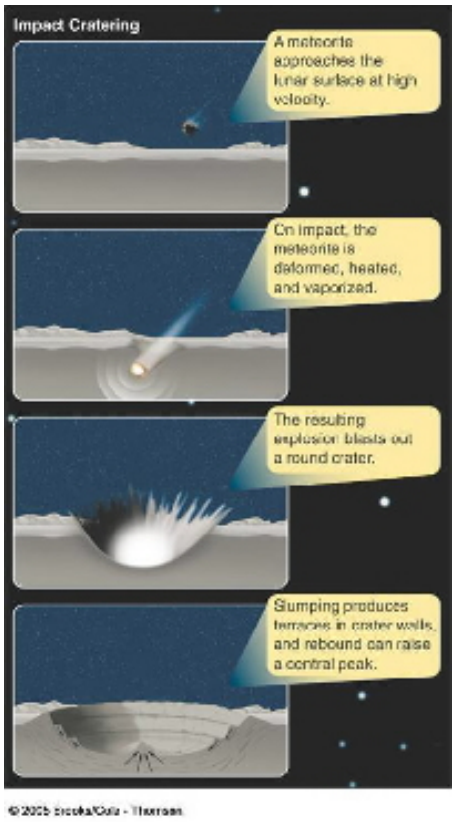
1 Moon

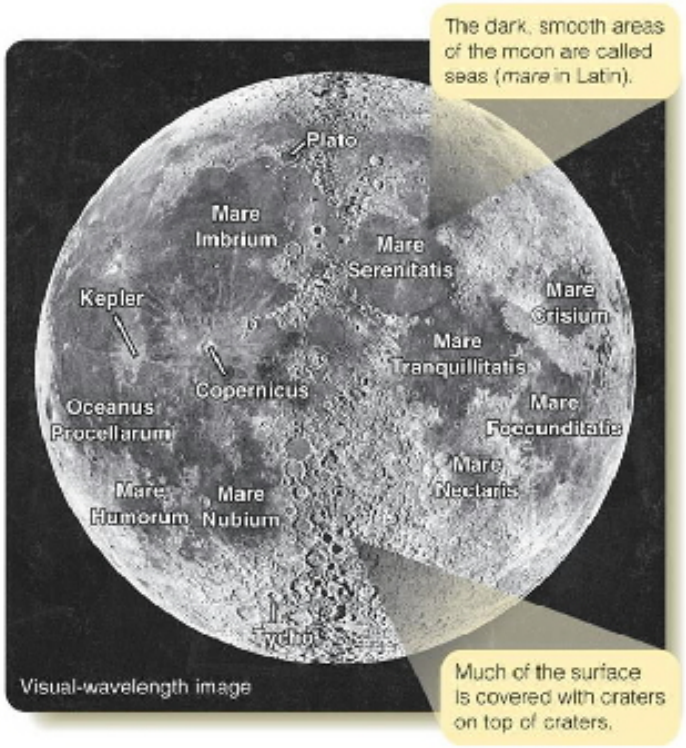
Always faces the same side toward Earth
Tidal coupling
Rotation rate = Orbital period

1.1 Features

Craters- impact; note the crater density increases in the light colored highlands



Mountains - peaks and ranges due to impacts only
Mare - sea



Rays - bright ejecta
Terminator - boundry of Sun's illumination
Limb - the edge of its disk
Rilles - long deep valleys

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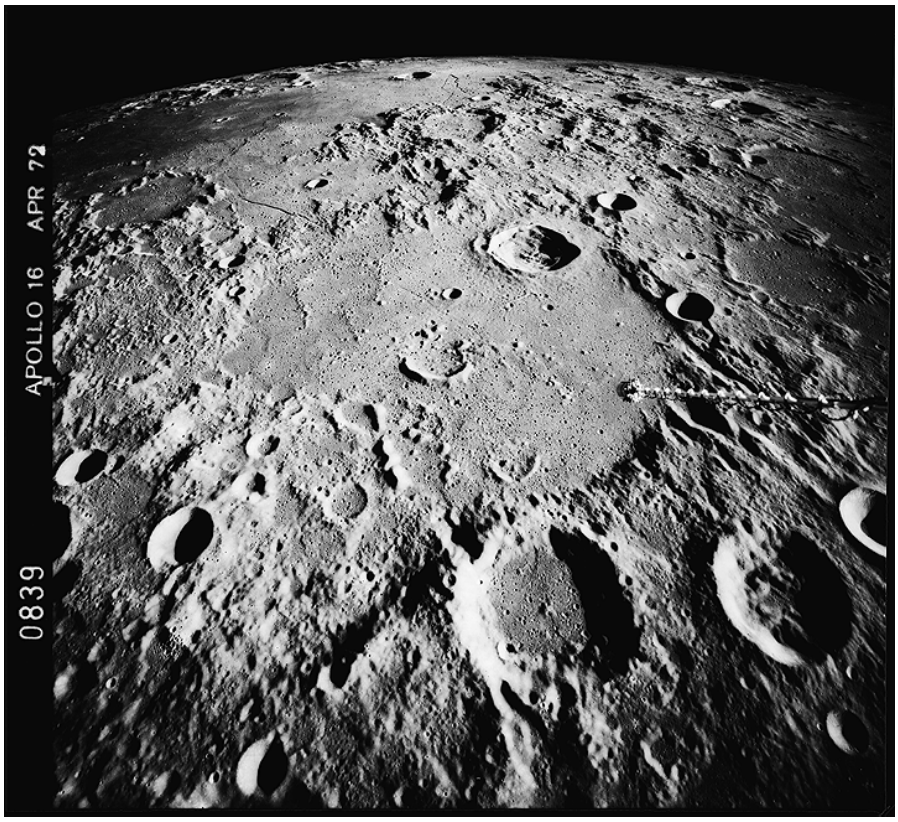
1.1.1 Terrain Ages

Relative Ages - more cratering in older areas of terrain

Absolute Ages - radioactive decay of returned samples, Apollo missions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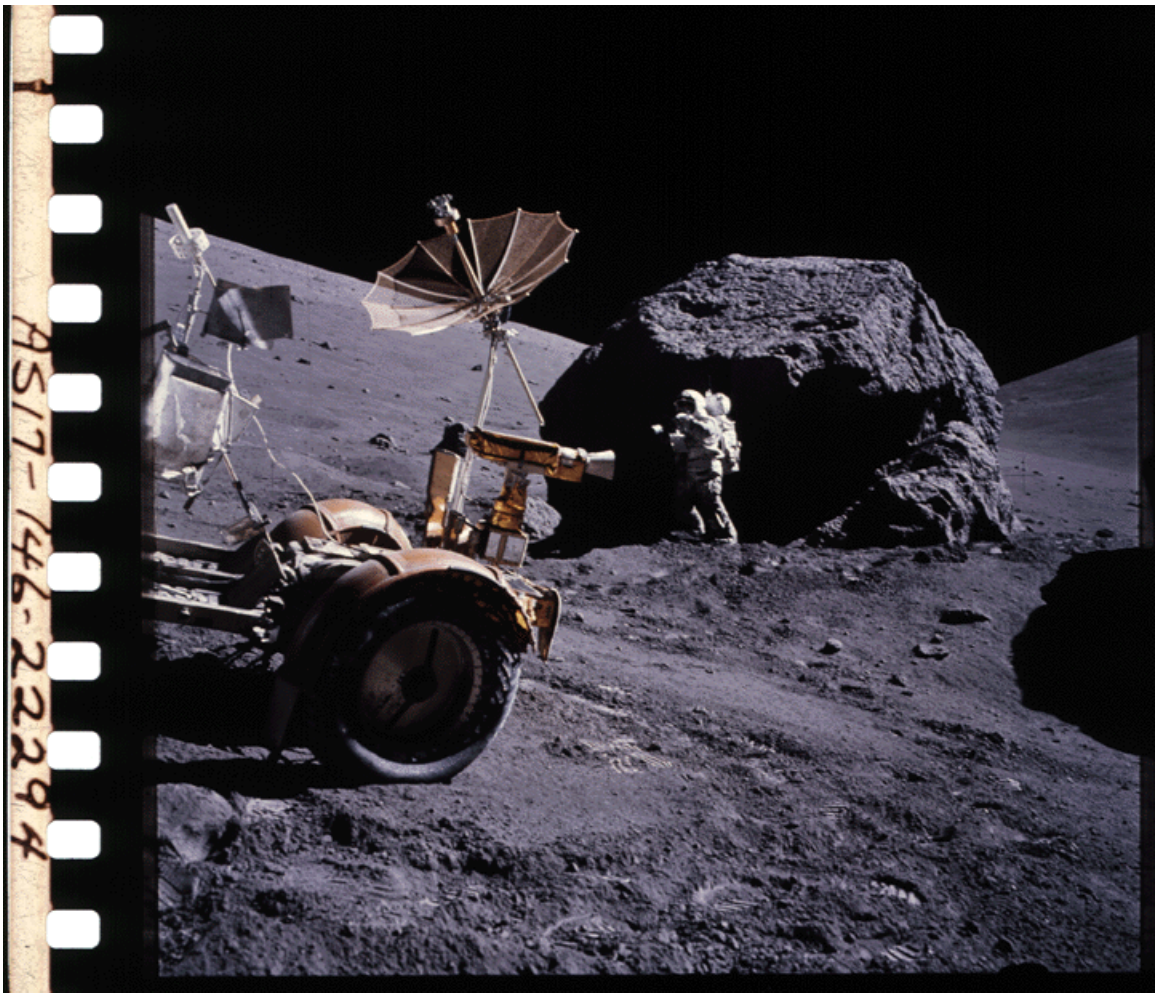
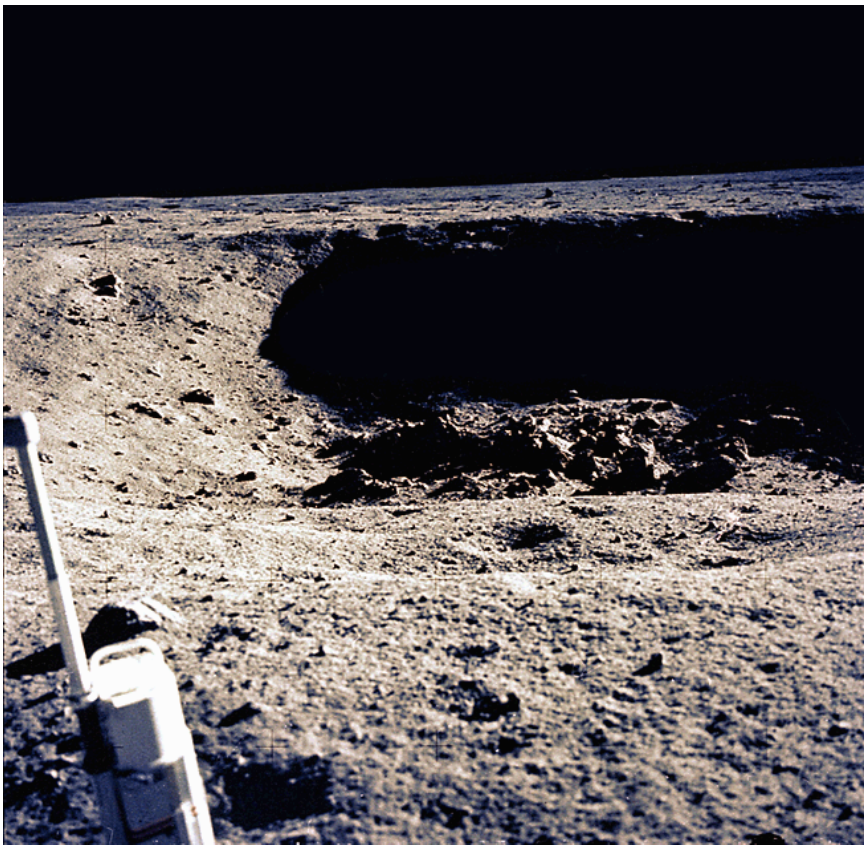
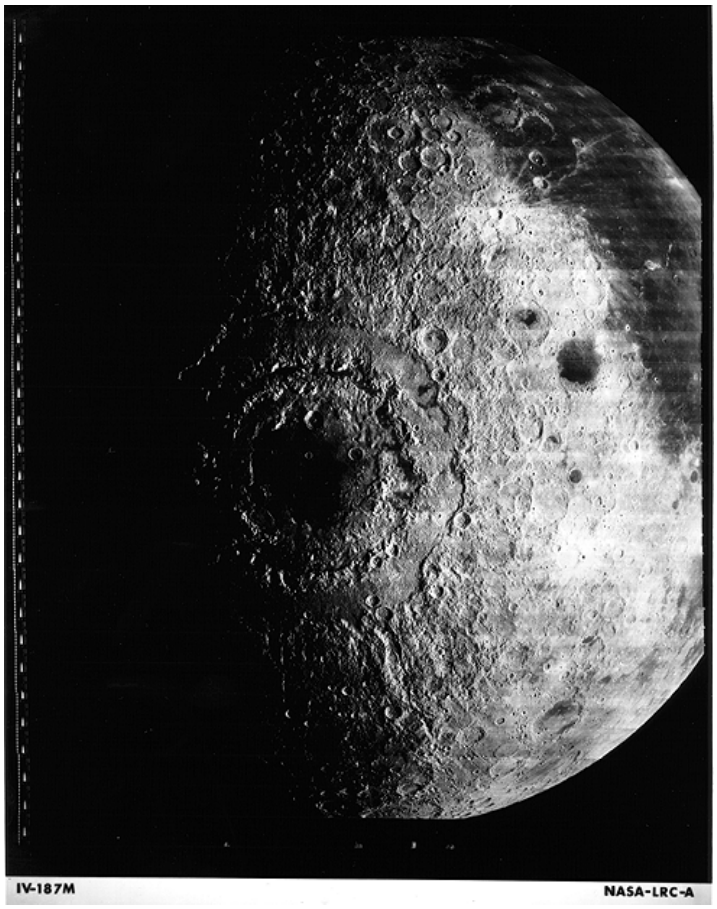


Impact Craters



Energy of motion is mainly converted into heat energy
Size of the crater is over 10 times the size of the meteorite
The heat is enough to vaporize itself and nearby rock
Rebounding shock wave moves upward and outward
This blasts away the surface producing a crater
Rocks blasted from the crater falls nearby to form the rim
Central peak - rebounding of the surface
Multi-ringed basins - Mare Orientale (Lunar Orbiter 4)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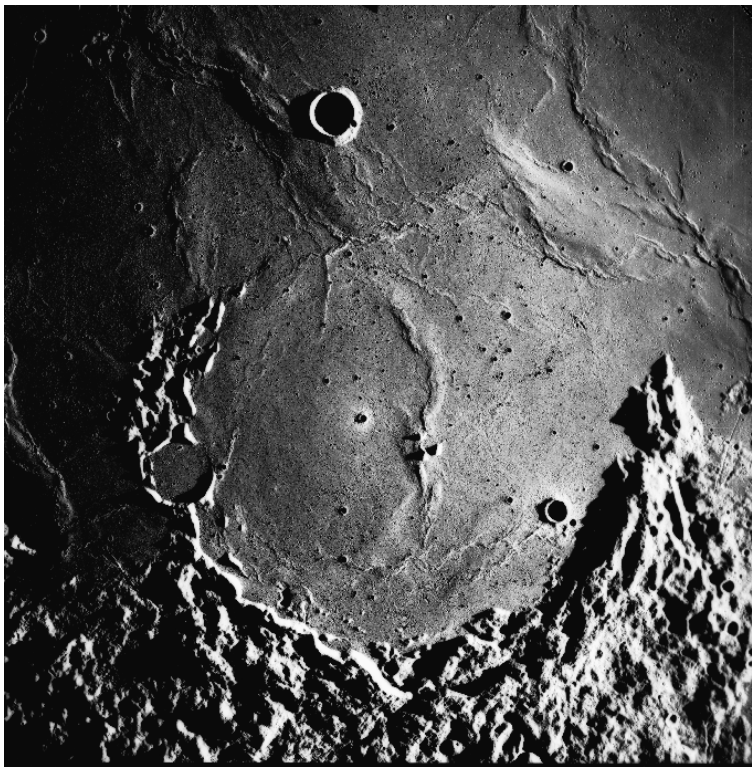
Letronne Crater has its northern wall eroded by lava flows from Ocean Procellarum



1.1.2 Types of rocks

All rocks on Moon are igneous - solidifaction of molten rock

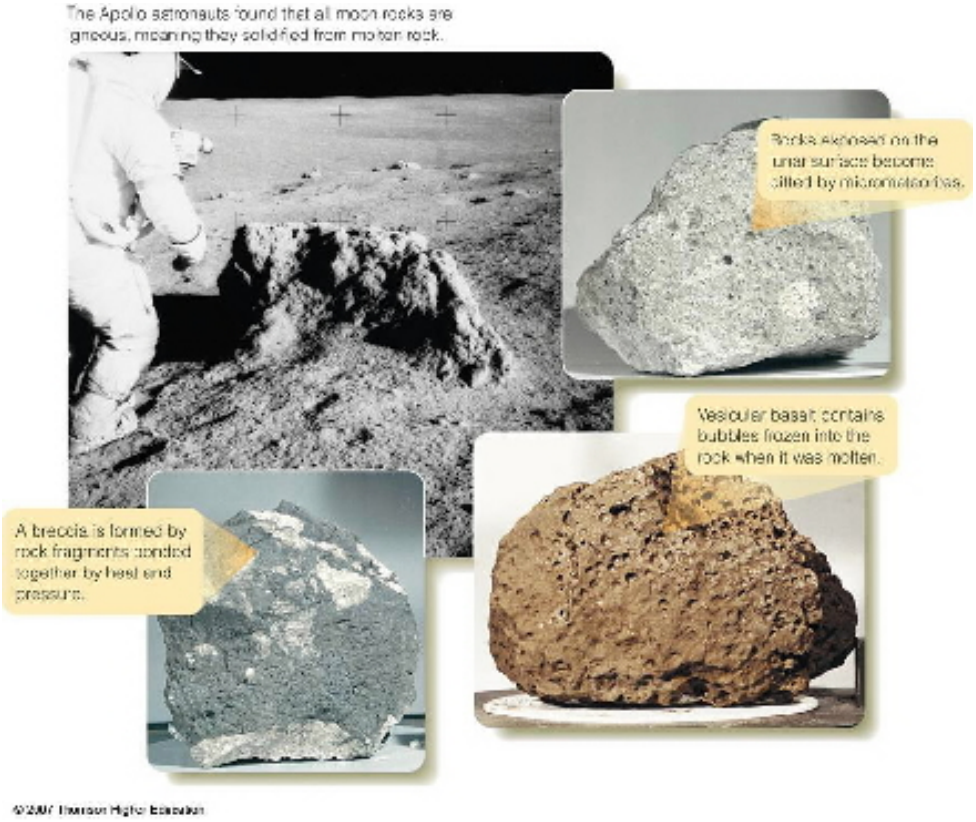
No sedimentary rocks ever found on Moon

Moon rocks contain no water, extremely dry

Basalts - lava, dark colored, rich in heavy elements such as iron, manganese and titanium, dated to be 3.1 to 3.8 billion years old

Vesicular basalts - contain holes caused by bubbles of trapped gas

Anorthosite - found in the highlands, are light in color and lower density, rich in calcium, aluminum and oxygen, true crustal rock, dated to be 4.0 to 4.5 billion years old



Breccias - rocks fused together during metorite impacts, multi-colored

1.2 Apollo Missions

11, 12, 14, 15, 16, 17

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1.3 Origin of Moon

Many hypotheses

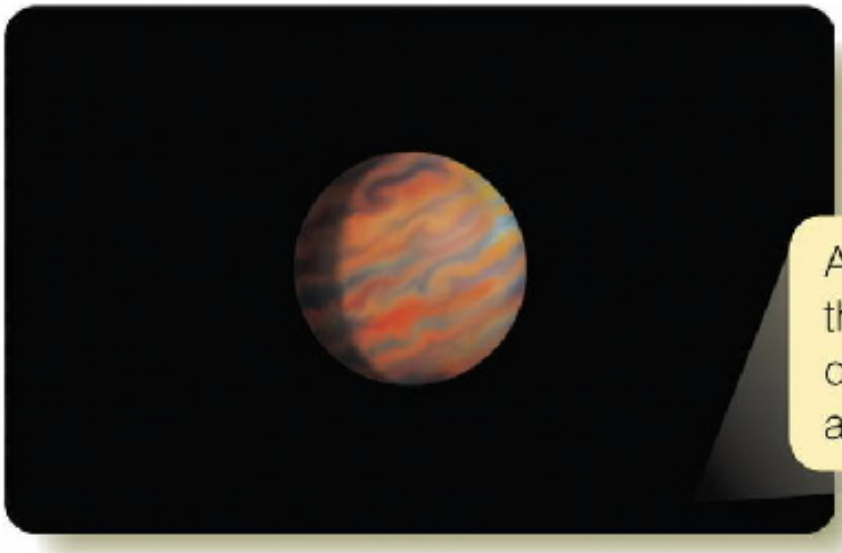
Fission hypothesis - Earth spun too fast and a blob flung off

Co-accretion hypothesis - Moon formed right alongside Earth from the solar nebula, Moon should have the same chemical composition as Earth, it doesn't

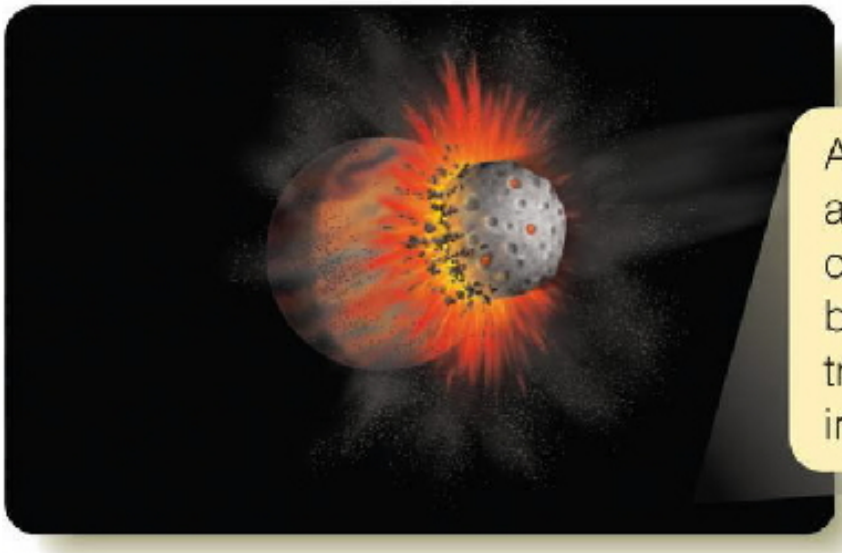
Capture hypothesis - Moon formed somewhere else in the solar system, highly unlikely events must occur

Large-impact hypothesis - debris from Earth impact, collision and merger of two large planetesimals

The Large-Impact Hypothesis



A protoplanet nearly the size of Earth differentiates to form an iron core.



Another body that has also formed an iron core strikes the larger body and merges, trapping most of the iron inside.