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Explore: Extending Human Presence into the Solar System

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EXPLORE

*EXTENDING
HUMAN PRESENCE
INTO THE SOLAR SYSTEM*

Bill Hill
Deputy Associate Administrator
Exploration Systems Development
46th Space Congress
Cape Canaveral, Florida
June 5, 2019

The NASA Charge to the Moon

In keeping with SPD-1, NASA is charged with landing the first American woman and next American man at the South Pole of the Moon by 2024, followed by a sustained presence on and around the Moon by 2028.

NASA will “use all means necessary” to ensure mission success in moving us forward to the Moon.



Vice President Mike Pence speaks about NASA's mandate to return American astronauts to the Moon and on to Mars at the U.S. Space & Rocket Center in Huntsville, Alabama.

Why Go to the Moon?

Establishes American leadership and strategic presence

Proves technologies and capabilities for sending humans to Mars

Inspires a new generation and encourages careers in STEM

Leads civilization changing science and technology

Expands the U.S. global economic impact

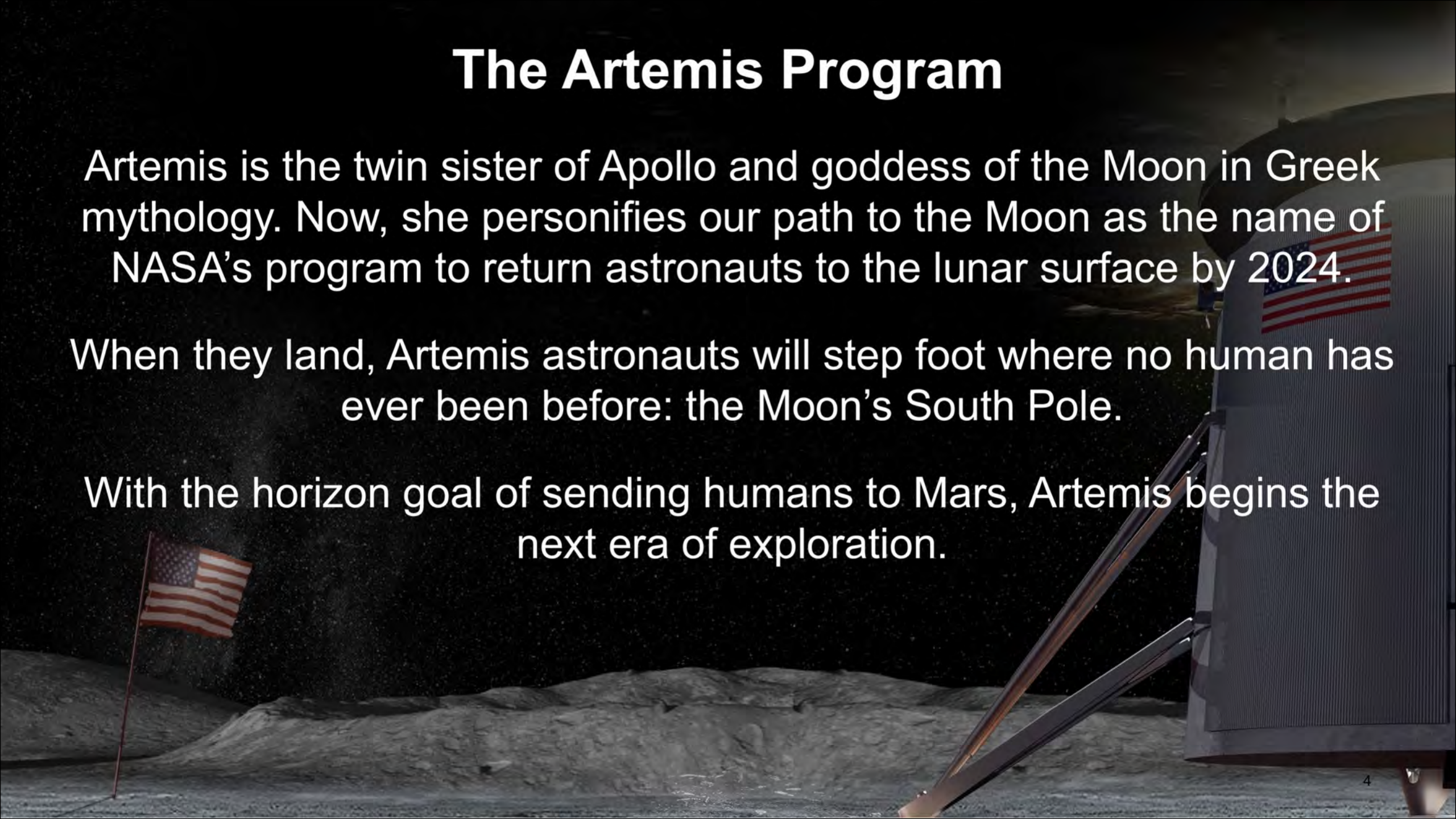
Broadens U.S. industry & international partnerships in deep space

The Artemis Program

Artemis is the twin sister of Apollo and goddess of the Moon in Greek mythology. Now, she personifies our path to the Moon as the name of NASA's program to return astronauts to the lunar surface by 2024.

When they land, Artemis astronauts will step foot where no human has ever been before: the Moon's South Pole.

With the horizon goal of sending humans to Mars, Artemis begins the next era of exploration.



American Leadership in Space Exploration



EARTH ORBIT

- Grow a robust commercial space industry with a constant human presence
- Expand our international partnerships through the ISS
- Conduct exploration science and technology demonstrations aboard ISS
- Continue critical earth science research
- New jobs through in-space manufacturing and assembly
- Low-Earth orbit launches us to farther destinations



LUNAR ORBIT

- The next step for commercial space development
- Conduct groundbreaking decadal science
- A new venue to strengthen international partnerships
- Stepping stone and training ground for extending human presence into deep space
- Sustainable and affordable human and robotic programs



LUNAR SURFACE

- Seed investments in commercial lunar landers
- Opportunities to develop technologies for long-term survival
- Explore and exploit space resources
- Create a foothold on a new frontier



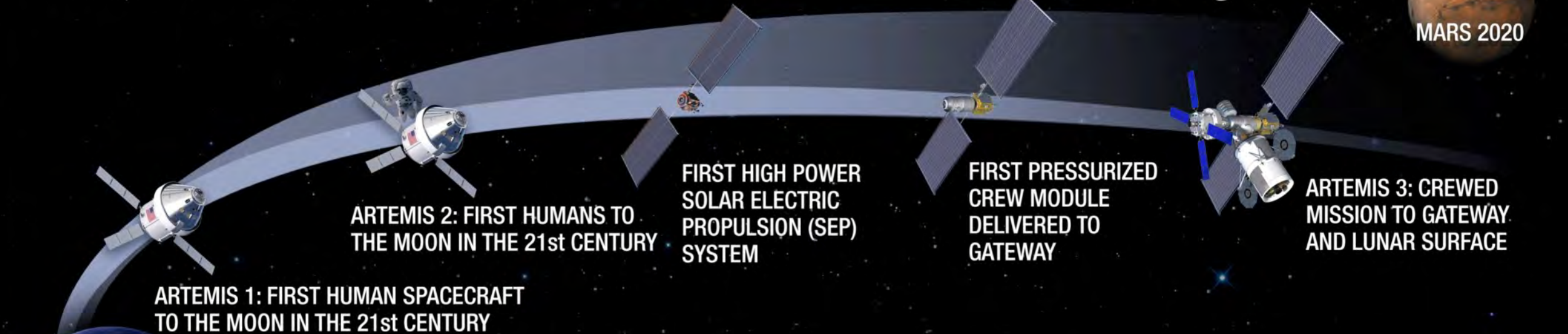
MARS & BEYOND

- America's next giant leap – reaching new worlds
- Push the boundaries of human knowledge
- Answer the question of 'are we alone?'
- Unlock the mysteries of the universe

Artemis Phase 1: To the Lunar Surface by 2024



MARS 2020



ARTEMIS 1: FIRST HUMAN SPACECRAFT TO THE MOON IN THE 21st CENTURY

ARTEMIS 2: FIRST HUMANS TO THE MOON IN THE 21st CENTURY

FIRST HIGH POWER SOLAR ELECTRIC PROPULSION (SEP) SYSTEM

FIRST PRESSURIZED CREW MODULE DELIVERED TO GATEWAY

ARTEMIS 3: CREWED MISSION TO GATEWAY AND LUNAR SURFACE



Commercial Lunar Payload Services
- CLPS delivered science and technology payloads

Early South Pole Crater Rim Mission(s)
- First robotic landing on eventual human lunar return and ISRU site
- First ground truth of polar crater volatiles

Large-Scale Cargo Lander
- Increased capabilities for science and technology payloads

Humans on the Moon - 21st Century
First crew leverages infrastructure left behind by previous missions

LUNAR SOUTH POLE CRATER TARGET SITE

2019

2024

Achieving 2024 – A Parallel Path to Success

Artemis will see government and commercial systems moving in parallel to complete the architecture and deliver crew



Artemis 1

First flight test of SLS and Orion as an integrated system

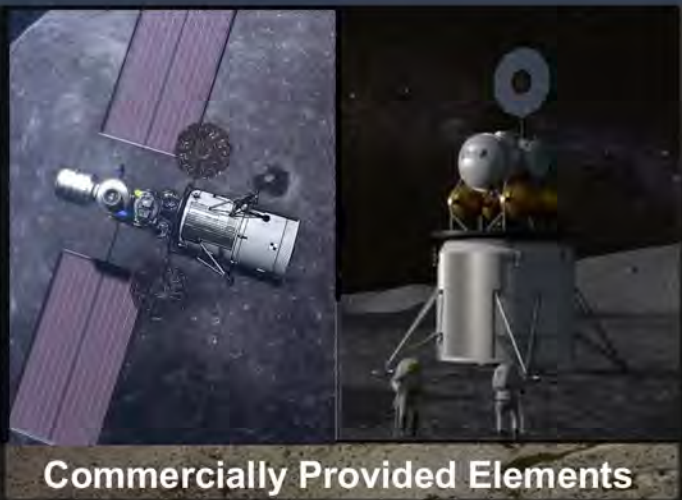
Artemis 2

First flight of crew to the Moon aboard SLS and Orion

Artemis 3

First crew to the lunar surface; Logistics delivered for 2024 surface mission

Between now and 2024, U.S. industry delivers the launches and human landing system necessary for a faster return to the Moon and sustainability through Gateway.



PPE

Power Propulsion Element arrives at NRHO via commercial rocket

Crew Module

Small pressurized crew module launches to Gateway on a commercial rocket

Human Landing System

Transfer

Transfers lander from Gateway to low lunar orbit

Descent

Descends From Transfer vehicle to lunar surface

Ascent

Ascends from lunar surface to Gateway

Up to three commercial rocket launches, depending on distribution of the Transfer, Descent, and Ascent functions.

Sustainability at the Moon and on to Mars

- The U.S. leading in exploration and setting the standards for the Moon
- Unbound potential for partnerships and collaboration
- Meaningful, long-duration human missions
- Testing impacts on human performance and exploration operations to be used for Mars
- Repeatable operations traveling from Earth to the Gateway to the surface with reusable systems
- Unprecedented science outside of Earth's influence
- Maintains strategic presence as a deep space port and refueling depot around the Moon
- Increases international and commercial partnership opportunities, fostering healthy competition





Let's go! *The time is now.*

We have the capability

We have the purpose

We have the charge

We have the responsibility



National Aeronautics and Space Administration

A full-page background image showing an astronaut in a white spacesuit standing in a dark, rocky lunar cave. The cave has several large, circular openings that create a tunnel effect. At the end of the tunnel, a bright light illuminates the Earth as seen from space. The astronaut's reflection is visible on the smooth, polished floor of the cave.

Questions?

www.nasa.gov