International Observe the Moon Night 2023

LUNAR MARIA (SEAS) · NORTHERN HEMISPHERE · SATURDAY, OCTOBER 21

Moon Map

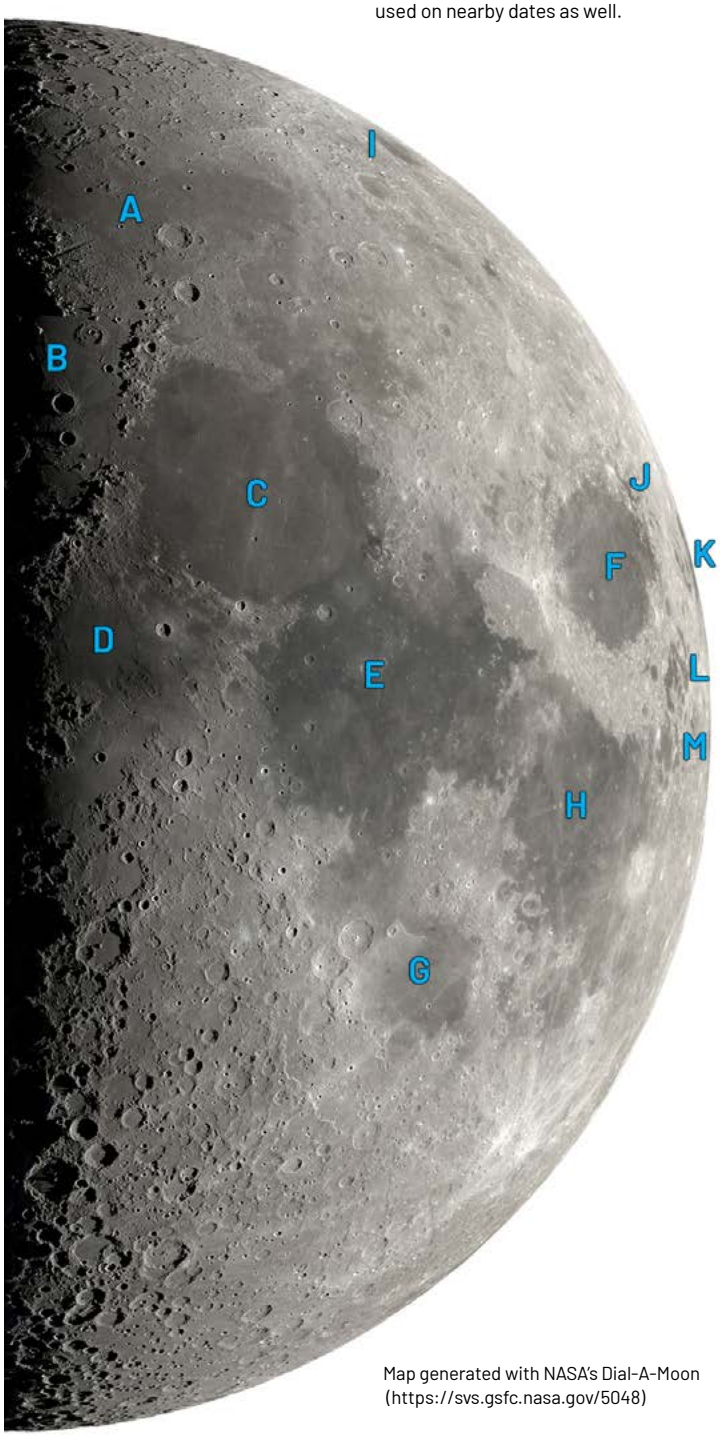
This map depicts the Moon as it will appear from the northern hemisphere on International Observe the Moon Night, October 21, 2023 (02:00 UT October 22). Many of the best views will occur along the terminator (the line between the day and night side of the Moon).

Lunar Maria (Seas)

You can see a number of maria tonight. Once thought to be seas of water, these are actually large, flat plains of solidified basaltic lava. They can be viewed in binoculars or even with the unaided eye. Some of the maria are circular, hinting at origins from giant asteroid impacts that created great basins, which were later flooded with lava. Other maria are irregular and have more mysterious origins. Tonight, you may be able to identify 13 maria on the near side of the Moon, including two maria along the eastern edge that are often hard to see. If you are up for a challenge, you can try to spot these elusive eastern seas! *Mare Humboltianum* (I), on the Moon's northeast edge, will be the easier of the two. Observers with telescopes may just barely be able to see a very thin darkening at the far eastern limb of the Moon, marking the extreme western edge of *Mare Marginis* (K).

- A **Mare Frigoris** (Sea of Cold)
- B **Mare Imbrium** (Sea of Rains)
- C **Mare Serenitatis** (Sea of Serenity)
- D **Mare Vaporum** (Sea of Vapors)
- E **Mare Tranquillitatis** (Sea of Tranquility)
- F **Mare Crisium** (Sea of Crises)
- G **Mare Nectartis** (Sea of Nectar)
- H **Mare Fecunditatis** (Sea of Fertility)
- I **Mare Humboldtianum** (Humboldt's Sea)
- J **Mare Anguis** (Serpent Sea)
- K **Mare Marginis** (Border Sea)
- L **Mare Undarum** (Sea of Waves)
- M **Mare Spumans** (Sea of Foam)

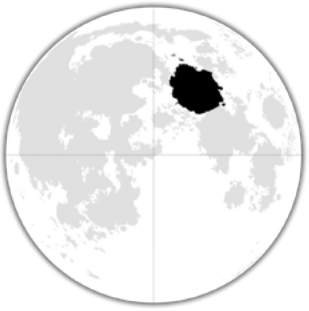
This map shows what the Moon will look like at 10 p.m. EDT on International Observe the Moon Night, but it can be used on nearby dates as well.



Map generated with NASA's Dial-A-Moon (https://svs.gsfc.nasa.gov/5048)

A. Mare Frigoris
(Sea of Cold)

B. Mare Imbrium
(Sea of Rains)



C. Mare Serenitatis
(Sea of Serenity)

D. Mare Vaporum
(Sea of Vapors)

E. Mare Tranquillitatis
(Sea of Tranquility)

F. Mare Crisium
(Sea of Crises)

G. Mare Nectartis
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H. Mare Fecunditatis
(Sea of Fertility)

I. Mare Humboldtianum
(Humboldt's Sea)

J. Mare Anguis
(Serpent Sea)

K. Mare Marginis
(Border Sea)

L. Mare Undarum
(Sea of Waves)

M. Mare Spumans
(Sea of Foam)

These charts show the positions and extents of 13 lunar seas that are at least partially visible on the Moon tonight, with north up and lunar west to the left. Some of the larger seas can be found without any special equipment. Other smaller seas may be challenging to find even through binoculars. Combine these charts with the accompanying map and see how many of the Moon's maria you can track down tonight!

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HUMAN LANDING SITES · NORTHERN HEMISPHERE · SATURDAY, OCTOBER 21

Moon Map

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Lunar Landing Sites

Between July 1969 and December 1972 a total of 12 astronauts landed on the surface of the Moon for six of the Apollo missions. Apollo missions 11, 12, 14, 15, 16, and 17 each landed in different locations on the lunar surface. These locations, each fascinating for their own particular reasons, sampled a wide range of lunar geology and terrain, from smooth mare plains to rugged ancient highlands. Four landing sites are visible tonight. Use this map and the magnified charts on the other side of this sheet to find and observe these historic sites.

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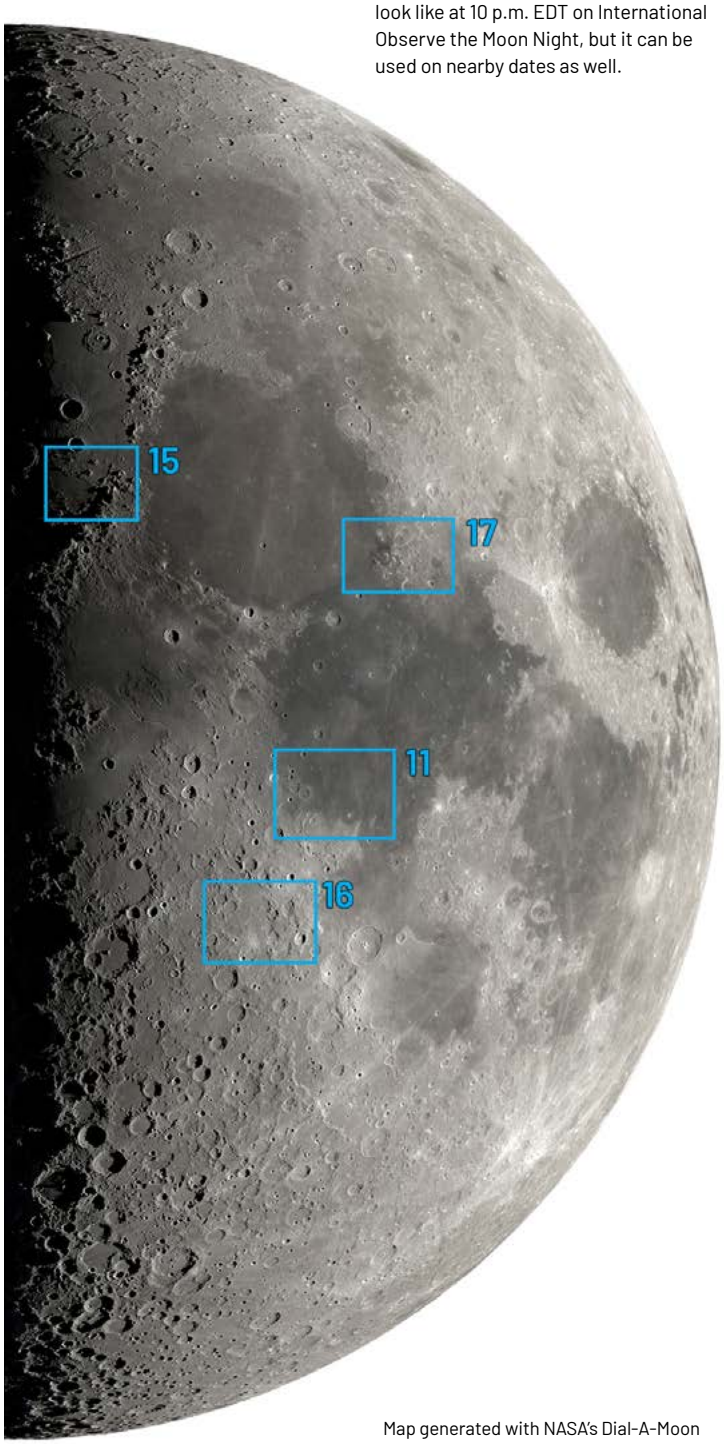

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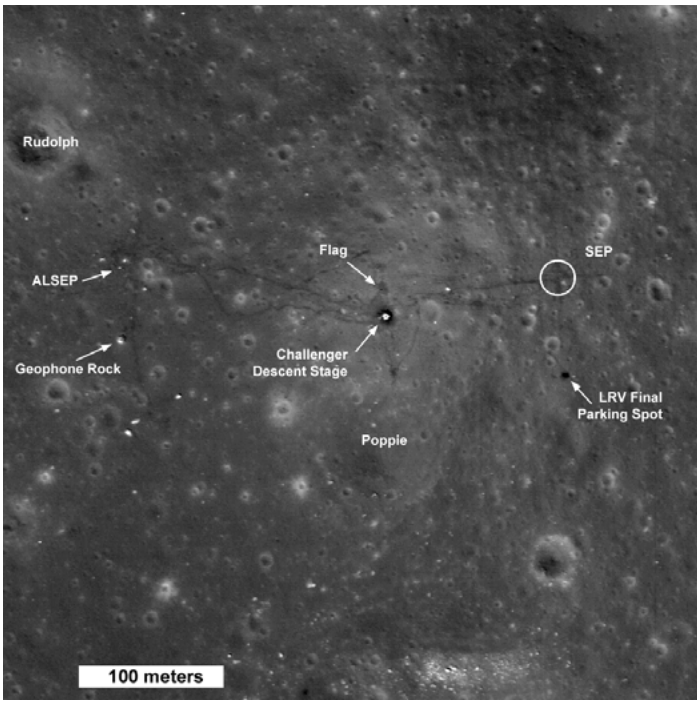
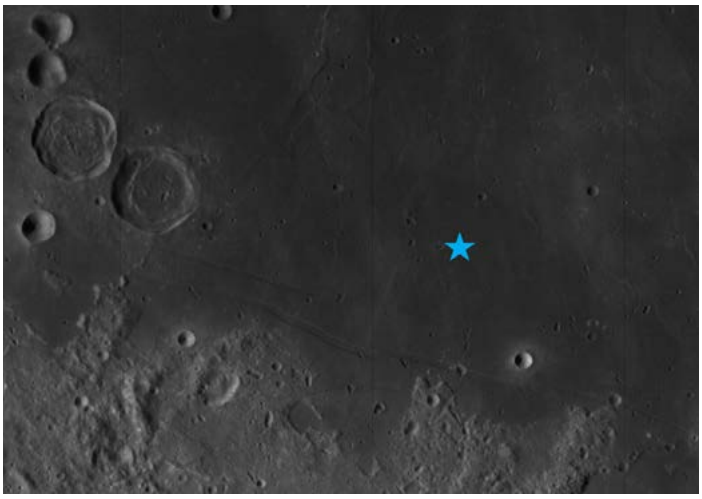


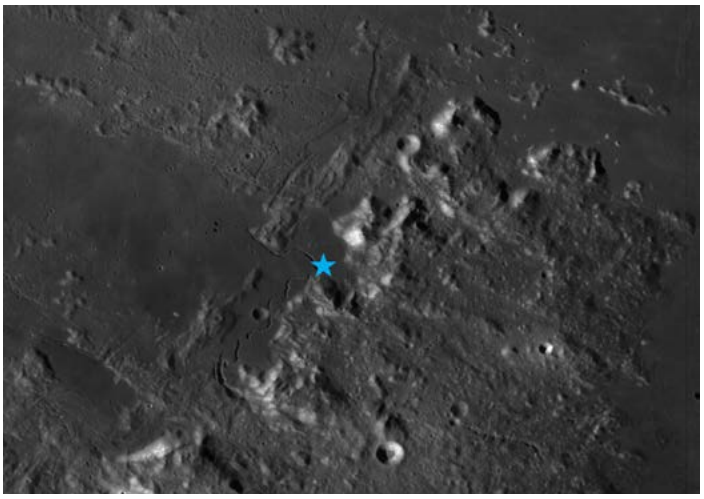
Detail view of Apollo 17 landing site with some features annotated. Image from the Lunar Reconnaissance Orbiter Camera.



Apollo 11

The first human landing site was on the smooth flat plains of the Sea of Tranquility. Despite how flat the area looks from Earth and from lunar orbit, astronauts Neil Armstrong and Edwin Aldrin had to maneuver their lander at the last minutes of their descent in order to avoid a field of giant boulders.

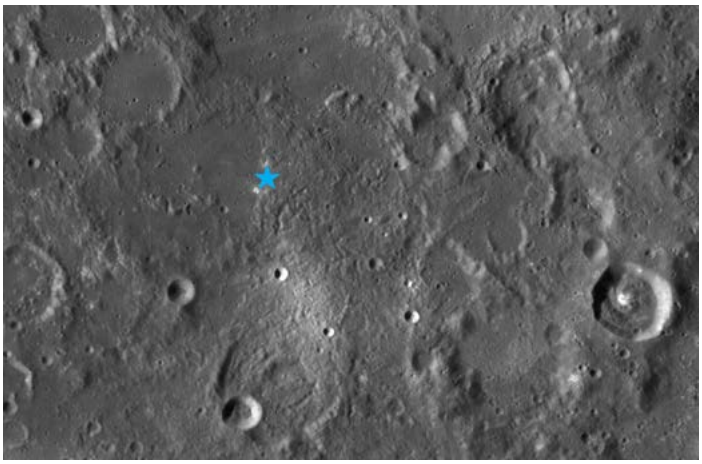
Site: **Mare Tranquillitatis** | Mission Duration: **July 16, 1969 - July 24, 1969**
Command Module: **Columbia** | Lunar Module: **Eagle**
Commander: **Neil Armstrong** | Lunar Module Pilot: **Edwin Aldrin Jr.**
Command Module Pilot: **Michael Collins**



Apollo 15

In July 1971, astronauts David Scott and James Irwin landed at the edge of Mare Imbrium at the base of the towering Apennine Mountains. Driving their rover across the mare and up the lower mountain slope, they gathered samples from the dark plains and the surrounding, light-colored lunar highlands.

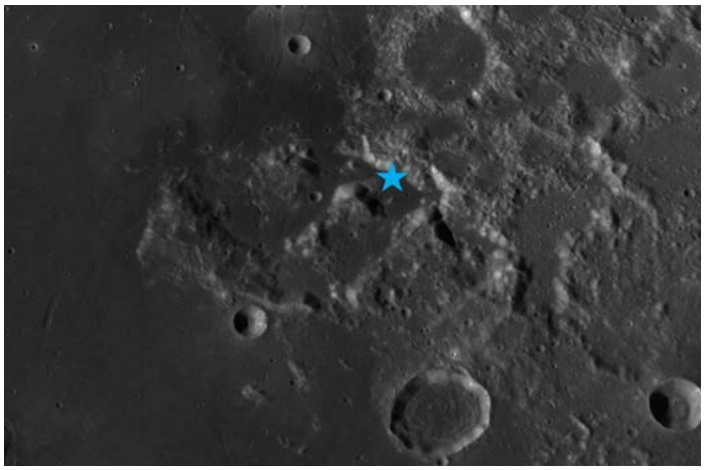
Site: **Hadley-Apennine** | Mission Duration: **July 26, 1971 – August 2, 1971**
Command Module: **Endeavour** | Lunar Module: **Falcon**
Commander: **David Scott** | Lunar Module Pilot: **James Irwin**
Command Module Pilot: **Alfred Worden**



Apollo 16

This was the first and only mission to land in the rugged lunar highlands. In April 1972, astronauts John Young and Charles Duke collected rock samples more than 4 billion years old. These showed that the ancient lunar crust formed from rock that crystalized and floated to the top of a global lunar magma ocean.

Site: **Descartes Highlands** | Mission Duration: **April 16, 1972 – April 27, 1972**
Command Module: **Casper** | Lunar Module: **Orion**
Commander: **John Young** | Lunar Module Pilot: **Charles Duke Jr.**
Command Module Pilot: **Thomas Mattingly II**



Apollo 17

The final Apollo mission to land on the Moon visited the spectacular Taurus-Littrow Valley, deeper than Earth's Grand Canyon. In December 1972, astronauts Eugene Cernan and Harrison Schmitt (the first professional geologist on the Moon) explored an active fault scarp, a gigantic landslide deposit, and brought back samples that included beads of volcanic glass erupted in an ancient lunar fire fountain.

Site: **Taurus-Littrow** | Mission Duration: **December 7, 1972 – December 19, 1972**
Command Module: **America** | Lunar Module: **Challenger**
Commander: **Eugene Cernan** | Lunar Module Pilot: **Harrison Schmitt**
Command Module Pilot: **Ronald Evans**

Detailed images are Lunar Reconnaissance Orbiter WAC mosaics with north up and lunar west to the left.
Find more high-resolution images of the Moon at https://trek.nasa.gov/moon

International Observe the Moon Night 2023

SELECTED OBJECTS FOR TELESCOPIC VIEWING · **NORTHERN HEMISPHERE** · **SATURDAY, OCTOBER 21**

Moon Map

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Selected Telescopic Objects

Some of the more interesting lunar landforms that have favorable lighting for viewing tonight are identified here. Details for each are on the reverse side of this map.

1. **The lunar alps** (Montes Alpes)
2. **The Caucasus Mountains** (Montes Alpes)
3. **Apennine Mountains** (Montes Apenninus)
4. **Imbrium Sculpture**
5. **Rima Hyginus & Rima Ariadeus**
6. **Ptolemaeus, Alphonsus, Arzachel, & Albategnius Craters**

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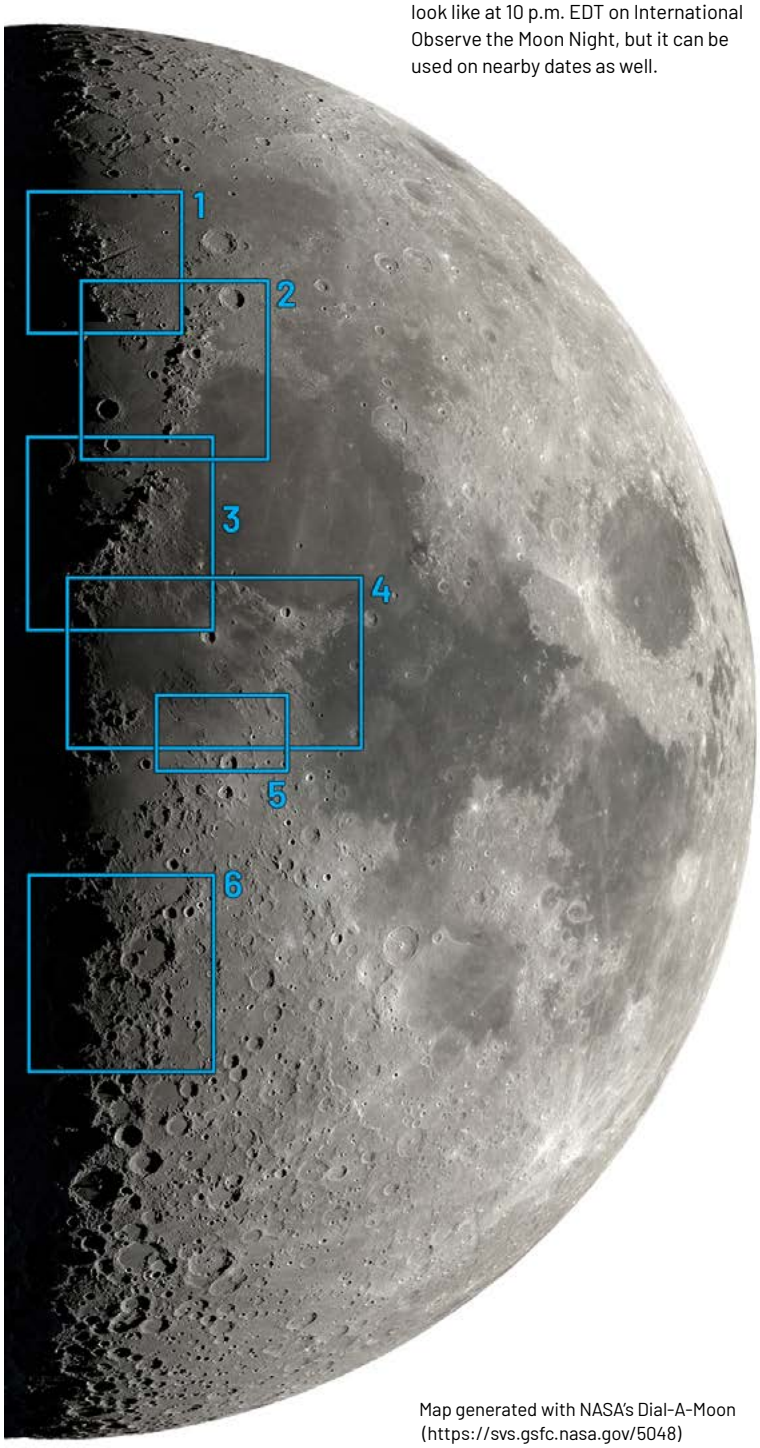


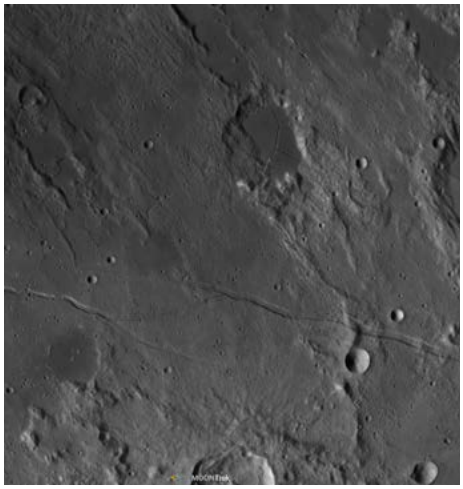
Map generated with NASA's Dial-A-Moon (https://svs.gsfc.nasa.gov/5048)

1. The lunar alps (Montes Alpes):
This mountain range is formed by the northeast rim of the Imbrium Basin, with the plains of Mare Frigoris to the north. Cutting across the mountain range is the Alpine Valley, a graben formed by a strip of lunar crust that dropped down between two parallel faults. Peaks of the Alps rise up about 3 kilometers. The Alpine Valley is 166 km long and 10 km wide.

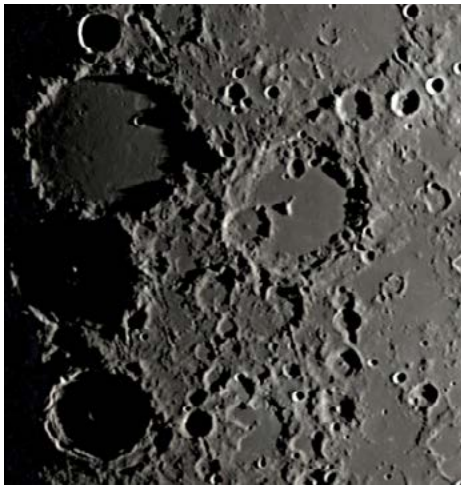
2. The Caucasus Mountains (Montes Alpes):
This mountain range rises on the eastern rim of the Imbrium Basin and the western rim of the Serenitatis Basin. Towering peaks in this rugged landscape rise to heights of about 4 kilometers. On International Observe the Moon Night 2023, the entire range will be illuminated by the early morning Sun on the Moon. This excellent lighting should provide dramatic views.

3. Apennine Mountains (Montes Apenninus):
The most spectacular of the Moon's mountain ranges stretches for 600 km along the southeast rim of the Imbrium Basin. Its peaks rise to heights of about 5 kilometers. Lunar sunrise will be advancing along the peaks and ridges of the range on International Observe the Moon Night, with only the northern portion illuminated.

4. Imbrium Sculpture:
The Imbrium Basin formed 3.9 billion years ago in an incredibly violent impact. Evidence of this impact within the basin was buried by the flood of lava that formed Mare Imbrium. But outside the rim, dramatic evidence of the impact can still be seen. To the southeast of the basin, vast deposits of ejected debris and gigantic gouges in the Moon's surface give spectacular testimony to this event.



5. Rima Hyginus & Rima Ariadeus:
Amidst the chaos of the Imbrium Sculpture are two great, prominent, apparent fractures in the lunar crust. These are excellent examples of straight rilles formed by magma rising up through and widening cracks in the lunar crust. Hyginus lies to the west and Ariadeus to the east. Magma apparently reached and erupted onto the surface along Hyginus with blankets of volcanic ash around the rille and volcanic pit craters along the rille.



6. Ptolemaeus, Alphonsus, Arzachel, & Albategnius Craters:
The lunar sunrise on these large impact craters should put on a spectacular show. Watch the dark shadows of the eastern rims retreat across the crater floors and see the heights of the western rims catch the rays of the rising Sun. Look for Alphonsus' central peak to appear as a bright star as the Sun rises. Ptolemaeus, Alphonsus, Arzachel are aligned north to south and Albategnius is to the east.

North is up and lunar west to the left in these close-up views.
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