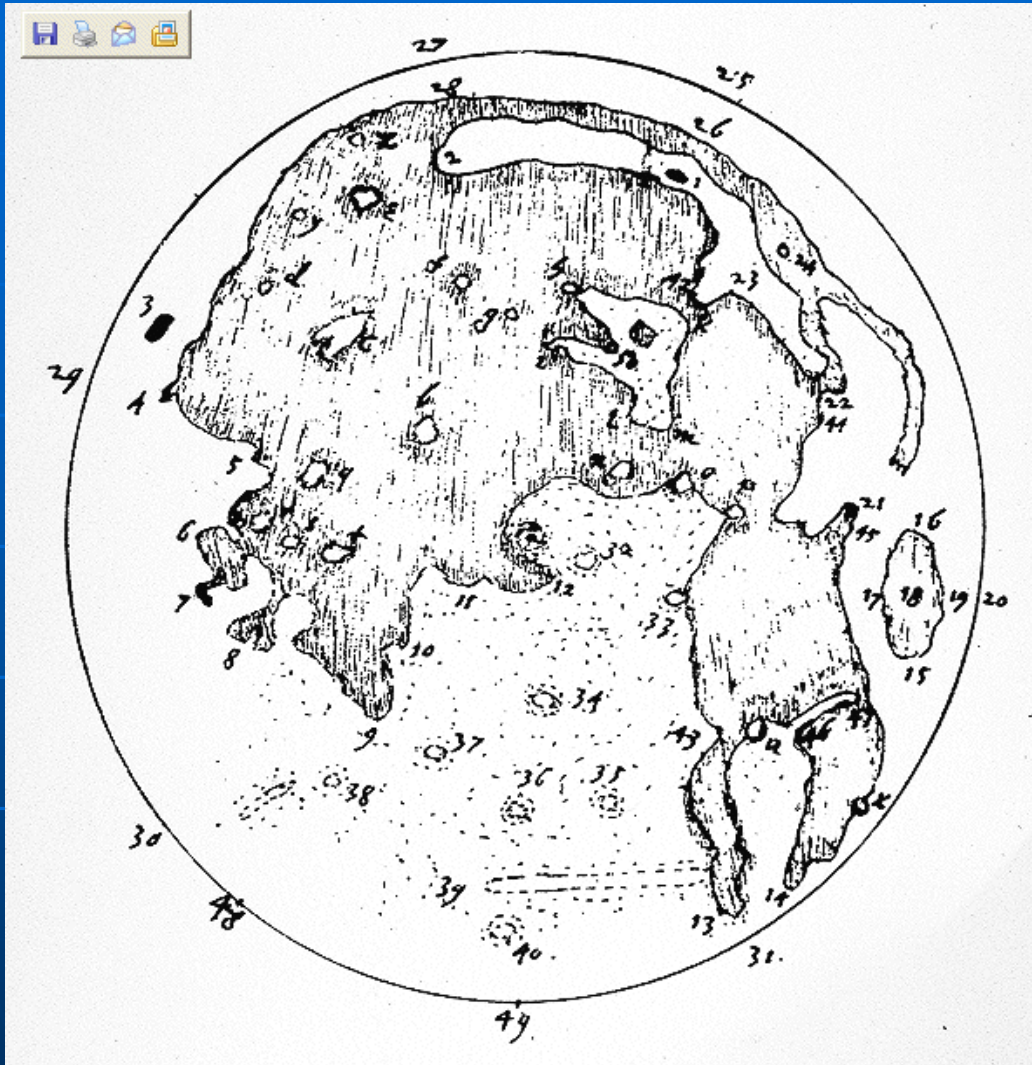


Ten Things You Might Like to Know About the Earth's Moon



A short
presentation by
the Howard
Astronomical
League

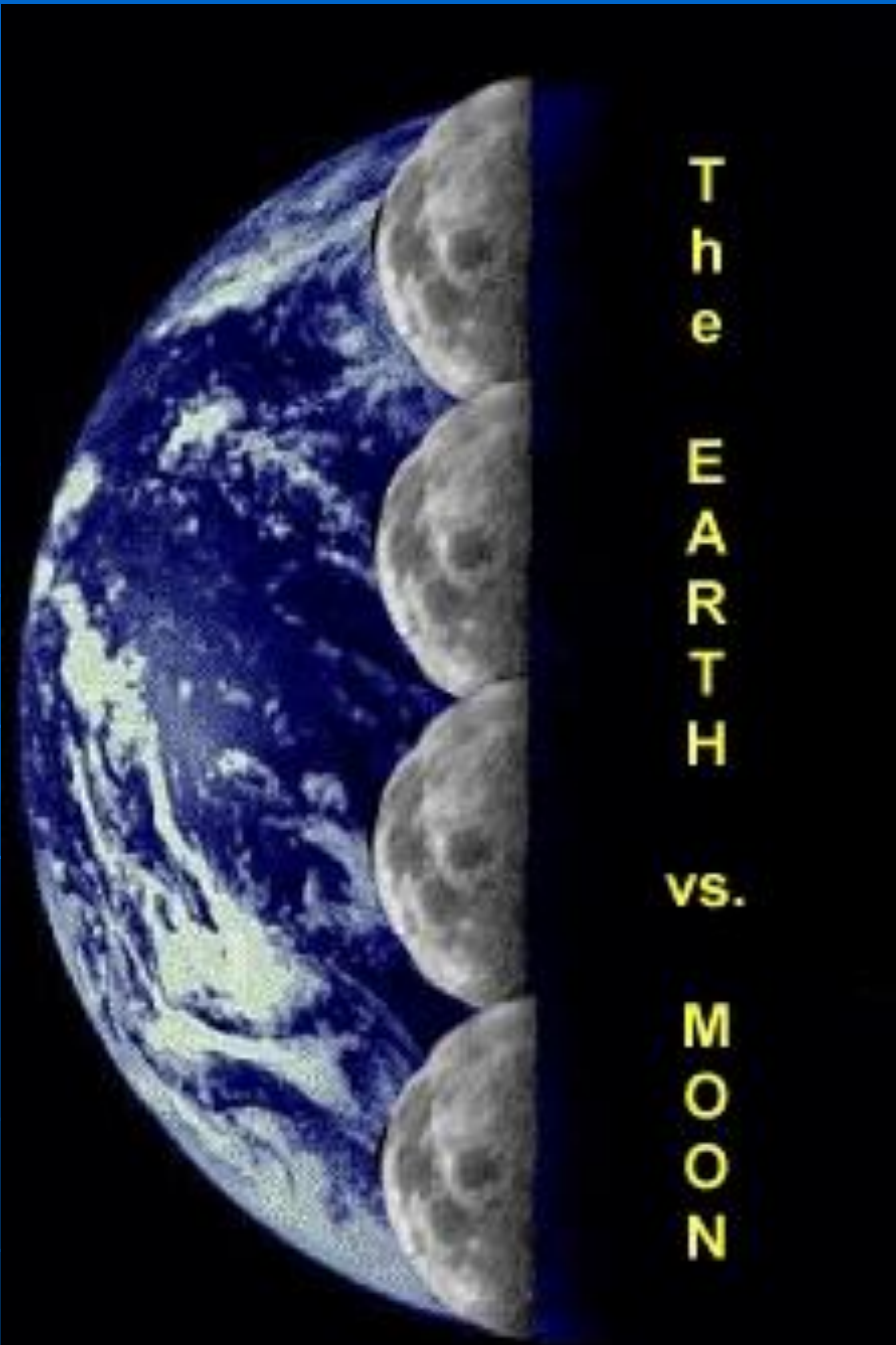




In 1609 and 1610, the first years that the newly invented telescope was turned towards the Moon, Thomas Harriot made a number of drawings of his telescopic observations of the Moon.



The Unlabeled Moon



The
EARTH
vs.
MOON

| | |
|---|-------------------------------|
| Distance From Earth: | 225,745 miles |
| Length of a Day: | 27.3 days |
| Radius: | 1,080 miles |
| Diameter: | 2,160 miles |
| Weight: | 81 Quintillion Tons |
| Surface Temp (Day): | 273° F |
| Surface Temp (Night): | - 244° F |
| Gravity At Surface: | 0.1667 g (1/6 Earth's) |
| Orbital Speed | 2,287 mph |
| Driving time by car (@70 mph): | 135 days |
| Flying time by rocket: | 60 to 70 hrs. |
| No. of Men Who Have Walked on Surface: | 12 |
| Age of Oldest Rock Collected: | 4.5 Billions yrs. |
| Rocks Collected By Apollo: | 842 pounds |
| Widest Craters: | 140 miles (dia.) |
| Deepest Craters: | 15,000+ (ft.) |
| Highest Mountains: | 16,000+ (ft.) |

1. Theories of Moon Formation

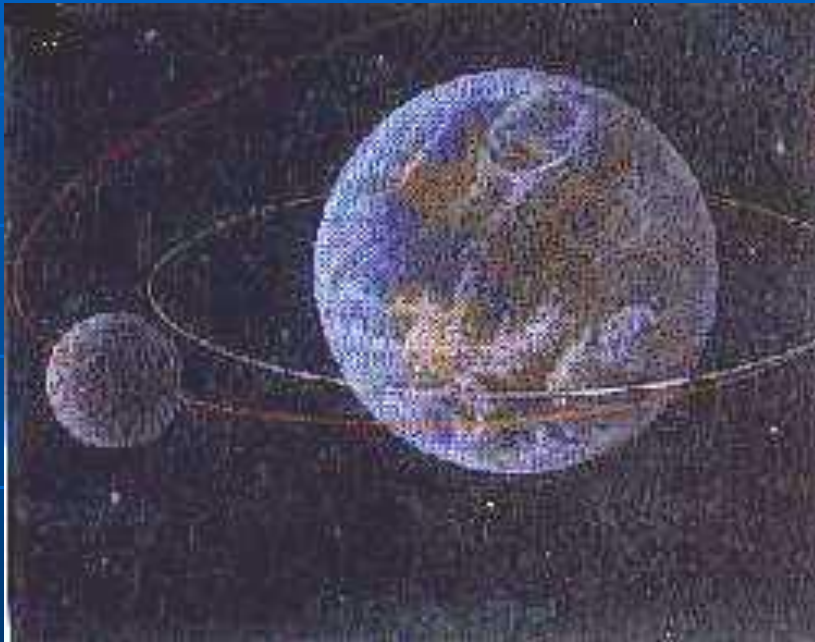
Even now we do not know
with absolute certainty...

Accretion



...the Moon and the Earth formed at about the same time, 4.6 billion years ago, when the solar system emerged from the Solar Nebulae

Capture



...the Moon formed elsewhere in the solar system and was subsequently captured by the Earth

Fission

...the Moon split off from
the Earth



Collision Ejecta



...the Earth collided with a very large object (as big as Mars or more) very early during the formation of the solar system and the Moon formed from the ejected material

2. The Moveable Moon

It used to be a lot closer...

The Moon used to occupy a sizeable amount of the sky. No one is exactly sure how large it appeared from the Earth or how close the fully formed Moon actually was to the Earth.

Calculations predict around 13,500 miles. There were no human eyes to see it.

Back then, like a tether ball on a rope wrapped around the pole or keys on the end of a chain swinging around your finger, it "swung" a lot faster because it was "wound up" closer to the pivot. The Earth revolved once every 5 hours or so.

Nowadays the moon constantly moves further away from the Earth – at a rate of about 1-1/2 inches per year.

Every century the moon moves just over 12 feet further away.

In the next one million years the moon will be about 24 miles further away from the earth.

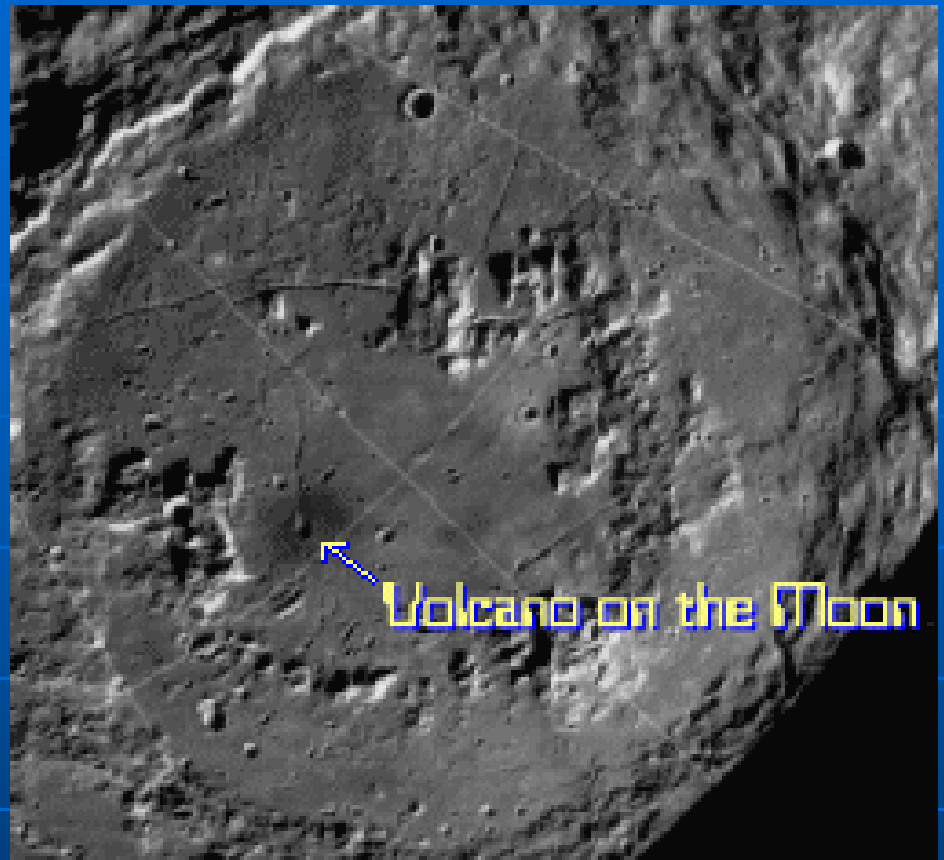
3. The Moon's Ultimate Fate

The Moon will continue to drift outward until, in the remote future, the Earth and the Moon will be locked in a frozen embrace like Pluto and its satellite Charon. Then the Earth will turn on its axis once in the same period the Moon revolves around it, about once every 50 days.

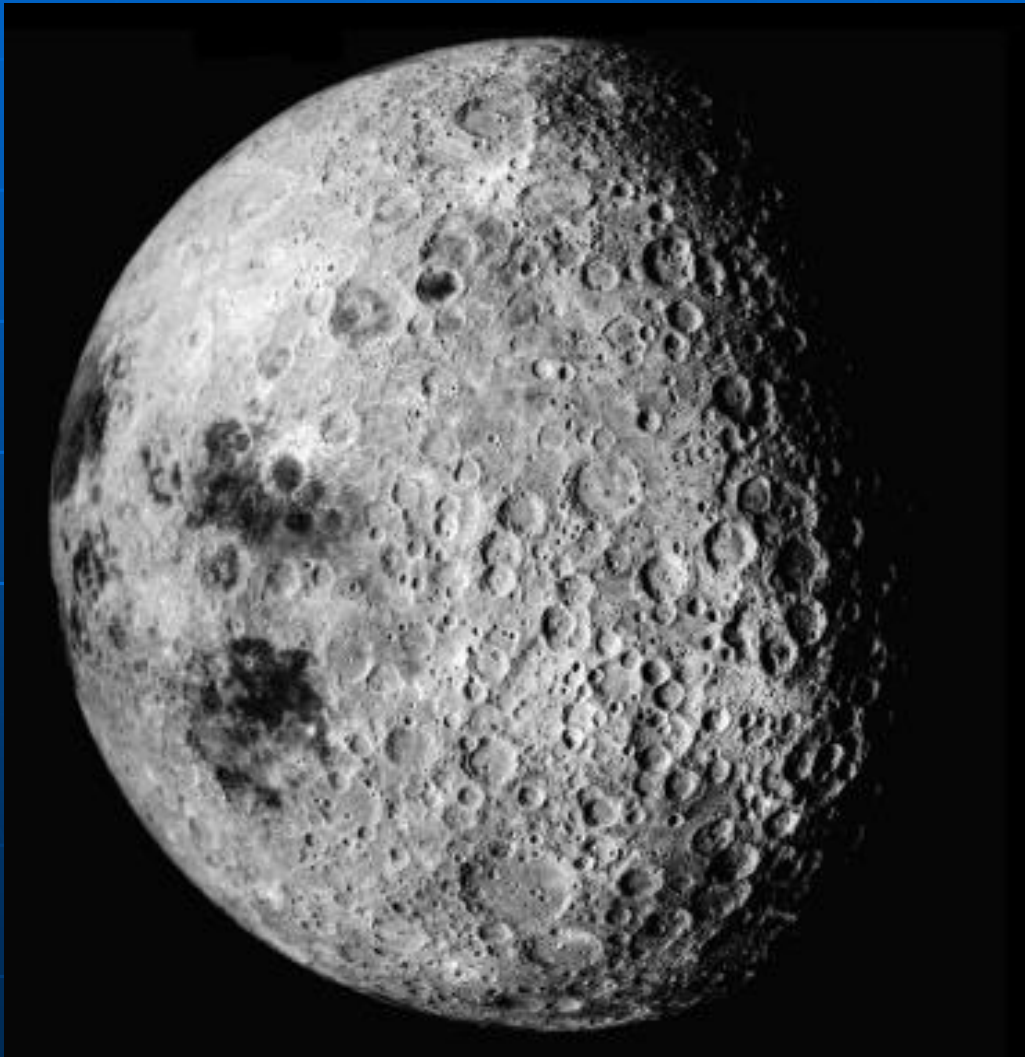
4. A Dead Moon

Dead, essentially, for 3.8 billion years or more...

For hundreds of years it was thought desperately that the Moon had a volcanic history like the Earth's. The Moon HAS had a limited volcanic history, in fact. A Picture taken in 1994 by the Clementine mission shows a volcano on the Moon's South Pole from millions of years ago. This is fairly recent in the Moon's history, which explains why there are few impact craters nearby. But vulcanism is the minor player in the Moon's history.



The Far Side of the Moon



The major player is meteorite impact, mostly occurring during the Moon's early history – the so-called periods of heavy and light bombardment.

And incidentally there is no permanent dark side of the Moon except on Pink Floyd albums.

5. A Brief Series of Visits

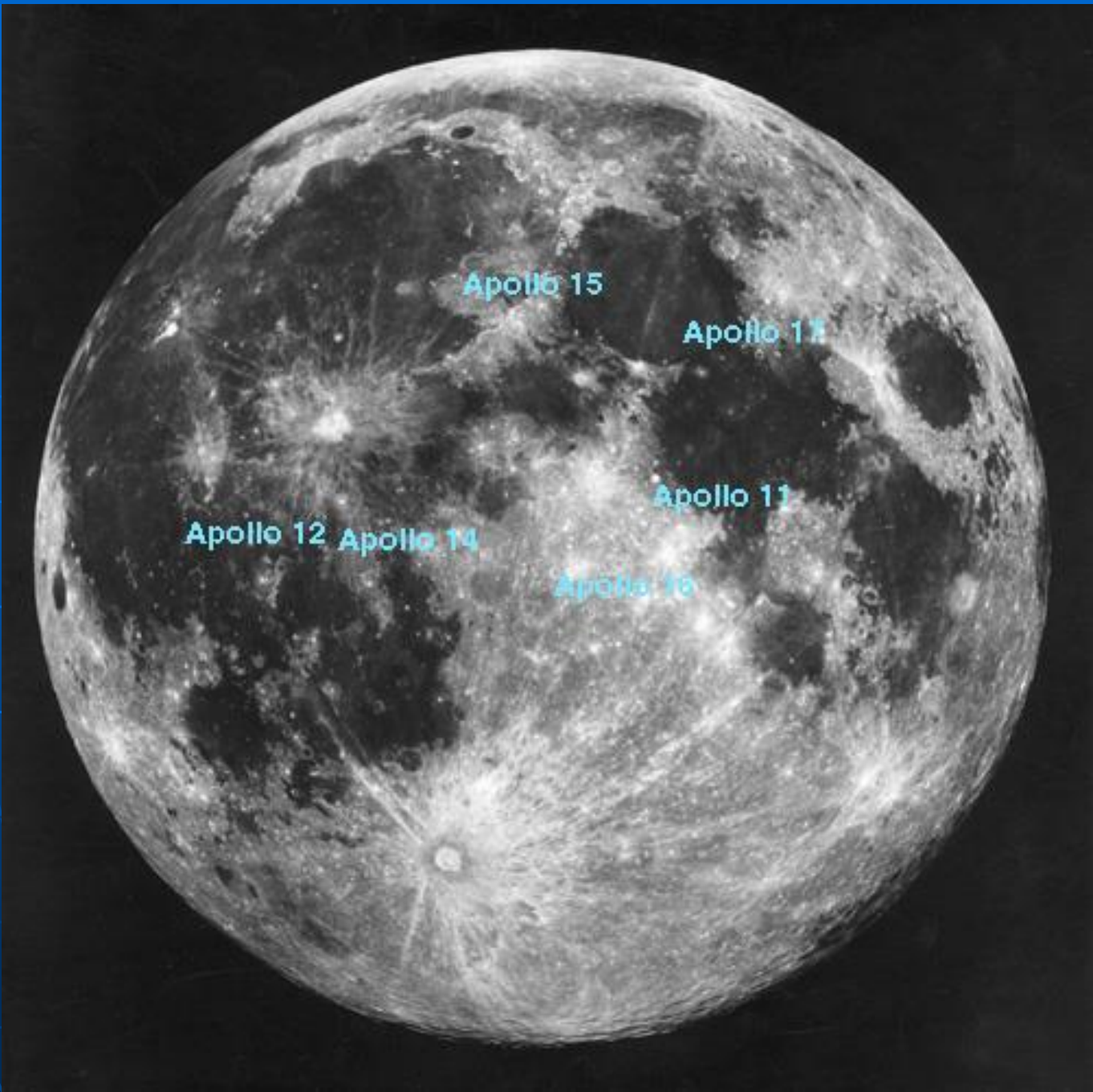
Just 30 years ago...

The Lunar Landscape from Apollo 17



THE APOLLO LANDING SITES

| Mission | Site Location | Latitude | Longitude | Date of Landing |
|----------------|----------------------|-----------------|------------------|------------------------|
| 11 | Mare Tranquillitatis | 0°41'15" N | 23°26' E | July 20, 1969 |
| 12 | Oceanus Procellarum | 3°11'51" S | 23°23'8" W | Nov. 19, 1969 |
| 14 | Fra Mauro | 3°40'24" S | 17°27'55" W | Jan. 31, 1971 |
| 15 | Hadley-Apennines | 26°06'03" N | 03°39'10" E | July 30, 1971 |
| 16 | Descartes | 8°59'29" S | 15°30'52" E | April 21, 1972 |
| 17 | Taurus-Littrow | 20°9'55" N | 30°45'57" E | Dec. 11, 1972 |



Apollo 15

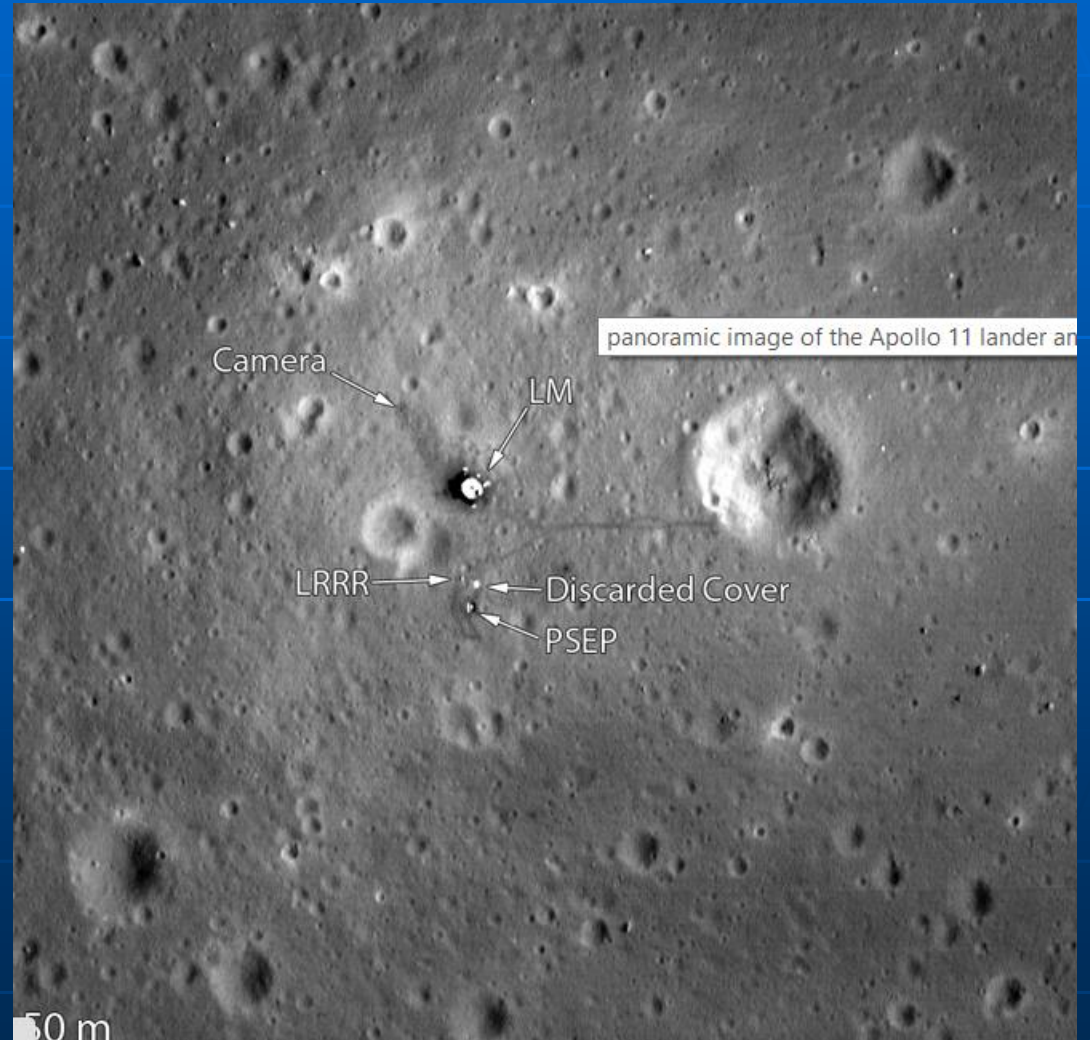
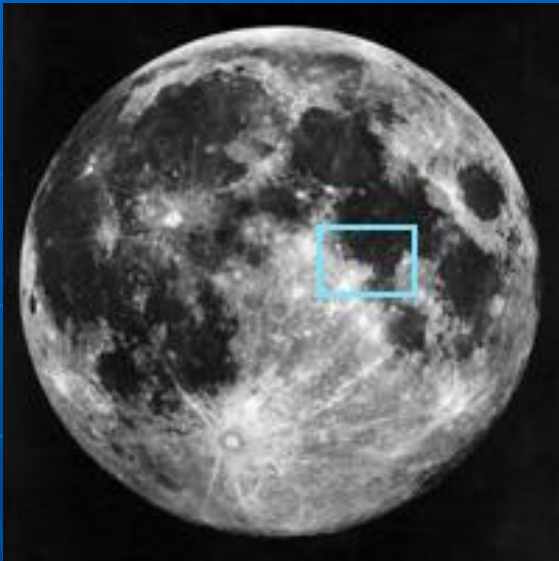
Apollo 17

Apollo 11

Apollo 12 Apollo 14

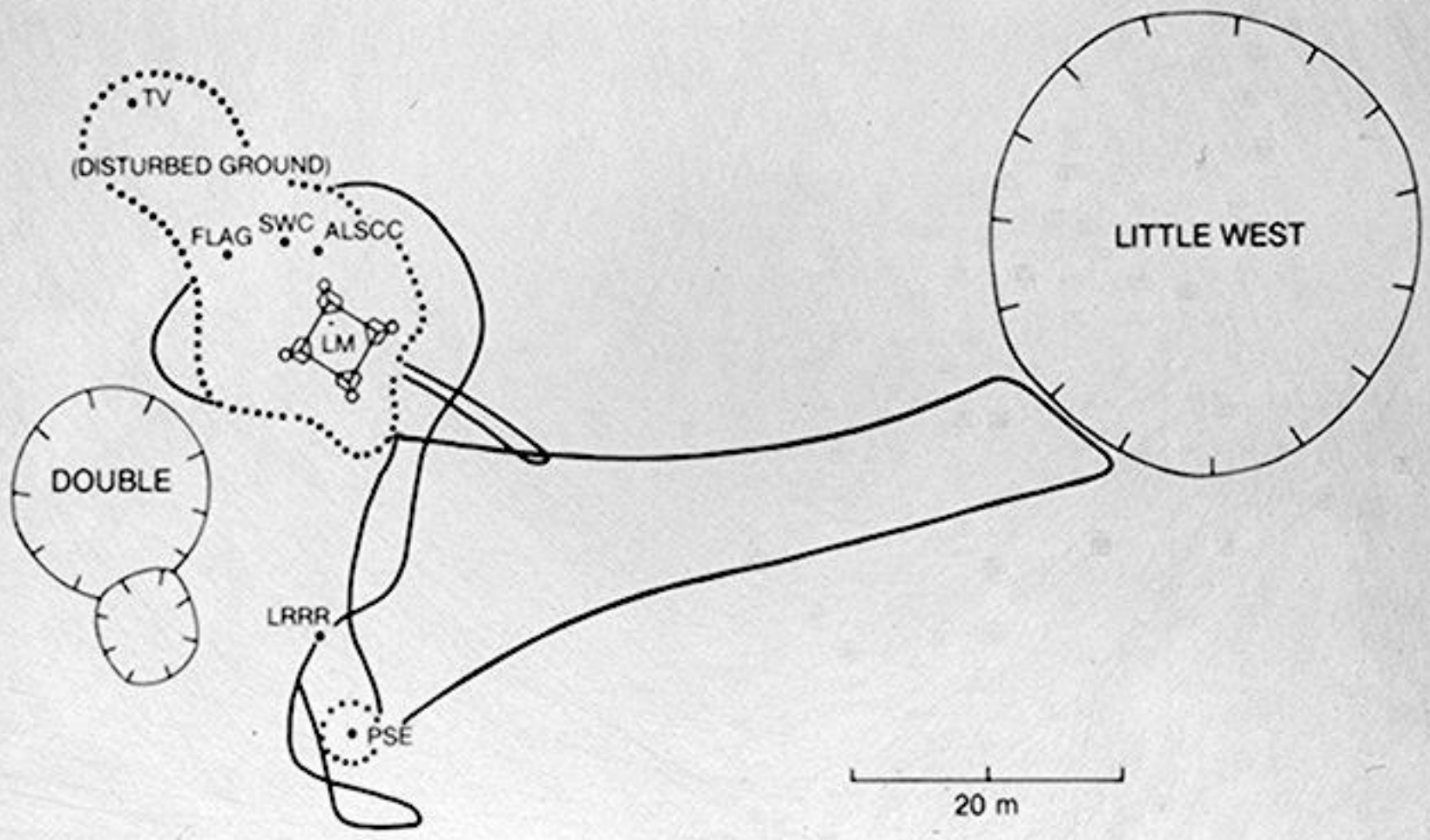
Apollo 16

Apollo 11 Landing Site





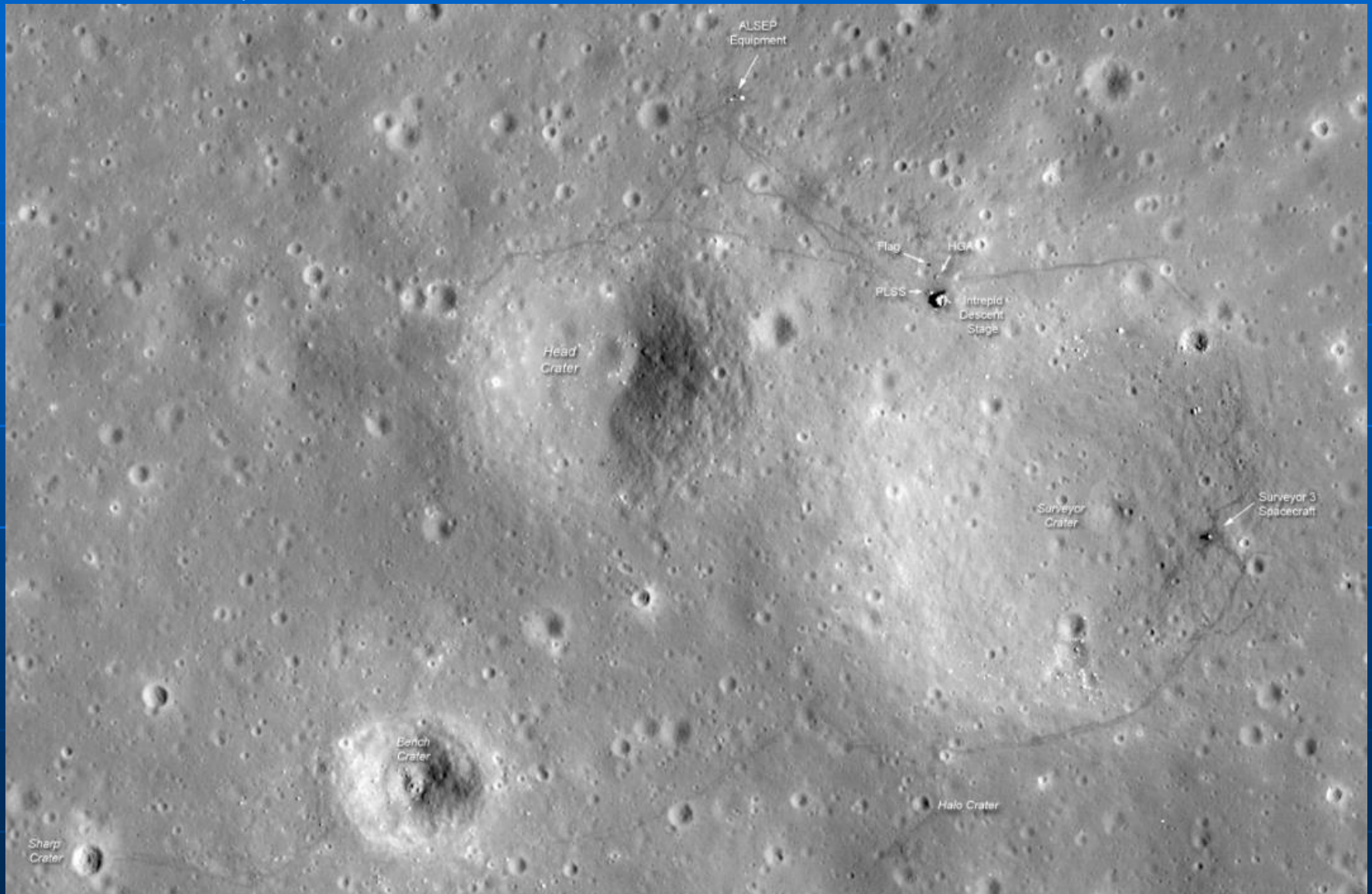
APOLLO 11



Apollo 12 - Nov. 14th - Nov. 24th (1969)

Crew: Charles Conrad, Jr., Commander
Richard F. Gordon, Jr., Command Module Pilot
Alan L. Bean, Lunar Module Pilot

Surveyor 3 Spacecraft - 1966



6. Light and Dark Areas

A cursory view of the moon...

The light areas are heavily cratered, rocky, high land on the moon, known as the Uplands. They cover 85% of the moon's near side and almost all of the moon's far side.

The dark areas are called '*maria*'. '*Maria*' is a Latin word for 'seas', because it was believed that these dark areas were actually seas. They are, instead, smoother, lower areas of land, with fewer impact craters. They cover 15% of the moon's near side and almost none of the moon's far side.

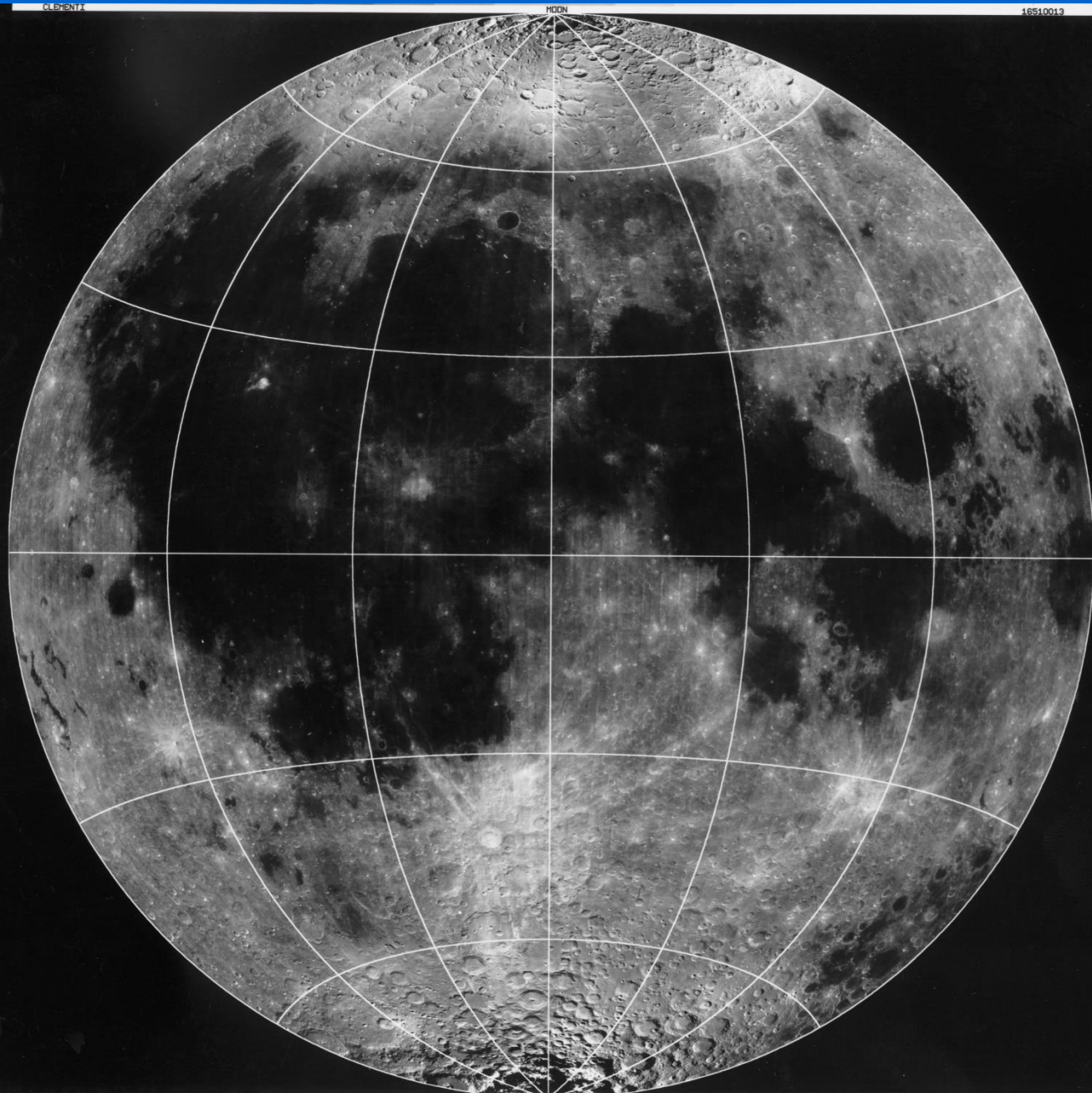
The key to all of this is:

The Moon's surface was first shaped by heavy meteorite bombardment, followed by lava floods.

All of the Moon used to look like the light areas, heavily cratered. The lava flows later filled in many of the cratered areas.

7. As Bright as Asphalt

The moon shines by reflected
sunlight...



CLEMENTINE GLOBAL 250-NH ALBEDO, NEARSIDE, LAMB
 STRETCH: 0-0, 255-255
 HEIGHT: 255
 DATE: 01-FEB-95 ID# 31013

BIT NL: 4914
 NSI 4914

TAPE: USER6

FILE: 2



The Moon's Albedo

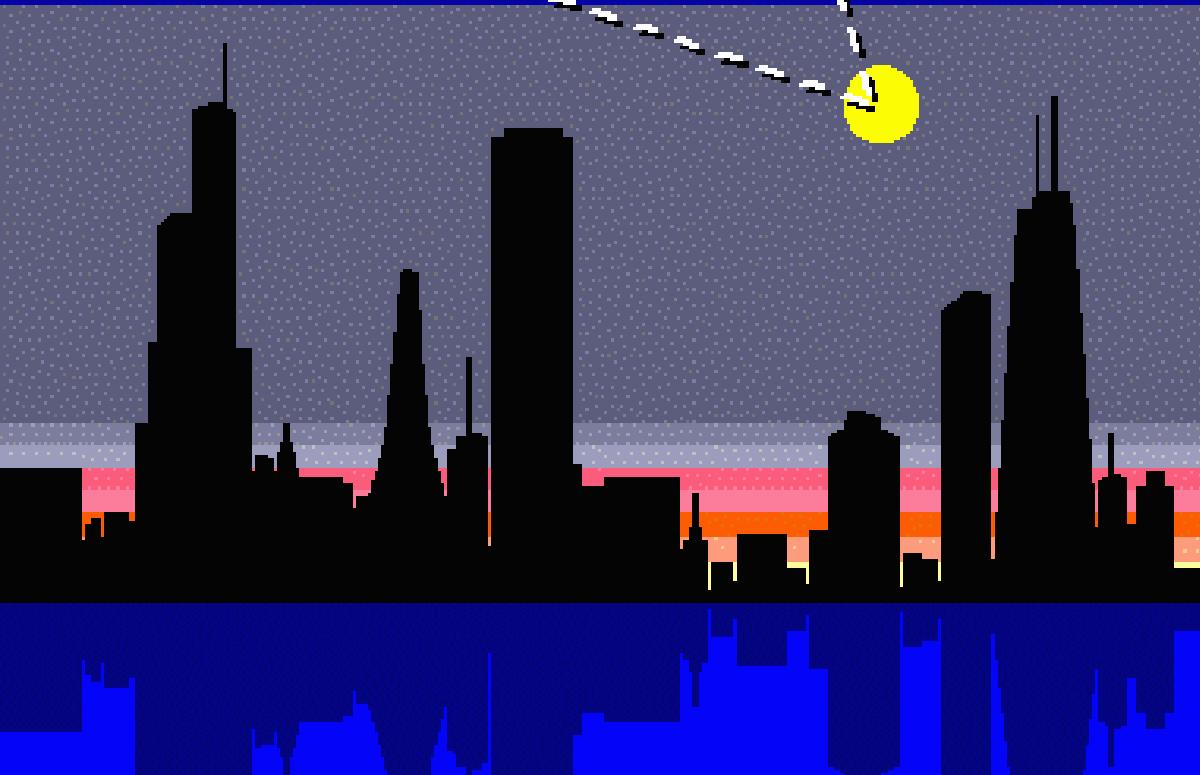
Brightness

Next to the sun, the full moon is the brightest object in the heavens. However, its surface is rough and brownish and reflects light very poorly. In fact, the moon is about the poorest reflector in the solar system. The amount of light reflected by a celestial object is called the *albedo* (Latin: *albus*, white). The moon reflects only 7% of the sunlight that falls upon it, so the albedo is 0.07.

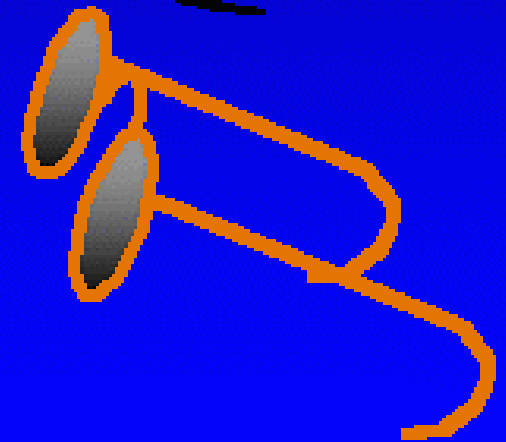
A "Moon Rock"

Highland Anorthosite
(Igneous Silicate Rock)

4.4 Billion Years Old



Hard to believe the
Moon is a dark rock
on the sky!



8. Phases of the Moon

It all adds up to 29.53 days...

Phases of the Moon



The Moon's Appearance from Earth during its Phases

WANING

Crescent Phase



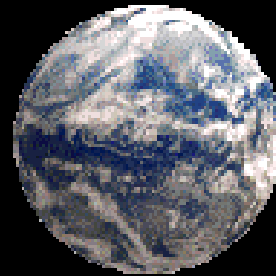
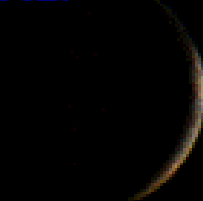
Last Quarter



Gibbous Phase



New Moon



Full Moon

Crescent Phase



First Quarter



Gibbous Phase



WAXING

9. Eclipses

Enjoy them while they last...

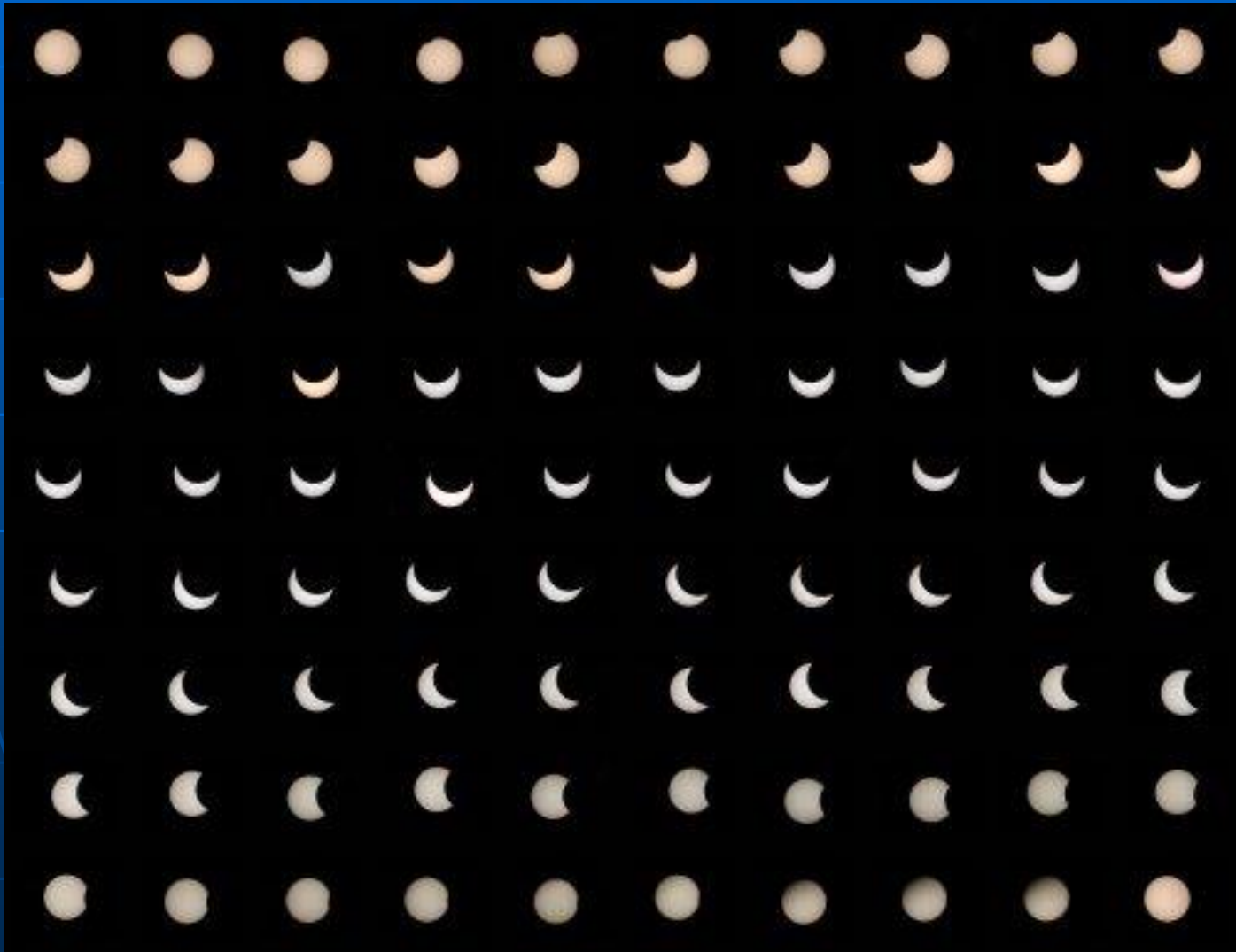
Solar Eclipse



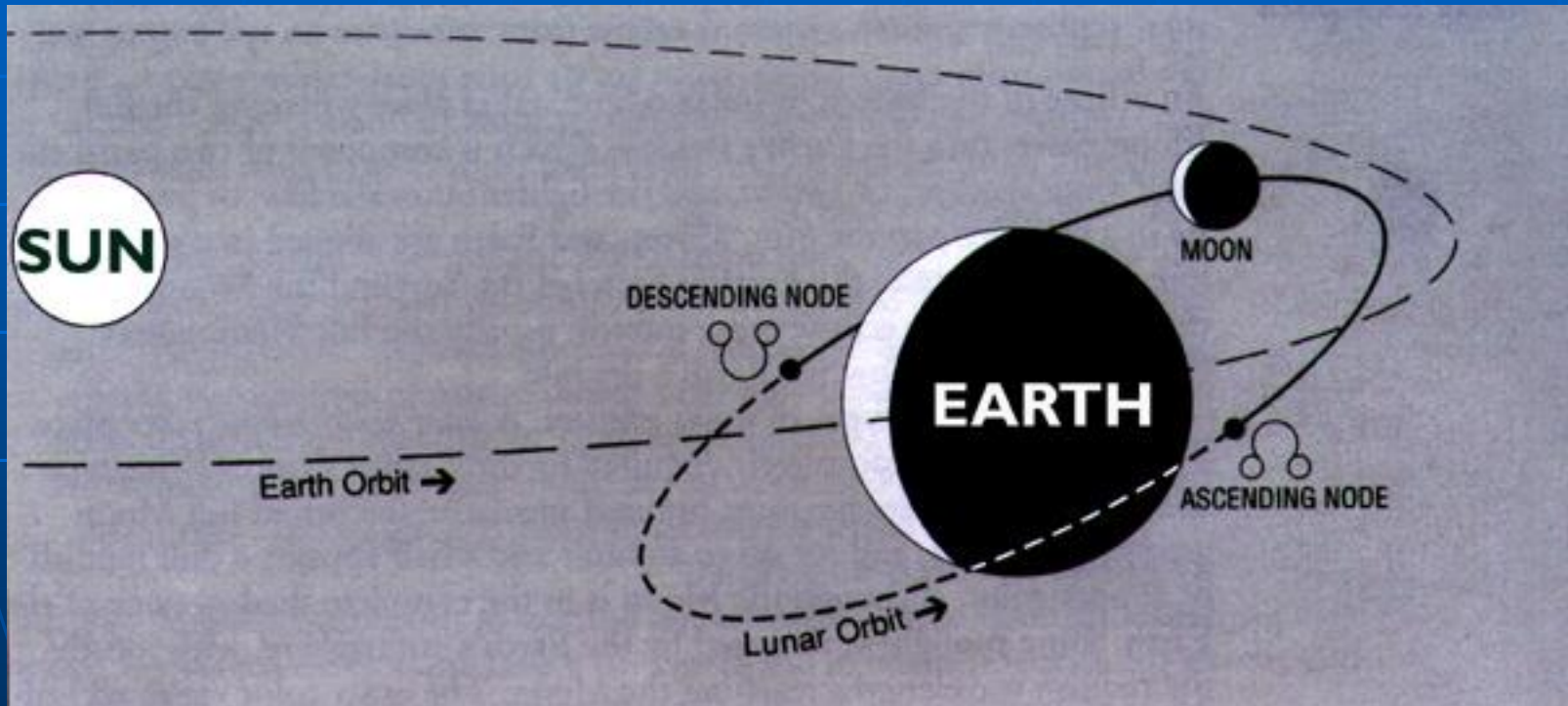
Solar Eclipse



Solar Eclipse Collage 2002

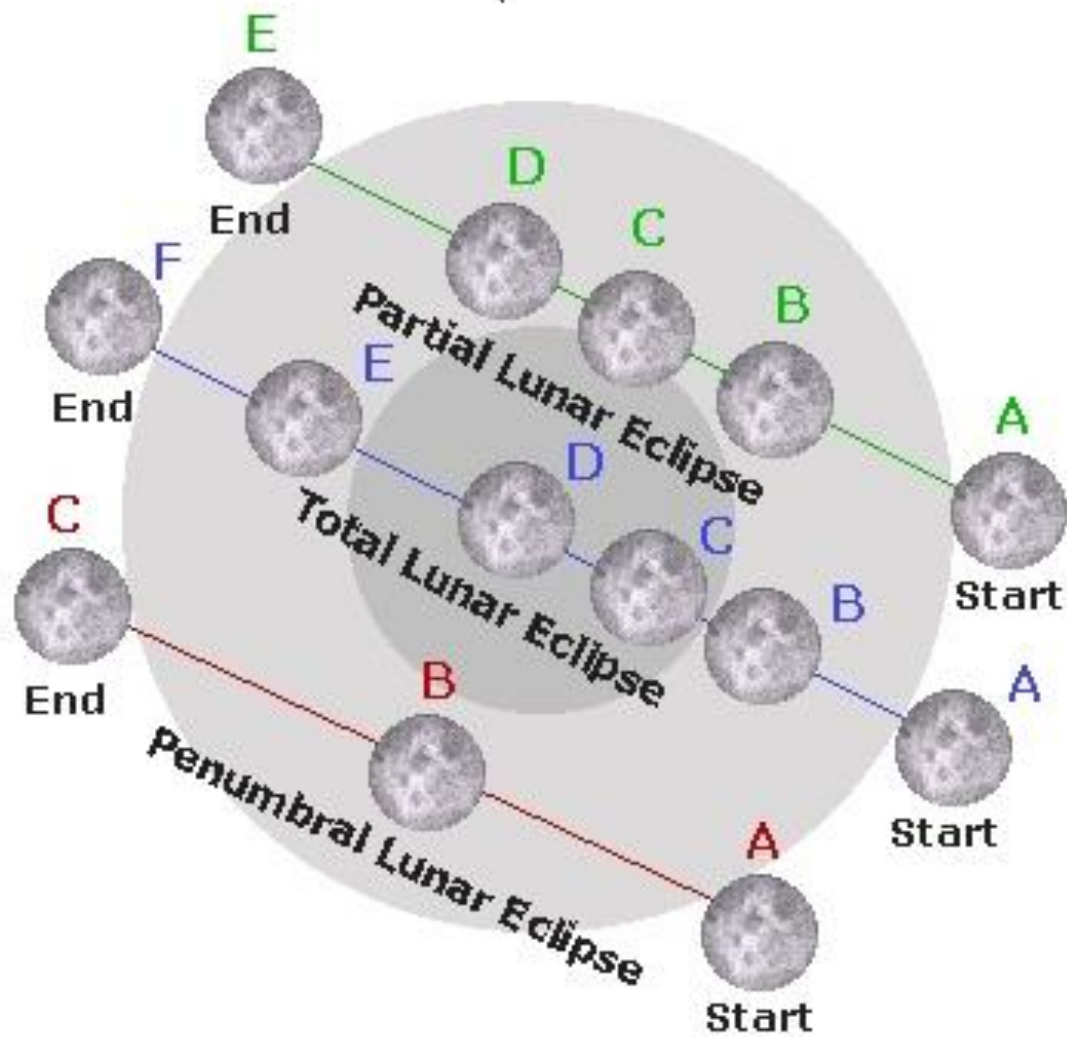


Lunar Eclipse



Lunar Eclipse





It is quite remarkable that total solar eclipses even occur at all. They are possible because the Sun and the Moon appear from Earth to be about the same size in the sky.

The Sun, whose diameter is 400 times that of the Moon, happens to be about 400 times as far away from the Earth. This condition permits the Moon to just barely cover up the Sun.

In fact, if the Moon's diameter (2,160 miles) were just 140 miles less, it would not be large enough to ever completely cover the Sun -- a total solar eclipse could never happen anywhere on Earth!

10. Moonstruck!: Luna, Lunacy, Looney – The Lunar Effect?

Correlation does not mean
causation...

Do things get crazy when the moon is full?

- the homicide rate
- traffic accidents
- crisis calls to police or fire stations
- domestic violence
- births of babies
- suicide
- major disasters
- casino payout rates
- assassinations
- kidnappings
- aggression by professional hockey players
- violence in prisons
- psychiatric admissions
- agitated behavior by nursing home residents
- assaults
- gunshot wounds
- stabblings
- emergency room admissions
- behavioral outbursts of psychologically challenged rural adults
- lycanthropy
- vampirism
- alcoholism
- sleep walking
- epilepsy

Moonstruck! Does the full moon influence behavior?



No. Correlation
does not
necessarily mean
causation...

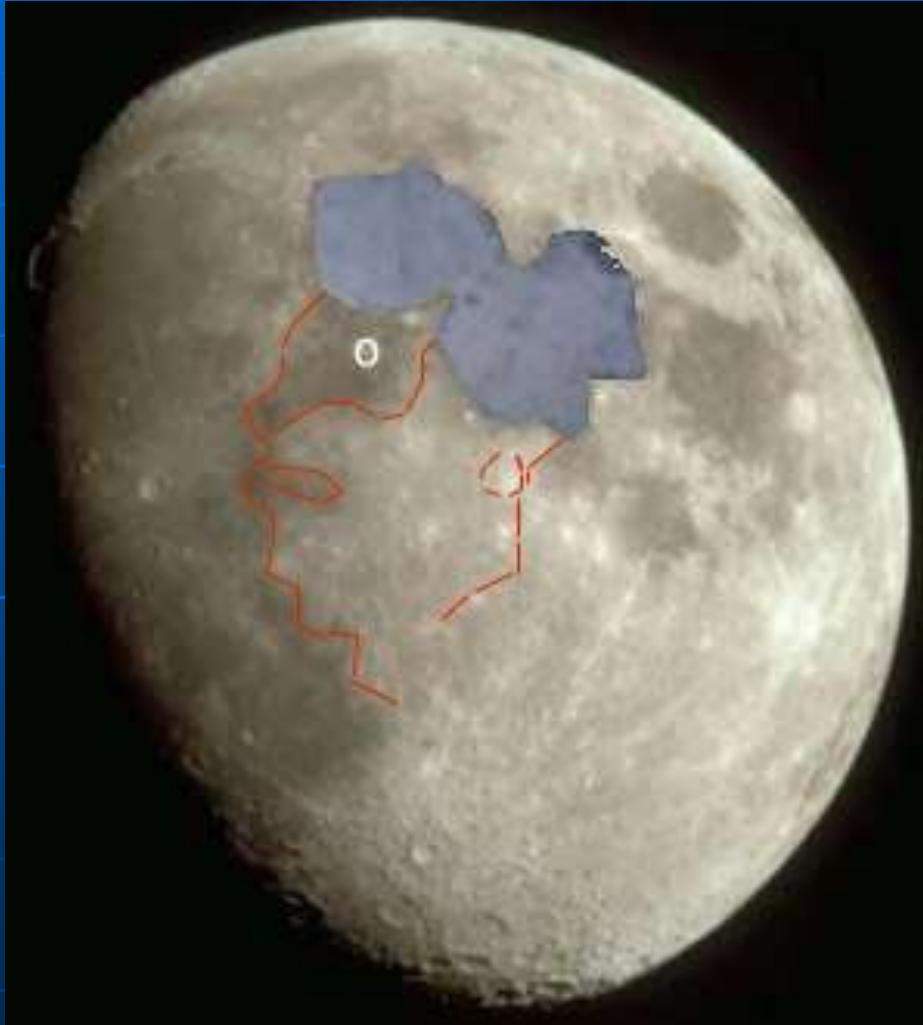
Bonus!

11. Faces in the Moon



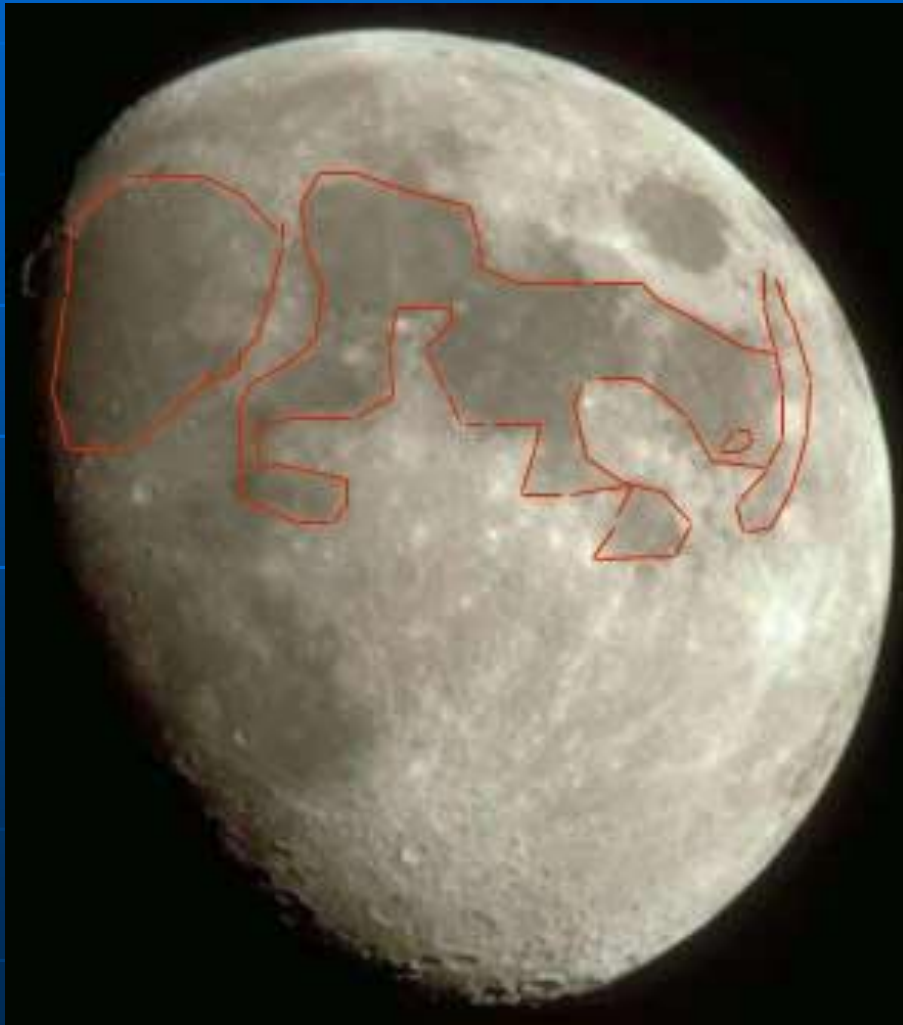
This is the moon before any outline is drawn. Use this as a reference to visualize upcoming shapes.

Woman in the Moon



Every person may see the image a little differently. Length of hair and the shape of her face may vary.

Man Reading a Book



This view may vary depending on your earthly location.

The Bogeyman Moon



Rabbit in the Moon



Man in the Moon





Thanks for coming out
to view the Moon!!