The Big Hurricanes Theory, the Great Unconformity, and a Supposed Worldwide Flood

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Requirements for a habitable planet include (1) enough water for a large ocean, (2) the water migrated from the planet's interior to its surface, (3) water was not lost to space, and (4) water exists as a liquid. The Earth meets those requirements, but what seems to be published now about water in the oceans is not exactly what is described in these four requirements. That is, many investigators seem to think that the Earth began with an ocean deeper than the present ocean, but the geologic evidence and processes described in this article indicate that such a belief is not true. In **Figure 1**, it is shown that the original Earth contained nitrogen, carbon dioxide, water, hydrogen sulfide, methane, ammonia, but no free oxygen.

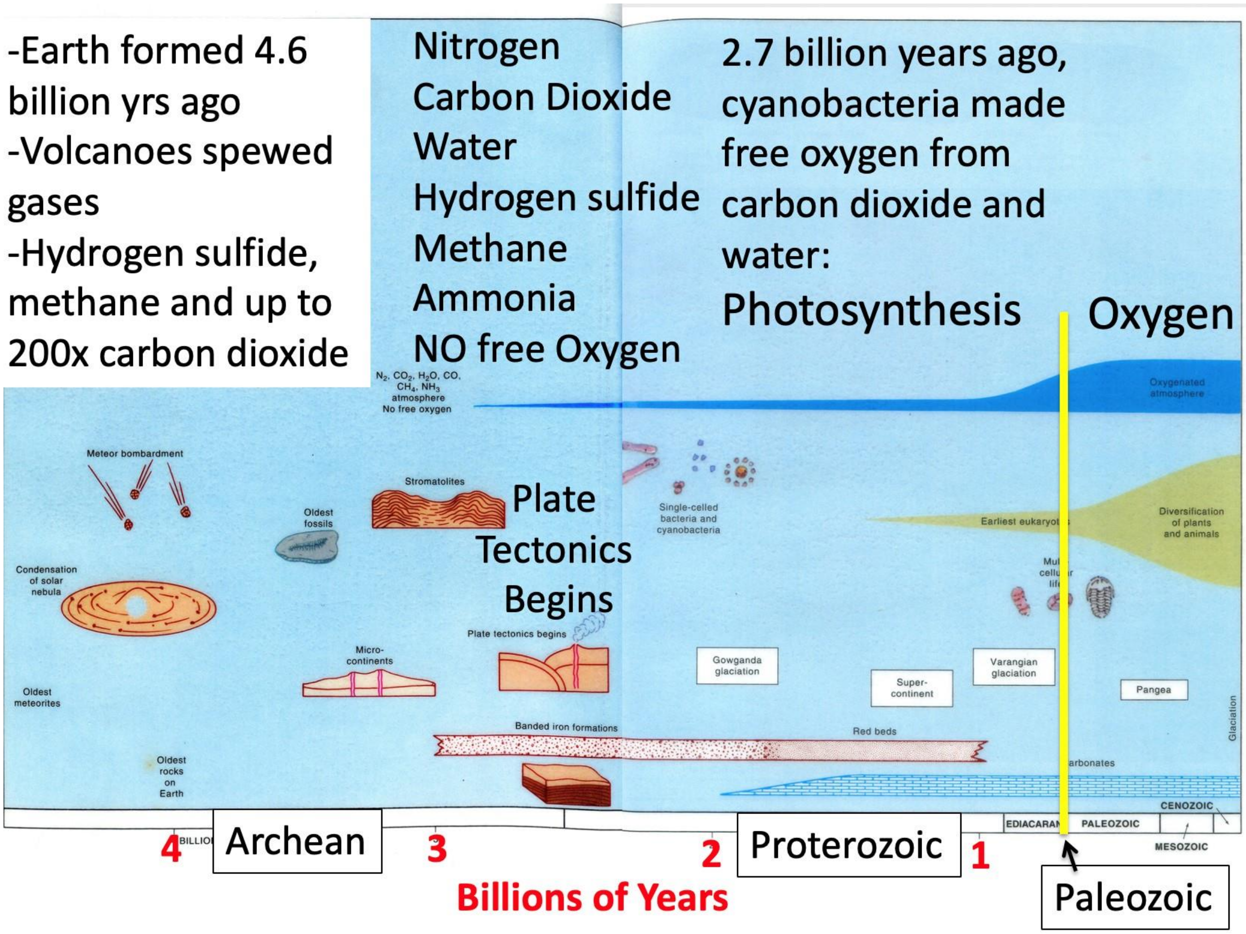

Figure 1. Gases spewed from volcanoes that came from the interior of the Earth.

The distribution of Archean rocks on the five continents on the Earth shows their wide extent in isolated tiny islands of shields and cratons that is illustrated by those shown in this image (**Figure 2**).

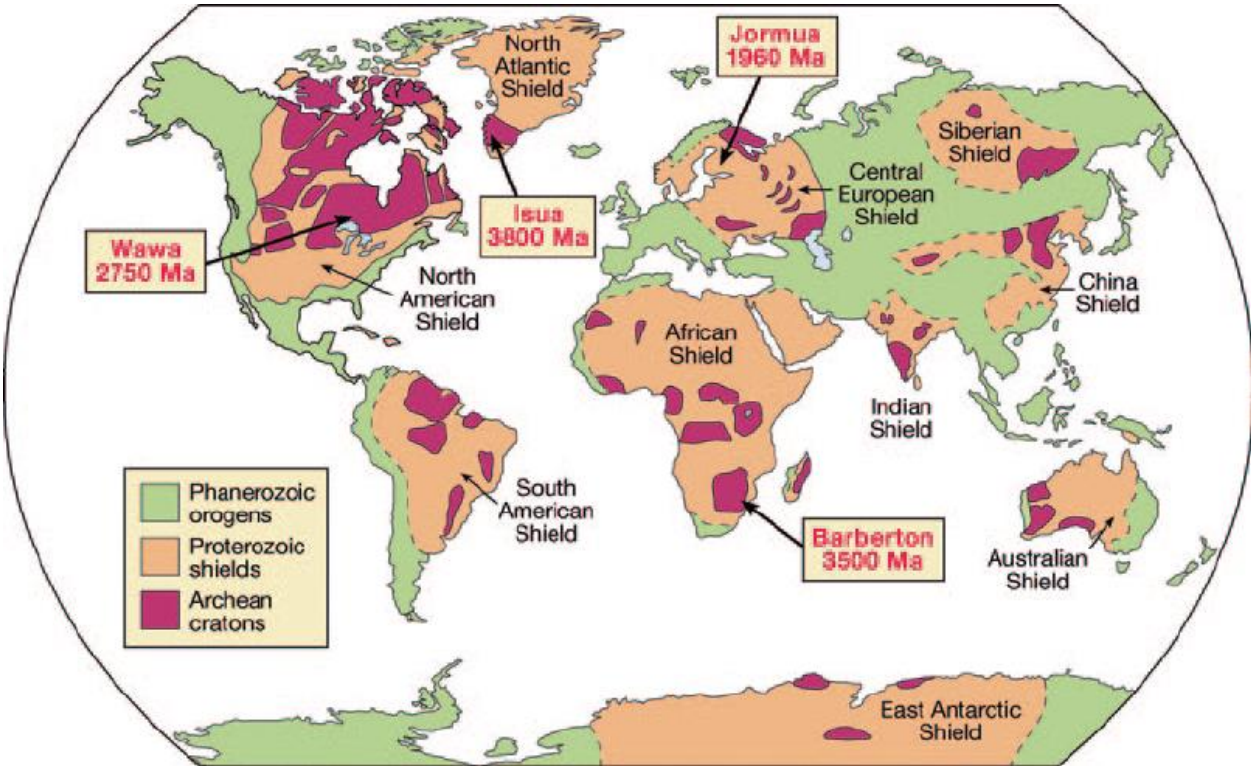

Figure 2. Distribution of Phanerozoic orogens (green), Proterozoic shields (orange), and Archean cratons (red)

The North American continent (**Figure 3**) has one of these shield areas in which different islands of ancient Precambrian rocks are shown in dark pink (Wyoming and Superior of greater than 2.5 x 1,000 million years), gray (Yavapai Mazatzal of 1.8-1.6 x 1,000 million years), and red (Grenville of 1.4-1.0 x 1,000 million years).

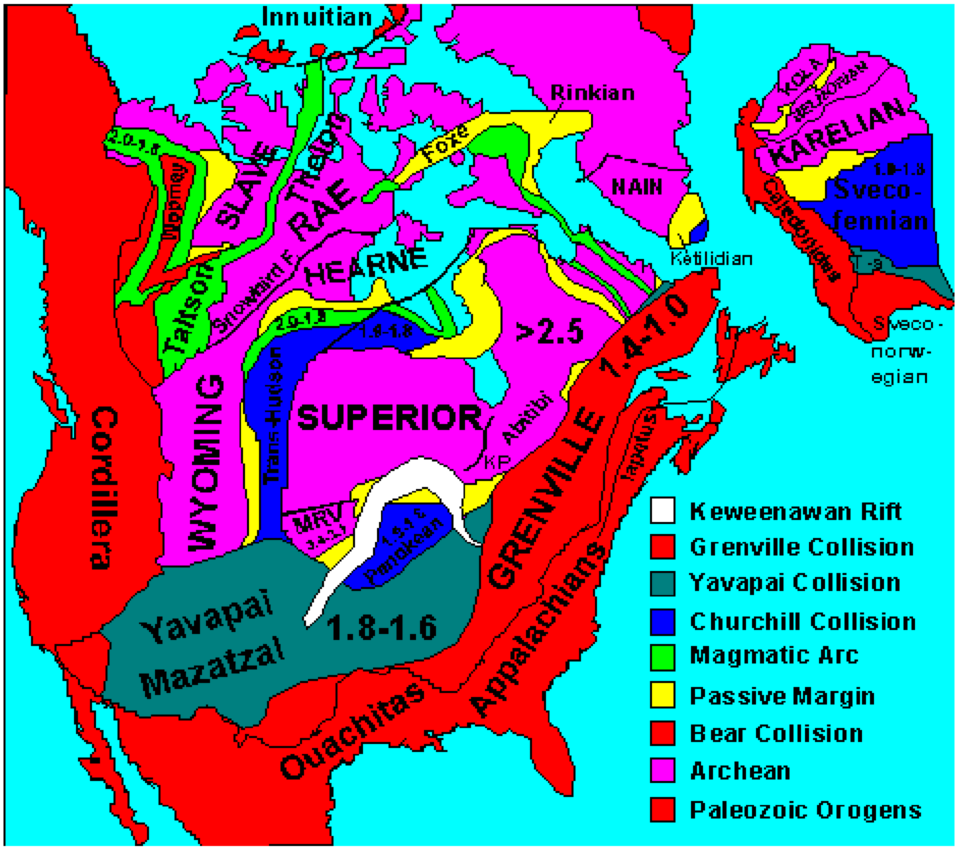

Figure 3. Map showing locations of various provinces with ages in millions of years times 1000 in the North American crustal plate.

Similar islands of ancient Precambrian rocks occur on all the other continents (**Figure 2**), and these ancient Precambrian rocks begin with Archean rocks that have ancient ages of their formation being created 4,000 to 2,500 million years ago (**Figure 4**)

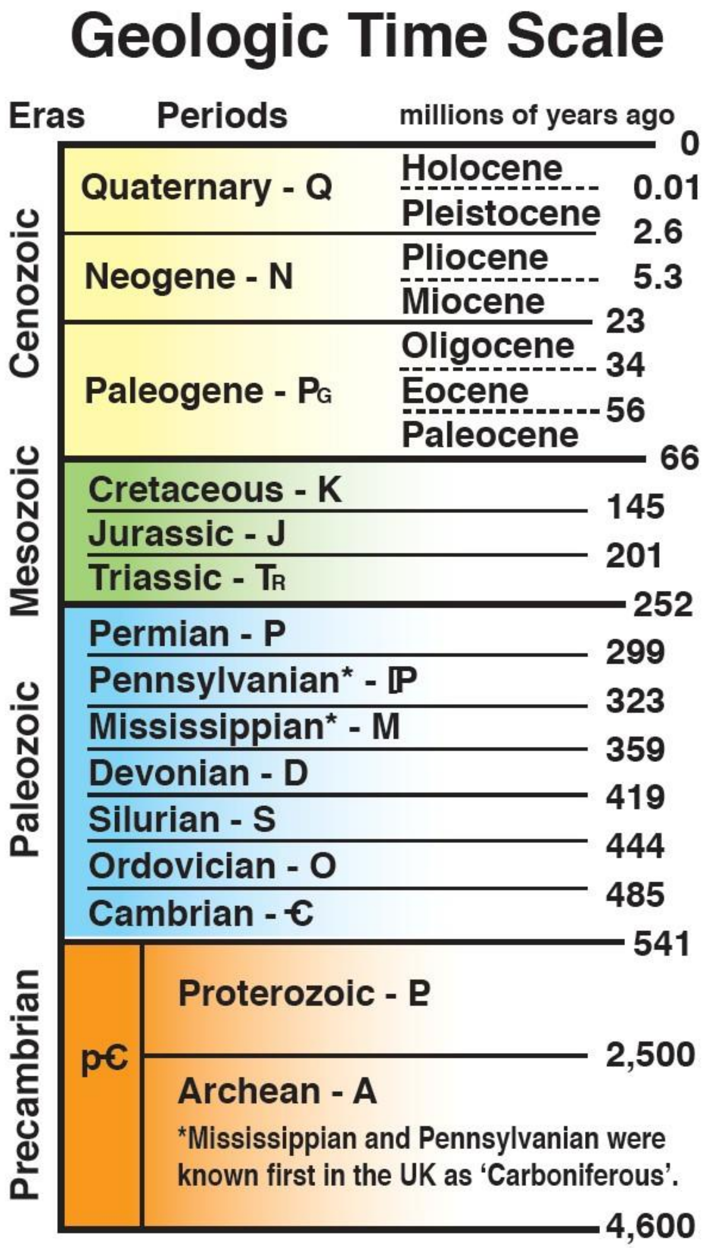

Figure 4. Geologic time scale.

One of the geologic mysteries of the present time is the origin of the **Great Unconformity** (**Figure 5**) in the Grand Canyon, Arizona.

Figure 5. Great Unconformity – the erosional surface (mid-line across width of image) between overlying, nearly-horizontal, sedimentary Paleozoic Cambrian rocks and dipping with underlying Precambrian rocks in the Grand Canyon.

Some scientists have suggested that it forms following a great amount of erosion during plate tectonics while others have suggested that it resulted from extensive snowball glaciation of the Earth. But there is no evidence of glacial striations of the rocks at the top of this unconformity and for what really caused the great amount of erosion.

Early Archean history

This mystery of the origin of the **Great Unconformity** can be solved by examining the early Archean history of the Earth. Although hurricanes likely appeared when methane first began to become abundant in the Earth's atmosphere about 3,000-3,500 million years ago, they likely gradually increased in abundance and power until they were particularly big, frequent, and powerful (like the category 5 Katrina hurricane, **Figure 6**, but bigger, more often, and more powerful) about 1,600 million years ago before the Cambrian Tapeats Sandstone began to be deposited about 541 million years ago.

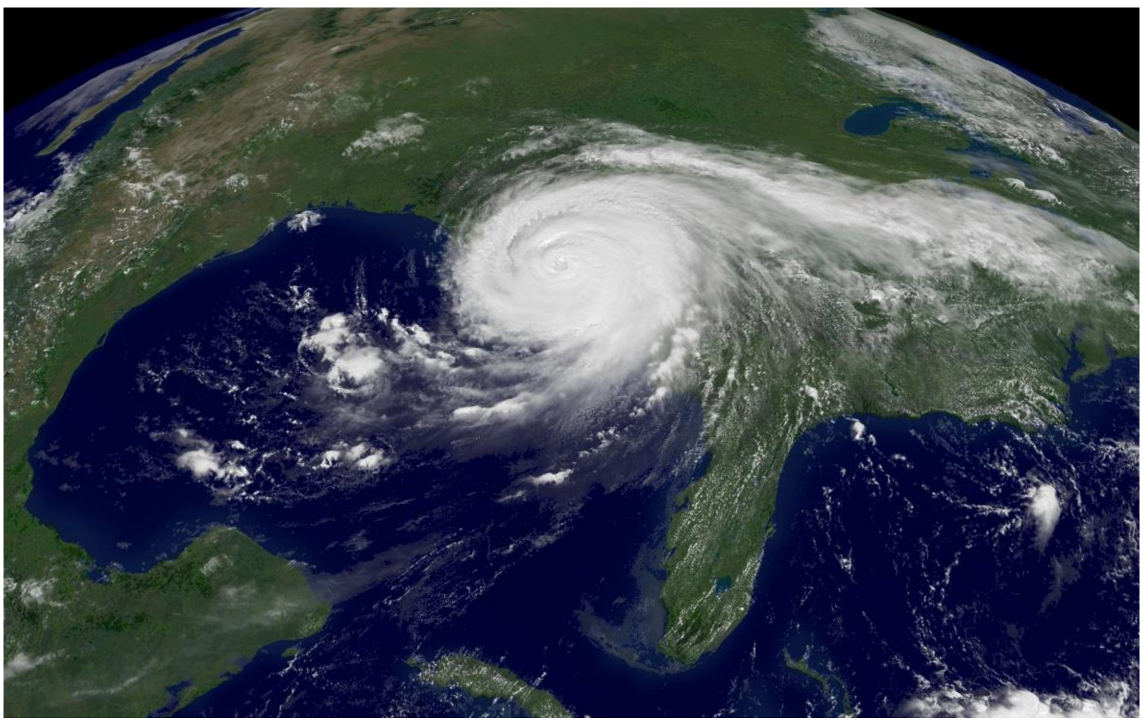

Figure 6. Category 5 Katrina hurricane, hitting coast of Texas and Louisiana in the United States in August, 2005.

It was earlier thought that the first oceans were more voluminous oceans on the basis of the relatively high ^{18}O content of the water. This high ^{18}O content, however, likely has nothing to do with evidence for the oceans being more voluminous but merely reflects that the ocean waters were warmer, creating relatively more evaporation of water molecules containing the lighter ^{16}O isotope and enriching the ocean waters in the heavier ^{18}O. Moreover, recent studies of these oxygen isotopes in more than 1,300 zircon crystals in the Jack Hills formation in Australia that range in age from 3.4 to 4.2 billion years in age show that the early ocean waters were fresh waters and that only later did the Earth's oceans become progressively and increasingly saltier.

The volume of the original oceans was supposedly constrained by a variable mantle water storage capacity, by mantle temperature, and by its hydrous (OH) minerals. However, the mantle mineral, Mg-sursassite, $Mg_2 2Al_3(SiO_4)(Si_2O_7)(OH)_3$ in Earth's interior that has OH as part of its chemical formula, is not likely the source of water that eventually diffused up in the mantle to cause basalt melts to form and which later caused the explosive eruption of water-bearing basalt lava and ash from volcanic vents. That is, this OH is structurally bound and not free to migrate. More likely the sources of mantle water for basaltic eruptions are free (water) H_2O or OH molecules in the interstices or crystal boundaries between iron-magnesium silicate minerals. Probably, although the amount of water in the original mantle was only in trace amounts, the volume of the mantle is enormous so that once there was 4 to 5 times as much water in the mantle as the volume of water in the world's oceans now.

Formation of the proto-Earth

According to current theories, the proto-Earth was formed by zillions of impacts of meteorites, and the energy produced during the collective bombardment of these meteorite masses and the heat released from the decay of radioactive elements would have melted the whole proto-Earth so that heavy iron atoms sank to form its core, and this proto-Earth would have had magma oceans. On that basis, subsequent outgassing, volcanic activity, further meteorite impacts produced an early atmosphere of nitrogen, carbon dioxide, and water vapor. Then, after these gases in the atmosphere had accumulated over millions of years and after significant cooling, the water vapor would have condensed to form the Earth's first oceans. Then, *supposedly*, the Earth during the Archean Eon was mostly a water world, but that it had a continental crust that was mostly under an ocean deeper than today's oceans.

But the laws of atmospheric physics indicate that for today's atmosphere it can only hold 0.01 to 4.0 percent by volume, and therefore, the early Archean atmosphere could not have held as much water as would have created oceans that would have had greater volume than the water volume in the present oceans. Moreover, **Figure 1** suggests that water was not lost in space that would reduce the supposed original volume to its present volume and that the water actually came from the Earth's interior.

It is true that when the Archean began, the Earth's heat flow was nearly three times as high as it is today (**Figure 7**).

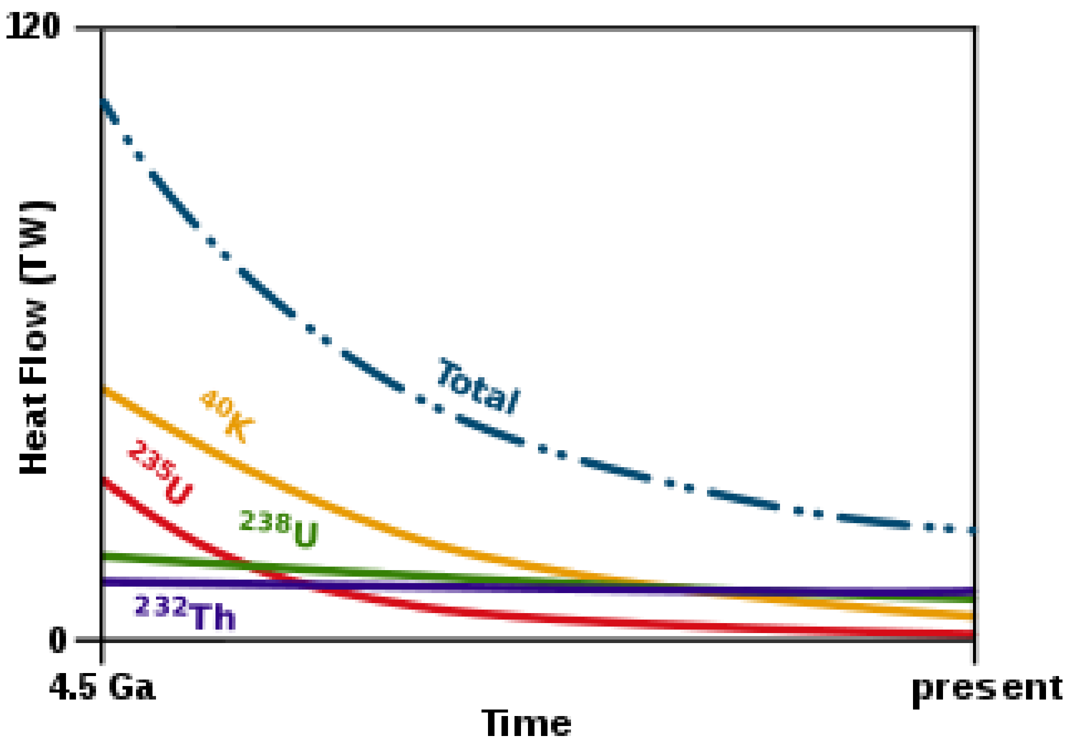

Figure 7. The evolution of Earth's radiogenic heat flow over time.

And, it was still twice the current level at the transition from the Archean to the Proterozoic (2,500 Ma). (See **Figure 4**.) The extra heat was (a) partly remnant heat from the zillions of meteorite accretionary bombardments, (b) from the crystallization of the iron core, and (c) partly from the decay of radioactive elements as shown in **Figure 7** that provides the extra heat. As a result, the Earth's Archean mantle was significantly hotter than today.

In the Archean islands that are shown in **Figure 2**, granitic rocks dominate in voluminous plutons of granite, diorite, layered intrusions, anorthosites, and monzonites, but some felsic rocks occur in extensive lava flows. In many places strongly metamorphosed sediments, such as graywackes, shales, volcanic sediments and banded iron formations, occur. Carbonate rocks are rare, which suggests that the oceans were more acidic because of dissolved carbon dioxide. Greenstone belts are common and consist of alternating units of metamorphosed mafic igneous and sedimentary rocks and felsic volcanic rocks. The metamorphosed igneous rocks were derived from volcanic island arcs, whereas the metamorphosed sediments represent sediments eroded from the neighboring island arcs and deposited in a forearc.

Plate tectonics likely produced large amounts of continental crust, but the Archean oceans probably covered most of the continents entirely. Only at the end of the Archean did the continents likely emerge from the ocean. The rest of the Archean continents have been recycled. The added oxygen of oxides in banded iron formations, chert beds, and chemical sediments and pillow basalts demonstrates that liquid water was prevalent.

A possible new interpretation

Previous investigators have insisted on their belief that the Archean Eon represented a time in which the whole Earth was covered with water and that the volume of this water was greater in deep oceanic basins than what occurs in the present oceans. This does not make good geological sense. The proto-Earth was not formed by impacts of water-bearing comets that had lots of water in them but by meteorites that consisted mostly of iron and of iron- and magnesium-bearing silicates, and any water in these iron-rich meteorites would have boiled off into space at the very high temperatures that resulted from their impacts. Therefore, no water would have been immediately available to produce deep oceans of water. The clue to this fact is what is observed on the Moon which has the same age as the Earth and which has little to no water on its surface or in its minerals, as is evident from the samples collected by astronauts. Therefore, what geologically makes sense is that the water in oceans of Archean age only appeared gradually in time by being brought to the Earth's surface during basaltic eruptions, and the volume of this water also only increased gradually. On that basis, first oceans appeared when plate tectonics began that allowed trace amounts of water to emerge during basaltic eruptions and the first oceans that covered the first crust were quite shallow and only became deeper with time as more eruptions of basalt occurred. On that basis, the questions to be asked are what are the geologic factors that accompanied the creation of the ocean waters during the Archean Eon and what happened following the early formation of shallow ocean waters?

Geologic factors that affected events in the Archean and subsequent younger aged rocks

The **first** is that in the mid-Archean the first life that was formed were methanogens (*Euryarcheota*) that generated methane as a waste product of metabolism, and this methane would be added to the atmosphere. The first atmosphere could have consisted of nitrogen, carbon dioxide, perhaps a little methane, but almost no water or oxygen. Therefore, throughout the Archean methane was constantly being added to the Earth's atmosphere by the methanogens and increased in amounts at the same time that the amount of water increased in the oceans. During this time the mantle and crustal rocks (most of which were underwater) were relatively hot as indicated in **Figure 7**, but methane is a greenhouse gas and, thereby, would also heat the atmosphere that would cause the water in the oceans to be warmed and much hotter than occurs today.

The **second** is the speed of rotation of the proto-Earth. Corals are particularly useful for calculating ancient day lengths and tidal patterns. Presently, the daily rotation of the Earth takes roughly 24 hours, and the Earth takes about 365 days and six hours to orbit the sun. But days used to be much shorter. Hundreds of millions of years ago, the Earth rotated 420 times around its axis in the time it took it to orbit the sun, rather than 365+ days. (See **Figure 4**) Corals from the Silurian Period (444-419 million years ago) show 420 little lines between seasonality bands, indicating that a year during that period was 420 days long. Corals from the Devonian Period, a few million years younger, show that the earth's spin had slowed down to 410 days per year. Projecting back in time could mean that in the Archean Eon the Earth's spin rate could have been such that there were more than 600 days in a year.

A **third** is that the greenhouse effect of methane in the atmosphere warms the ocean water that in turn results in powerful hurricanes as is observed in the present time. The hurricanes during the Archean likely would have been more powerful than category 5 in scale with winds moving much, much more than 156 mph. Such winds generate circular waves that would have very large amplitudes between troughs and crests of waves (**Figure 8**).

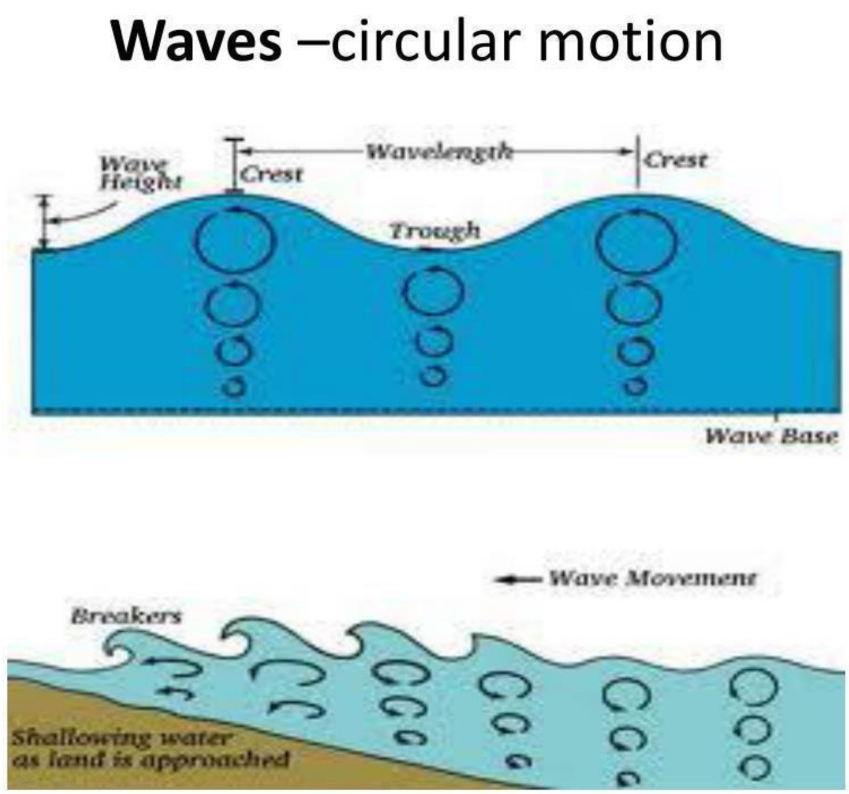

Figure 8. Circular motion of waves.

The **fourth** is that the Earth's high spin rate would result in the proto-Earth being an oblate spheroid with its diameter at the equator larger than it is now. This greater oblateness in combination with faster spinning could result in more flowage in the relatively hot plastic mantle so that circular convection cells of up-rising less-dense volumes in mid-ocean centers and down-movements of denser, colder, subducting crust could result in relatively faster plate tectonics than in later plate tectonic movements, which in turn would facilitate basaltic eruptions of water-bearing lava (**Figure 9**).

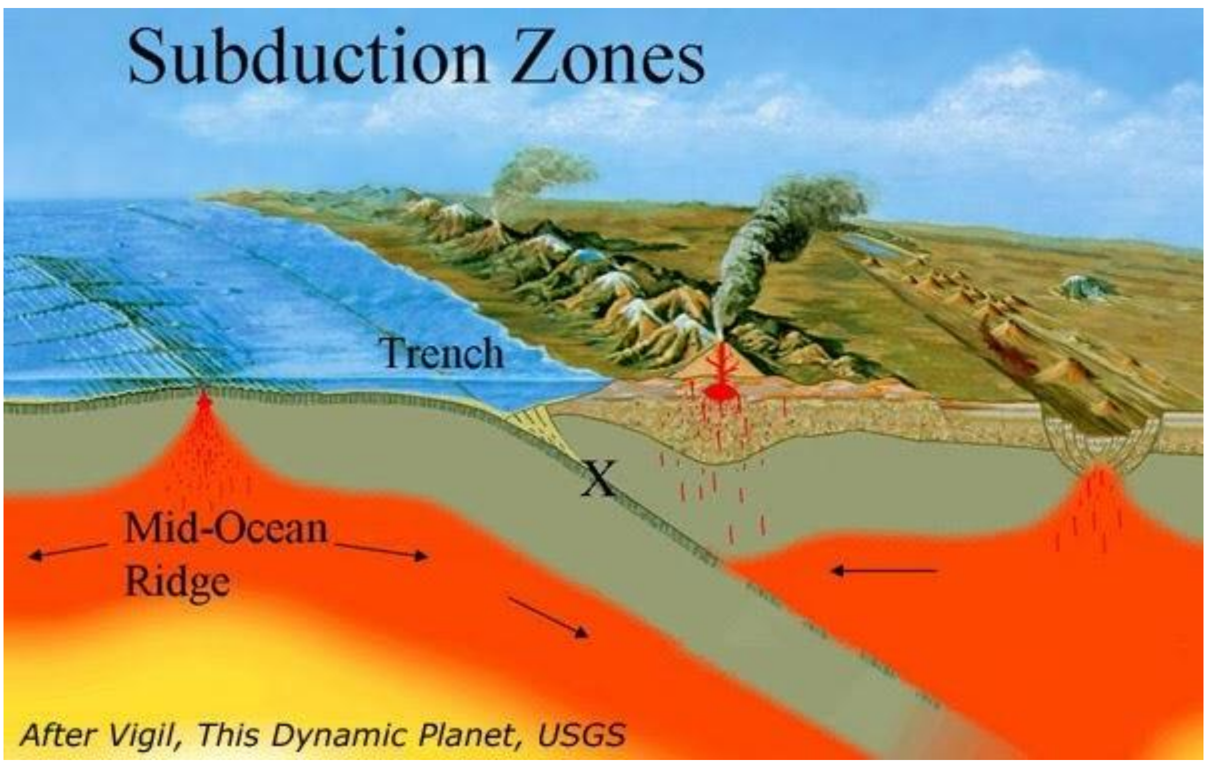

Figure 9. Subduction zones in plate tectonics. Basalt lava emerges in mid-ocean spreading centers and in island arc volcanoes above a subducting slab.

The high spin rate and greater oblateness would also make the Coriolis effect even stronger that would produce waves of even higher amplitude than have been observed in today's hurricanes.

The **fifth** is that at some point a mutation occurred in methanogen bacteria such that a new species of life (*cyanobacteria*) was formed that used sunlight energy in photosynthesis to produce a waste product of oxygen. This oxygen then began to move into the Earth's atmosphere following the Archean Eon in the beginning of the Proterozoic Eon 2,500 million years ago. But not all of this oxygen reached the atmosphere because the early oceans had much dissolved ferrous iron in it, and the oxygen reacted with this iron to produce layers of red-banded hematite deposits (**Figure 10**).

Figure 10.   Banded iron formation; red hematite alternating with white jasper.

Eventually, most of the iron was removed from the ocean waters, and then the oxygen increased in the atmosphere at the end of the Proterozoic Eon and the beginning of the Paleozoic Era about 541 million years ago (See **Figure 4**) when marine life began to evolve that used the oxygen for energy and released carbon dioxide as a waste product (**Figure 11** and **Figure 1**).

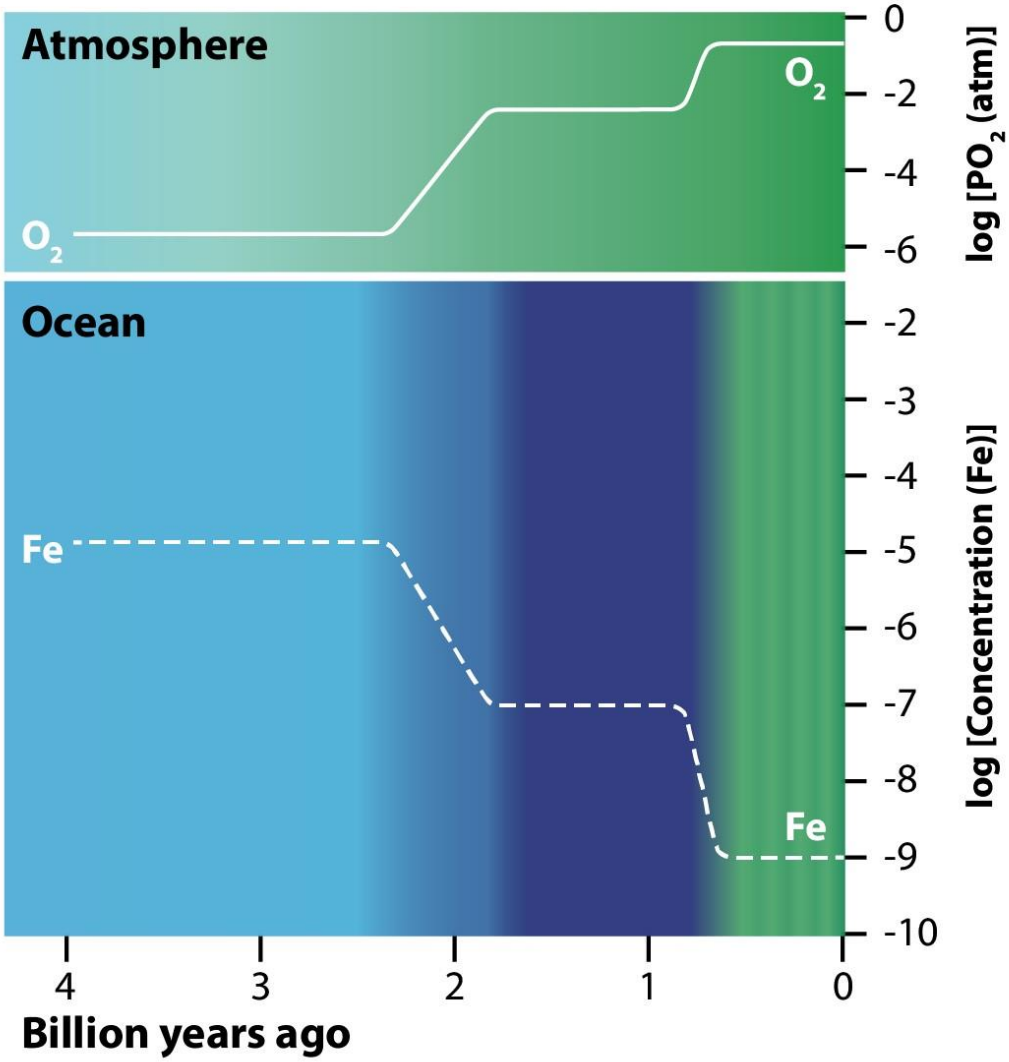

Figure 11. Diagram showing atmospheric P$_{O_2}$ (top curve) through time beginning less than 4 billion years ago.

A **sixth** is that during the Archean Eon, from 4,000 to 2,500 million years ago, more violent hurricanes were raging over the oceans, but beginning about 2,500 million years ago, when photosynthesizing *cyanobacteria* were formed that produced oxygen, geologic processes began to change. That is, oxygen was poisonous to the methanogens and killed most of them except for those in deeper parts of the oceans. Therefore, less methane was rising to accumulate in the atmosphere. Instead, oxygen began to accumulate. What methane existed in the atmosphere was mostly destroyed by lightning. On that basis, the new atmosphere consisted of nitrogen, carbon dioxide, oxygen, and water vapor which cooled the ocean waters so that Ediacaran life could form and mutate to become the various species of marine life in the oceans, such as sponges, clams, snails, trilobites, brachiopods, corals, etc., and on up in the evolutionary process to other life forms, eventually to mammals and humans. Therefore, although hurricanes continued, they were less powerful and less frequent than in the Archean Eon.

A **seventh** is understanding how all the above six factors affect the continental masses that were formed during the Archean Eon. **Figure 2** shows the locations of Archean rocks in the cores of continental shields in the North American continent and also around the world, but **Figure 3** also shows that in North America, adjacent to the Archean rocks there are other bordering rock provinces that represent concentric provinces of progressively younger ages until the outer Appalachian, Ouachitas, and Cordilleran provinces occur. This same growth pattern in continental size occurs to produce the large continent sizes that are shown in **Figure 2**.

As shown in dark pinkish red on **Figure 3** are the Archean rocks that are labeled as Wyoming and Superior that are greater than 2.5 billion years old. The Wyoming and Superior rocks represent the roots of former horizontal wide surfaces of former continents (similar to that shown in **Figure 2** but smaller in width) that were once surfaces covering a large percentage of the Earth's surface (**Figure 2**). The sliding of these continents during plate tectonics caused these rocks to collide and to be uplifted, thrusted, and folded into high mountains of shorter width (smaller surface areas), and during that process these folded rocks were intruded by plutonic igneous rocks. Eventually, these rocks were eroded down to their roots over millions of years of time, and much of these Archean rocks were subducted to produce other continental masses that repeated the sliding of continents around to create giant continents that were then split apart into smaller continents that slid across the ocean to re-collide and make a giant continent again. **Figure 3** shows that this happened at least in five repeated times of erosion, deposition of sedimentary layers, deep burial, metamorphism, collision, intrusion of plutonic igneous rocks, and erosion of these rocks to add to the shield areas. On that basis, the continental masses grew in size so that the percentage of land coverage increased while the surface coverage of the oceans decreased progressively from 90% to 80% and finally to 71% at the present time. During this time water was still emerging from the mantle in basaltic eruptions, and, therefore, the ocean waters deepened with time.

The **eighth** to consider is the erosion processes that were occurring during the seven other factors described above. In **Figure 8** that shows the circular motion of storm waves, it also shows what happens when these waves come in contact with shallow areas adjacent to the continental boundaries where they spill forward as crashing waves. The rush of water in such crashing waves, when impacting and colliding with rock cliffs with rock fracture openings, would cause air in these openings at 1 atmosphere pressure to be compressed to tens of atmospheric pressures as the weight of water in the massive waves moved quickly into these openings or fractures. That compression could explosively tear cliff rocks apart. Furthermore, it is well known that during strong winter storms, storm beaches are produced in which rocks are thrown out of the crashing circular waves to toss them more than 100 feet beyond where waves normally wash up on a beach. Therefore, the amount of erosion of continental rock borders in the Archean Eon by violent hurricane waves could have been very extensive by the pounding of these thrown-rocks hitting the rock cliffs. Likely, this is the way that the eroded surface, called the **Great Unconformity**, was produced in the Grand Canyon in which this eroded surface extended across the North American continent (**Figure 5**). That is, the methane-rich atmosphere and warmer ocean waters that caused frequent and powerful hurricanes persisted until near the end of the Precambrian and produced the wide erosion surface that is the **Great Unconformity**. This means that more than 600 million years of strong erosion occurred before the Cambrian rocks were first deposited 541 million years ago and ***when the methane-rich atmosphere changed to an oxygen-rich atmosphere*** (**Figure 1 and Figure 11**) and ***when the strong, many-hurricane-produced erosion ceased***. Geologic evidence clearly shows that the sediments in the Cambrian Tapeats Sandstone that overlie this erosional unconformity were not derived locally from the Precambrian rocks but came by stream transport from distant sources.

Of course, hurricane storms also produce a huge amount of rainfall on continental land surfaces. Therefore, some of the erosion of the land in the broad extent of the Great Unconformity would also have been by rushing streams. Also, less frequent tsunamis than hurricanes, moving through the ocean waters, would have created large amounts of erosion because of giant waves produced by periodic jumps of subducting oceanic slabs in trenches (**Figure 9**). That happens when there is a sudden drop of 10 to 20 feet of the ocean surface when a slab moves quickly downward under the ocean water. Immediately, after the sudden drop of the water, the ocean starts to level itself and sends a tsunami wave racing at 450 mph across the ocean with a huge circular motion (**Figure 8**) that could increase in its amplitude to 50 to 100 feet high when crashing on a distant shore and do tremendous amounts of erosion of the shore rocks.

Moreover, (a) because the Earth was spinning much faster in the Archean Eon and in the younger Precambrian than occurs now and, thereby, had more days in a year and (b) because of the greater oblateness of the Earth, water rushing in and out of estuaries and river mouths in tides would have been more frequent in a year than occurs in tides of today. If such higher and more powerful tides arrived at a shore at the same time as storm, wind-blown surges of water arrived with their higher amplitudes, even more erosion would have happened to the continental rocks.

A Supposed Worldwide Flood

Figure 8 shows that molecules of water in the waves in Big Hurricanes only have circular motions. That means that no mattter how large the storm was that supposedly deposited the sedimentary layers of rocks in the Grand Canyon on top of the Great Unconformity (**Figure 5**), the waves with very tiny circular motions at the bottom are incapable of eroding rocks on the ocean floor to make particles to be suspended and transported thousands of miles, say to the Grand Canyon, to be deposited there in sedimentary layers. On that basis, the sedimentary layers in the Grand Canyon cannot have been deposited there by a worldwide flood. Moreover, (a) in the overlying sedimentary layers in the Grand Canyon is the Jurassic (**Figure 4**) Navajo Sandstone that is a sandstone that was deposited in a desert with giant dune cross-bedding (**Figure 12**)

Figure 12. Giant dune cross-bedding in Navajo Sandstone.
(b) the Cambrian Tapeats Sandstone and sandstone layers in the Permian Supai Group have stream cross-bedding (**Figure 13**).

Figure 13. Typical stream cross-bedding in sandstone layers in the Cambrian Tapeats Sandstone and Pennsylvanian to Lower Permian Supai Group, Grand Canyon.

And (c), raindrop prints thst occur in the Permian Coconino Sandstone (**Figure 14**) show that the sedimentary layers cannot have been deposited in the Grand Canyon because dune cross-bedding, stream cross-bedding, and raindrop prints are surface features produce above ocean levels.

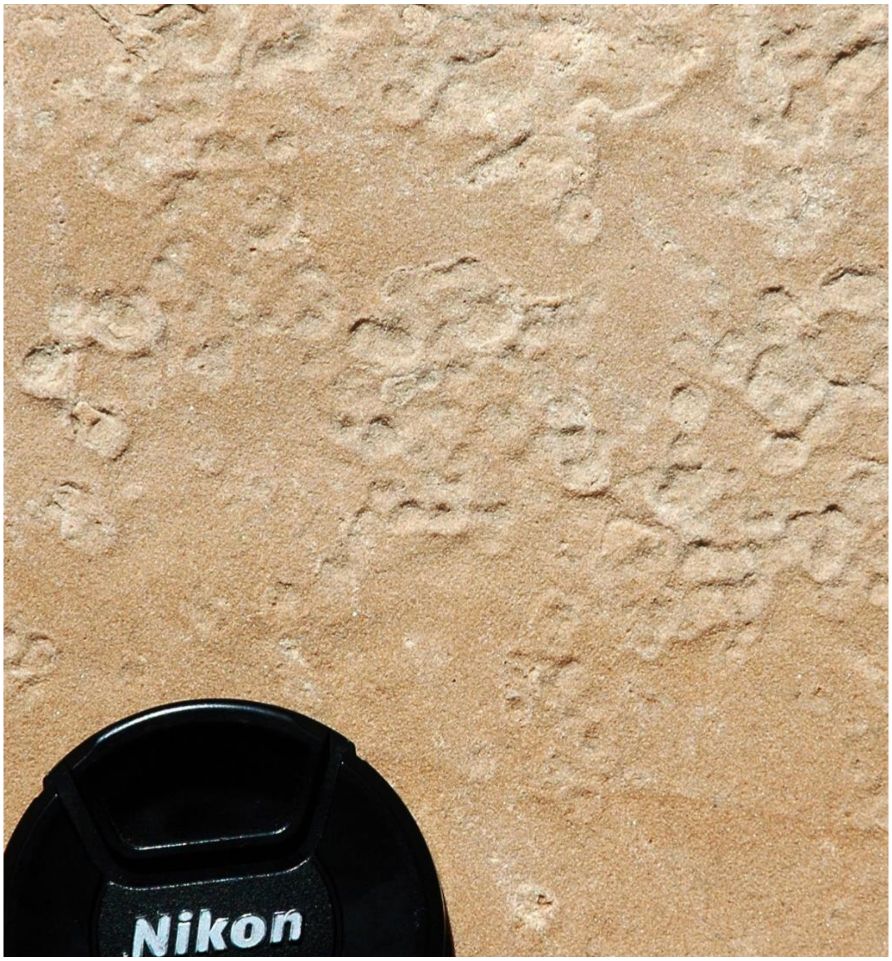

Figure 14. Raindrop prints on the Coconino Sandstone.

On that basis, likely an ancient major flood occurred in early biblical times, but it was in southeastern Mesopotamia (now Iraq) and deposited sedimentary rocks only locally there.

Conclusion

The Archean Eon began 4,000 million years ago with the formation of a shallow ocean that covered the proto-Earth with a methane-free atmosphere. Ultimately, through geologic time a deep ocean was produced in the Proterozoic Eon with the progressive addition of warm water and a relatively-hot methane-rich atmosphere. That atmosphere generated frequent violent hurricanes that eventually caused the erosion surface on continental rocks that became the **Great Unconformity** (**Figure 5**). Noteworthy is the fact that **the Great Unconformity** is underlain mostly by the Vishnu Schist that is composed of quartz-mica schists, pelitic schists, and meta-arenites. Because mica has a hardness of 3 on the Mohs hardness scale, the Vishnu Schist would be relatively easy to erode. Also in the Grand Canyon area is the Unkar Group that contains layers of quartzite and basalt that are more resistant rock types and that resistance would cause the Unkar Group to stand at higher elevations above the unconformity. These rock types could also provide the hard rubble that would enable erosion of the Vishnu Schist by (a) “pounding it” with thrown rocks and (b) the grinding effects of hard rocks sliding back and forth and up and down on beach faces and in bedrock “rubbings” of boulders in surface stream erosion. The violent hurricanes continued until oxygen arrived when most of the methane in the atmosphere disappeared at the end of the Proterozoic Eon. This can be called “the **Big Hurricanes Theory**.” When the oxygen arrived, that is when the further evolution of animal life began with the Ediacaran life in the youngest Precambrian and in the Paleozoic Era with the Cambrian Tapeats Sandstone, 541 million years ago (**Figure 4**). This sandstone was then overlain by other rocks (such as shales and limestones) and by wind-blown desert sands that were deposited as the Coconino and Navajo Sandstones. Moreover, the Paleozoic and Mesozoic

Eras contain thick salt layers (e.g., in the Michigan Basin, in the Salzburg area of Austria, and in eastern Brazil, some more than 9,000 feet thick) that were deposited in four of the five continents that require evaporation of huge volumes of water in order for the salt to be precipitated and that cannot happen in the midst of supposed worldwide flooding lasting one year. Other reasons include: (a) time for tiny clay particles to settle to make thicknesses of shale more than 3,000 feet thick in the Mancos Shale in adjacent Colorado, (b) karst topography with caves and sinkholes in the Redwall Limestone in the Grand Canyon and other Paleozoic limestones around the world, (c) volcanic ash particles that are interlayered with clay-bearing particles in shale layers when both kinds of particles would be mixed if they were deposited by rushing flood waters and not in quiet water, (d) *Lepidodendron* tree trunks (100 feet high) in coal layers of Mississippian and Pennsylvanian ages in Illinois and Kentucky in 13 successive overlying layers and in coal layers of Permian age in China, when it takes much more than one year for such trees to grow that tall, (e) stream canyons more than 100 feet deep in the Muav Limestone in the Grand Canyon, (f) the time necessary to dissolve calcium ions from weathered basalt that contains calcic plagioclase feldspar crystals to provide the needed calcium to make the calcium carbonate shells in marine fossils or calcite crystals in the Muav, Redwall, and Kaibab Limestone formations in the Grand Canyon, (g) the time it takes to loosen and transport quartz grains from 1,000-foot thicknesses of weathered igneous rocks that contain on average

10 % quartz to make 100-foot thicknesses of quartz sand layers of the Supai Group and Coconino and Navajo Sandstones in the Grand Canyon, and (h) by the simple fact that if the flood was worldwide (that is, the whole world covered with water that was depositing sediment in layers of every geologic age in the Paleozoic era), then the Grand Canyon would not be missing sedimentary layers of the Ordovician and Silurian ages, and such are missing there but are found in other places around the world and in the United States.

On that basis, it is clear that Genesis 1 and the story of Noah's flood were not written to be a science lesson but to have the Holy Spirit tell Moses to give the early biblical people some good theology that they needed to hear in that time and culture. That is, as suggested by Conrad Hyers, a Presbyterian minister, the issue being faced by the early Hebrews was not how the universe, earth, and life were created but by the beliefs of their neighbor tribes who thought that the gods that they worshiped were bad and were out to get them. These gods included night, water, sun, moon, stars, plants, and animal gods, and the early Hebrews had to make daily sacrifices to idols of these gods if they wanted to survive. Moses then said: "These are not gods. There is only one God and He made all of these objects and they are all GOOD." And then Moses used some ancient epics by Gilgamesh and Atrahasis and an older Sumerian story about a major flood in southeastern Mesopotamia to be rewritten to give some good theology to the early Hebrews that God would not drown sinful people and animals on Earth again and made the rainbow in the sky as a symbol of that promise.

Furthermore, any Christian can accept and believe all the above without any concern that it goes against what Jesus would teach His disciples because Jesus just says: "Come, follow me." He does not say that there are certain things you must believe before you can do that. Witness, for example, the twelve men he asked to follow him. He also accepted women to be His followers and disciples even though the culture of that time would not allow it. Finally, His father, God the Creator, used science (and is still using) with the natural laws that He produced to do His creating processes, including the Big Bang. God is not a liar but tells the TRUTH, not only in science, but also in the theology spoken in the Bible. Our faith should not be replaced by science. Science merely informs us what an awesome Creator God is. What saves us, as human sinners, is not science, but the death of Jesus on the cross and His resurrection. God still loves and forgives us for being humans because He made us in His image.

(This article lacks references, but the material in it comes from several articles listed in a document titled **Resources** at this link where reference citations are included.) Nr122Resources5.pdf (csun.edu)