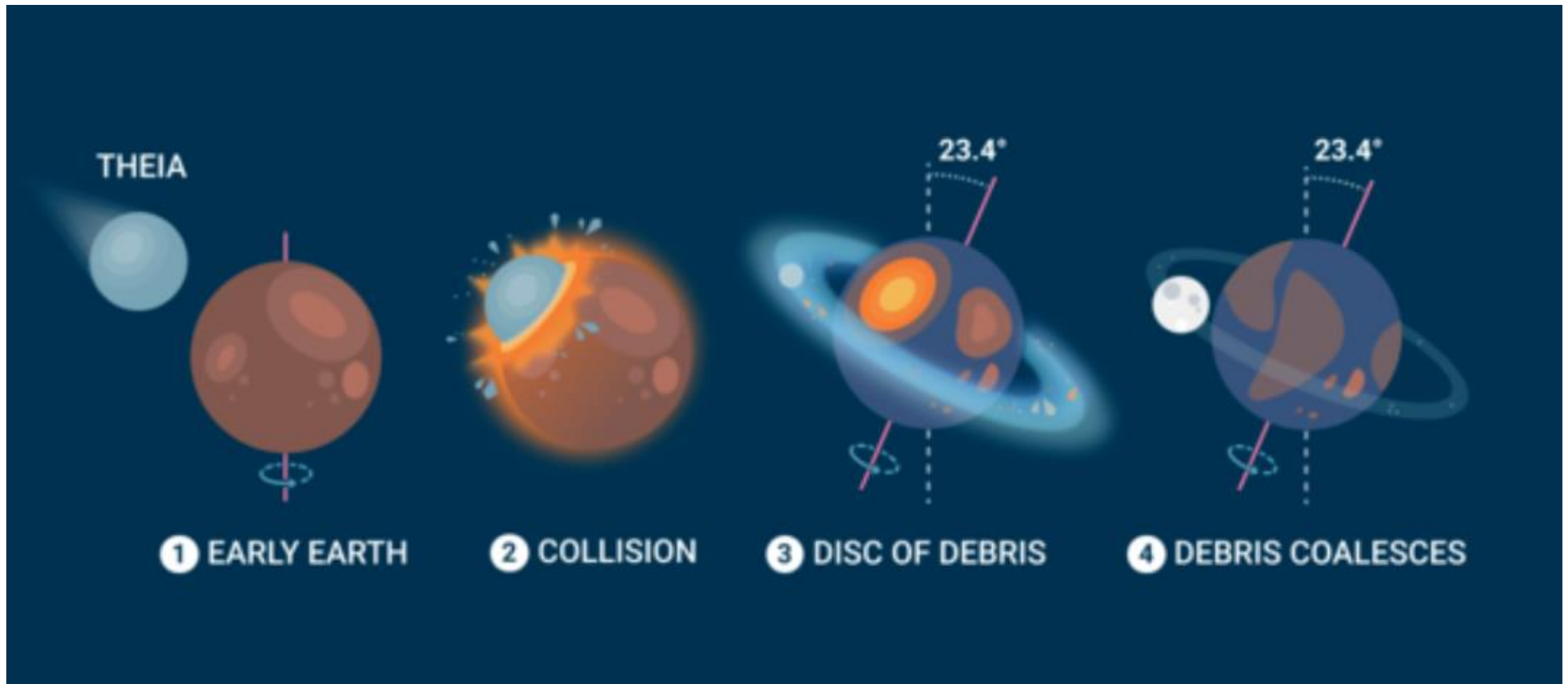


# Topic 2: The Lunar Disc





# Formation of the Moon

<https://science.nasa.gov/moon/formation/>

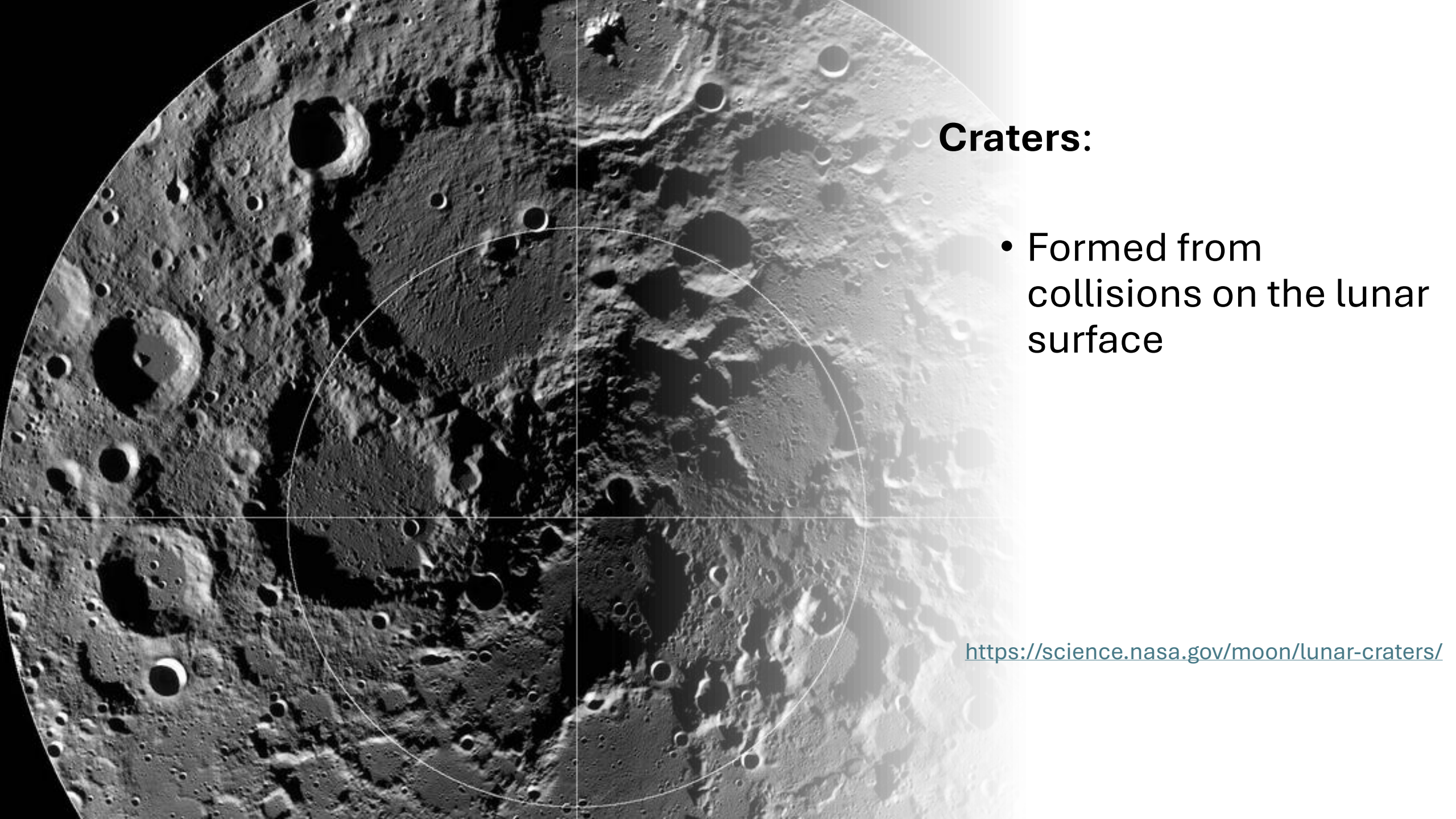


## The Moon

- **Oblate Spheroid**
- It is approximately **380,000 km** from the Earth.
- The Moon has a mean diameter of **3,500 km**.
- This is about **27% the diameter of Earth**.



# Lunar Landscape



## Craters:

- Formed from collisions on the lunar surface

<https://science.nasa.gov/moon/lunar-craters/>

A composite image of three lunar craters. The top-left panel shows the Copernicus crater, a large, multi-ringed impact crater with a prominent central peak. The top-right panel shows the Tycho crater, a smaller, bowl-shaped crater with a very bright, extensive ray system radiating from its rim. The bottom panel shows the Kepler crater, a dark, circular crater with a relatively smooth interior. The panels are separated by white diagonal lines.

Copernicus

Tycho

Kepler



# Mare (Maria)

- Bombardment pierced the crust when the Moon was relatively young
- Molten rock cooled to form flat maria
- Basaltic iron-rich rock

250 km

A large, dark, circular lunar mare with a complex, radial pattern of smaller impact craters and a bright central peak. The surrounding lunar surface is lighter and more heavily cratered.

Ocean of Storms  
(Oceanus Procellarum)

A dark, relatively smooth lunar mare with a few small, distinct craters. The surrounding lunar surface is lighter and more heavily cratered.

Sea of Tranquility  
(Mare Tranquillitatis)

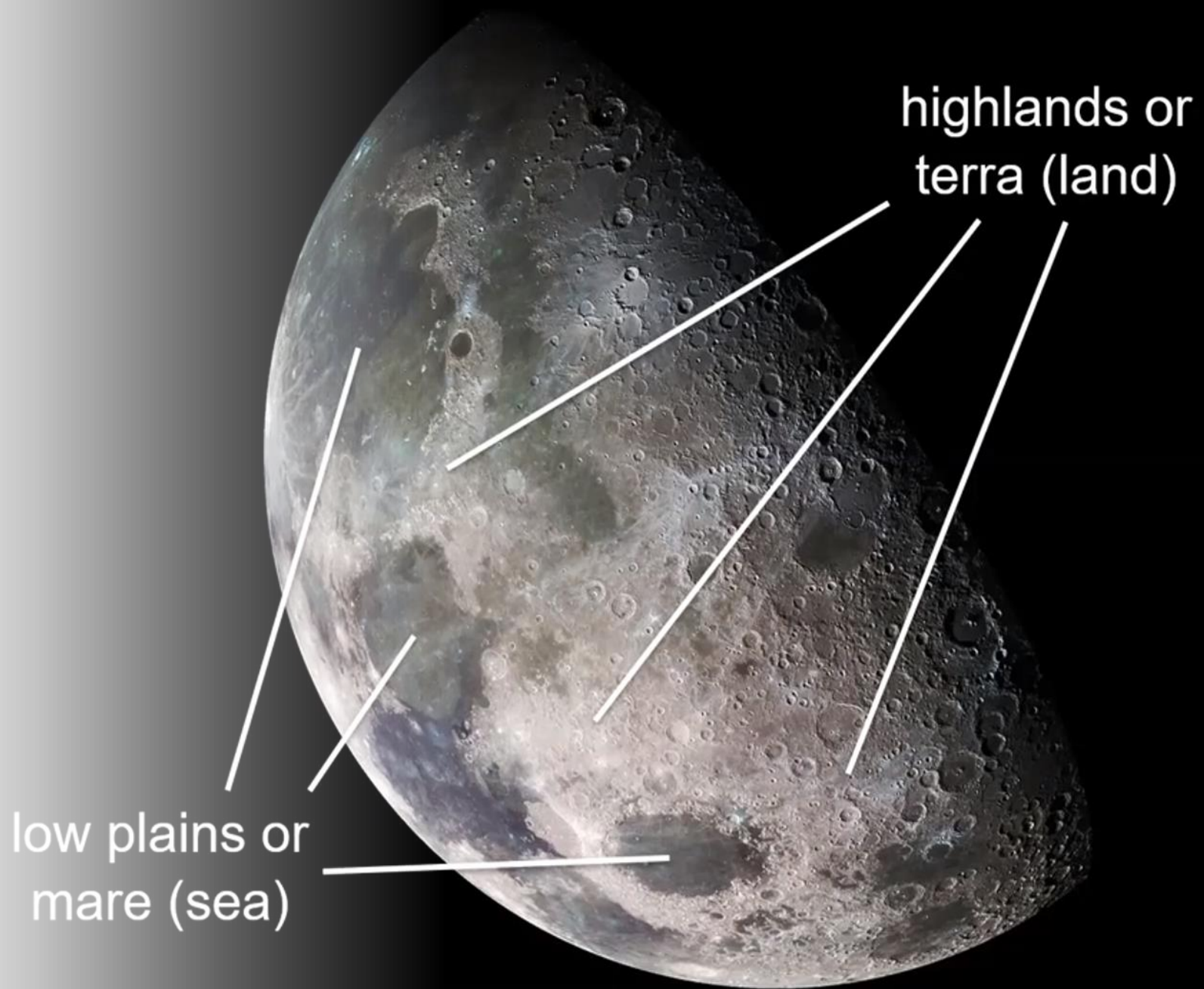
A dark, circular lunar mare with a few small, distinct craters. The surrounding lunar surface is lighter and more heavily cratered. Three specific craters are labeled with red arrows: Swift, Peirce, and Picard.

Sea of Crises  
(Mare Crisium)

Swift  
Peirce  
Picard

## Terrae (Highlands)

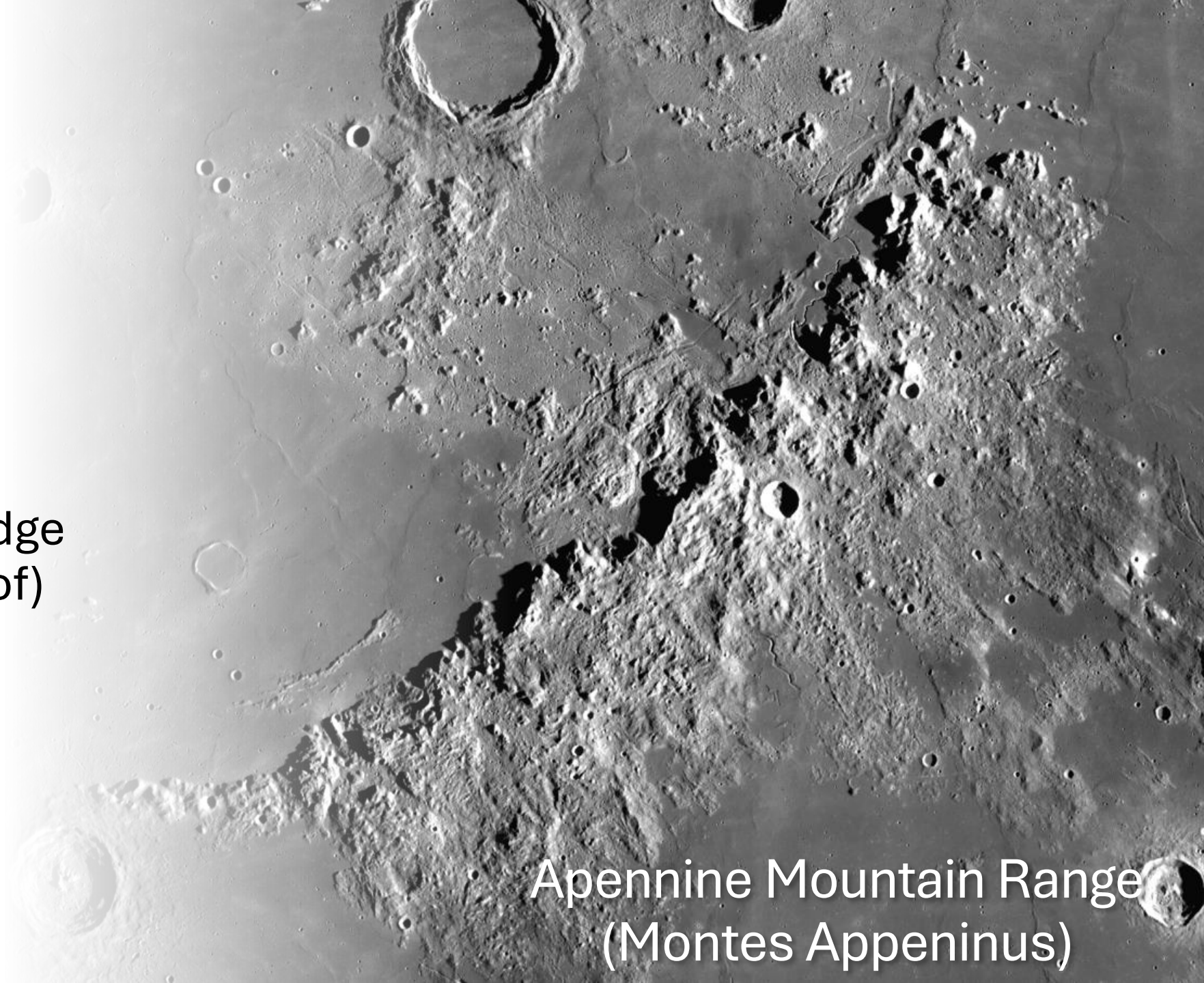
- Highly cratered mountainous regions
- Formed as the molten surface of the moon cooled

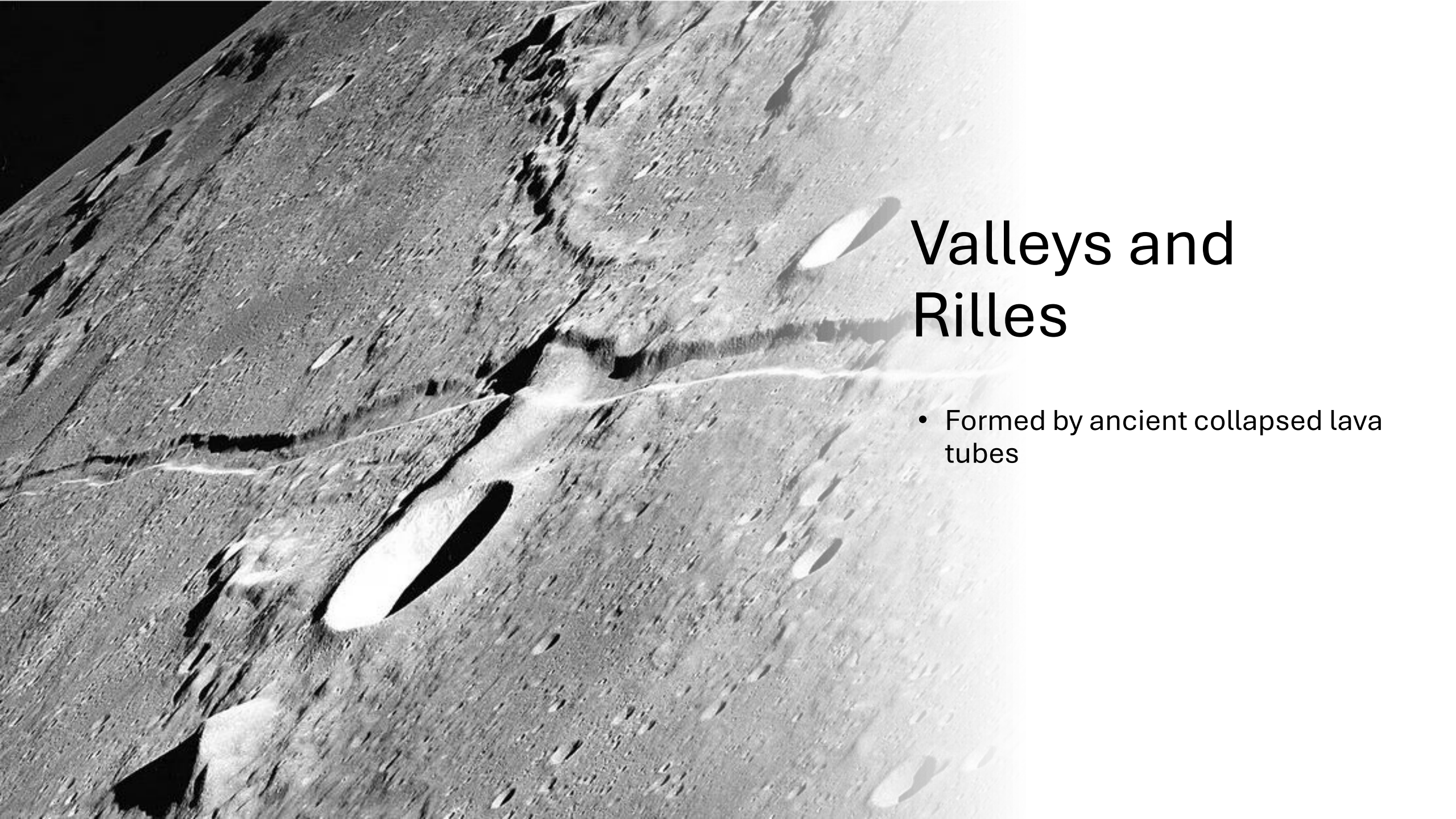


# Mountains

- Formed on the edge or (in the centre of) massive craters

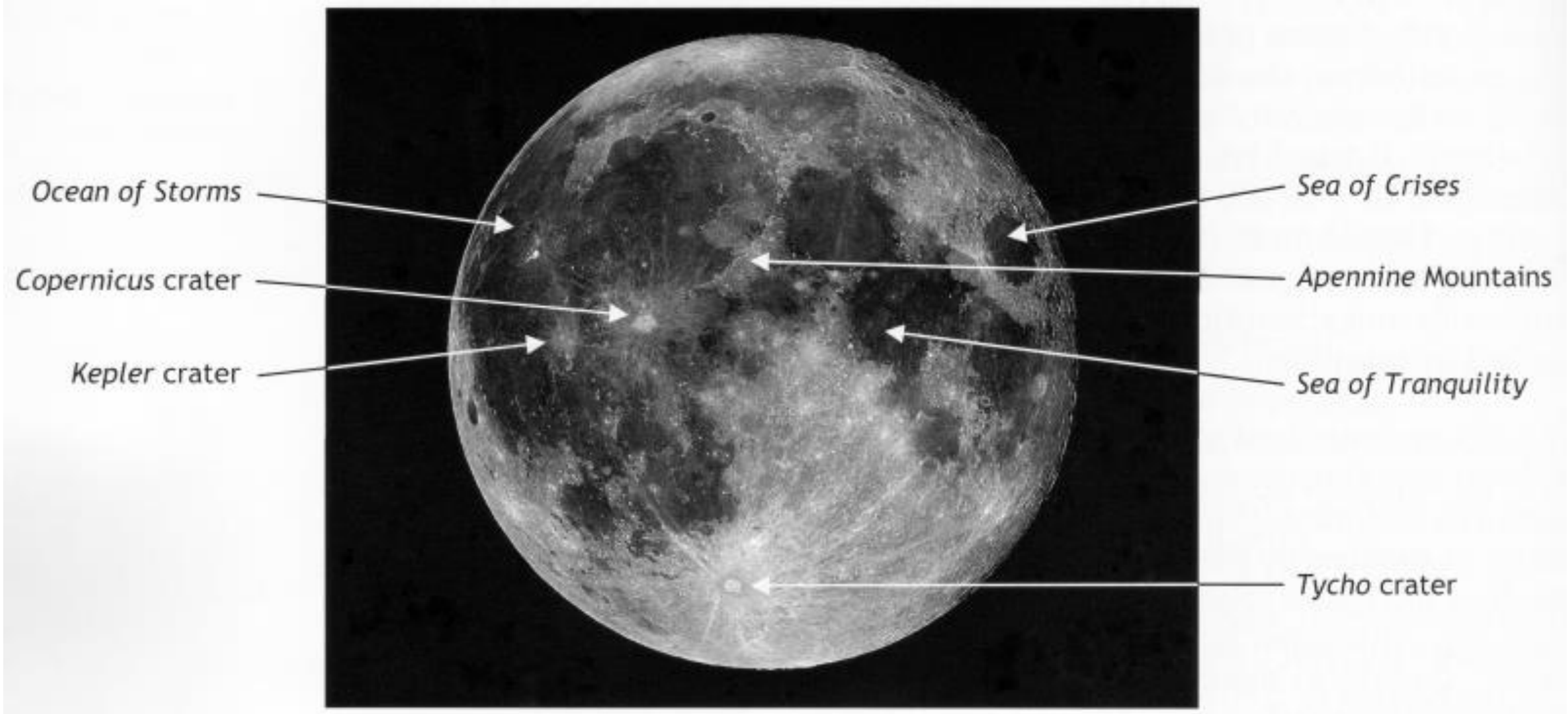
Apennine Mountain Range  
(Montes Appeninus)





# Valleys and Rilles

- Formed by ancient collapsed lava tubes



*Ocean of Storms*

*Copernicus crater*

*Kepler crater*

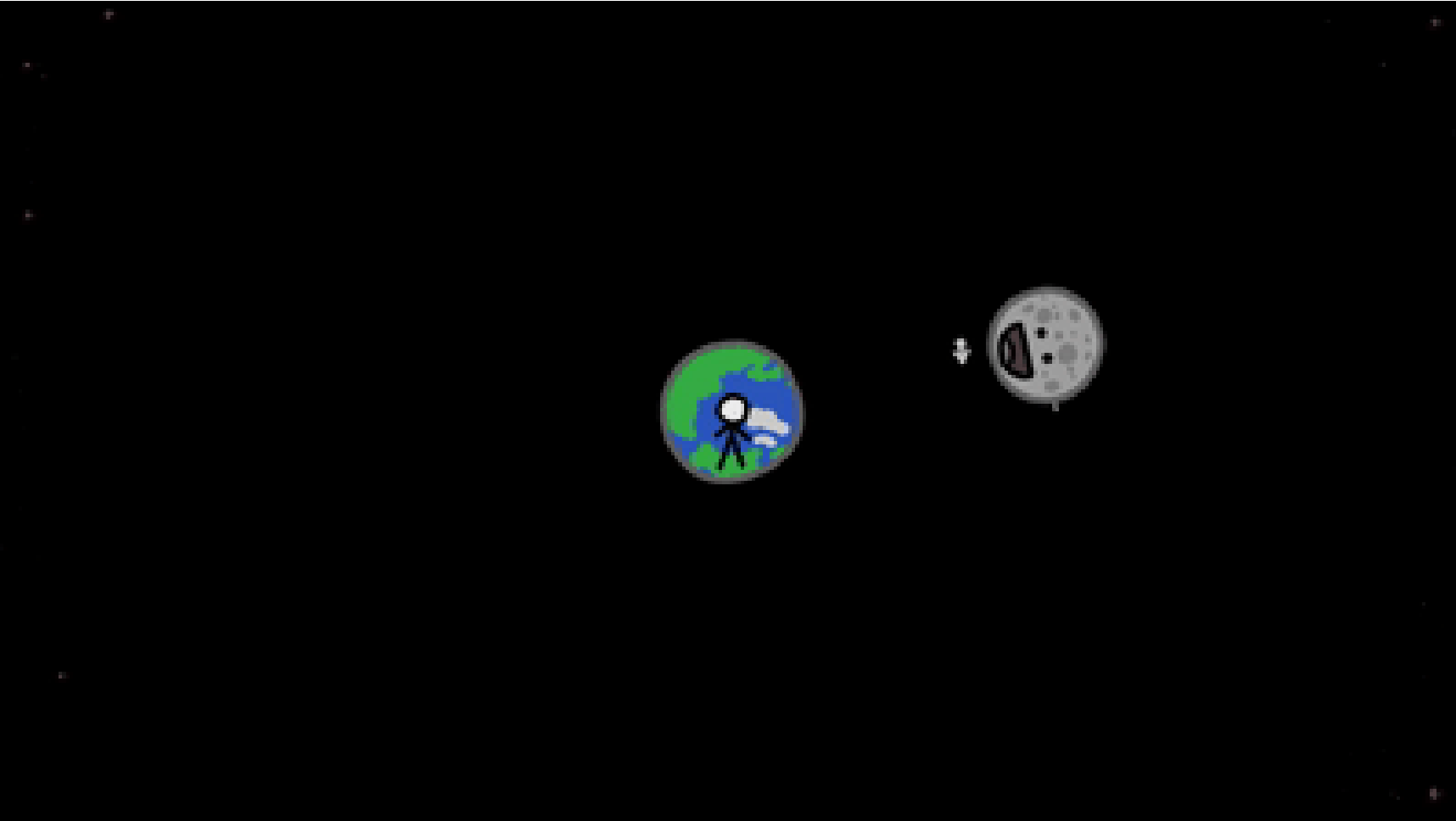
*Sea of Crises*

*Apennine Mountains*

*Sea of Tranquility*

*Tycho crater*

# Rotation and Revolution



Orbital period: 27.3 days  
(time taken to orbit Earth).

Rotation period: 27.3 days  
(time taken to spin once on  
its axis).

The moon is **tidally locked**  
to Earth.

<https://science.nasa.gov/moon/tidal-locking/>

<https://science.nasa.gov/resource/shadows-near-the-moons-south-pole/>

# Lunar Libration

We actually see **59%** of the moon's surface due to:

1. The elliptical orbit of the Moon around the Earth.
2. The plane of the Moon's orbit.
3. Our own observing position.
4. The Moon also has a precession effect so that it wobbles slightly.

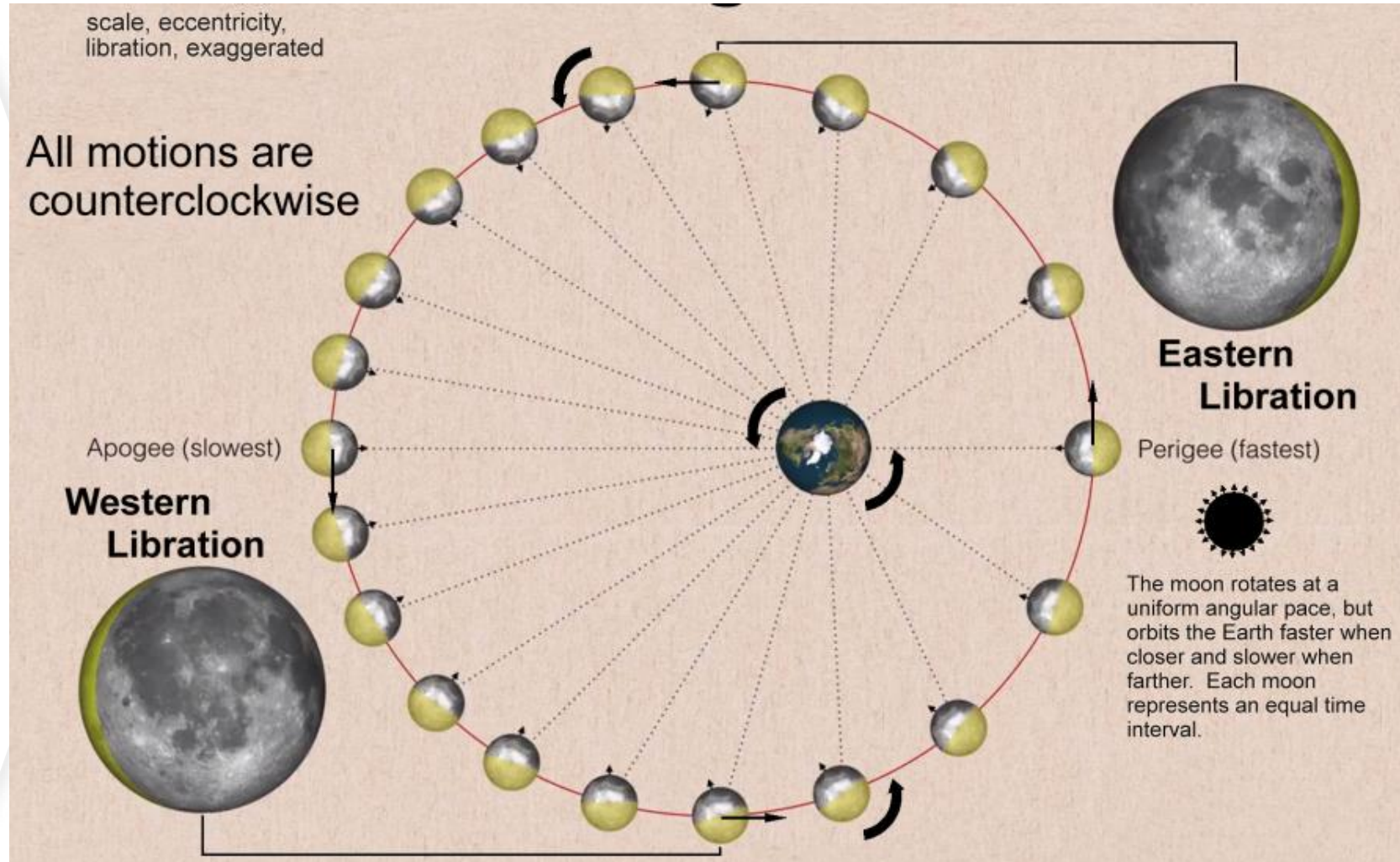


## Libration in Longitude

The Moon's orbit is elliptical, so its speed changes.

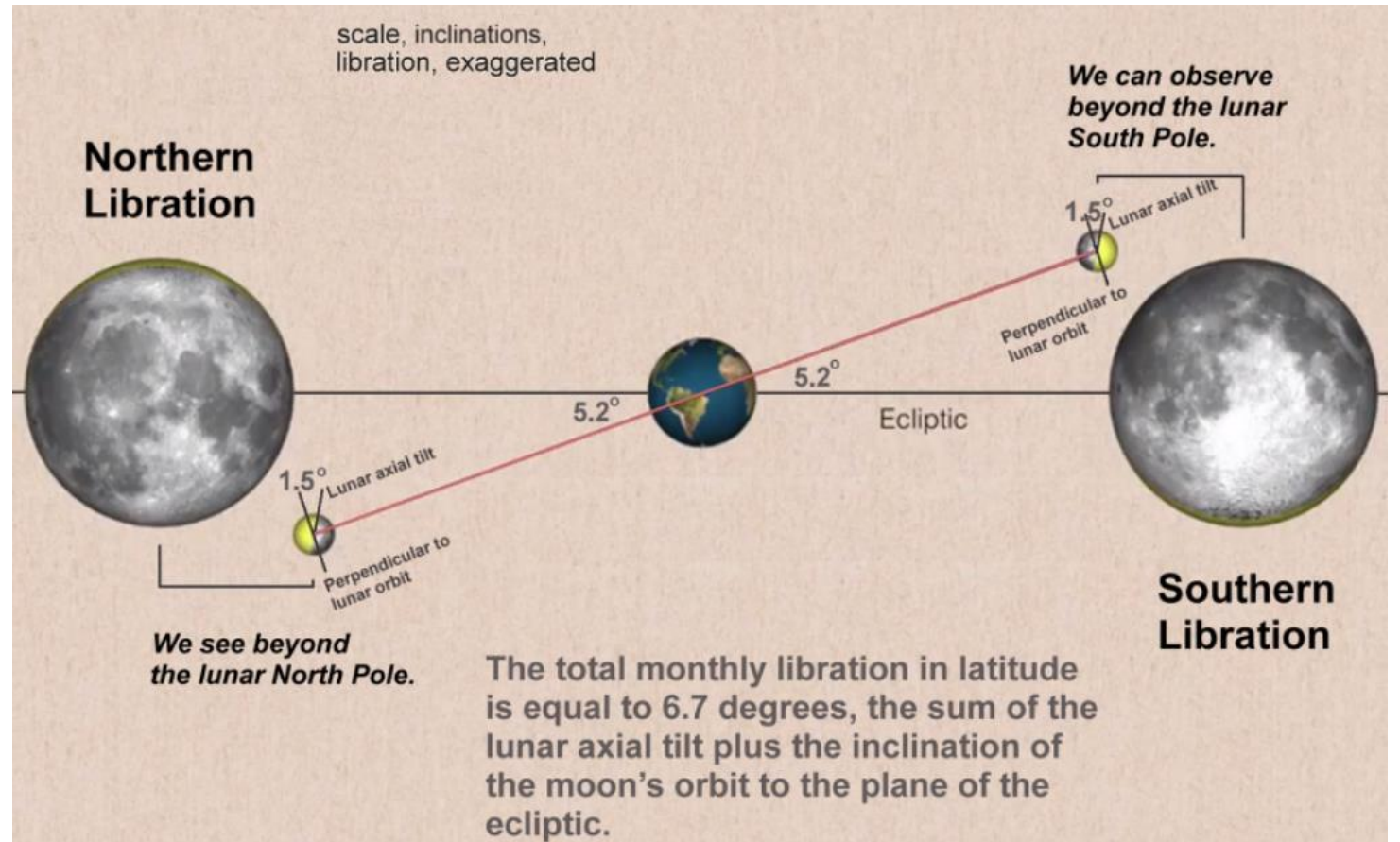
However, its rotation on its axis is steady.

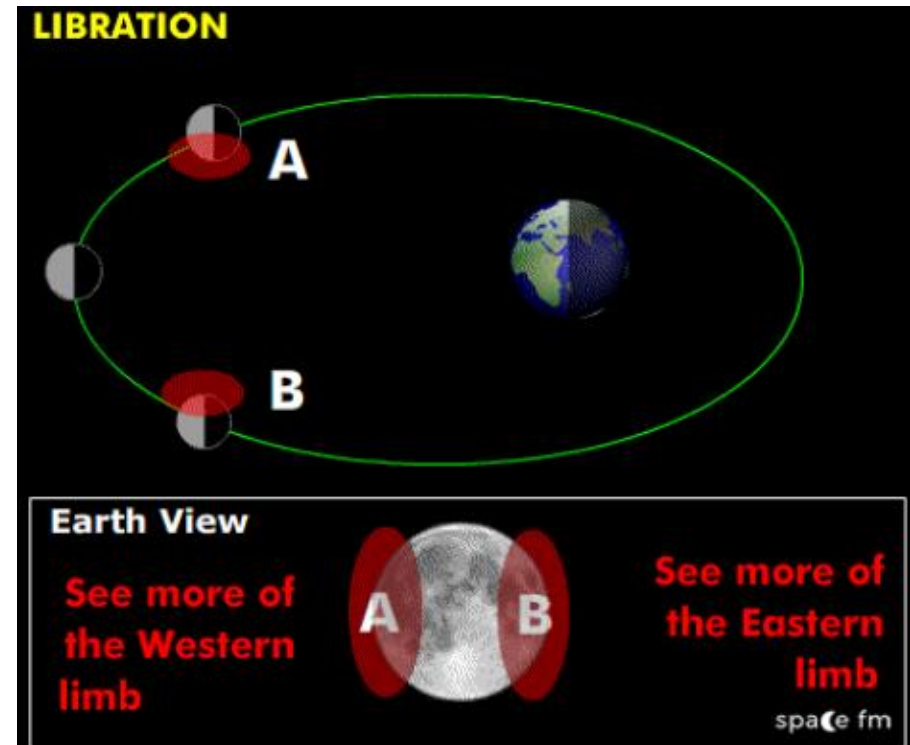
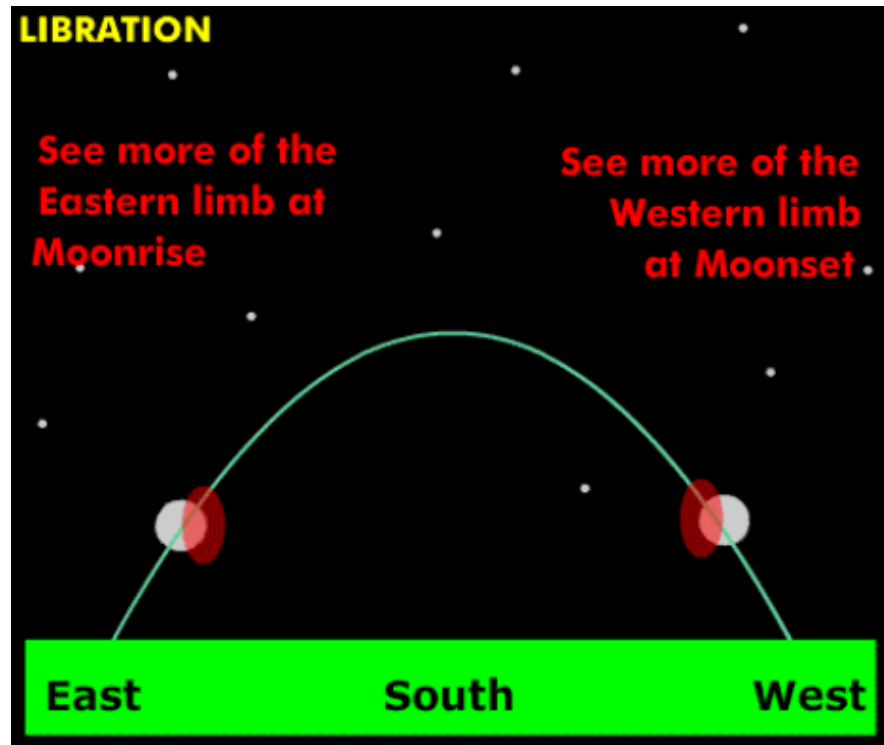
This results in us seeing slightly more of one side and then the other.



## Libration in Latitude

- The Moon's axis is tilted slightly (around 7 degrees), and its orbit has a small inclination (around 5 degrees).
- This lets us 'peek' over the top and underneath slightly.





# Diurnal Libration

- The Moon's axis is tilted slightly (around 7 degrees), and its orbit has a small inclination (around 5 degrees).
- This lets us 'peek' over the top and underneath slightly.