Royal International Global Journal of Advance and Applied Research
Peer Reviewed International, Open Access Journal.
ISSN: 2998-4459 | Website: https://rlgjaar.com Volume-2, Issue-12 | December - 2025

Original Article

Findings of the Split of the Moon

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Manuscript ID:
RIGJAAR-2025-021230

ISSN: 2998-4459
Volume 2
Issue 12
Pp. 142-145
December 2025

Submitted: 12 Nov. 2025
Revised: 17 Nov. 2025
Accepted: 18 Dec. 2025
Published: 31 Dec. 2025

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Quick Response Code:

Web. https://rlgjaar.com

DOI:
10.5281/zenodo.18143584

DOI Link:
https://doi.org/10.5281/zenodo.18143584

Abstract

The Moon's formation and surface features can be analyzed through both scientific and cultural perspectives. Scientifically, the Moon likely originated around 4.5 billion years ago via the giant-impact hypothesis, in which a Mars-sized proto-planet, Theia, collided with the early Earth, ejecting material that coalesced into the Moon. Its surface, characterized by craters, rilles, and faults, reflects a combination of impact events, volcanic activity, and tectonic processes. From an Islamic viewpoint, the Moon's splitting is regarded as a miraculous event performed by Prophet Muhammad, with some interpretations associating it with the formation of lunar craters. While modern science finds no empirical evidence for a physical split, the integration of scientific observations and cultural narratives provides a holistic understanding of the Moon's evolution, structure, and significance.

Keywords: *Moon's Beginning, Moon Formation, Lunar rille, The Craters on the Moon, Exchange of views, A Dual Perspective on the Splitting of the Moon: Science and Islamic Tradition, Conclusion*

Moon's Beginning

The most widely accepted scientific explanation for how the Moon formed is known as the **giant-impact hypothesis**. According to this model, around **4.5 billion years ago**, when the Solar System was still young and chaotic, a large proto-planet about the size of Mars—named **Theia**—collided with the early Earth. This massive impact released an enormous amount of energy, melting and vaporizing large portions of both Earth's outer layers and Theia's material. The collision was so intense that huge amounts of debris were ejected into space, forming a glowing ring of molten and vaporized rock around Earth. Over time, this material began to cool, clump together, and merge due to gravitational attraction. Gradually, these fragments coalesced into a single, stable body, which became the Moon we see today. Computer simulations, the Moon's low iron content compared to Earth's core, and similarities in isotopic composition between Earth and lunar rocks all support the giant-impact hypothesis. This theory explains not only the Moon's size and location, but also many features of Earth's early evolution.

Moon Formation

Some researchers propose that the Moon's numerous craters were created by asteroid or meteoroid impacts over billions of years, though this explanation remains inconclusive because no definitive remnants of the impacting bodies have been found. In Islamic tradition, the Moon is described as having been temporarily split into two parts by the command of God, a miracle performed by the Prophet Muhammad and reportedly witnessed by people in the Arabian Peninsula. From this perspective, some interpret the Moon's craters as arising from internal processes related to the temporary separation of its halves rather than external impacts. Extending this idea, some scholars suggest that certain geological features on Earth, such as volcanoes, may have formed with analogous divine or miraculous purposes, although mainstream science attributes them to tectonic activity, mantle convection, and magmatic processes. This combined approach illustrates how religious narratives and scientific observations can coexist, providing different frameworks to interpret lunar and terrestrial phenomena while recognizing the limits of empirical evidence.

Lunar Rille

The giant-impact hypothesis is the most widely accepted scientific explanation for the Moon's origin. According to this theory, approximately 4.5 billion years ago.

How to cite this article:
Maner, N. P. (2025). Findings of the Split of the Moon. Royal International Global Journal of Advance and Applied Research, 2(12), 142–145. https://doi.org/10.5281/zenodo.18143584

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Moon Formation

Lunar Rille

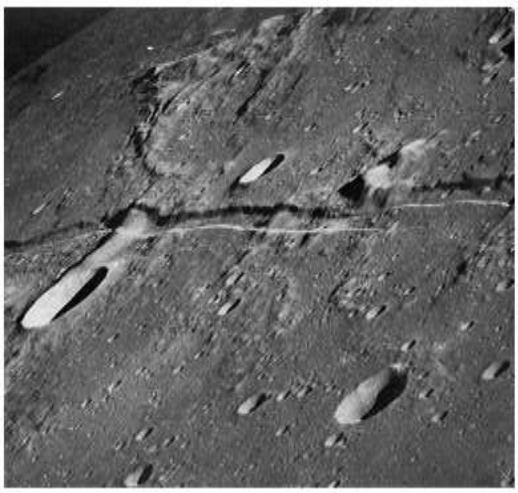
when the Solar System was still forming and highly unstable, a large planetary body roughly the size of Mars, named Theia, collided with the early Earth. The energy released in this colossal impact was tremendous, melting significant portions of both the Earth's outer layers and Theia's material, and even vaporizing some of it. The collision dramatically reshaped the young Earth's surface and altered its composition.

The force of the impact ejected a vast amount of molten and vaporized debris into orbit around Earth. This debris formed a circumterrestrial **disk**, a temporary ring of hot rock and gas encircling the planet. Over time, gravitational forces caused the material in this disk to gradually cool, condense, and stick together. Clumps of material merged, forming larger and larger fragments, eventually coalescing into a single, stable celestial body the Moon.

Multiple lines of evidence support the giant-impact hypothesis. For example, the Moon has much lower iron content than Earth's core, consistent with it forming from the outer layers of Earth and Theia. Additionally, the isotopic composition of lunar rocks closely matches that of Earth's mantle, indicating a shared origin. Computer simulations of early Solar System dynamics also demonstrate that such a collision could realistically produce a Moon with the size, orbit, and angular momentum observed today. Overall, this hypothesis not only accounts for the Moon's formation but also provides insights into Earth's early geological evolution, including the development of its crust, mantle, and the establishment of its rotational and orbital characteristics.

The Craters on the Moon

Some researchers suggest that the numerous craters visible on the Moon's surface were formed by asteroid or meteoroid impacts



over billions of years. However, this explanation remains **inconclusive** in some perspectives because no definitive remnants of the impacting bodies have been identified on or around the Moon.

In Islamic tradition, the Moon is described as having been split into two parts by the command of God, a miracle performed by the Prophet Muhammad, and later rejoined. This event was reportedly witnessed by people in the Arabian Peninsula. From this viewpoint, some interpret the Moon's craters as resulting from internal processes triggered by the temporary separation of its two halves, rather than from external impacts. Extending this idea, some scholars and thinkers have speculated that similar geological features on Earth, such as volcanoes, may have formed with comparable divine or miraculous purposes, although mainstream science attributes their formation to

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tectonic activity, mantle convection, and magmatic processes. This approach illustrates how religious narratives and scientific observations can coexist, offering different frameworks to interpret lunar and terrestrial phenomena while acknowledging the limits of empirical evidence.

Exchange of views

NASA was asked about the idea that the Moon had physically split in the past. In response, they clarified that they were unaware of any such event and reiterated the prevailing scientific model for the Moon's origin: the giant-impact hypothesis. According to this model, the Moon formed approximately 4.5 billion years ago after a collision between the early Earth and a Mars-sized protoplanet. During this period, Earth was largely molten, allowing heavier elements to sink toward the core while lighter material remained near the surface. The impact is thought to have ejected part of this outer layer into orbit, where it later accreted to form the Moon.

From a scientific perspective, there is no empirical evidence supporting the claim that the Moon split into two parts at any point in its history. Geological, seismic, and orbital data all indicate that the Moon has remained structurally intact for billions of years. Similarly, the scientific consensus holds that the Moon's craters formed over long periods of time due to asteroid and meteoroid impacts**,** especially during the Solar System's early heavy bombardment phase. These features are billions of years old, not recent formations.

No scientific observations support the idea that the Moon's craters originated within the last 1,400 years or that earlier civilizations would have observed a crater-free lunar surface. Modern radiometric dating and crater-density analysis provide clear evidence that lunar craters predate human history by a very large margin. The "splitting of the moon" refers to a miraculous event mentioned in Islamic tradition and attributed to the Prophet Muhammad. The Qur'an and hadith describe the moon as dividing into two parts after the Meccan people requested a sign. Many Muslims understand this event as a literal miracle, while others interpret it symbolically. Some people point to historical references such as reports from Chinese astronomers or to a visible lunar rift as possible support for the event, but these claims are not widely accepted as scientific evidence.

A Dual Perspective on the Splitting of the Moon: Science and Islamic Tradition

In Islamic tradition, the splitting of the moon is regarded as a miraculous event granted to the Prophet Muhammad as a sign for the people of Mecca. From a scientific perspective, modern lunar research especially data collected by missions such as NASA's Lunar Reconnaissance Orbiter (LRO) provides extremely detailed images of the Moon's surface, revealing long, deep cracks known as *rilles* and *fault lines.* While scientists explain these features as the result of natural processes such as cooling, thermal contraction, and ancient tectonic activity, some believers see these same formations as possible physical reminders of the miraculous event described in the Qur'an and hadith.

This dual perspective shows how religious interpretations and scientific observations can coexist: science studies *how* the Moon's surface developed over billions of years, while faith traditions describe *why* certain extraordinary events occurred according to divine purpose. Although scientific investigations have not identified any conclusive structural evidence of a past physical splitting, the presence of notable lunar rifts continues to inspire discussions that bridge religious belief with scientific curiosity.

Conclusion

The Moon's history and features can be understood through both scientific investigation and religious tradition. Scientifically, the Moon likely formed around 4.5 billion years ago through **the** giant-impact hypothesis, in which a Mars-sized body, Theia, collided with early Earth, ejecting material that coalesced into the Moon. Its surface, including craters, rilles, and faults, results from a combination **of** impact events, volcanic activity, and tectonic processes**.**

From the Islamic perspective, the Moon's splitting is regarded as a miraculous event performed by Prophet Muhammad, witnessed by people in the Arabian Peninsula, with some interpretations connecting this event to the origin of lunar craters. While modern science does not find empirical evidence for a physical split, lunar features like rilles continue to spark dialogue between scientific observation and cultural-religious interpretation**.** Overall, studying the Moon through both lenses provides a holistic understanding of its formation, structure, and significance, showing how empirical evidence and spiritual narratives can coexist in interpreting extraordinary celestial phenomena.

Acknowledgment

The authors express their sincere gratitude to all those who contributed, directly or indirectly, to the completion of this research work. We are thankful to our respective institutions, KBP Polytechnic, Satara, for providing an encouraging academic environment and necessary support to carry out this study.

We sincerely acknowledge the valuable insights drawn from scientific literature, particularly lunar geological studies and data provided by international space research organizations, which helped strengthen the scientific foundation of this paper. We also extend our appreciation to classical Islamic scholars and authentic religious sources whose interpretations and historical narratives enriched the cultural and theological perspective of the study.

Finally, we acknowledge the broader scholarly community whose interdisciplinary contributions continue to inspire dialogue between science and faith, fostering a deeper and more holistic understanding of celestial phenomena.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper**.**

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Peer Reviewed International, Open Access Journal.
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