IMBRIUM BASIN, one of the largest impact basins on the Moon, formed when a huge impactor hit Earth. Resurfacing processes active on Earth have obscured our planet’s early history of formation, differentiation, and evolution.

**Big Impacts, Big Basins**

As the outer layers solidified, the interior of the Moon also differentiated. The heavier iron separated from the less-dense rock in the mantle and sank, forming a small core surrounded by the rocky mantle and crust.

The evidence for a magma ocean core dates to before the Moon’s impact or its impact-related history. The magma ocean is the region beneath the Moon’s surface where the differentiated rocks solidified. The magma ocean was hot and fluid, allowing materials to be transported from one part of the Moon to another. The evidence for a magma ocean core dates to 4.5 billion years ago, which is thought to indicate when the Moon’s crust solidified.

**The Lunar Surface**

The Moon’s surface is dotted with craters, mountains, and valleys. The cratering on the lunar surface is evidence of the Moon’s ancient past. The craters range in size from a few meters to thousands of kilometers in diameter. The largest craters are typically found in the highlands, the brighter, light-colored, heavily cratered regions we see on the Moon. Deeper parts of the Moon’s crust and mantle include rock anorthosite, which is primarily made of a single mineral: low-density, aluminum-rich, plagioclase feldspar. This rock forms the “lunar highlands.”

The Moon’s surface is punctuated by mountain ranges—the uplifted rims of impact basins. Apollo 15 astronauts landed in the Apennine Mountains, and Apollo 17 astronauts landed in the Orientale Basin. These ancient rocks formed in the Moon’s magma ocean 4.5 billion years ago. They were collected by Apollo astronauts and are now housed in laboratories around the world.

**The Lunar Basalt**

The lunar basalt is a type of rock that is abundant on the Moon’s surface. The basalt is formed from molten rock that has cooled and solidified on the Moon’s surface. The basalt is typically dark in color and is composed of olivine, pyroxene, and plagioclase feldspar. The basalt is also rich in iron and titanium, which gives it its dark color.

**The Lunar Oceans**

The Moon has no oceans or an atmosphere. However, scientists have identified the presence of water on the Moon through the analysis of lunar samples and remote sensing data. The water is primarily in the form of ice and is located in the lunar regolith, the layer of loose material that covers the Moon’s surface.

**The Moon’s Age**

The Moon is approximately 4.54 billion years old, which is the same age as Earth. The Moon formed from the same material as Earth shortly after the solar system formed. The Moon’s age is determined by the isotopic ages of the samples collected by the Apollo missions.

**The Moon’s Evolution**

The Moon has undergone significant changes throughout its history. The Moon’s evolution is thought to have been driven by collisions with other objects in the solar system. The Moon’s surface is pockmarked with impact craters and other features that reflect its history of impacts and resurfacing.

**The Moon’s Future**

The Moon is a potential source of resources, including water and metals. The Moon is also a destination for future space missions and could be a stepping stone for human exploration of Mars and other destinations in the solar system.