

# Emperor Seamount Chain and Hawaiian Ridge – Ancient Age or 4,350 Years Old

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## Introduction

The main theme of many young-Earth creationists (YEC) in such organizations as **Answers in Genesis** and the **Institute for Creation Research** is that the Earth was created 6,000 years ago (Snelling, 2000a). This short time of Earth's creation means that the volcanoes and their eroded remnants that occur in the Emperor Seamount Chain and the Hawaiian Ridge must have formed after Noah's Flood about 4,350 years ago. This assertion is supported by the YEC on the basis that *if* the Hawaiian Ridge had formed before or during Noah's Flood, the Flood would have deposited sediments on the volcanoes along the ridge, and they have none. Therefore, in the YEC model the volcanoes must have erupted following the Flood (Snelling, 2014). <https://answersingenesis.org/geology/plate-tectonics/hawaiis-volcanic-origins-instant-paradise/> The following sections examine the characteristics of the volcanoes in this area and the events that must have happened to create them if the YEC model is true.

Psalm 144:5 Bow thy heavens, O LORD, and come down!

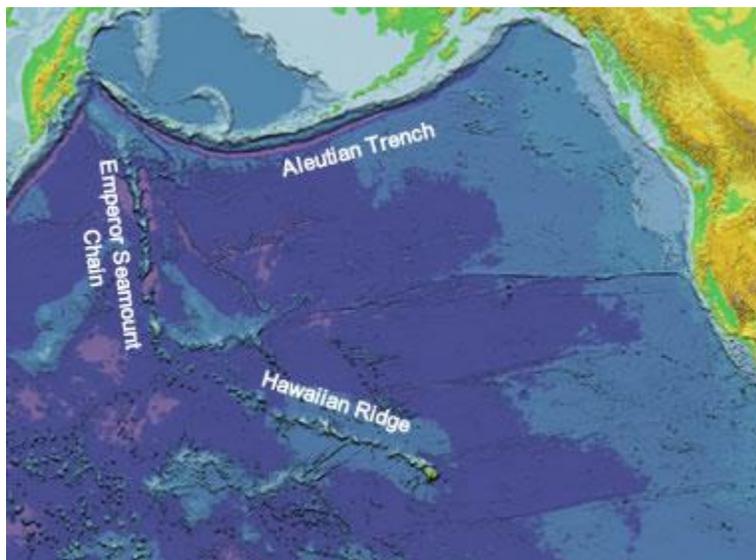
Touch the mountains that they smoke! (RSV)

## The Emperor Seamount Chain and the Hawaiian Ridge

The Emperor Seamount Chain in combination with the Hawaiian Ridge forms an archipelago that extends over a vast area of the North Pacific Ocean. The part of the archipelago that is the Hawaiian Ridge is made up of 132 islands, atolls, reefs, shallow banks, shoals, and seamounts that stretch over 1,500 miles (~2500 km) from the island of Hawaii in the southeast to Kure Atoll in the northwest. Then, at the western end of this ridge the Emperor Seamount Chain extends north

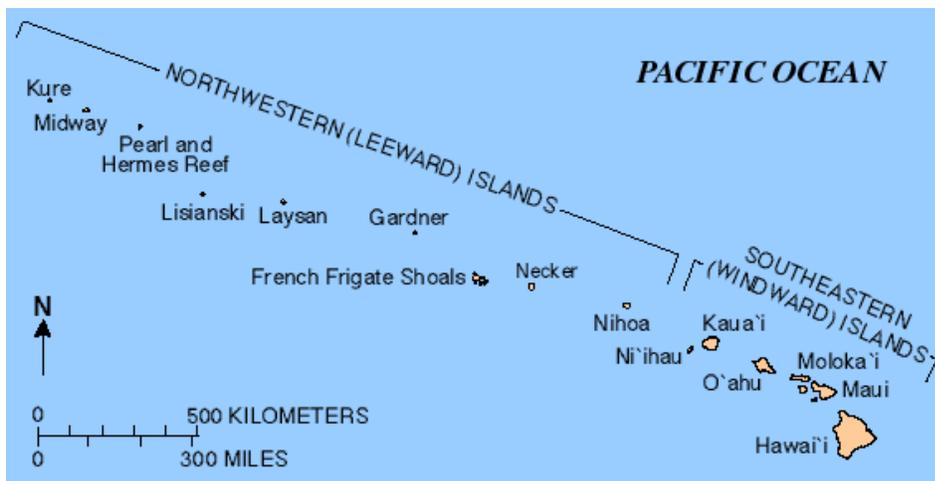
toward the Aleutian Trench for another 1,500 miles (~2500 km) (**Figure 1.1**).

<https://oceanservice.noaa.gov/facts/hawaii.html>



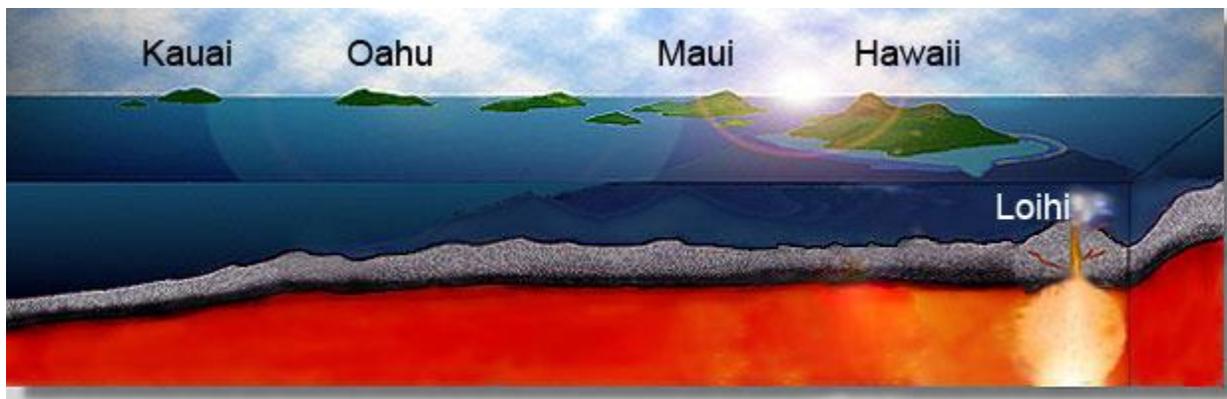
**Figure 1.1.** Locations of volcanoes and their extinct remnants in the Hawaiian Ridge and of submerged eroded volcano remnants in the Emperor Seamount Chain. Source: <https://geology.com/usgs/hawaiian-hot-spot/>

The major named volcanoes and atolls in the Hawaiian Ridge are shown in **Figure 1.2** with the atoll of Kure shown at the farthest west position.



**Figure 1.2.** Volcanoes and remnants in the Hawaiian Ridge.  
[https://en.wikipedia.org/wiki/Hawaiian\\_Islands](https://en.wikipedia.org/wiki/Hawaiian_Islands)

Each volcanic island or submerged seamount (a wave-planed, flattop-eroded, former extinct volcano) in the chain is successively older toward the west as well as toward the north in the Emperor Seamount Chain. The youngest emerging newly-volcano-to-be of the Hawaiian Ridge chain is named Loihi and is presently periodically erupting lava from its summit southeast from Hawaii at a depth of 1000 meters (**Figure 1.3**).

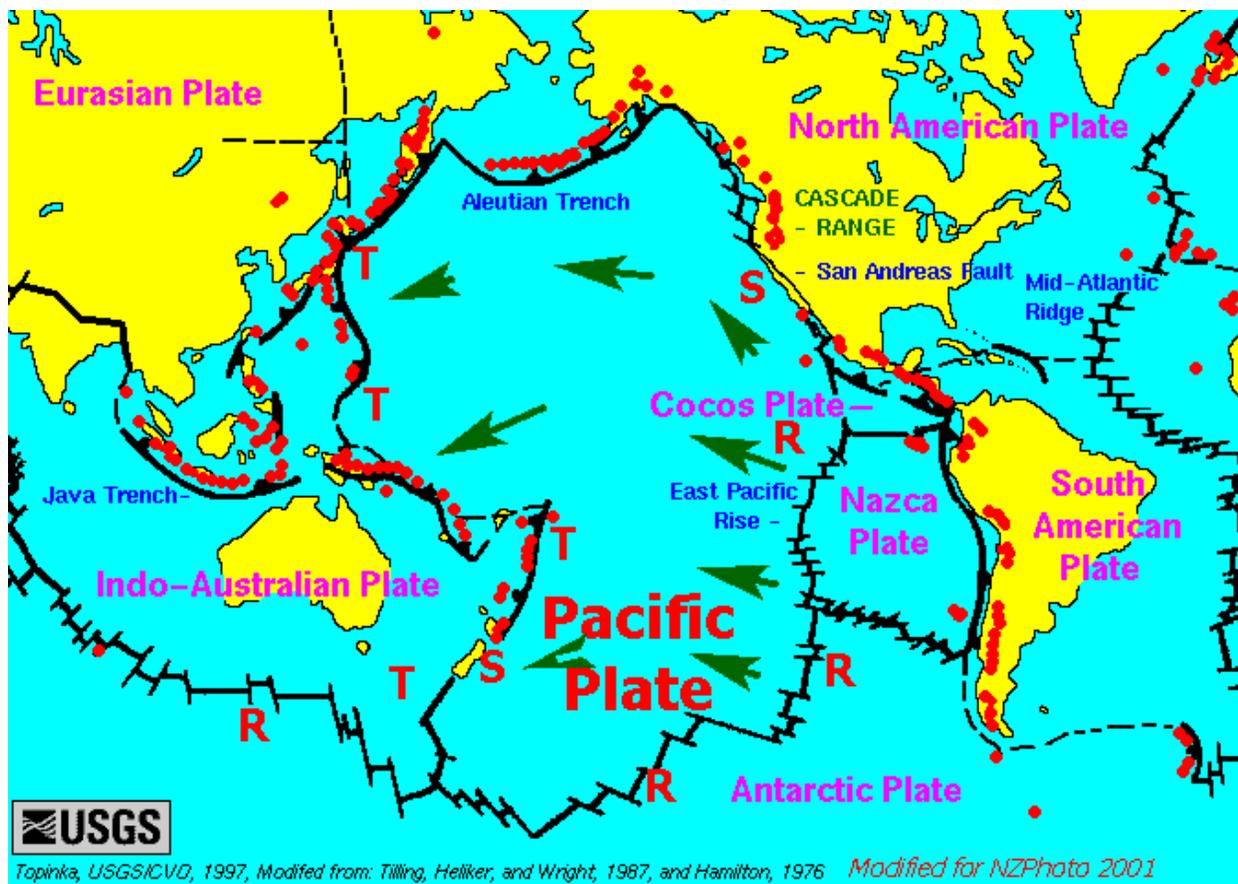


**Figure 1.3.** Location of newly emerging volcano, Loihi.

<https://www.marinebio.net/marinescience/02ocean/hwgeo.htm>

### **Geologic Explanation for Origin of These Volcanoes**

The Earth's outer crust is made up of a series of tectonic crustal plates that move over the surface of the planet. One of these plates is the Pacific Plate that is presently moving northwest and west at a speed of between 7 and 10 centimeters (cm) or ~3-4 inches a year, according to GPS measurements (**Figure 1.4**). Volcanoes can emerge where plates subduct (dive under) other plates. This is shown as a "ring of fire" around the Pacific Ocean (red dots on **Figure 1.4**).

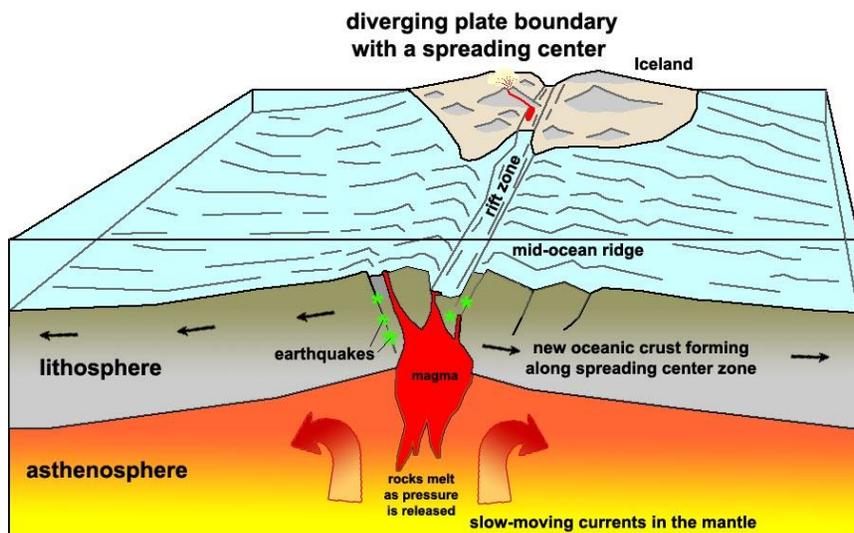


**Figure 1.4.** Pacific Plate, showing active volcanoes (red dots) where the plate subducts (dives under) other plates. A mid-ocean rift zone (red Rs) in the middle of volcanic ridges (at one time in the center of the Pacific Ocean until the North American Plate slid over its eastern part) is shown between the Pacific Plate and the Nazca Plate west of South America as well as another mid-ocean rift zone and ridges in the Atlantic Ocean (right side of figure).

The volcanoes that emerge in mid-ocean rift zones where plates are being pulled apart form a double volcanic mountain chain as volcanoes erupt on opposite sides of the rift zone (**Figure 1.5**).

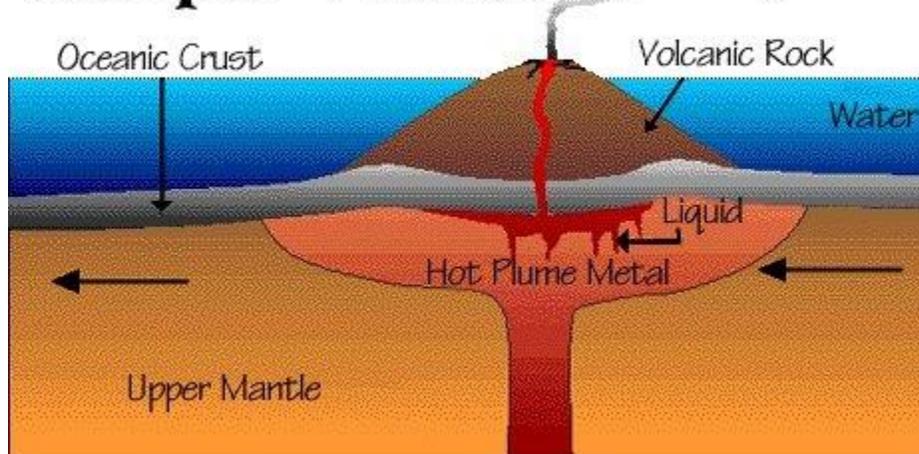
In most of the Pacific Ocean where volcanoes emerge in rift zones, the volcanoes do not rise above sea level, but in the Atlantic Ocean the island of Iceland is one place where this emergence above sea level happens (**Figures 1.4** and **1.5**). However, in some places volcanoes can also form in the middle of a plate. In such places magma rises upward through conduit pipes until it erupts on

the seafloor, at what is called a “hotspot” (**Figure 1.6**). In addition to the hotspot under Hawaii, one hotspot exists under the North American Plate where Yellowstone Park occurs in Wyoming



**Figure 1.5.** Mid-ocean spreading center with a central rift zone. Lava emerges alternately on either side of the rift zone to form a double mountain chain of volcanoes parallel to the rift. Locally, these emerging volcanoes have reached the Earth's surface at the island of Iceland (top)

### "Hotspot" Volcano (e.g., Hawaii)



**Figure 1.6.** Hotspot volcano emerging from a hot plume (conduit-pipe) of magma coming up from deep in the mantle.

The volcanoes in the Pacific Ocean archipelago (**Figure 1.1**) were formed where such a hot spot occurs in the middle of the Pacific Plate. While the hotspot itself is fixed, the plate is moving. So, as the plate moved over the hot spot, the strings of submerged seamounts (former volcanic islands) and remnant volcanoes that make up Hawaiian Ridge chain were formed. The change in the orientations of the two volcanic chains (strings) from west to north indicates an abrupt change in the direction in which the Pacific plate was sliding over the hotspot.

### **Present Active Volcanoes in the Archipelago**

The island of Hawaii consists of five volcanoes, but the only active volcanoes that exist now on this island are Mauna Loa and Kilauea. However, as pointed out above, a new eruption of magma, Loihi, is now emerging from the ocean floor southeast of Hawaii (**Figure 1.3**).

Mauna Loa is the largest volcano on earth. It rises gradually from the ocean floor to an elevation of 4 km (13,100 ft) above sea-level. Mauna Loa covers half of the island of Hawaii. Mauna Kea, adjacent to Mauna Loa, is a bit higher than Mauna Loa and rises 13,796 feet (4.2 km) above sea level but extends another 19,700 feet (6 km) below sea level to meet the deep ocean floor. Thus, its total height is nearly 33,500 feet (10.2 km), considerably higher than the height of the tallest mountain on land, Mount Everest in the Himalayas, whose peak is 29,029 feet (8.8 km) above sea level. [https://www.usgs.gov/faqs/how-big-are-hawaiian-volcanoes?qt-news\\_science\\_products=0#qt-news\\_science\\_products](https://www.usgs.gov/faqs/how-big-are-hawaiian-volcanoes?qt-news_science_products=0#qt-news_science_products)

### **Volcanoes in Hawaii**

The volcano Mauna Loa on the island of Hawaii is called a shield volcano because of its bowed-shape of a shield (**Figure 1.7**).



**Figure 1.7.** Mauna Loa (shield volcano).

The basalt lava of which it is composed emerges at temperatures of 1200-1400°C, and because of its low silica content (45-55 percent  $\text{SiO}_2$ ), it is highly fluid and can readily flow 25 to 40 miles from its eruption site before it spills into the Pacific Ocean. In comparison, molten glass composed of 100 percent  $\text{SiO}_2$  is extremely viscous. As molten basalt lava hardens into solid basalt, it contracts to make fractures in the rock that are important in allowing new eruptions to occur relatively quickly (discussed later).

The lava that emerges to form the volcano contains dissolved steam (water) that also increases the fluidity of the molten rock. This water once occurred disseminated in the hot mantle below the volcano and slowly rose towards the Earth's surface to accumulate where the lower rock pressure caused the hot rock to melt to become magma. Once melting occurs, the magma can force its way upward to erupt as lava that forms a volcano. At and near the Earth's surface, bubbles of steam are created in the lava which act like ball bearings that enable the

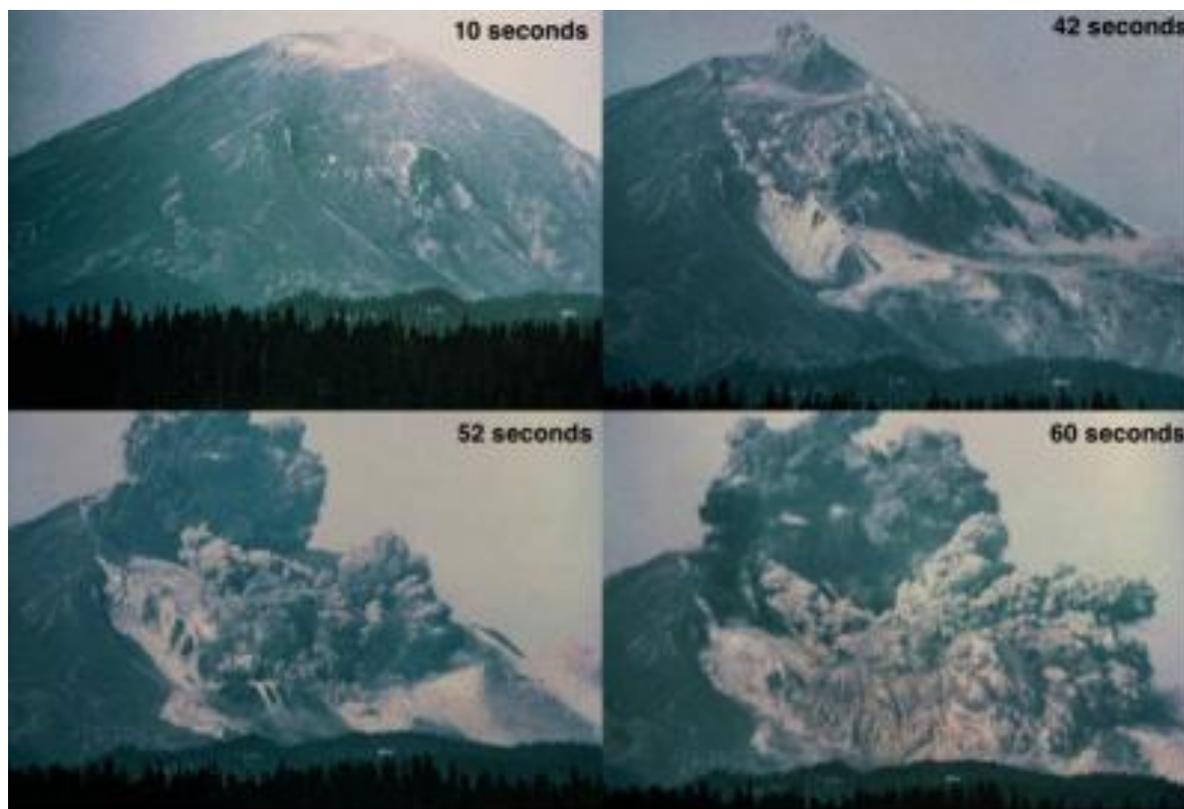
lava to flow easily. When the lava has cooled and solidified, the basalt surface has a ropey appearance called pa hoe hoe (**Figure 1.8**).



**Figure 1.8.** Braids of pa hoe hoe lava with molten lava showing beneath.

The upward accumulation of water rising through the mantle is a very slow migrating process because of the high viscous nature of the mantle rock and because of the interlocking of the crystals in the mantle rock that does not allow the easy movement of any free water molecules. However, because of the fractures in the overlying solidified rock, the molten rock with water that converts to expanding steam can break through the fractures and burst its way to the surface. The explosive nature of volcanoes is because water at 100°C that becomes steam at 100°C expands its volume 520 times.

For example, the powerful explosion of Mount St. Helens on May 18, 1980, resulted when rising magma moved up from depth to cause the eastern flank of this mountain to bulge out and increase its steepness to destabilize its slope. Eventually, this steepness reached a point when two landslides of rock masses on the side of the mountain, triggered by an earthquake, suddenly slid downward (**Figure 1.9**).



**Figure 1.9.** Sequence of what happened when two large masses of older volcanic rock slid from the side of Mount St. Helens, May, 18, 1980. The slides start on sloping planes near the top of the mountain. Blasts of expanding ash particles emerged from both the top and bottom of the slide masses.

Now let's use an analogy to explain what next happened. Imagine putting a bottle of 7-UP on a stove and heating the 7-UP for several minutes. The heated liquid in the bottle contains dissolved, invisible carbon dioxide gas under pressure. Then, if the cap of the bottle suddenly breaks loose, all the carbon dioxide gas in the heated liquid would expand explosively to create a froth of liquid and gas, rushing out of the top of the bottle. This explosive expansion is similar to what happened at Mount St. Helens in which invisible super-heated water was contained in magma near the Earth's surface under the pressure of the overlying rock that acted as a cap on the magma. When this cap was suddenly removed in the two large landslide masses, the super-heated water converted into steam whose volume suddenly increased 520 times. Thus, it is not surprising that the side of the mountain expanded away at more than 450 miles per hour and converted the

magma into rushing, frothy, ash particles that blew down large trees in adjacent forest-covered slopes, stripping the trees and soil down to bedrock.

Eruptions of Hawaiian volcanoes that are active commonly occur every 5 to 10 years, but other volcanoes that are composed of more silica and consequently are more viscous, may take many hundreds of years before enough water can migrate and create enough steam pressure to break through wider-spaced fractures and cause an eruption, like what happened at Mount St. Helens.

### **Volumes of Lava in the Volcanoes of the Archipelago**

The Mauna Loa volcano with its relatively gentle slopes is estimated to have a volume of approximately 18,000 cubic miles (75,000 km<sup>3</sup>), although its peak is about 125 feet (38 m) lower than that of its neighbor, Mauna Kea, that has a similar but smaller volume. However, the above volume of Mauna Loa only includes that portion above sea level. Hawaii is 92 miles long and 76 miles wide (average 84 miles wide), and the ocean channel between Maui and Hawaii is 29.6 miles wide and 6,810 feet deep (1.29 miles). The weight of the lava in Hawaii above sea level (and adjacent Maui) has depressed the ocean floor to this depth to create this deep channel because outside these places the ocean is shallower. Because Mauna Loa is 13,100 feet high and the shield-shape surface slopes to the depth of 6,810 feet and because the rock underlying the top of this shield must consist of lava under that slope for 56.8 miles (42 [half of 84] + 14.8 [half of 29.6]) to the depth of 6,810 feet, the volume of lava that composes the entire volcano with an average radius of 56.8 miles is enormous in the areal extent for all lava erupted both above and below sea level.

Because these two volcanoes and three other extinct volcanoes on the island of Hawaii must have both formed by eruptions every five to ten years or so, and the amounts of each eruption only puts out a tiny portion of the total volume of lava in the volcano and because the number of identified volcanoes and seamounts (former eroded volcanoes) is 80 and each of these volcanic sites likely had similar volumes of lava to produce an enormous shield-type volcano, it is illogical that such volumes of lava can be produced in the short time of 4,350 years after Noah's Flood. Water migrating up from the mantle does not move that fast nor does lava eruption from 80 different volcanoes occur over a fixed hot spot that quickly.

Moreover, during this same time, as the plates are moving apart from spreading centers (rift zones) to form volcanic ridges because of plate tectonics in the 4,350 years since Noah's flood, enormous volumes of lava were erupting in these places that were transported (rafted) away from the spreading centers and

eventually covered both the Pacific and Atlantic Ocean floors to form the oceanic volcanic lava crust on top of the lithosphere (**Figure 1.5**). Such a volume of lava erupting over the entire floors of both oceans in just 4,350 years would surely have generated so much heat that the water in the oceans would have been boiling. How would sea life have survived in such conditions?

### **Ages of Volcanic Rocks in the Archipelago**

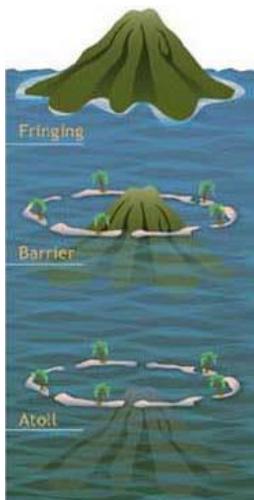
Conventional geologists use K-Ar dating to estimate the ages of the volcanoes in the Archipelago. Basaltic rocks generally do not have zircons that carry uranium, so the uranium/lead (U/Pb) radioisotope method of dating cannot be used to date the basalt volcanoes in the archipelago.

If YEC accept: (a) that the isotope of radioactive technetium-99 (Te-99) has an accurate half-life of about 6 hours so it can be used safely to detect gall bladder malfunction by images of the human body detecting the decay of this isotope, (b) that the isotope of radioactive iodine-131 (I-131) has an accurate half-life of only eight days so that this isotope can be used safely in treating thyroid cancer, and that the isotope of radioactive C-14 has a half-life of 5,730 years and can be used to date an age of a cloth shroud dated at 2,050 years old which covers a mummified bull that matches the time of burial in an Egyptian tomb in a pyramid that was built at this same time (Gove et al., 1980), then the YEC have no valid reason for saying that the half-life of K-40 to produce Ar-40 is not a valid method for determining the ages of the basaltic rocks in the archipelago (Nichols and Panner, 2019). See also article by Davidson and Wolgemuth (2018) that gives evidence for the accuracy of C-14 dating up to 50,000 years.

The K-40 isotope decays to form two isotopes, Ca-40 and Ar-40. Because Ca-40 is common in many rocks, the amount of Ca-40 formed only by K-40 decay cannot be determined, but Ar-40 is not common in rocks and, therefore, it can be used in determining the age of the basalt in the volcanoes. The half-life of K-40 is 1.25 billion years. The islands from southeast to northwest (Hawaii to Kauai; **Figure 2**) have increasing radiometric dates with the northernmost being 3.8 million years (Nichols and Panner, 1999). The oldest dated volcano near the northern end of the Emperor Seamount Chain is 81 million years (**Figure 1**). The bend between the two chains is dated at 43 million years, and volcanism ended on

the island of Kauai (**Figure 1.2**) 3.8 million years ago, making it the oldest of the main Hawaiian islands (Google: Evolution of Hawaiian Volcanoes).

This dating of basalt of 3.8 million years for basalt on the island of Kauai (**Figure 2**) gives an age that is consistent with the time it would take to erode its extinct volcanoes to their present remnant state where its highest peak (Kawaikini) is at 5,243 feet (1.6 km) above sea level, particularly when this volcanic peak was once likely in excess of 13,000 feet like those on the island of Hawaii. Also, the date of 43 million years at the bend is consistent with the erosion time to form a coral atoll reef (Kure, **Figures 1.2** and **1.10**) that once ringed the base of the volcano at this place. That amount of erosion cannot happen in less than 4,350 years for the ages of the volcanoes in the Hawaiian Ridge nor for the ages of the eroded remnants of volcanoes in the Emperor Seamount Chain (**Figure 1.1**). Hard solidified basalt lava does not erode that rapidly, and this great amount of erosion could not have happened during supposed tsunamis generated by Noah's Flood because these volcanoes had to have originated after the Flood.



**Figure 1.10.** Formation of an atoll progressively (a) from a fringing coral reef surrounding a volcano (top) to (b) a barrier reef stage and finally (c) to an atoll after the volcano is eroded away and/or sinks down from its weight.

The above ages are also consistent with measurements made by the Global Positioning System (GPS) of the rates of 7 to 10 cm per year at which the oceanic plates are spreading apart from oceanic spreading centers and are consistent with the rate at which the Pacific Plate would have slid over the "hot spot" that

generated the volcanoes in the archipelago. If YEC cannot accept all of the above observations, they must come up with an explanation as to how the Bible offers more accurate age dating if they claim that they are using the Bible as a science text.

### **False Arguments by Young-Earth Creationists**

The YEC can say: "How do we know that isotopes did not decay faster in the past (Snelling, 2009)? We cannot rule it out because there would not have been any human observer making observations and recording experimental results that would confirm that the rates of decay (half-lives) of radioactive isotopes 4.6 billion years ago occurred at the same rates and in the same way that we observe today."

On that basis, to support their young-Earth model the YEC claim that decay rates were different in biblical times.

If YEC claim that the radioactive decay rates were different in biblical times in order to produce ages that make the basaltic rocks have ages that are less than 6,000 years old, then they have to say also that the nuclear forces that bind atoms together that allow stars to transmute hydrogen into all atoms of the periodic table must have been different from 0.007 which is the number that defines how firmly atomic nuclei bind together and how all the atoms on Earth were made. However, even a slight difference in the strength of the nuclear forces, say 0.006 or 0.008, would mean that the elements and their isotopes could not have formed in the first place, and we could not exist (Rees, 1999). Therefore, the supposed argument that rates could have been different in the past can be dismissed.

Moreover, if radioactive decay rates were higher in the past biblical times than what is measured in laboratories today, so much heat would have been generated by the radioactive decay in 6,000 years instead of 4.6 billion years (the conventional age of the Earth) that the whole Earth would have melted so that Noah's Flood waters would have been converted into steam. Thus, YEC cannot claim to use science if they want to say that their models are scientifically correct.

The YEC also claim that the Pacific Plate was moving at accelerated speeds (Austin, et al., 1994) following Noah's Flood such that the volcanoes in the

Emperor Seamount Chain did not have time to grow to large size, but then later the speed of plate movement gradually slowed to the present speed so that the largest volume of lava was erupted in the largest island of Hawaii (Snelling, 2014).

(<https://answersingenesis.org/geology/plate-tectonics/hawaiis-volcanic-origins-instant-paradise/>) There are at least three problems with this hypothesis.

(1) In the YEC model, all volcanoes in the Emperor Seamount Chain were produced as the Pacific Plate slid over the hotspot, now under Hawaii, during accelerated plate tectonics, at speeds of 10 feet per second (calculated to be 7 mph) (Austin et al., 1997). If this happened shortly after the Flood and if the Pacific Plate were moving at 7 mph while the volcanoes in the Emperor Seamount Chain were being formed across a distance of 1500 miles and if the plate then gradually slowed down across the next 1500 miles to the speed at which the plate is now sliding over where the volcanoes of Hawaii exist, all 79 volcanoes west of Hawaii would have been created in about 2 years and 2 months. That accomplishment is highly unrealistic. The problem that exists for this YEC model is what has been pointed out earlier. Water to facilitate melting to form magma (and subsequently lava) can only migrate up through viscous mantle rock with interlocking crystals at exceedingly slow speeds, and there is no experimental laboratory support that suggests that simultaneous with accelerated plate tectonics, an accelerated movement of water can occur that would allow huge quantities of water to move up through the mantle that could produce all volcanoes in the Emperor Seamount Chain and the Hawaiian Ridge so soon after the Flood. Thus, the YEC model is nonsense.

(2) The YEC suggest that the islands west of the island of Hawaii were reduced in size because of huge landslides (huge blocks [up to 20 miles long and 1 mile thick]) that have carried parts of the island into the Pacific Ocean during mass wastage (Whitmore, 2013). This certainly would reduce the height of some of the islands, but the YEC have not shown that this has happened to all volcanoes west of Hawaii. Moreover, the landslides do not take into account the great volumes of lava that would have been erupted and occur below sea level in these islands where the landslides occurred, and such, as has been noted in item (1), do not make the occurrence of landslides to be sufficient and an adequate argument to make the YEC model correct. The normal erosion that would happen over millions of years

is a more logical explanation as to why the volcanoes show progressive reduction in size west of the island of Hawaii.

(3) The YEC ignore the existence of the Kure Atoll which is 4-5 miles in diameter (**Figure 1.11**).



**Figure 1.11.** Kure Atoll.

It is well known (a) that a coral atoll is produced as a volcano below its center slowly sinks (**Figure 1.9**) and (b) that the sinking has to be slow enough for the coral growth to keep up with the sinking. Corals grow so slowly that they could not possibly have produced the Kure Atoll if accelerated plate tectonics is a prerequisite condition for its formation soon after Noah's Flood. For example, massive corals have growth rates of 0.3 to 2 cm per year and branching corals, up to 10 cm per year, but it would take 100,000 to 30,000,000 years to fully form an atoll. [https://oceanservice.noaa.gov/education/kits/corals/coral04\\_reefs.html](https://oceanservice.noaa.gov/education/kits/corals/coral04_reefs.html) On that basis, the corals that form the Kure Atoll must have once been a fringing reef around a former volcano, and these corals could not have grown upward for many hundreds of meters from their initial growth positions adjacent to the volcano to become the Kure Atoll in just a few years after the Flood or even in 4,350 years. The age of the bend between the end of Hawaiian Ridge and the Emperor Seamount Chain just beyond Kure is 43,000,000 years and this age fits with the 30,000,000 year age of the Kure Atoll.

[https://www.google.com/search?q=age+of+kure+atoll&rlz=1C1EJFA\\_enUS695U](https://www.google.com/search?q=age+of+kure+atoll&rlz=1C1EJFA_enUS695U)

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Nevertheless, the YEC point out that there are some problems with K-Ar dating (Snelling 2,009) because in some places excess argon (Ar-40) comes up with the lava. For example, Snelling (2000b) points out that "the potassium-argon dates obtained from the basalts of the 1800–1801 eruptions of Hualalai on Hawaii were 1.4, 1.6 and 22.8 million years, from the basalts of the Kilauea Iki eruption of 1959 on Hawaii, 8.5 million years, and from basalts erupted from Kilauea on Hawaii <200 and <1,000 years ago, 21 and 42.9 million years respectively." Dalrymple and Moore (1968) have also found similar problems with excess Ar-40 in pillow lava basalt for the Kilauea volcano as well as studies by Noble and Naughton (1968). Nevertheless, a consistent increase in age for the volcanoes in the Hawaiian Ridge occurs progressively to the west and in the Emperor Seamount Chain progressively to the north. Even if the K-Ar dating is suspect, the farther each volcano is from Hawaii clearly makes each of them older with increasing distance, and the rates at which these volcanoes can erupt (every 5 to 10 years or so) to produce the huge volumes of lava in each volcano still makes them have ages far greater than 4,350 years with increasing distance which the YEC model places as the age limit for them as well as for the ages of each of the five volcanoes on the island of Hawaii. That is, each volcano in the Pacific archipelago that supposedly formed in about 2 years and 2 months while the accelerated plate was sliding over the hotspot was in its fastest mode in the Emperor Seamount Chain or slowing down to the present rate of movement over the hot spot at Hawaii, did not erupt as a single enormous blob of lava while sitting on top of the hotspot in order to complete their volcanic sizes, say in 10 days for each of the 80 volcanoes in the chain of volcanoes. Each volcano consists of thousands and thousands of lava layers on top of each other (perhaps as many as 100,000 or more to make an island whose lava flows accumulate to be as much as 33,500 feet thick for Hawaii) that were separated by 5 to 10 years or more, and this observed fact logically and clearly makes the time for each volcano to form far in excess of the 10 days for each volcano that the YEC model of accelerated plate tectonics proscribes. This certainly even makes Hawaii older than 4,350 years. The YEC model requires miracles and is not supported by science.

The YEC can also argue on the basis of their theological interpretations that they have the Bible which is God's Word revealed to them and that because of who God is, being all knowing, the YEC can have much more confidence in God's Word than in science. Furthermore, they say: "Truths revealed by God are eternal and unchanging, whereas science changes all the time." Therefore, YEC argue that it would be foolish to give up their Bible-based theology because of pressure from arguments presented by scientific studies of the nature of the universe. Thus, for YEC their Bible-based theology says the Earth is young, and, so, the Earth must be young (Nichols and Panner, 2019).

Nichols and Panner (2019) give a much more thorough discussion of how all the above YEC arguments are false in comparison to the few arguments that are given in this article, and the interested reader should look at what they say.

Nevertheless, if the YEC appeal to the superiority of their theological interpretations, they still have to provide alternative explanations to the observed scientific facts concerning the volcanoes in the Emperor Seamount Chain and the Hawaiian Ridge and present strong scientific reasons why the science is wrong if they want to use the Bible as a science text.

Although the YEC commonly point to 2 Timothy 3:16-17 as proof that the Bible is scientifically accurate, they twist what the Bible says in order to make it say what they want to believe. For example, these verses say: [16] *All scripture is given by inspiration of God, and is profitable for doctrine, for reproof, for correction, for instruction in righteousness:* [17] *That the man of God may be perfect, thoroughly furnished unto all good works.* (King James Version)

Note that these verses give instructions for achieving righteousness and not for instructions as to how science works. The Creator has given us two books to describe what He/She teaches. The Bible is a book that answers the questions of who and why, and science is a book that answers the questions of when, where, and how. Biblical authors had the total freedom to use explanations that made good theological sense to the Hebrews living in their time and culture, and these explanations need not have been scientifically accurate because such knowledge was not known or available during the time in which the Hebrews were composing the books of the Bible.

## Conclusion

As Galileo Galilei said: "I do not feel obliged to believe that the same God who has endowed us with senses, reason, and intellect has intended us not to forgo their use." On that basis, God has given us a brain and expects us to use it. It is perfectly logical to interpret what is written in the Bible as the views of Hebrews who had no scientific knowledge and who wrote in the time and culture in which they lived, using words that had symbolic theological meaning for them rather than precise scientific meaning. On that basis, it is logical to use the ability to use reason that the Creator has given us and to suggest that the volcanoes that form the Emperor Seamount Chain and the Hawaiian Ridge were produced over several millions of years and not in less than 4,350 years.

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