GEOPHYSICS AND THE BIBLE

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Abstract

There is a misconception that there is disagreement between science and Scriptures. Science is based on facts, not just opinions or preferences. To understand science, we need to consider how science started. It began with people who knew God and who believed that God is a God of order and designs. They believed that the universe He designed would reflect that order and that by studying nature, they could learn more about God and His attributes. Science only deals with nature and not the supernatural or spiritual. When conducting research, scientist use the scientific method to gather measurable empirical evidence in experiments related to a hypothesis, the results of which aim to support or contradict the theory. The basic focus of science is knowledge. It is critical to realize that scientists have not learned everything and that as we gain new knowledge, they must change what they once believed to be true. One example is the understanding of the interior of the Earth. Using earthquake data, scientists originally thought that the Earth had a crust, a mantle, and a solid core. Using earthquake data, they realized that there was also a liquid inner core. More data revealed that the mantle may have different layers. Even with all their tools, scientists have not been able to determine the exact nature of the core, the mantle, or even the crust. Although, we do not yet understand the structure of the core and mantle, scientists have realized that they are essential for life to exist on earth. As scientists have learned more about the mass of the universe and the parameters that control the natural laws of the universe, they have realized that the universe and this planet have been specifically designed to support life here. This has brought many scientists to realize that the universe was specially designed by a Great Engineer.

Keywords: Science, earth.

What is Science

There is much confusion as to what is science. Let's start with how we came to develop science. It started with men who knew God and who believed that God was a God of order and design. They believed that the universe He designed would reflect that order and that by studying

the natural world they could learn more about God and His nature. To study the natural world they needed to record, catalogue, and analyze the information that they gained. They realized that they needed to find a way to test ideas and to repeat these tests to understand the rules that God had created to operate the natural world.

According to *Random House Dictionary*, science is defined as: "The intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment".[1] And "Science is the systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe".[2]

The Science Council defines science as: "Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence".[3] In order to run tests that were repeatable and to understand the relationship between the cause and effect, the scientific methodology was developed. This method is described by The Science Council as:

> "The scientific methodology includes the following: Objective observation: measurement and data (possibly although not necessarily using mathematics as a tool), evidence, experiment and/or observation as benchmarks for testing hypotheses, repetition, critical analysis, verification and testing (critical exposure to scrutiny), peer review and assessment."[4]

The word "science" is derived from the Latin word *scientia*, which is knowledge based on demonstrable and reproducible data, according to the Merriam-Webster Dictionary.[5] True to this definition, science aims for measurable results through testing and analysis. Science is based on fact, not opinion or preferences. The process of science is designed to challenge ideas through research. One important aspect of the scientific process is that it is focusing only on the natural world, according to the University of California. Anything that is considered supernatural does not fit into the definition of science.

When conducting research, scientists use the scientific method to collect measurable, empirical evidence in an experiment related to a hypothesis, the results aiming to support or contradict a theory. "As a field biologist, my favorite part of the scientific method is being in the field collecting the data," Jaime Tanner, a professor of biology at Marlboro College, told Live Science. "But what really makes that fun is knowing that you are trying to answer an interesting question. So the first step in identifying questions and generating possible answers (hypotheses) is also very important and is a creative process. Then once you collect the data you analyze it to see if your hypothesis is supported or not."[6] To be valid a hypothesis must be testable and

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[1] Random House Dictionary. .
[2] Random House Dictionary.

[3] https://sciencecouncil.org/about-science/our-definition-of-science/ accesed on March 1, 2022 at 9.15 pm.
[4] https://sciencecouncil.org/about-science/our-definition-of-science/ accesed on March 1, 2022.
[5] Alina Bradford , Ashley Hamer. *Science and the scientific method: Definitions and examples.* 2022. https://www.livescience.com/20896-science-scientific-method.html/ accesed on 3 March 2022.
[6] Alina Bradford , Ashley Hamer. *Science and the scientific method: Definitions and examples.* 2022.

falsifiable according to North Carolina State University.[7] Falsifiable means that there must be a possible negative answer to the hypothesis. For example, when Einstein first published his General Theory of Relativity, the scientists who wanted to test it came up an idea. According to the theory, gravity would bend light. Therefore, they determined where a solar eclipse would occur. They went there and took a picture of the stars at night. Then, several months later, during the solar eclipse, they took another picture of the same stars. They said that if the stars were in the same position, the theory was proven false. The stars were different in the two pictures. Testable means that there must be an experiment that can be performed that demonstrates the cause-and-effect relationship in the hypothesis. For a hypothesis to be valid, the experiment supporting it must be reproducible.

One shortfall in science is that there is no test that can prove a theory. However, it only takes one experiment to disprove a theory. There are a few theories that do become scientific law. One example would be the laws of conservation of energy, which is the first law of thermodynamics. This law states that energy cannot be created nor destroyed, it can only be changed in form. In science, a law just describes an observed phenomenon, but it does not explain why the phenomenon exists or what causes it. Peter Coppinger, and associate professor of biology and biomedical engineering at the Rose-Hulman Institute of Technology stated, "In science, laws are a starting place. From there, scientists can then ask the questions, 'Why and how?'"

Unless otherwise stated, scientific laws have no exception. Over time, as we gain more knowledge and understanding some laws have been modified. Although few theories become laws, theories are still meaningful in science. To become a theory, a hypothesis must undergo rigorous testing often across multiple disciplines by several separate groups of scientists. The concept that something is "just a theory" is not from science. In science, a theory is more than just a hunch. Tanner told Live Science that, "In science, a theory is the framework for observations and facts." Science only deals with the natural world and not the supernatural. Further, science only deals with the now and with facts and reproducible events. History records events that are in the past. Science can only guess about what happened in the past. The only guess that we can make is based upon current events. By measuring current events and assuming that they have always been constant, we can extrapolate backwards and forwards. However, we have no basis for that assumption other than we do not know anything else. If that assumption is wrong, then our "guess" is wrong.

Estimating the Age of the Earth

The basic focus of science is knowledge. Science deals with systems and processes that we can observe. History deals with what generations have observed and recorded in the past. However, not considering the Bible, these records only go back a few thousand years. Any further back and we are outside the bounds of real science. We can only speculate about events that are older than recorded history. These speculations are based on current science, or physical processes, and assumptions as to what might have occurred in the past. In general, we assume

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https://www.livescience.com/20896-science-scientific-method.html/ accesed on 3 March 2022.

[7] A.W. Fairhall and J.A. Young, "Radiocarbon in the Environment," *Advances in Geochemistry*, 93, 1970, 401–18.

that what we are seeing, observing today is what has occurred in the past. There are a number of natural processes that are used as chronometers. Many of these are geophysical processes that are used to determine the age of the earth. Let me stress that the farther back we speculate the greater the error there is in our estimation. It is also important to examine the assumptions that we use to establish the age or the earth or the time of an event. These assumptions are:

1. The process has always occurred at the same rate as it does today.
2. The system/process has always been a closed system. This means that nothing has been added to the system from the outside or subtracted from the system.
3. The initial conditions must be known and must be global in scope. If the initial conditions are only local, then the variations around the world will yield different estimations for the age of the earth. The rate of change of the process must be measurable. That is, there must be a way to accurately measure the rate at which the process proceeds today.

There are several processes that are worldwide. However, we cannot be sure that a process has always proceeded at the same rate over time. Nor is there a truly closed system in the world. In addition, as no one was there, except God, there is no process where the initial conditions can be determined. At best, we can assume that all of the daughter material is a direct product of the parent material. Under this assumption, we can, at best, determine an upper limit for the apparent age of the system. However, this only provides an upper limit and has no real bearing on the real age of the system which is likely much smaller. It is not possible for science to verify the three basic assumptions. God was the only person present when the process started, and He did not record the details needed to verify the assumptions.

Radiocarbon Dating

One method that is used to measure that the age of the earth and the age of various events is radiocarbon dating. Natural carbon has a molecular weight of 12. However, in the upper atmosphere, a process that involves nitrogen and cosmic radiation results in a carbon atom with a molecular weight of 14. Studies indicate that the total amount of carbon-14 in the world is increasing. Because carbon-14 is radioactive, it will eventually break down to its daughter material, nitrogen. This breakdown process has a half-life of about 5,700 years. That means that if there is a block of catbon-14 that weighs 2 kilograms, in 5,700 years, there will be 1 kilogram of carbon-14 and the rest will have converted to nitrogen. 1 kilogram will be come ½ kilogram in 5.700 years, and 4 grams of carbon-14 will become 2 grams in 5,700 years.[8]

To determine the age of an object that contains carbon, we need to accurately measure the amount of carbon-12 in the object and the amount of carbon-14 in the object. We assume the ratio of carbon-14 to carbon-12 when the object, say a tree, died is the same as the ratio today. With these measurements and this assumption, we can estimate the amount of carbon-14 in the tree when it died and, assuming the rate of decay has not changed, then we can determine when the tree died.

[8] A.W. Fairhall and J.A. Young, "Radiocarbon in the Environment," *Advances in Geochemistry*, 93, 1970, 401–18.

However, as mentioned, the total carbon-14 is increasing in the world, therefore our estimation of the amount of carbon-14 at the time tree died is likely wrong. The assumption that the rate of decay has been constant has been demonstrated to be in error. There are several factors that can alter the rate of decay including the burial material, the water saturation, and associated chemicals. The rate of carbon-14 creation varies with the intensity of the cosmic radiation. From these, we know that the estimation of the initial conditions are wrong and that the estimation of the rate of decay may not be constant. There is also the possibility that water leaching and chemical alteration is likely to eliminate the assumption of a closed system. If we take the current rate of decay and the measured rate of carbon-14 creation we can extrapolate back to a point in time where there was no carbon-14. This also assumes that several factors are constant over time. With these assumptions, we can estimate the age of the earth to be about 10,000 years. Or more accurately, we can estimate that 10,000 years ago is the date when carbon-14 began to be deposited on the earth.

"The troubles of the radiocarbon dating method are undeniably deep and serious. Despite 35 years of technological refinement and better understanding, the underlying assumptions have been strongly challenged, and warnings are out that radiocarbon may soon find itself in a crisis situation. . . . It should be no surprise, then, that fully half of the dates are rejected. The wonder is, surely, that the remaining half come to be accepted". [9]

The Foundations of the Earth

Where were you when I laid the foundation of the earth?
Tell Me, if you have understanding.
Who set its measurements? Since you know.
Or who stretched the line on it?
On what were its bases sunk?
Or who laid its cornerstone.
When the morning stars sang together and all the sons of God shouted for joy?
(Job 38:4-7)

Thus says the Lord, "If the heavens above can be measured and the foundations of the earth searched out below, then I will also cast off all the offspring of Israel for all that they have done." Declares the Lord.

(Jeremiah 31:37)

Using earthquake data, geophysicists have been able to estimate that the earth has a solid inner core and a liquid core. Outside of this is a mantle that may have a lower and an upper layer. On top of the upper mantle, it is thought that there may be a "plastic" layer. Above the mantle is the crust with the continental rocks. The solid and liquid cores are thought to be about 2,100 miles in radius. The two layers of the mantle are generally believed to be 1,800 miles thick. The detailed structure of the core and the mantle are far from settled. The crust of the earth is about

[9] Robert E. Lee, "Radiocarbon Ages in Error," *Anthropological Journal of Canada*, 19, no. 3, 1981.

25 miles thick. This is a layer of solid rock that sits on top of the Mohorovicic Discontinuity ("Moho"). There is a strong density change at the Moho which supports the crust.

Scientists have not been able to determine the precise nature of the core, the mantle, or the crust. It is likely that we will ever know their nature. Currently, we do not have the technology that is needed to explore that far beneath the surface of the earth. Recently, man has tried to dig a hole to discern the nature and composition of the mantle. The most ambitious attempt was Project Mohole. The plan was to drill down through the earth's crust to the top of the Moho. It was started at a deep part of the ocean where the earth's crust is thinnest. This would have given man some samples of the mantle from just below the Moho so we could begin to understand the composition of the mantle. However, the project encountered so many problems and became so costly that it had to be abandoned long before it reached it goal.

Although we have not been able to understand the makeup of the core and the mantle, scientists have realized that they are essential for life to exist on earth. The core needs to be dense to provide the gravity needed to hold the atmosphere around the planet. The earth's magnetic field serves as a shield that prevents the solar radiation from destroying life on earth. The magnetic field is thought to be formed in either the core with the iron acting as a dynamo or in the mantle as a product of electrical eddy currents. The actual source and nature of the magnetic field is uncertain.

These are just a few examples of how complex our planet is. There is much more that we have discovered from the mass of the universe to the very fine-tuning of many of the parameters that control the natural laws of the universe. One example is the speed of light. If it is faster, there is too much energy and we burn up. Any slower and we are too cold. This has caused one physicist to comment, "The universe does seem fine-tuned for our existence".[10]

Conclusion

Our universe was specifically designed by a Great Engineer (Almighty God) to support life on this planet. While we will never be able to fully explore and understand the earth we can continue to explore, to study, and to learn about God's creation and some about God. Just as we will never be able to fully understand God's creation, we will never be able to fully understand God. However, we must continue to study and to learn about God.

[10] Korey Haynes, "Are the laws of the universe fine-tuned for life?", Discovery Magazine, November 12, 2018

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