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The Interpretation of Geological Verses in the Qur'an and Their Relationship with Modern Geological Theories

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ABSTRACT

This study discusses the relationship between the Qur'anic verses and modern geology through a scientific exegesis approach. The background of this research stems from the belief that the Qur'an not only contains moral and spiritual guidance but also reflects scientific principles that can be revealed through contextual interpretation. The main objective of this study is to explain the harmony between the Qur'an's explanations of natural phenomena and modern geological theories such as the earth's eqsuilibrium, the formation of mountains, and the dynamics of the earth's crust. The method used is a qualitative descriptive analysis of the interpretations of Hasbi Ash-Shiddieqy, Sayyid Quthb, and M. Quraish Shihab on three verses, namely QS. An-Nahl [16]:15, QS. Ar-Ra'd [13]:3, and QS. Adz-Dzariyat [51]:47–48. The results of the study indicate that the concept of mountains as stabilizers of the earth, the continuous process of land formation, and the expansive motion of the universe reflect the compatibility between the revealed text and modern geological principles. In conclusion, the Qur'an implicitly contains scientific values that support the understanding of natural laws and reinforce the view that revelation and science complement each other. This research contributes to enriching scientific exegesis studies and encourages synergy between religious knowledge and modern science to build an integrative understanding of God's creation.

Keywords: *Scientific exegesis, Modern geology, Mountains as stabilizers, Earth dynamics, Cosmic verses.*

INTRODUCTION

Islam is a religion that encourages its followers to think and reflect upon the signs of Allah's greatness spread throughout the universe. One manifestation of these signs is geological phenomena, which include the creation of the Earth, mountains, rivers, and the orderliness of natural systems. In the Qur'an, numerous verses discuss the Earth and its elements, which implicitly contain scientific and spiritual values. These verses are known as *ayat kauniyah*, namely verses that provide indications of natural phenomena and invite humankind to reflect and uncover the wisdom behind Allah's creation. (Muhammad Zaini, 2020)

Etymologically, geology derives from the Greek words *geos*, meaning Earth, and *logos*, meaning knowledge. Terminologically, geology is the scientific discipline that studies the structure, composition, and processes occurring within the Earth, both originating from internal and external forces. The development of modern geology has produced several important theories, such as Plate Tectonic Theory, Isostasy, and Geomorphology, which scientifically explain the dynamic nature of the Earth. Interestingly, these concepts show a degree of harmony with Qur'anic verses that describe mountains as stabilizers of the Earth, interconnected layers of the Earth, and the gradual process of the creation of the heavens and the Earth. (Abdullah, 2024)

In the context of modern life, the study of geological verses in the Qur'an is highly relevant. Amid rapid advances in science and technology, humans often separate scientific knowledge from spiritual values, even though the two are complementary. The Qur'an offers an integrative perspective, emphasizing that understanding natural phenomena is not merely a scientific endeavor, but also a form of worship and an acknowledgment of Allah's greatness. Thus, the interpretation of geological verses not only strengthens faith but also enriches human understanding of the Earth and humanity's role as *khalifah* (steward) upon it. (Quraish Shihab, 2021)

Several previous studies have examined the relationship between the Qur'an and science, particularly in the field of geology. Zaini, Wahid, and Hamdan (2020) assert that the Qur'an demonstrates scientific coherence with modern geoscientific findings, especially regarding the structure of the Earth and tectonic processes. Meanwhile, Faisal Abdullah (2024) explains the correspondence between Qur'anic verses concerning the Earth and modern theories of Earth dynamics, indicating that natural phenomena are not coincidental but manifestations of Allah's power. However, most of these studies remain general in nature and have not comprehensively examined the interpretation of geological verses from a Qur'anic exegesis perspective integrated with modern geological theories.

Therefore, this research is important to address this gap. The study aims to analyze and interpret Qur'anic verses related to geological phenomena and connect them with modern geological theories. Through an integrative approach combining Qur'anic exegesis and science, this research is expected to provide a deeper understanding of how the Qur'an portrays the Earth's system both scientifically and spiritually. Accordingly, the Qur'an can be understood not only as a source of moral guidance, but also as a source of scientific

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inspiration for the development of modern knowledge.

METHOD

This study employs a qualitative method using a library research approach and thematic (*maudhu'i*) interpretation. The primary data consist of Qur'anic verses related to geological phenomena, such as QS. An-Nahl [16]:15, QS. Ar-Ra'd [13]:3, and QS. Adz-Dzariyat [51]:47–48. Supporting data are obtained from classical and contemporary Qur'anic exegesis (tafsir) as well as contemporary geological literature.

The analysis is conducted by interpreting the selected verses thematically and subsequently comparing them with modern geological theories, including isostasy, geomorphology, and plate tectonics. Through this approach, the study seeks to identify the harmony between divine revelation and scientific knowledge, while also demonstrating that the Qur'an contains scientific indications that remain relevant to the development of modern science.

DISCUSSION

Definition of Geology

The Literally, geology is derived from two words: *geos*, meaning Earth, and *logos*, meaning knowledge (Muhammad Zuhdi, 2019). Geology can therefore be defined as the science of the Earth. Another definition states that geology is an Earth science that studies all aspects of planet Earth and its contents, both past and present. Geology is a branch of science that discusses the properties and materials composing the Earth, its structures, the processes operating both beneath and on the Earth's surface, its position in the universe, and the history of its development from the formation of the Earth to the present day. Geology can be classified as a complex scientific discipline with a wide range of subject matter, yet it remains an interesting field of study. This science examines phenomena ranging from objects as small as atoms to features as large as continents, oceans, basins, and mountain ranges (Djauhari Noor, 2009).

Geological science continues to develop and is further divided into sciences that form the foundations of geology. These branches of geological science include Mineralogy, Petrology, Stratigraphy, Paleontology, Structural Geology, Geomorphology, Physical Geology, and Geochemistry. In the book *Introduction to Geology* by Djauhari Noor, it is stated that geology is divided into two groups, namely: (Muhammad Zuhdi, 2019).

1. Geological Isostasy

Isostasy is a fundamental principle in geology that explains how the lithosphere exists in a state of equilibrium above the more plastic asthenosphere, such that variations in crustal thickness and density result in differences in Earth's topography. In modern geology, isostasy is not only understood through the classical Airy and Pratt models, but also through the concept of whole-lithosphere isostasy, which

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emphasizes that the lithosphere responds as a whole to tectonic loading. This principle is key to understanding crustal structure, gravity anomalies, and the distribution of mass beneath the surface (Lamb, 2020)

Modern developments indicate that isostatic models now incorporate numerical and elastic approaches, such as flexural isostasy, which takes into account the elastic behavior of the lithosphere in response to lateral loading. This model explains how mountain ranges, sedimentary basins, and oceanic crust adjust to changes in loading over time. The selection of a model strongly depends on the regional geological context, as each region has different crustal thicknesses, compositions, and elastic strengths (Watts, 2023)

The concept of isostasy is widely applied in studies of glacial isostatic adjustment (GIA), surface changes resulting from ice-sheet melting, as well as in estimates of mantle viscosity based on geoid data and land uplift. Advances in modern geodetic technologies, such as high-precision GPS and GRACE satellites, enable scientists to directly measure rates of isostatic rebound and to distinguish isostatic signals from dynamic topography. These studies show that isostatic equilibrium is dynamic in nature and is strongly influenced by mantle rheology that changes over time (Schiffer, 2023)

The term "theology of isostasy" in modern literature does not refer to religion, but is a metaphor describing the tendency of earlier scientists to view isostasy as the most dominant principle in explaining topography, almost like a dogma. Contemporary critiques emphasize that isostasy must be understood together with other factors such as plate tectonics, erosion, sedimentation, and mantle dynamics to avoid overly deterministic geological interpretations. A multidisciplinary approach is now considered more accurate in explaining the evolution of the Earth's surface (Dunnett, 2024)

2. Physical Geology

Physical geology is a branch of geology that examines the physical properties of the Earth, including mineral composition, rock structures, their formation processes, and the interactions between the Earth's internal and external systems. This field of study includes analyses of the arrangement and characteristics of the materials forming the Earth's crust, the atmosphere that surrounds the planet, and the hydrosphere, which plays an important role in geomorphic processes (Keller, 2021)

In addition to examining the components that make up the Earth, physical geology also studies various natural processes driven by solar energy, gravity, and the Earth's internal dynamics. These processes include weathering, erosion, material transport by natural agents (water, wind, and ice), and deposition that results in new landforms on the Earth's surface. These external processes operate continuously and strongly determine landscape evolution on geological time scales (Marshak, 2020)

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In contemporary developments, physical geology not only studies the Earth's surface but also internal mechanisms such as plate tectonics, magmatic activity, earthquakes, and crustal deformation caused by endogenic forces. The interaction between endogenic and exogenic forces produces complex landforms and influences the rock cycle. Therefore, physical geology forms the basis for understanding more specific geological phenomena such as volcanology, sedimentology, and geomorphology (Tarbuck, 2021)

Modern studies also emphasize the importance of understanding physical geology in environmental contexts and disaster mitigation. Analyses of weathering processes, slope instability, river dynamics, and shoreline changes are crucial for spatial planning, geological engineering, and disaster risk assessment. Physical geology provides a scientific framework for predicting changes to the Earth's surface and their impacts on human activities (Montgomery, 2022).

3. Expansion of the Universe

The theory of the expansion of the universe is a cosmological concept that states that the universe has been continuously expanding since the Big Bang event, approximately 13.8 billion years ago. In modern geology, this theory is understood as a cosmochemical foundation that explains the origin of the materials composing the Earth as well as the dynamics of early energy that enabled the formation of planets, rocks, minerals, and radioactive isotopes that form the basis of geological age analysis. In other words, the theory of expansion provides a context of "early history" prior to the onset of geological stages, namely a phase during which heavy elements were created in stars and supernova explosions before eventually becoming part of the protosolar nebula (Peebles, 2022)

4. Plate Tectonics

Plate tectonics is a modern geological theory that explains that the Earth's lithosphere is divided into several rigid plates that move over the more plastic asthenosphere. This movement is driven by the Earth's internal heat dynamics, including mantle convection, slab pull forces, and ridge push. This theory replaced the older concept of "geosynclines" and is now the main foundation for understanding mountain building, earthquakes, tsunamis, faults, and continental evolution (Kearey, 2021)

In modern geology, plate tectonics is used to understand the long history of continental evolution, the reconstruction of supercontinents such as Pangea and Gondwana, and the distribution of metallic minerals and hydrocarbons. Advanced numerical modeling integrates GPS data, seismic tomography, and gravity imaging to map interactions between the lithosphere and the mantle in greater detail. Recent studies also emphasize that plate tectonics is influenced not only by mechanical factors, but also by mantle chemical composition, viscosity, and the Earth's internal thermal dynamics that have continued to change over billions of years.

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The Qur'an also refers to natural phenomena of the universe as signs of the power of Allah. These phenomena are referred to as *ayat kauniyah*, namely verses that relate to the universe and the scientific processes within it. Among them is Surah An-Nahl [16]: 15, which explains that Allah has set firm mountains so that the Earth does not shake. This phenomenon is related to the concept of the stability of the Earth's crust. Furthermore, Surah Ar-Ra'd [13]: 3 indicates the regulation of the Earth system consisting of mountains and rivers, as well as the orderliness of the Earth's topographic structure. Additionally, Surah Adz-Dzariyat [51]: 47–48 refers to the expansion of the heavens and the structuring of the Earth, concepts that are related to the theory of the expansion of the universe.

Interpretation of Geological Verses

1. An-Nahl [16]: 15

وَاَلْقٰى فِى الْاَرْضِ رَوَاسِيَ اَنْ تَمِيْدَ بِكُمْ وَاَنْهٰرًا وَّسُبُلًا لَّعَلَّكُمْ تَهْتَدُوْنَۙ

"*He placed firm mountains on the earth so that it would not shake with you, and He made rivers and paths so that you might be guided" (An-Nahl [16]: 15)*

This verse explains that Allah has set mountains on the Earth so that it ©does not shake. This phenomenon is related to the concept of crustal stability In *Fi Zilal al-Qur'an*, Sayyid Qutb views this verse not merely as a geological statement, but also as a spiritual reflection on the orderliness of Allah's creation. Mountains are described as the "pegs of the Earth" that establish balance within the natural system so that human life remains stable. He emphasizes that this order is evidence of Allah's power in governing all things with wisdom and precision (Sayyid Qutb, 2003)

Meanwhile, in *Tafsir Al-Qur'anul Majid An-Nur*, Hasbi Ash-Shiddieqy interprets this verse as a manifestation of Allah's mercy toward humanity by making mountains as stabilizers of the Earth. Mountains function to maintain the stability of the Earth's layers and prevent large-scale movements that could lead to disasters. He stresses that this natural phenomenon is a sign of Allah's greatness that can be understood through observation and scientific knowledge (Hasbi Ash-Shiddieqy, 1956)

In *Tafsir Al-Mishbah*, Quraish Shihab interprets mountains as part of the Earth's ecological system. Mountains play a role in maintaining climatic balance, serving as sources of water, and stabilizing atmospheric pressure (Quraish Shihab, 2002) This interpretation emphasizes the interconnection between geology, hydrology, and the sustainability of life on Earth.

The concept of mountains as the "pegs of the Earth" in Surah An-Nahl [16]: 15 illustrates their function as stabilizers that prevent excessive shaking of the Earth. This perspective is consistent with the theory of isostasy in modern geology, which refers to the balance of mass between the Earth's crust (lithosphere) and the underlying layer

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(asthenosphere) that maintains surface stability. In addition, the deep roots of mountains extending far into the Earth's crust act as counterweights that balance internal pressures, thereby reducing the risk of extreme deformation of tectonic plates. Mountains also function as barriers to lateral forces resulting from plate movements, helping to dissipate stress within the Earth's crust. Thus, the Qur'anic depiction of mountains as stabilizing elements not only holds theological significance, but can also be understood through a scientific perspective, demonstrating that the presence of mountains contributes to a more balanced Earth system, allowing life on the Earth's surface to persist in a stable manner (Frank & Siever, 1986)

2. Ar-Ra'd [13]: 3

وَهُوَ الَّذِيْ مَدَّ الْاَرْضَ وَجَعَلَ فِيْهَا رَوَاسِيَ وَاَنْهٰرًاۗ وَمِنْ كُلِّ الثَّمَرٰتِ جَعَلَ فِيْهَا زَوْجَيْنِ اثْنَيْنِ يُغْشِى الَّيْلَ النَّهَارَۗ اِنَّ فِيْ ذٰلِكَ لَاٰيٰتٍ لِّقَوْمٍ يَّتَفَكَّرُوْنَ

"He is the One who spread out the Earth and placed within it mountains and rivers. He made all kinds of fruits in pairs, and He covers the night with the day. Indeed, in these are signs for people who reflect" (Ar-Ra'd [13]: 3).

This verse indicates the regulation of the Earth system consisting of mountains and rivers, as well as the orderliness of the Earth's topographic structure. In *Fi Zilal al-Qur'an*, Sayyid Qutb interprets this verse as evidence of a perfect divine order on Earth. According to him, Allah not only created the Earth with mountains and rivers, but also arranged them within a harmonious system so that life may proceed in balance.

Meanwhile, in *Tafsir Al-Qur'anul Majid An-Nur*, Hasbi Ash-Shiddieqy explains that the phrase "spreading out the Earth" demonstrates Allah's omnipotence in preparing the Earth to be inhabited by humankind (Hasbi Ash-Shiddieqy, 1956). He emphasizes that this verse describes ecological balance: mountains maintain the stability of the Earth, while rivers serve as sources of life. This reflects the presence of a divine design within the geological order of the Earth.

In *Tafsir Al-Mishbah*, Quraish Shihab emphasizes that the meaning of the phrase *madda al-ardh* refers to an ongoing process of Earth formation and expansion rather than a static process (Quraish Shihab, 2002). He connects this meaning with scientific findings that the Earth's surface undergoes continuous geomorphological processes, such as erosion and sedimentation.

In Surah Ar-Ra'd [13]: 3, it is stated that Allah spread out the Earth and placed mountains and rivers upon it. When viewed from the perspective of geomorphology, this verse describes the formation of the Earth's surface through natural mechanisms such as sedimentation, erosion, weathering, and tectonic activity that create variations in landforms. Quraish Shihab interprets the term *mad al-ardh* as a process of spreading that occurs continuously, not merely as a momentary act. This indicates that the Earth is understood as a dynamic creation, in which the surface and subsurface structures constantly change over time. This interpretation is consistent with modern geological

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concepts that view landforms as the result of continuous interactions between internal Earth processes, such as tectonic plate movements, and external processes such as wind, water, and climatic changes. Thus, this verse not only depicts the beauty of nature, but also affirms the existence of a living, orderly, and continuously evolving Earth system in accordance with the natural laws established by Allah (Tarbuck, 2018).

3. Adz-Dzariat [51]: 47-48

وَالسَّمَآءَ بَنَيْنٰهَا بِاَيْيدٍ وَّاِنَّا لَمُوْسِعُوْنَ وَالْاَرْضَ فَرَشْنٰهَا فَنِعْمَ الْمٰهِدُوْنَ

> *"We built the heaven with power, and indeed, We are truly expanding it. And the Earth We have spread out, and We are the Best of spreaders." (Adz-Dzariat [51]: 47-48)*

This verse refers to the expansion of the heavens and the arrangement of the Earth, concepts that are related to the theory of the expansion of the universe. Sayyid Qutb interprets this verse as evidence of the unlimited power of Allah, in which the heavens and the Earth exist within a system of perfect order (Sayyid Qutb, 1980). He emphasizes that every movement in nature follows the laws established by Allah (*sunnatullah*). This interpretation correlates with modern principles of physics and geophysics, which demonstrate the orderliness of gravitational laws, the rotation of the Earth, and the balance of forces within the universe.

Meanwhile, Hasbi Ash-Shiddieqy, in his commentary *Al-Qur'anul Majid An-Nur*, interprets this verse as an affirmation of Allah's power in continuously governing and developing the universe (Hasbi Ash-Shiddieqy, 1956). The phrase "We are expanding it" indicates that Allah's creation is not static, but dynamic, constantly moving in accordance with His will.

Furthermore, Quraish Shihab, in *Tafsir al-Mishbah*, explains that the phrase *"wa al-samâ'a banaynâhâ bi aydin wa innâ la-mûsi'ûn"* ("And the heaven We built with Our power, and indeed We are truly expanding it") demonstrates the greatness and authority of Allah in creating and sustaining the universe. He emphasizes that the term *mûsi'ûn* (مُوسِعُونَ) linguistically means "possessors of vast power" rather than directly indicating the physical expansion of cosmic space (Quraish Shihab, 2002)

In Surah Adz-Dzariyat [51]: 47–48, it is stated that Allah "has constructed the heavens and indeed We are the expanders, and the Earth We have spread out in the best manner." This verse has strong relevance to the theory of the expanding universe and the concept of plate tectonics (Hubble, 1929). Both theories indicate that the universe and the Earth undergo continuous dynamic motion. Sayyid Qutb, in *Fi Zilal al-Qur'an*, affirms that the order and motion of the cosmos are part of *sunnatullah*, namely the natural laws created by Allah in an orderly and wise manner. In a similar vein, Quraish Shihab interprets this verse as an encouragement for humanity to investigate natural phenomena, since such order is a sign of Allah's greatness and precision in His creation.

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CONCLUSION

This study demonstrates that the Qur'an has a close relationship with modern geological science, particularly in explaining natural phenomena such as mountains, rivers, and the dynamic processes of the Earth. Through an analysis of three main verses — Surah An-Nahl [16]: 15, Surah Ar-Ra'd [13]: 3, and Surah Adz-Dzariyat [51]: 47–48 — it was found that the interpretations of exegetes such as Hasbi Ash-Shiddieqy, Sayyid Qutb, and M. Quraish Shihab do not focus solely on theological dimensions, but also contain scientific values relevant to modern geological theories such as isostasy, geomorphology, and plate tectonics. These verses explicitly and implicitly describe a balanced, dynamic, and orderly Earth system, indicating harmony between divine revelation and natural laws. This study affirms that the Qur'an does not contradict science; rather, it contains fundamental principles that inspire the development of scientific knowledge, while simultaneously teaching humanity to recognize and be grateful for the greatness of Allah through an understanding of natural phenomena.

Furthermore, the findings of this study highlight the importance of an integrative approach between Qur'anic exegesis and science in understanding *ayat kauniyah*. Such an approach provides a more comprehensive understanding that scientific knowledge can serve as a means to strengthen faith and reveal the wisdom behind Allah's creation. Thus, scientific interpretation plays a significant role in building an Islamic scholarly paradigm that harmonizes reason and revelation, faith and empirical research.

As a direction for future research, this study opens wide opportunities for further development. Future researchers are encouraged to deepen the study of scientific exegesis by examining more verses related to other branches of Earth sciences, such as geophysics, oceanography, or volcanology, as well as by comparing the perspectives of classical, modern, and contemporary exegetes from diverse cultural backgrounds. A broader interdisciplinary approach will further strengthen the evidence that the Qur'an is an eternal and timeless source of knowledge, serving as both guidance and inspiration for the advancement of science and human civilization.

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