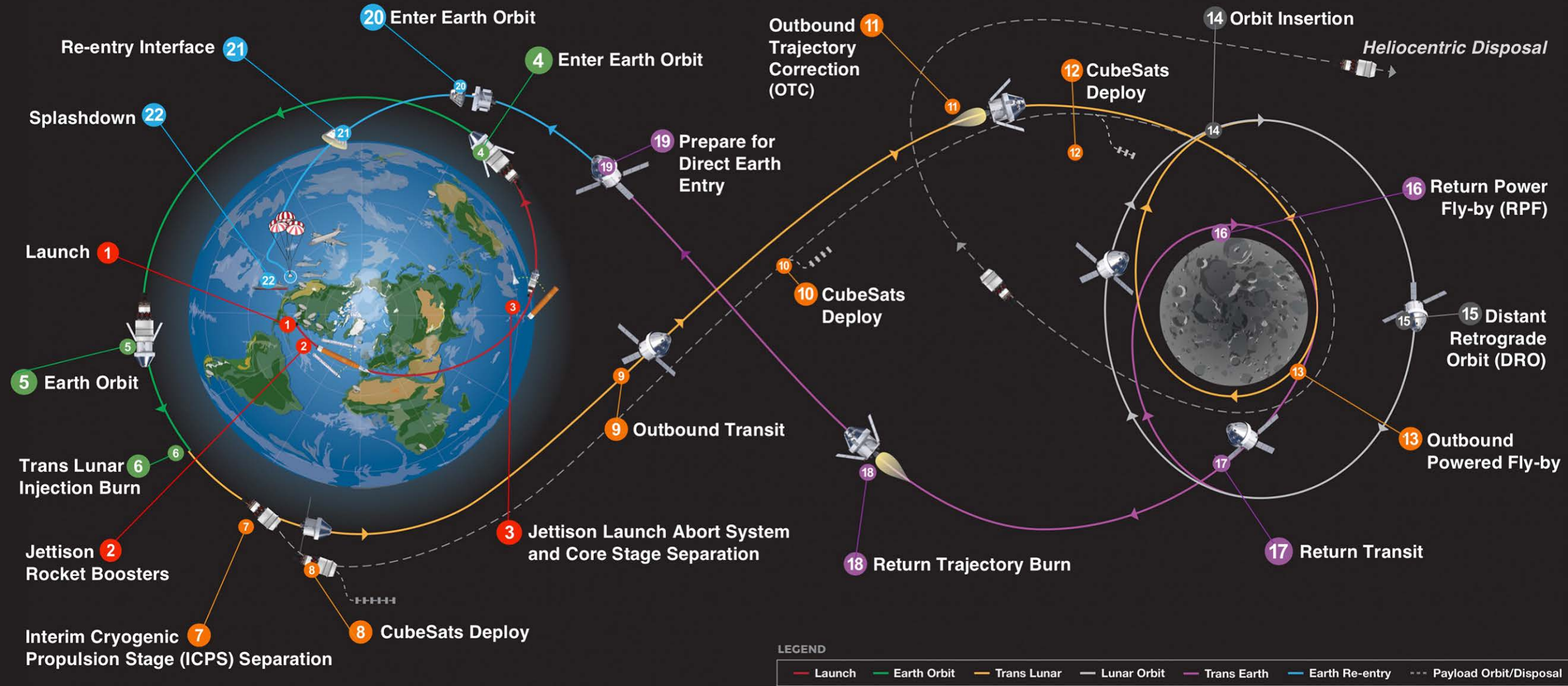
EXPLORATION MISSION-1

EXPLORATION MISSION-1

National Aeronautics and Space Administration



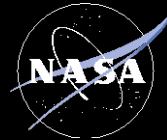
The first uncrewed, integrated flight test of NASA's Deep Space Exploration Systems. The Orion spacecraft and Space Launch System rocket will launch from a modernized Kennedy spaceport.



Total distance traveled: 1.3 million miles – Mission duration: 25.5 days – Re-entry speed: 24,500 mph (Mach 32) – 13 CubeSats deployed

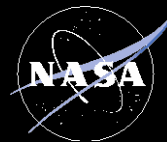
Assurance

EM-1 will strengthen worldwide confidence that this is the right strategy to send humans to deep space



Achievement

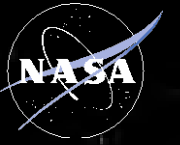
EM-1 will herald the success of America's human spaceflight program in partnership with others

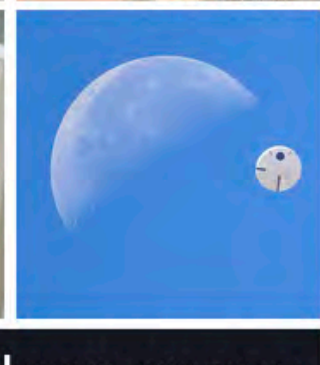
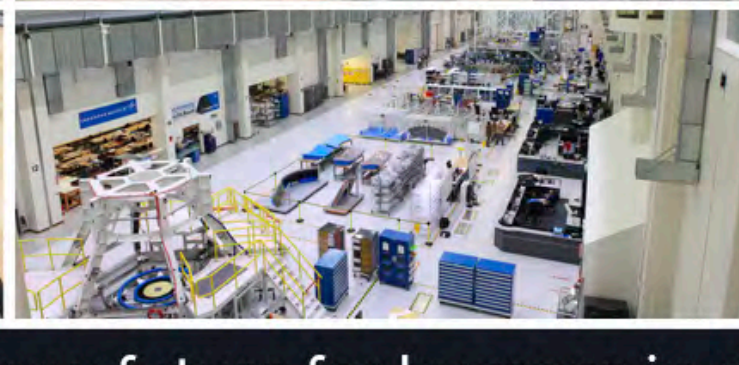
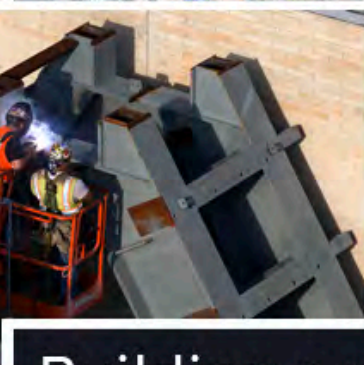
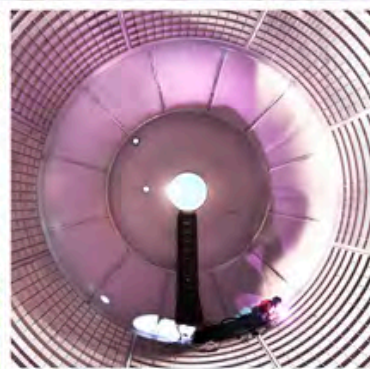
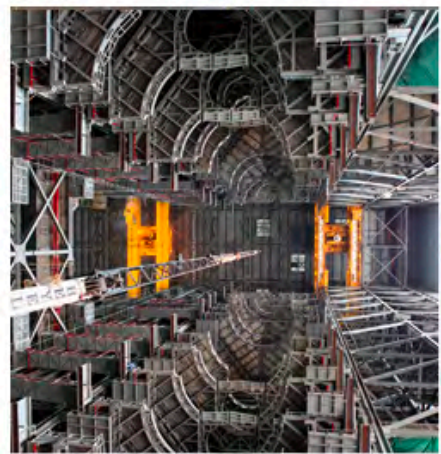
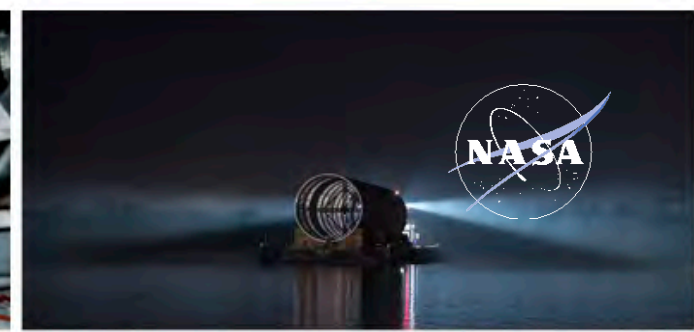
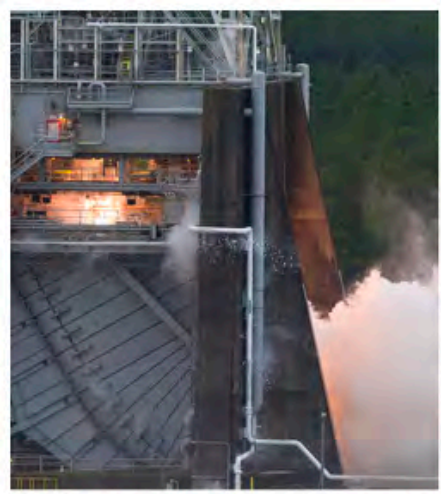




Aspiration

EM-1 can inspire the world to pursue greatness in the exploration of our universe





Building a new future for humans in deep space

