Trends of International Space Exploration and JAXA's Space Exploration Plan

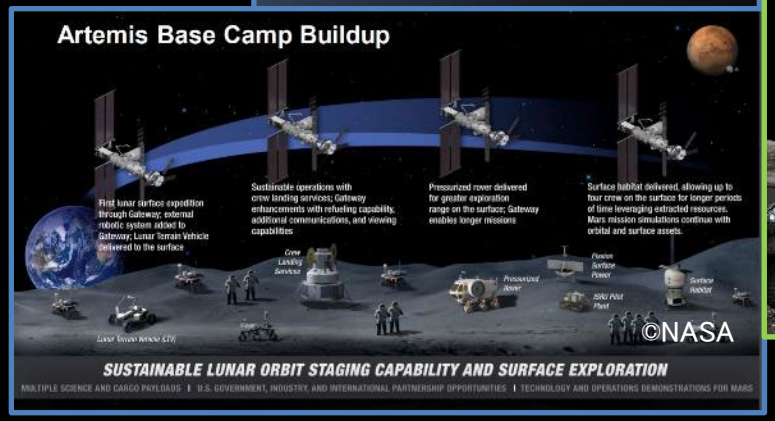
Fumiya TSUTSUI

JAXA Space Exploration Center (JSEC)
Japan Aerospace Exploration Agency

2023/07/21

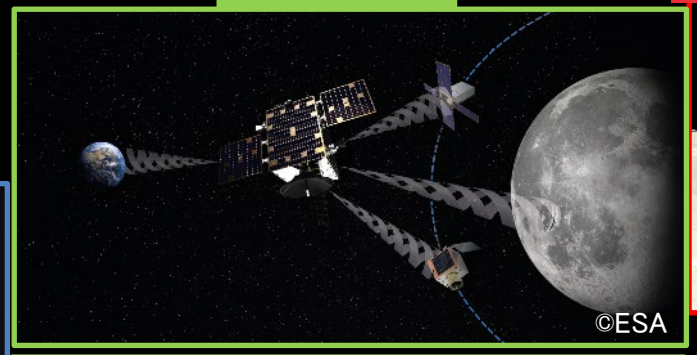
1. Lunar Exploration in the World

US



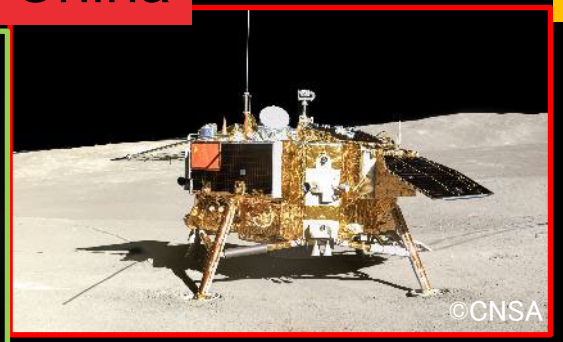
- Promoting the Artemis Program
- Successful Launch of SLS/Orion (Artemis I)
- Crewed Lunar Landing Planned for 2025
- Sustainable Lunar Exploration to Prepare for Crewed Mars Missions

Europe



- Cooperation in the Construction of the Manned Moon Orbiting Base (Gateway)
- Establishing a Lunar Communication/ Positioning Network (Moonlight)
- Lunar Cargo Lander Program

China

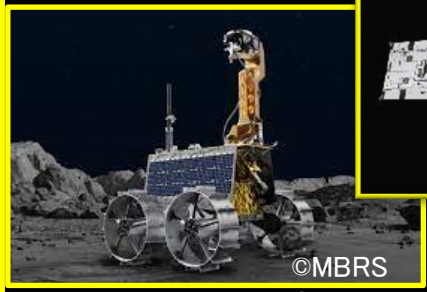


- Lunar Exploration Program (Chang'e) : Landing on the Far Side of the Moon (2018) ; Sample Return (2020) ; Investigation in South Polar Region (2025～)
- Building of International Lunar Research Station (ILRS)

Russia

- Promoting the "Luna" Program (Luna 25–28)
- Cooperation with China for ILRS.

New Space Nations

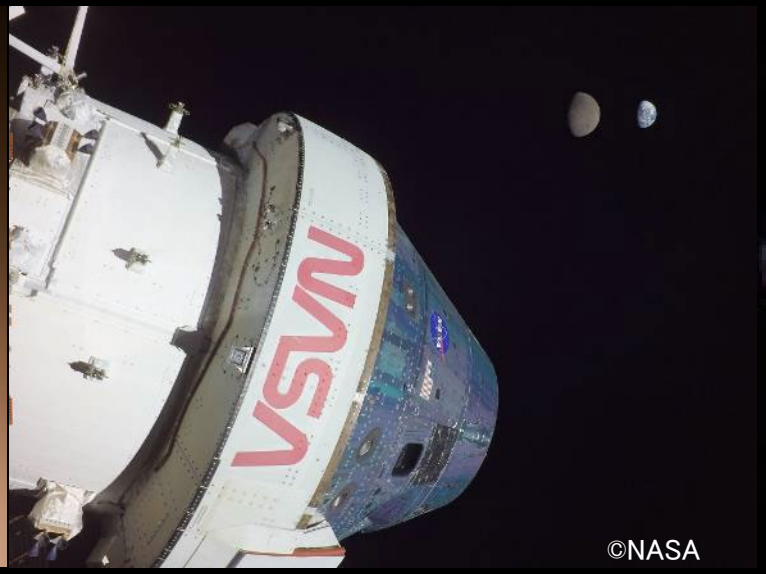


India, UAE, South Korea
Lunar Landing/Orbiting Missions

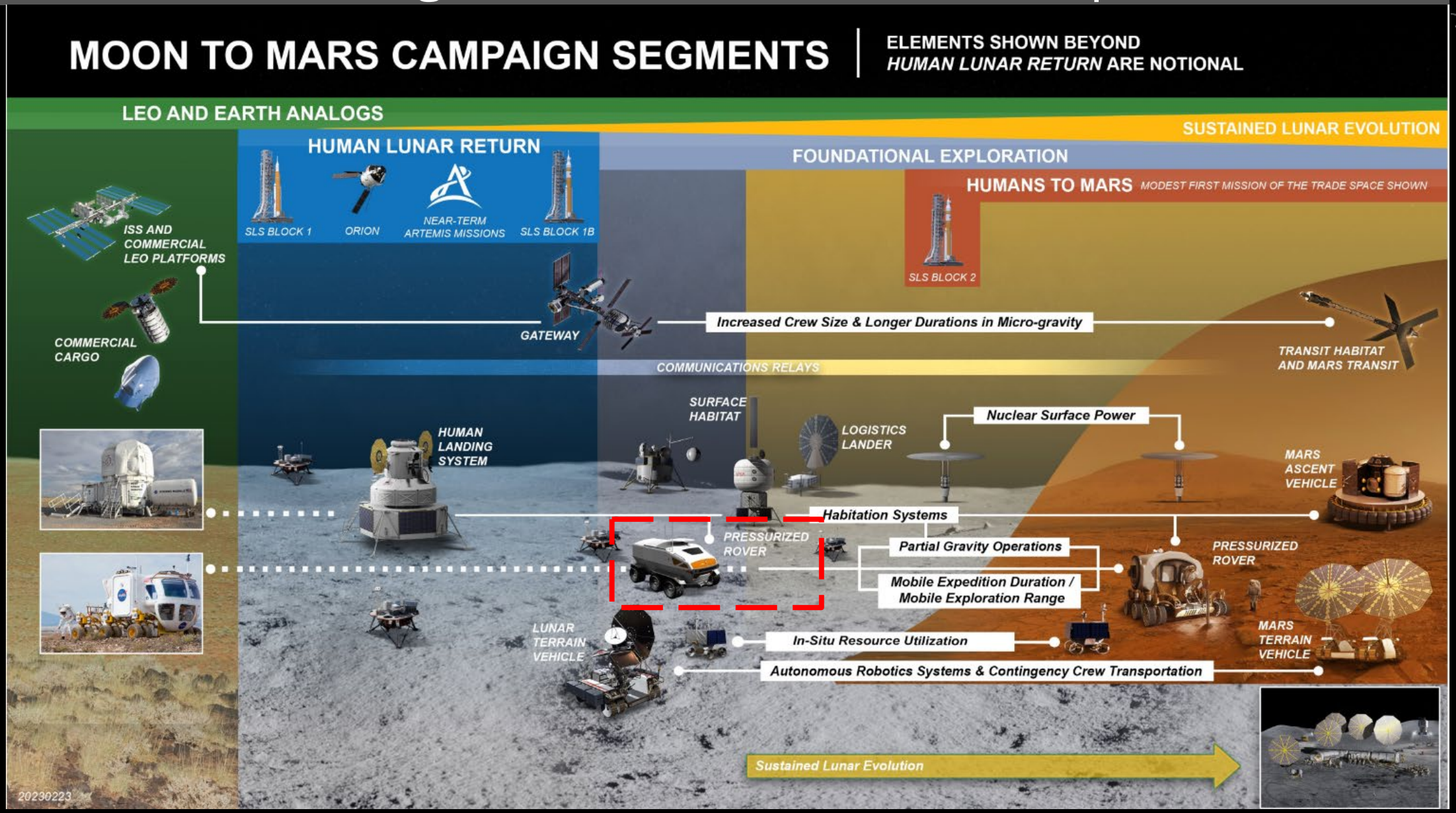
2. The Artemis Program : Overview

- **Artemis Program : Comprehensive Program Encompassing All Programs Related to Manned Lunar Exploration :**
  - ✓ Space Launch System (SLS) Program (Launcher)
  - ✓ Orion Program (Crewed Spacecraft)
  - ✓ Gateway Program (Moon Orbiting Base)
  - ✓ Human Landing System (HLS) Program
  - ✓ Commercial Lunar Payload Services (CLPS) Program, ･･･etc
- **Demonstrate Technologies Necessary for Crewed Mars Mission in the 2030s through Sustained Activity on the Moon.**

Announcement of Astronauts Back on the Moon at the Fifth Meeting of the National Space Council



3. The Artemis Program : Moon to Mars Roadmap



From NASA's Moon to Mars Architecture Workshop Documents
https://www.nasa.gov/MoonToMarsArchitecture

4. Japan Promoting International Space Exploration

International Space Exploration Forum 2 held in Tokyo (2018)

MoU Concerning Cooperation on Gateway Signed with NASA

Policy Determination for Promoting the Artemis Program and Realizing Moon Landing by Japanese Astronaut

IA Concerning Cooperation on Gateway Signed

- Providing ECLSS System.
- Providing Resupply
- Boarding Opportunity for Japanese Astronaut

Signing of the Artemis Accords by the Japanese Government

Policy Determination for Participation in International Space Exploration (Strategic Headquarters for Space Development)

Joint Exploration Declaration of Intent (JEDI) Signed with NASA

JAXA Astronaut Candidates Recruit

2
4127

Framework Agreement for Space Cooperation Signed between Japan/US Governments

Selection of Astronaut Candidates

2019 2020 2021 2022 2023

5. JAXA's Space Exploration Roadmap

2020 2030 2040

Expanding Human Presence

MARS

Robotic Tech Demo → Crewed Missions

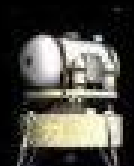
MOON


Kaguya

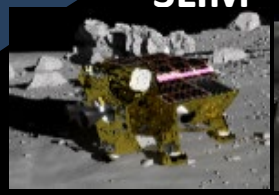
Gateway

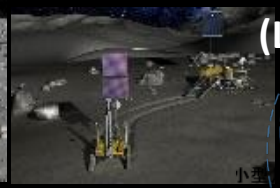

Pressurized Crew Rover

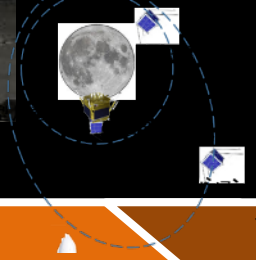

Gateway Logistics


Mid-class Cargo Lander

Robotic Missions → Crewed Missions → Surface Infrastructure → Sustainable Exploration


SLIM


LUPEX


LEAD (LNSS demo)


Fuel-Plant (demo)

EARTH LEO

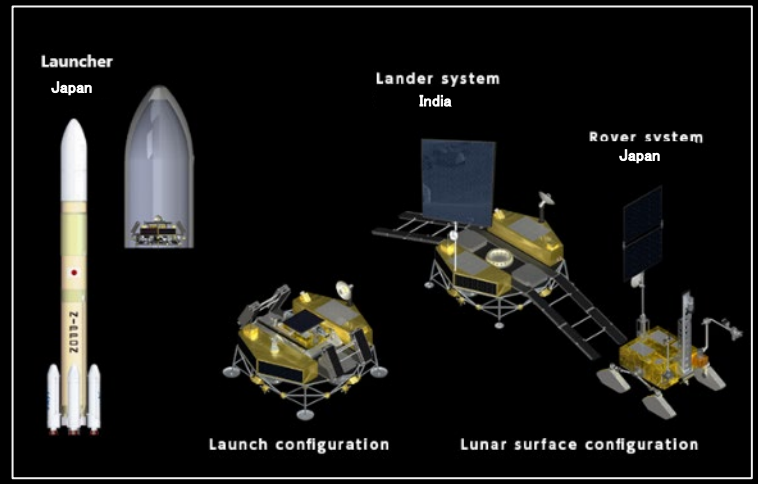
ISS Operations → Sustainable LEO

Privatizing Space Activities

6. Expanding Exploration Area on Lunar Surface（LUPEX）

Lunar Polar Exploration (LUPEX) (Launch Target 2025) Developing Phase

- Investigating Water Resources in South Polar Region
- Acquiring Technologies for Surface Exploration of Gravitational Bodies
- Technology Demonstration and Data Acquisition for Development of Crewed Pressurized Rover.



6. Expanding Exploration Area on Lunar Surface（Pressurized Rover）

Pressurized Rover (Launch Target 2029)

Concept Study Phase

- NASA Expects Japan to Provide It as a Contribution to the Artemis Program
- Dramatically Expands Exploration Area for Crewed Missions and Uncrewed Missions as well
- Allows Flexibility in Scientific Research

⇒ **Plays a Major Role for Sustainable Lunar Exploration under the Artemis Program**

Mission Overview	
Mission Duration	Crewed : max.42days/year Uncrewed : max.320days/year
Crew	2 (4 in contingency)
Life Span	10 years
Total Travel Distance	10,000km

7. Cooperation with Commercial Sector for Sustainable Exploration

JAXA's Technology

Space Transportation

Robotic Exploration

Manned Space Activities

Non-Space Industries' Technology

Explore

Create

Construct

Live

Promoting International Cooperation

宇宙探査 INNOVATION HUB イノベーションハブ Tansa


Thank You for Your Attention.