



Lunar CRater Observation and Sensing Satellite

The Moon

The Moon is the Earth's only natural satellite. It is generally accepted by scientists that the Moon formed early in the history of Earth, when the Earth was hit by a Mars-size object, sending approximately one tenth of Earth's mass into a ring of material around the Earth. This material eventually coalesced into our Moon. This theory is supported by the fact that the Moon is composed of the same material as Earth's mantle and crust where most of the material from the oblique impact¹ originated. Some differences in composition of the Moon from the Earth are thought to originate from the impacting body.



Seventeen percent of the Moon's surface is covered by dark volcanic plains known as maria, much younger regions than the heavily cratered highlands.

Photo courtesy NASA

The lunar highlands are the oldest surfaces on the Moon and are therefore heavily cratered. Their age of solidification dates back to the Moon's origin 4.4 billion years ago and is much older than any rock that has been found on Earth, because of Earth's active geology that continually resurfaces our world. However, 17 percent of the Moon's surface is covered by maria (Latin for "seas"), which are much younger areas. Early in its history when there was still large scale debris left over from the solar system formation, huge impact basins resulted from collisions of these large objects with the Moon. Volcanic activity on the Moon partially filled these depressions with lava flows. The Moon's volcanic activity ceased 3.3 billion years ago. Because such areas on the Moon are younger, they are far less cratered than the lunar highlands.



Four hundred kilograms of samples of lunar rock were returned to Earth by the Apollo program, which put people on the Moon, over seven missions from July 1969 to December 1972. This photograph shows Astronaut John W. Young, commander of Apollo 16. The upcoming LCROSS mission represents America's return to the Moon with the goal of establishing a permanent human presence on the Moon by 2020. Photo courtesy NASA

The Moon has so tenuous an atmosphere that it is basically negligible. With no atmosphere to shield it, the natural bombardment of the Moon during impact events breaks up the rock into fragments on the lunar surface. This surface dust layer, which can be as deep as 20 meters in the highlands, is called the Moon's regolith. It was once believed that the Moon was completely devoid of water. Although comet² impacts may have added small amounts of water to the lunar surface, because of the Moon's weak surface gravity, hydrogen and oxygen would have escaped into space. However, with the recent discovery of permanently shadowed regions of the Moon's surface at the lunar poles, NASA's LCROSS Mission to the Moon is traveling there in search of evidence of water ice at the lunar poles.

1: Oblique impact - the collision of two objects not moving along the same straight line before impact. 2: Comet - a **comet** consists of a solid icy nucleus (core) surrounded by a cloudy atmosphere called the coma and one or two tails.