

Training the Artemis II Astronauts for Observing the Moon

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Introduction



NASA's Artemis II Mission launched 1 April, 2026

- Artemis II included a lunar pass around the far side of the Moon
- The crew (Reid Wiseman, Victor Glover, Christina Koch, Jeremy Hansen) were trained as **mission scientists**, directly exploring the Moon's surface through their observations from orbit
 - They were able to see, describe, and image lunar surfaces that have never been directly observed by humans



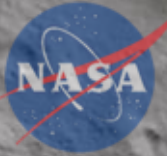
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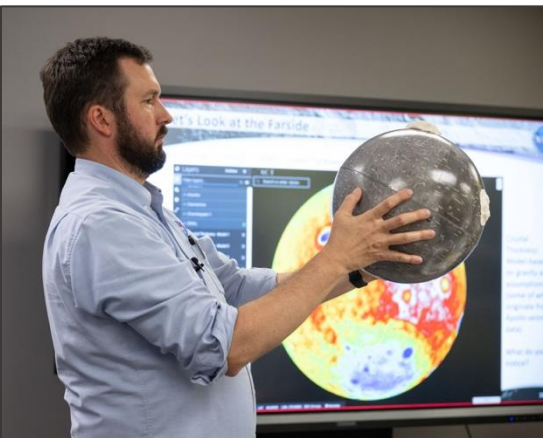
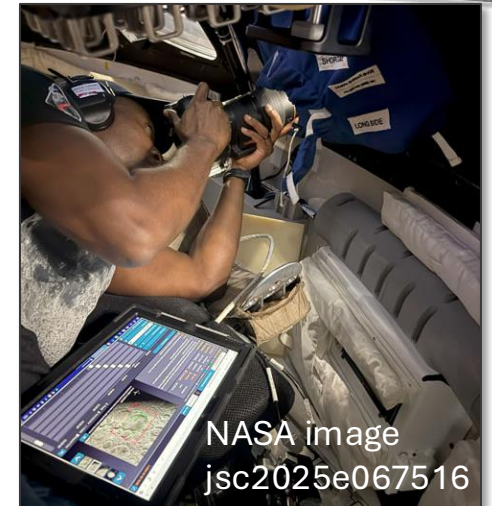
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Training the Artemis II Crew to Observe the Moon



- The Artemis II Lunar Science Training Team developed a multi-faceted lunar science and science operations training program to train the crew as mission scientists.
- The training program leveraged Apollo lessons-learned and included:
 - Classroom instruction
 - Fieldwork
 - Hands-on technical/operational training
 - Operational simulations
 - Digital exercises to reinforce learning



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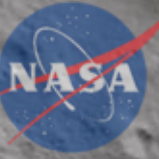
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Artemis II Training Program – Lunar Science in the Classroom



Basic Training: Lunar Fundamentals

- Establish a baseline of lunar knowledge/literacy
- Included Flight Control Team members
- Week-long deep dive into the Moon's geological history and exploration legacy
- Lunar processes such as impact cratering, volcanism, and tectonic deformation
- Emphasis on lunar samples and volatiles
- Tools and datasets for modern lunar science
- Key talking points for their public appearances





Artemis II Training Program – Lunar Science in the Field



Field training in terrestrial analogs to ground the crew's lunar science knowledge:

- Hands-on experience with **lunar-relevant rock types**
- Reinforced understanding of **lunar surface processes**
- Development of a **geologic vocabulary and a sense of scale**
- **Kamestastin Impact Crater** (N. Labrador), September 2023. Three crew members explored and studied a terrestrial impact structure and directly observed impact breccias and melts in feldspathic target rocks.
- **Icelandic Highlands**, Summer 2024. The entire crew conducted fieldwork in the Icelandic highlands, observing volcanic and tectonic features, as well as regolith (volcanic tephra) and icy regolith (an analog for volatile-rich regolith on the Moon).



NASA image jsc2024e055108



Artemis II Training Program – Science Plan for Lunar Observation



Training the crew on their science objectives

- Artemis II Science plan objectives and specific targets
- Illumination scenarios on the Moon's surface across launch dates
- Lunar geography and geology
- Visual observations and descriptions practice (including homework)
- One-on-one coaching for personalized feedback of visual observations and descriptions
- Lunar Geography and Targeting Plan software

Lunar Targeting Package
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Lunar Targeting Plan | Lunar Geography Review | Overview | Timeline | Targets | Guide

- 1. Whole Moon (1/2) 22:18 GMT
- 2. Orientale Basin 22:26 GMT
- 3. Crater Trio (Crookes) 22:34 GMT
- a. Crew Position Swap 22:42 GMT
- 4. Crater Trio (Vavilov) 22:42 GMT
- 5. Crater Trio (Jackson) 22:50 GMT

2. Orientale Basin OR-ee-ent ALL

Target Information

- Youngest basin on the Moon
- Diameter is distance between JSC and KSC

Camera Actions

- Mosaic entire basin at full zoom w/ overlap
- Take images while describing mare patches, basin rings, and ejecta
- Image and describe southern dark annular ring including boundaries and texture

Unaided Eye Actions

- Compare color and albedo variations between inner mare, outer mare, and southern annular ring
- Describe ring morphology and annotate the extent of any visible ejecta [use OneNote]

Science Impact

- Observations will be used to study the geologic evolution of the

Target Details: Apollo Basin, Montes Cordilera, Montes Rook, 2. Orientale Basin, Orientale Annular Ring

13 Feb 2026 22:26:00.000

Naked Eye | 135 mm | 200 mm | 400 mm | OneNote | Labels Off | Cue Card Off

1. Feature ID	2. Geometry	3. Color & Shadow	4. Structure & Texture	5. Geologic Relations	* Thoughts *
• Feature type/name	• Size	• Color tone	• Structures	• Association	• Impressions
• Target? (yes/no)	• Shape	• Albedo	• Slopes	• Contact habit	• Interpretations
• Location	• Boundary	• Shadows/illumination	• Texture	• Contact relationship	• Any changes?
• Observation style	• Preservation				

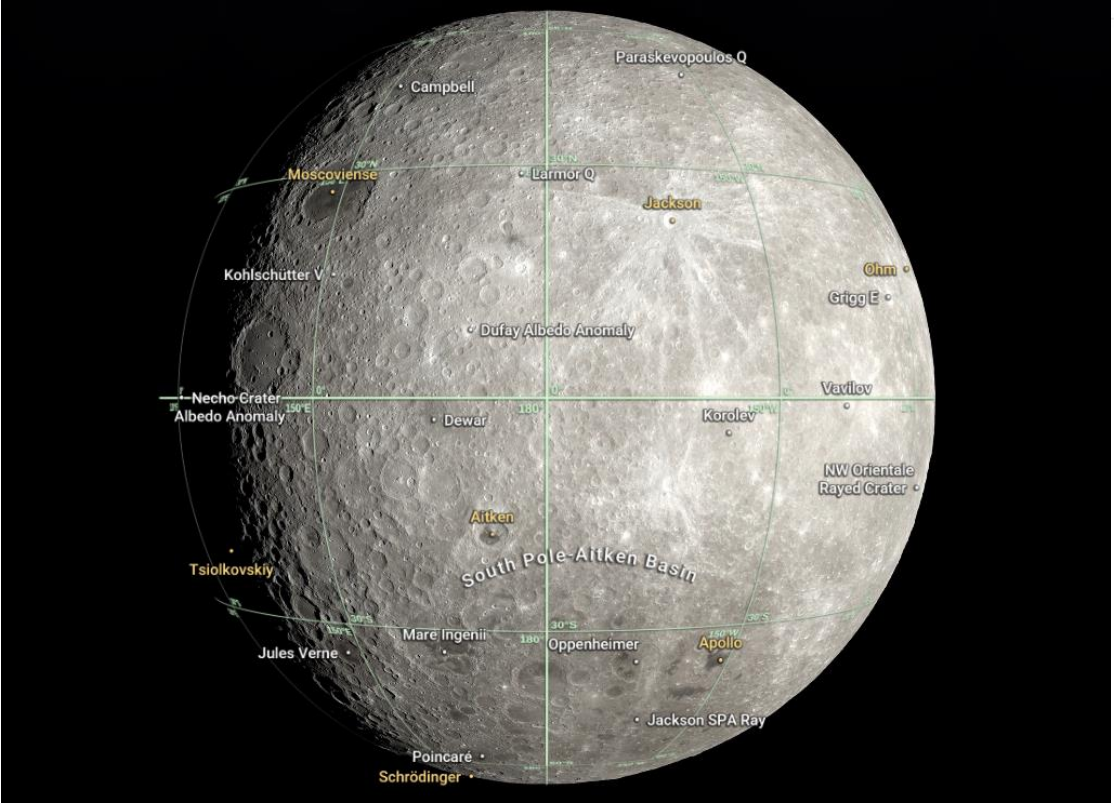
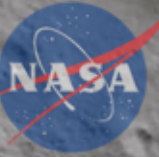
Color Provinces & Albedo Variation Priority: 1	Impact Flashes Priority: 1	Photometric Changes Priority: 2	Landing Sites & Lunar Poles Priority: 2	Impact History Priority: 2
Dust & Exosphere Priority: 2	Tectonics Priority: 2	Volcanic History Priority: 3	Terminator & Limb Priority: 3	Earth From Space Priority: 3

4 Exploration Capability Objectives

Exercise Crew Lunar Imaging/Observation Product Development and Execution 	Exercise Science Flight Team Support 	Exercise Science Data Capture Methods 	Exercise Science Data Archiving Methods
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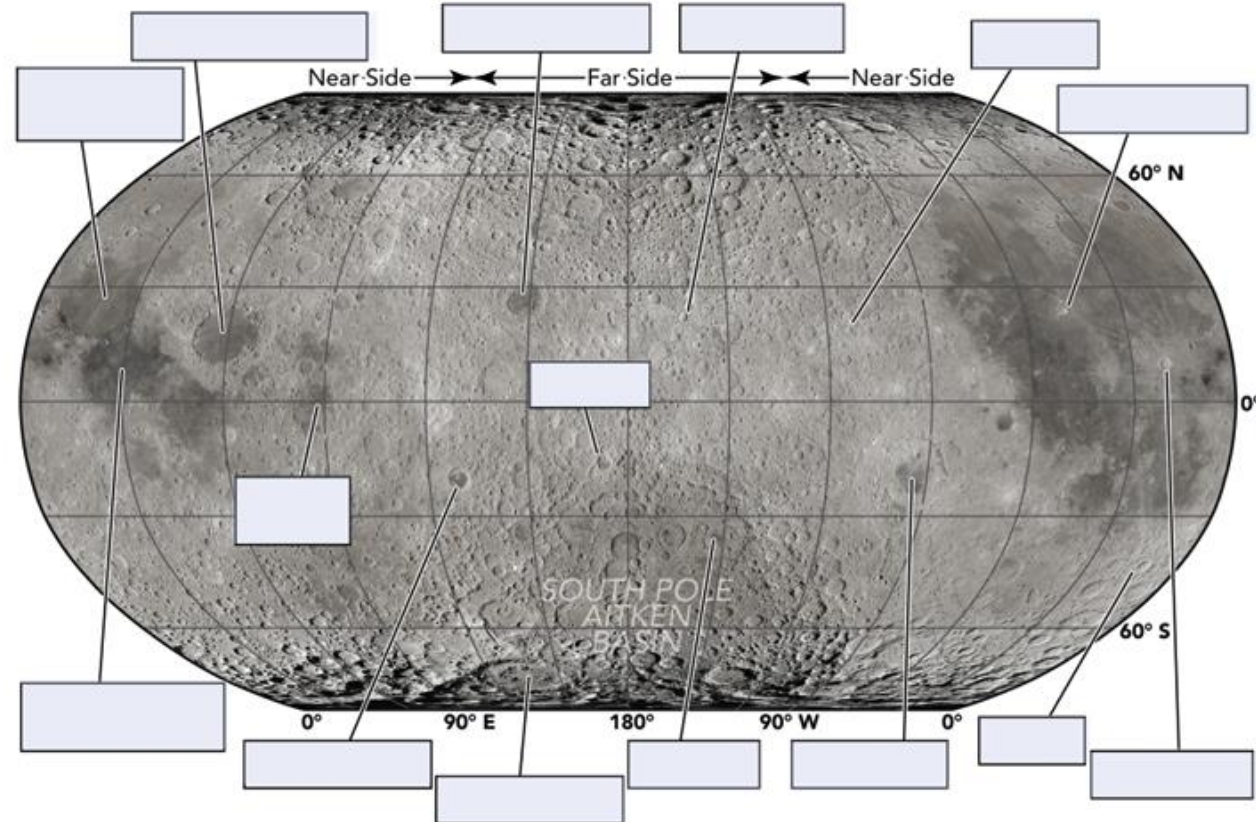
Artemis II Geography and Observations Homework



The lunar homework activities were highlighted as an example that provided repeated exposure, helping the crew quickly build understanding and retain information

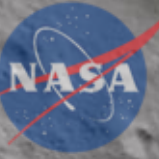
Step 1. Review the 15 Major Landmarks. Recollection of these features will help you navigate the lunar surface from above, no matter the orientation or illumination conditions present.

Fill in the boxes in the far side-centered global map of the Moon below. *Tip: Use the Views Tab (Minimum labels) of the LGR for assistance.*





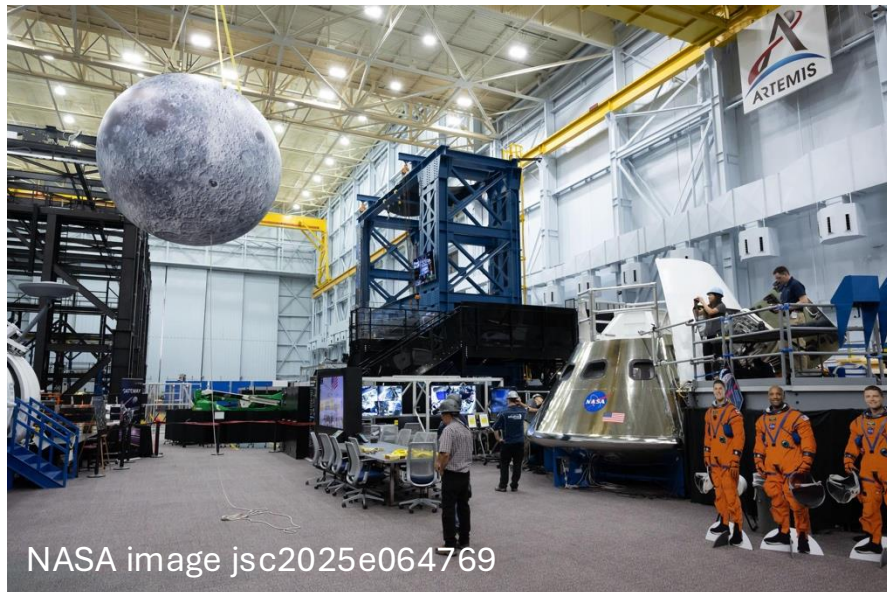
Artemis II Training Program – Lunar Observation Operations



NASA image jsc2025e087135

Bringing it all together: Training the crew on their science operations

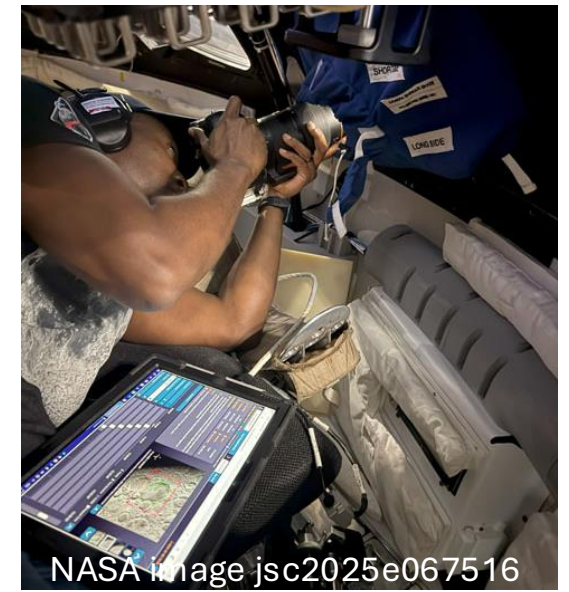
- Imagery/Camera Training
- Training on procedures with other hardware interfaces
- Crew-wide choreography for lunar observations
- Gaining familiarization with Lunar Targeting Plan and comfortable with feature descriptions
- Training in Orion capsule mock-ups
- Simulations with Flight Control Team



NASA image jsc2025e064769



NASA image jsc2025e064791



NASA image jsc2025e067516



Artemis II Results



Lunar Targeting Package LTP FINAL

Lunar Targeting Plan Lunar Geography Review Overview Timeline Targets

- 3. Crater Duo: Glushko (1/2) 19:15 GMT
- 4. Crater Duo: Ohm 19:23 GMT
- a. Window Team Position Swap 19:30 GMT
- 5. Aristarchus Plateau 19:31 GMT
- 6. Reiner Gamma 19:41 GMT

5. Aristarchus Plateau AIR-is-TAR-kus

Target Information

- Plateau known for its volcanic diversity and the bright Aristarchus crater.
- Within NW Oceanus Procellarum near limb.

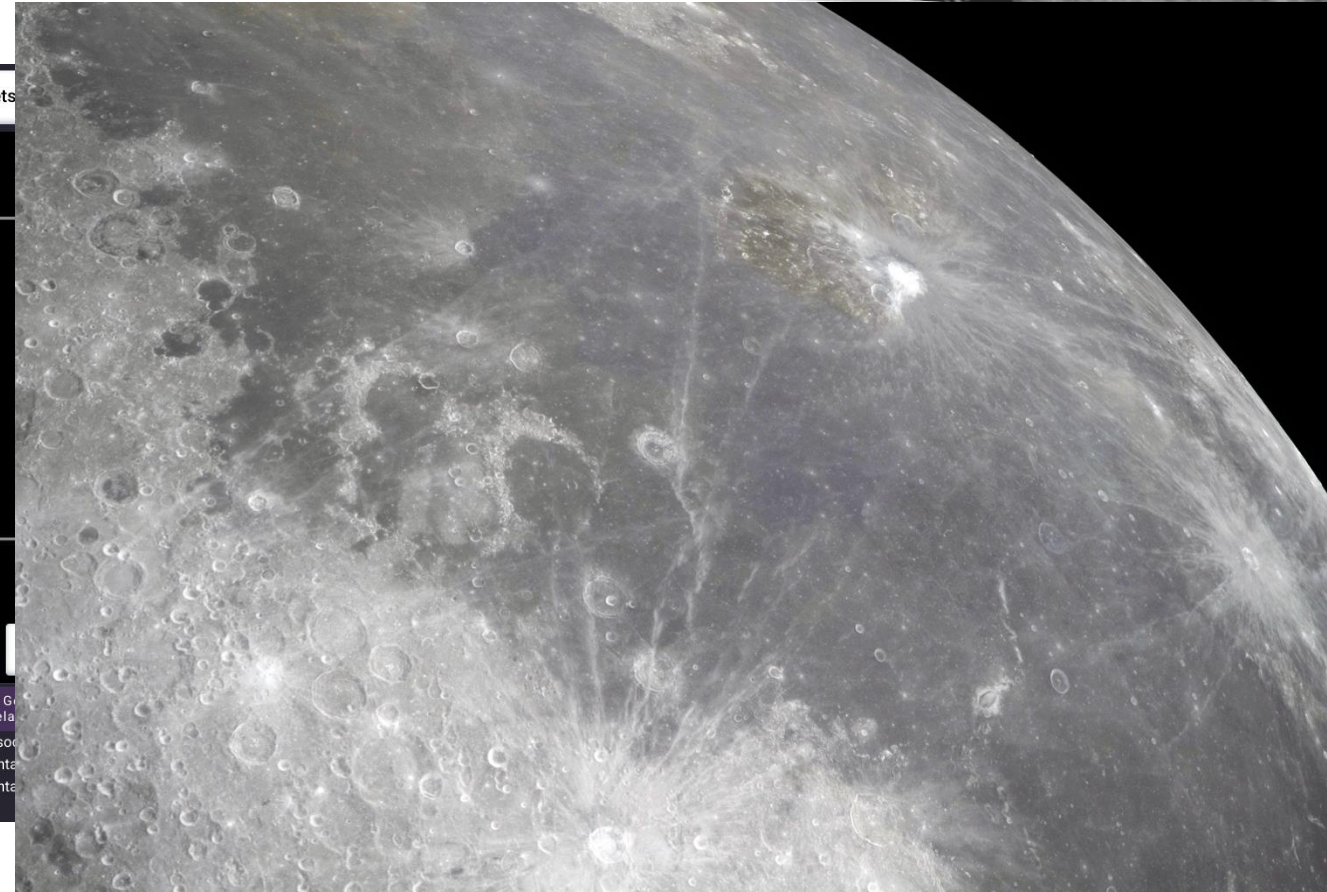
Camera Actions

- Centered image of plateau in full zoom.
- Image and describe any topographic highs or lava channels across the plateau.
- Image and describe any color/albedo variations across the plateau.
- Image and describe the colors and textures of Aristarchus crater and rays.

Unaided Eye Actions

Unaided Eye 135 mm 200 mm 400 mm OneNote Labels Off

1. Feature ID	2. Geometry	3. Color & Shadow	4. Structure & Texture	5. Geology & Relationship
• Feature type/name	• Size	• Color tone	• Structures	• Association
• Target? (yes/no)	• Shape	• Albedo	• Slopes	• Containment
• Location	• Boundary	• Shadows/illumination	• Texture	• Containment
• Observation style	• Preservation			



Lunar Targeting Plan

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Audio transcript from Artemis II (Hansen): I made some notes for Aristarchus PlateauI talked some more about how the **brownish colors** look like deposits on top of the darker mare from crater ray systems. To me, that creates the browns. **And Aristarchus Plateau is different. It's got greenish hues.**



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Earth in Moonshine
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Artemis II Results

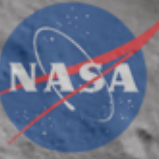
The Earth and Moon as members of the Solar System



Moon in Earthshine
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Artemis II leans into future Artemis missions to the Moon



NASA's lunar science training team has a better understanding of the training environment for subsequent Artemis missions.

Science and operations training take-aways

- Hands-on, scenario-based practice helps progressively build required skills
- Frequent updates and refreshes for training content retention
- Artemis II crew were pathfinders for our future lunar science training
 - Feedback important for geology training for the next Artemis lunar missions with the same goal of providing crews with the knowledge and tools to be the scientists and curators on the Moon's surface.



Image art002e009302

Artemis 2 crew (Left to right): Victor Glover, Jeremy Hansen, Reid Wiseman, Christina Koch

