Why Noah's Flood Could Never Have Been Global and Deposited the Sedimentary Rocks in the Grand Canyon

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Introduction

The Grand Canyon is among the most visited national parks in the world, and a view of the north rim (**Figure 1**) and looking across the canyon never affects a person for its awe-inspiring beauty until he or she has been there in person to look down a mile into the canyon. Probably more than 45 percent of the adult population in the United States believes that the sedimentary rock layers exposed in this canyon were deposited by Noah's flood. But scientific evidence presented in this article shows that these sediments can never have been deposited by a global flood.

Figure 1. View of north rim of the Grand Canyon with the Kaibab Limestone (light gray) at the top, underlain by the Toroweap formation (dark gray), Coconino Sandstone (white) and the Supai Group of sandstones and shales (dark red; bottom half of image).

In the opinion of those religious people who think that these sedimentary rocks were deposited by Noah's flood waters, the first deposits occurred in the Cambrian period in the Paleozoic era and ended at the end of the Cretaceous period in the Mesozoic 000era. All sedimentary rocks above this period that were deposited in the Cenozoic era occurred after the flood (**Figure 2**).

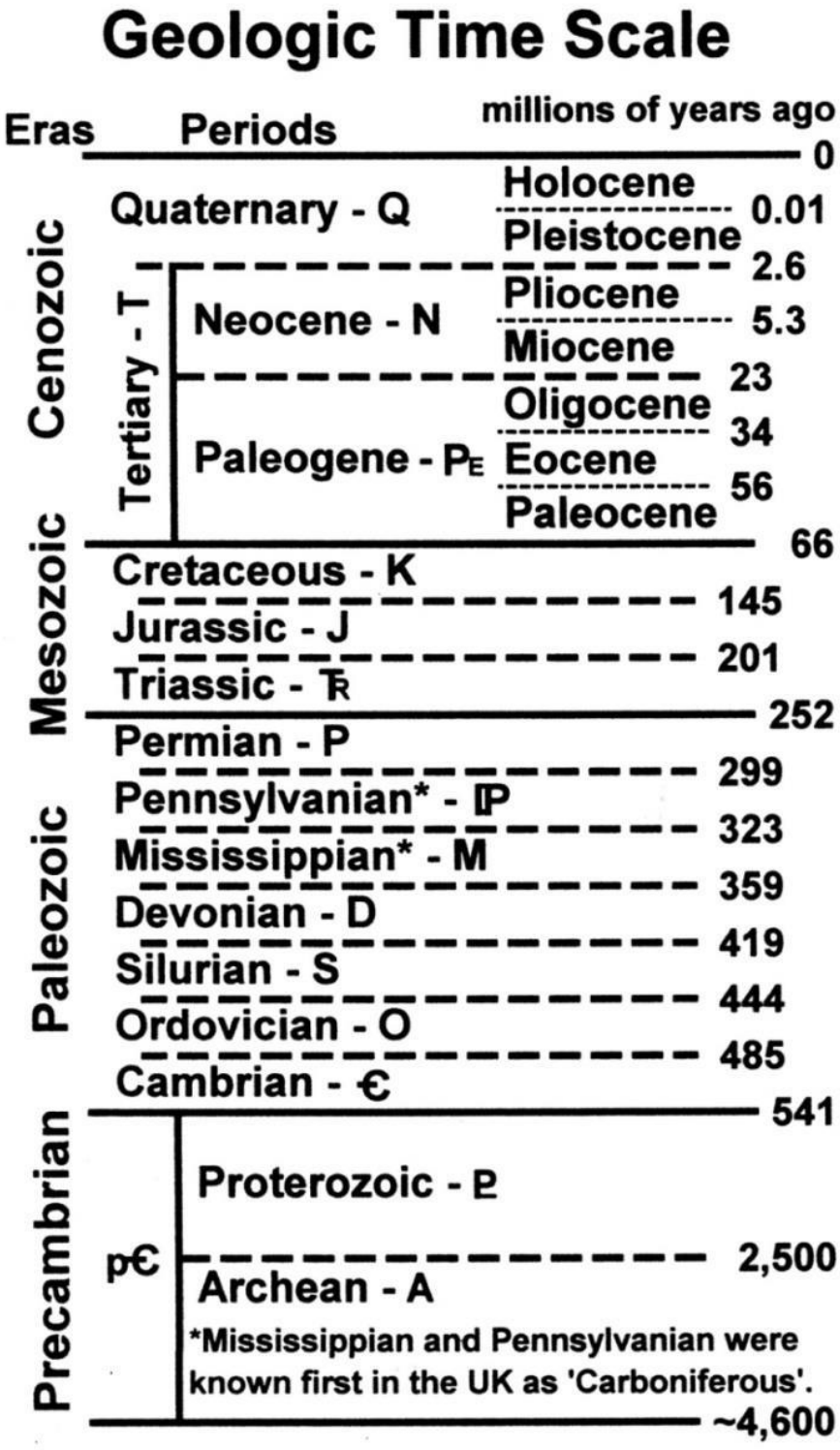

Figure 2. Geologic time scale and Noah's supposed flood time during the Paleozoic and Mesozoic eras.

In order to understand Noah's flood, if it did deposit the sedimentary rock layers in the Grand Canyon, it is helpful to consider the known effects of hurricanes and tsunamis. In today's world, when we have observed what has happened during major hurricanes that have hit the coast of the United States and when tsunamis have hit Japan, Sumatra, and Alaska, we recognize what damage can be done to the coasts of these places and how much erosion occurs (***almost none***) during these hurricanes and tsunamis. Of course, horrific damage is done to inland man-made structures but only little erosional damages are done to the beaches and off-shore, island sandbars. These observations give us an idea of what could have happened during the alleged Noah's Flood, if it had been global.

In order to understand what happens during hurricanes, we need to see how the Coriolis Effect acts on storm systems. Hurricanes are big low-pressure systems, which mean that they suck air into their centers. When air in these systems travels for a long distance across the Earth, it does not move in a straight line, but is deflected to the right in the northern hemisphere and to the left in the southern hemisphere because of the different speeds in which the air in the atmosphere is rotating around the Earth at different latitudes (slower toward the poles). Because of the different speeds, the air that is being sucked into the storm is deflected, and this deflection is what causes it to spin, and the spin is counter-clockwise in the northern hemisphere.

Next, we need to understand what happens when winds are blowing as much as 156 mph in a category 5 hurricane. In that case, friction of fast-flowing air over the ocean-surface builds up waves of large height (**Figure 3**), and the ocean water tends to pile-up ahead of the winds in a storm surge. If the timing is such that this piling-up is simultaneous with a spring tide (maximum high tide during a full moon), the amount of flooding over the land can be huge with depths of many feet. Such a storm surge in combination with huge amounts of rainfall in a hurricane that is moving very slowly then can cause extra amounts of flooding. Furthermore, when the circular motion of the waves spills forward where the ocean depth is shallow near the shore (**Figure 3**), the spilling forward then can cause erosion of the beach or off-shore barrier-island sandbars.

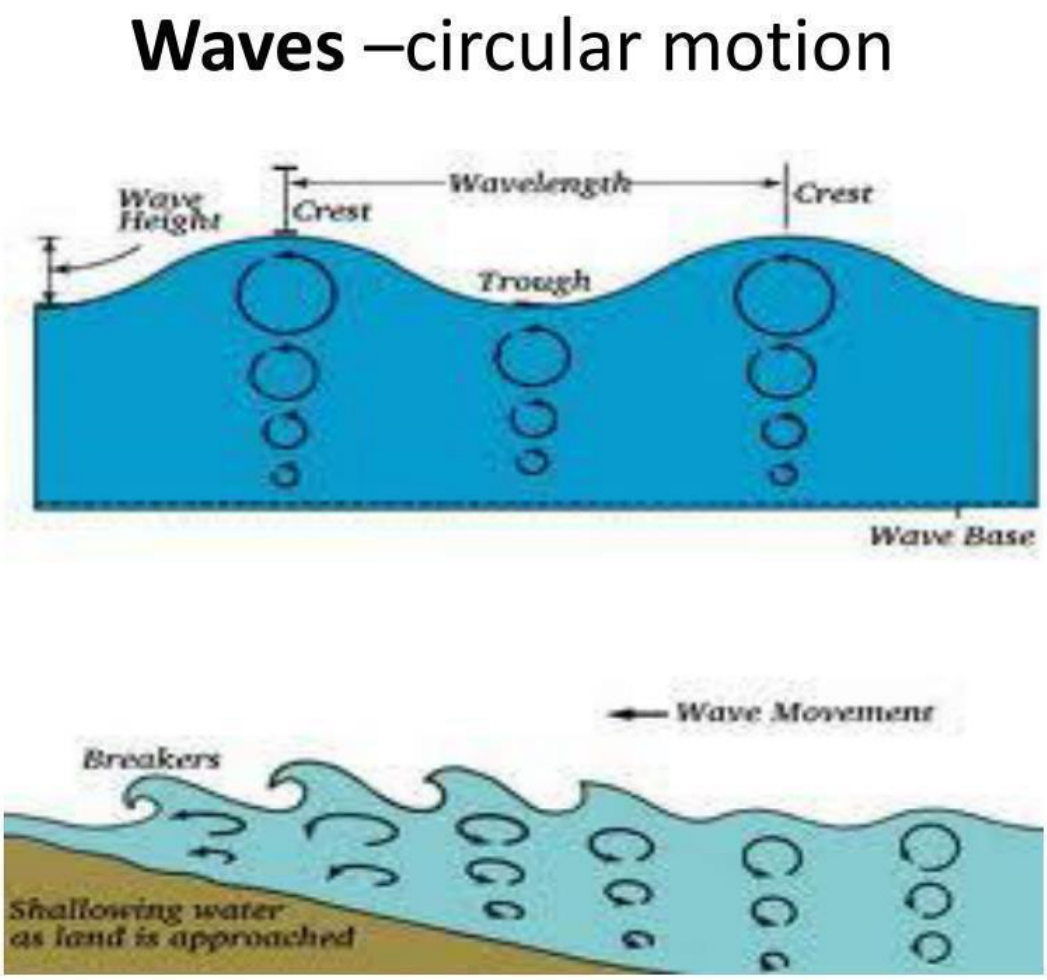

Figure 3. Circular motion of water in ocean waves.

Such a category 5 hurricane was the Katrina hurricane (**Figure 4**) that came into the shores of Texas and Louisiana with 10 to 20 inches of rainfall that caused great amounts of damage in and near New Orleans.

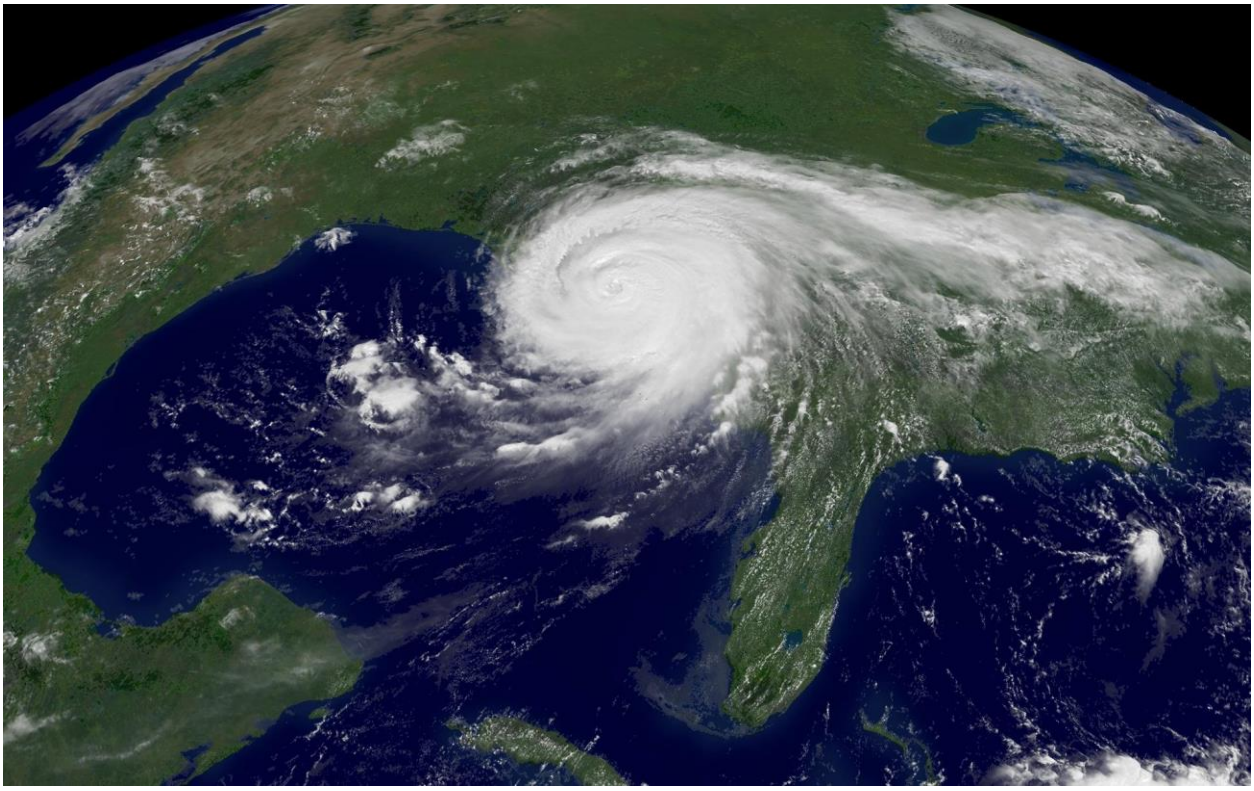

Figure 4. Category 5 Katrina hurricane, NASA image, August 2005, from space; showing counter-clockwise spinning.

Location of where Noah's flood started in Iraq (Mesopotmia)

On **Figure 5** the Tigris River and the Euphrates River (**Figure 6**) flow from higher land in Syria, Turkey, and northwestern Mesopotamia and enter a nearly flat area about 130 km north of Baghdad.

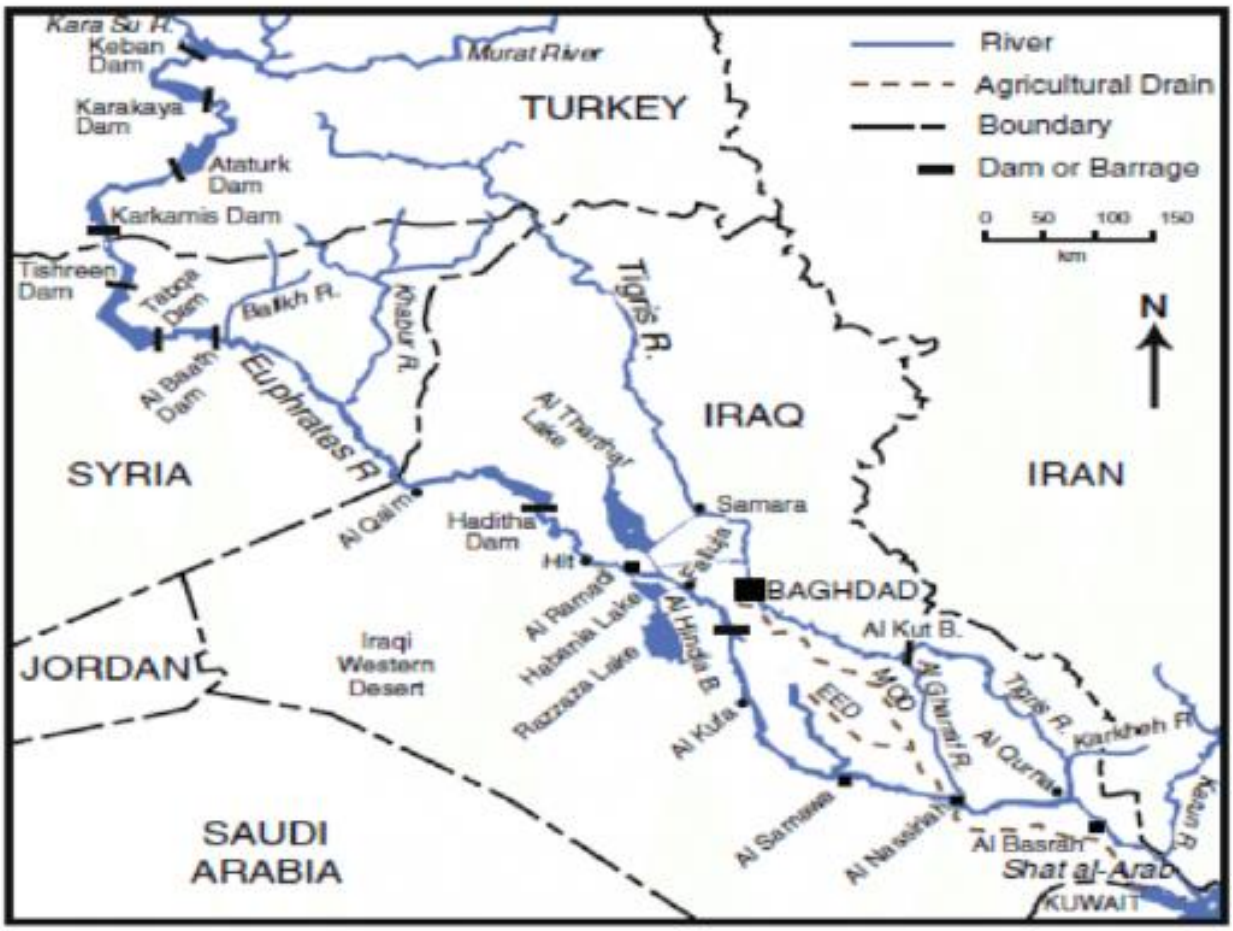

Figure 5. Map of Mesopotamia (Iraq), showing the Euphrates and Tigris Rivers (light blue lines), the city of Baghdad that straddles the Tigris River, the city of As Samawah (south of first D in the BAGHDAD label) on the Euphrates River, and the Persian Gulf in the lower right corner. (Source: https://www.syriahr.com/en/179262/ Syrian villages accuse Turkey of cutting water access. August 12, 2020)

Figure 6. Locations of Euphrates and Tigris Rivers. (Source: biblestudy.org Euphrates River Map, Pinterest image)

In this area north of Baghdad, the gradients of these rivers are small, with the elevation dropping about 2 m per km along the course of the rivers. Both the Euphrates and Tigris Rivers near Baghdad where the two rivers are nearest to each other have elevations of about 30 m above sea level, and at the city of As Samawah (280 km south of Baghdad), the Euphrates River has an elevation of 9 m (a drop in elevation of 21 m). A similar 21-meter drop occurs along the Tigris River. On that basis, the

gradients of the two rivers in these intervals are 0.075 m per km. In the additional 360 km to the Persian Gulf (sea level), the gradients are only about 0.025 m per km. Therefore, in both southeastern and central Mesopotamia the gradients are so low that the rivers barely flow downhill. Moreover, the joined floodplains of the Euphrates and Tigris Rivers are more than 200 km wide where their floodplains are connected together. Therefore, the combination of this width and the extension of exposed land to the ancient shoreline of the Persian Gulf another 200 km to the southeast in 6000 BC increases the area of nearly flat land by a very large amount and would explain why more than 6 months were needed for all the flooded land to drain so that Noah could find dry land on which to disembark from the ark.

All this nearly flat area means that the early humans living in this area (who later became the Hebrews after the time of Abraham) built their cities on the high lands of the natural levees adjacent to the two rivers or they built raised man-made brick-mounds (tells) on which houses were placed so that these early humans, raising barley or tending goats and sheep on the adjacent lower floodplains, could have a place to escape to when flooding occurred in ancient times, which commonly occurred nearly every year. But a huge flood of great depth could submerge the levees and tells, and people without a boat (ark) would drown.

Significance of the above

Now, what does all these relationships mean in understanding Noah's Flood story?

First of all, Noah's Flood likely did not happen about 1000 BCE because the Genesis flood narrative is almost a duplication of events that happened as reported in two ancient Babylonian epics that describe a huge flood. One is the Epic of Gilgamesh (2150-1400 BCE), describing a flood on the Euphrates River. The other is the Epic of Atrahasis (1646-1626 BCE, which has a huge flood on the Tigris River.

Also, an older Sumerian large flood event (4000 BCE) is reported prior to the Noah account whose history was passed down orally until written down.

"*Over a thousand years prior to this account, scholars from the ancient Sumerian civilization authored a remarkably similar account of the flood. In the Sumerian flood story, a hero builds an ark to preserve the species of the Earth from a great "Deluge" (flood) that is sent by the gods. The Sumerian civilization emerged from what is now called Iraq in 4,000 BCE.*"

In the Epic of Gilgamesh, Gilgamesh is warned that a god plans to destroy all humanity and is told to build a ship to save himself, his family, friends, and cattle. In the Epic of Atrahasis, a tribal chief survived with his family by floating in a boat down to the Persian Gulf. After the flood subsided, the chief got out on dry land and erected an altar and sacrificed to a water god so that such a flood would not happen again. Noah also built an altar when he got off the Ark and offered sacrifices (Genesis 8:20). Because these stories all describe an ancient huge flood

in Mesopotamia, it is extremely likely that a huge flood could have occurred in ancient times. Therefore, on the basis of the three older flood accounts, Noah's Flood story should not be considered to be a scientific account of the flood when the early humans were alive near the time in which Moses lived, but is a way in which Moses, if he is the author of Genesis, used the pagan epics to produce great theology that would have meaning for the early humans. That is, Moses taught something to the early humans that made sense to them in their time and culture without being concerned that what he was telling them was not correct or possibly scientifically accurate as we recognize today with our modern knowledge. **He was not giving a science lesson but a theology lesson.** Likely, Moses was smart enough to recognize that when Gilgamesh was warned that a god plans to destroy all humanity and is told to build a ship to save himself, his family, friends, and cattle, he recognized that a huge flood would have also destroyed all the animals on the Earth at the same time as humanity was being destroyed. Because animal life existed in the world where he and the early humans lived, he knew that the animals needed to have been saved as well as himself, his family, friends, and cattle. Therefore, in his Flood story, he had Noah build an ark big enough to also house all the local animals. During these ancient times perhaps as many as 1500 different animal species lived in that area and housing pairs (male and female) of this number of kinds (species) of animals on the large-sized ark could have been

possible without bringing all the animals in the whole world to the ark as a global flood model would require.

Note that the Muslims also have a similar flood story in their Bible (the Koran; Quran) in two places (Sura 11 and Sura 71) with a "chieftain" whose name was Nuh (similar to Noah), so the author of the Koran wanted to get in on the flood story.

What evidence is there that Noah's flood was not global and did not cover the whole earth?

First, during Noah's flood the nearly flat area south of Baghdad that could have been submerged by the huge flood that is mentioned in the Sumerian, Gilgamesh, and Atrahasis accounts would have been on the flat "immovable" Earth of the ancient universe. The mountains in Turkey (to the north), Arabia (to the west), and Iran (to the east) (**Figure 5**) would have been unseen by Noah (or some early ancient chieftain) because the curvature of the Earth would have dropped these highlands below the horizon and out of sight. Everywhere the "chieftain" looked would have been underwater during a huge flood, and for that person this area was the whole world and not the global world.

Second, the huge flood could have been created by a category 5 hurricane, like the Katrina hurricane (**Figure 4**), that moved into southeastern Mesopotamia in ancient times, perhaps coming in from the Persian Gulf. If it came in from that direction during a spring tide and slowly moved through this

area for several days, the combination of 40 days and 40 nights of rain (meaning lasting for a long time) would have submerged this area with water, perhaps 25-50 meters above the tops of the levees and tells. Moreover, it does not really matter if the storm came into this area from the Mediterranean Sea instead of the Persian Gulf because hurricanes have a rotating pattern and if the fringes of the rotating system reached the Persian Gulf from the Mediterranean direction, then its created waves would still erode the southeastern shore line of Mesopotamia.

Third, the evidence in **Figure 3** that shows how water molecules move in an ocean wave gives scientific proof that such a huge ancient flood never transported any sedimentary particles long distances to as far as the Grand Canyon if Noah's Flood was supposed to have transported and deposited sediment there. At most, the breaking (spilling) waves along the Persian Gulf shore line might have eroded sedimentary particles from the deltaic deposits of the Euphrates and Tigris Rivers and moved them a few 100 meters from their original shore position deeper into the Persian Gulf but not thousands and thousands of miles to the Grand Canyon. No hurricane waves (or multiple tsunamis), no matter how great the category number of a storm exists, can move sedimentary particles or suspend them for transport across great distances because oceanic waves only have a circular motion with no significant lateral translation of the water molecules (**Figure 3**).

The little to almost no erosion of rocks on continental coastal areas by hurricanes and tsunamis is because where these rocks are composed of igneous or metamorphic rocks or of well

cemented sandstone sedimentary rocks, the short time of wave-pounding on these rocks by water of hardness of less than 1 on the Mohs hardness scale in comparison to hardness 6 for feldspars and 7 for quartz in the continental rocks produces no erosion of these rocks except for the erosion of uncemented sands of beaches and sandbars.

Fourth, all kinds of scientific evidence exist that a global flood never happened. An example is fossils of growing *Lepidodendron* trees that became as tall as 100 feet in successive 13 coal layers of Mississippian and Pennsylvanian Ages (mid-Noah's flood time of one year) that overlie each other (**Figure 7**).

Figure 7. *Lepidodendron* trees.

Trees do not grow 100 feet high in one year let alone in each of 13 successive overlying layers, and these trees had to be growing at the time of the supposed Noah's global flood to be buried in coal layers of Mississippian and Pennsylvanian ages (the supposed mid-flood times; **Figure 2**).

Also, 4,000 different species of very tiny radiolarians cannot be sorted out into an evolutionary sequence from the Cambrian to the present time by supposed rushing water of a global flood (**Figure 8**).

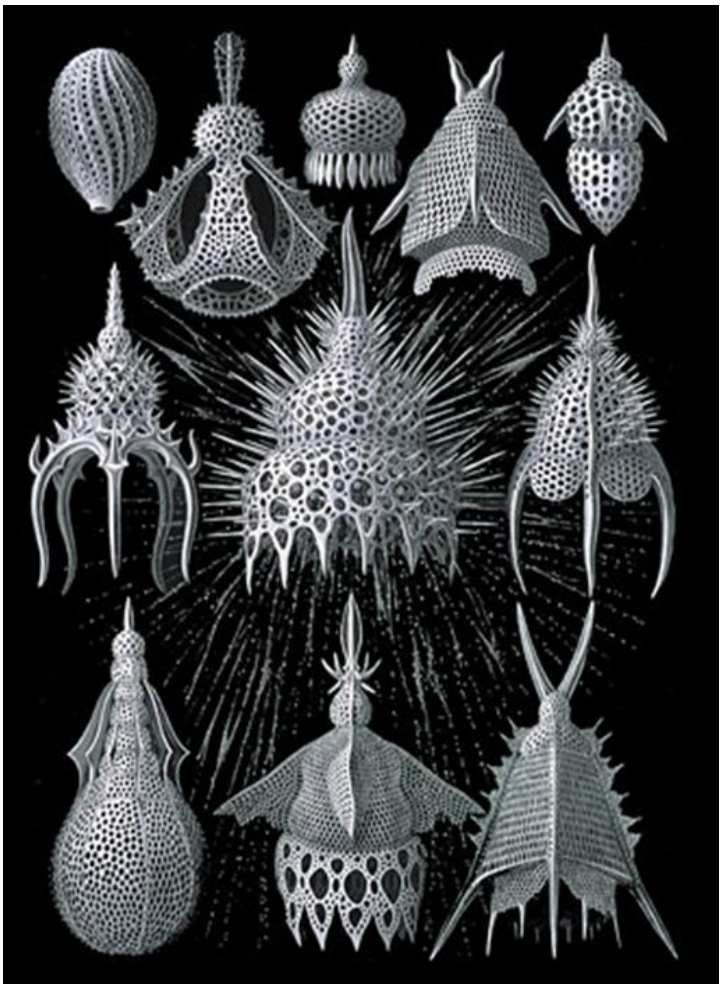

Figure 8. Radiolarian fossils; 0.1 to 0.2 mm in size.

Fifth, thick salt layers (as much as 5,000 feet thick) cannot be deposited at many different geologic times from Cambrian to Cretaceous ages on different continents in the midst of Noah's Flood when the only time of drying and evaporation of the ocean waters that would chemically precipitate salt, which is reported in the Bible, is at the end of the Flood which is at the end of the Cretaceous period as shown in **Figure 2**.

Shown in **Figure 9** is a view of sedimentary rock layers in the Grand Canyon below those shown in **Figure 1**.

Figure 9. View of lower part of the north wall of the Grand Canyon with the Supai Group of red sandstones at the top of the image.

In **Figure 9** older Precambrian rocks are at the bottom of the image, and they are cut by the **Great Unconformity** (white dashed line) that is an erosion surface on top of which various sedimentary rock layers are shown that were supposedly deposited by Noah's flood. They include the Cambrian Tapeats Sandstone immediately on top of the unconformity, the Ordovician Bright Angel Shale (dark gray), the Devonian Muav Limestone (light pink), the Mississippian Redwall Limestone (bright red), and the Pennsylvanian Supai Group (dark red layers at the top of the image). Other younger rock layers occur on top of the Supai Group and are shown in **Figure 1**.

Just 100 miles northeast of the Grand Canyon area (**Figure 9**) in Utah is the Paradox formation that contains salt and gypsum beds created by evaporation of water. It is Pennsylvanian in age and equivalent in age to the sandstones in the Supai Group that are exposed in the Grand Canyon as shown in both **Figures 1** and **9**.

How can these Paradox salt deposits be formed by evaporation of water just within 100 miles of the red sandstone layers of the Supai Group supposedly deposited underwater by Noah's flood waters if all rock layers supposedly deposited by Noah's flood were believed to be water-deposited? Moreover, there are salt deposits of Cambrian age in Iran in the Zagros Mountains in the Hormoz Formation, of Permian age in Salzburg, Germany, of Upper Permian to Upper Jurassic age in

the Texas-Louisiana Basin, and of Cretaceous age off the east coast of Brazil (**Figure 10)**.

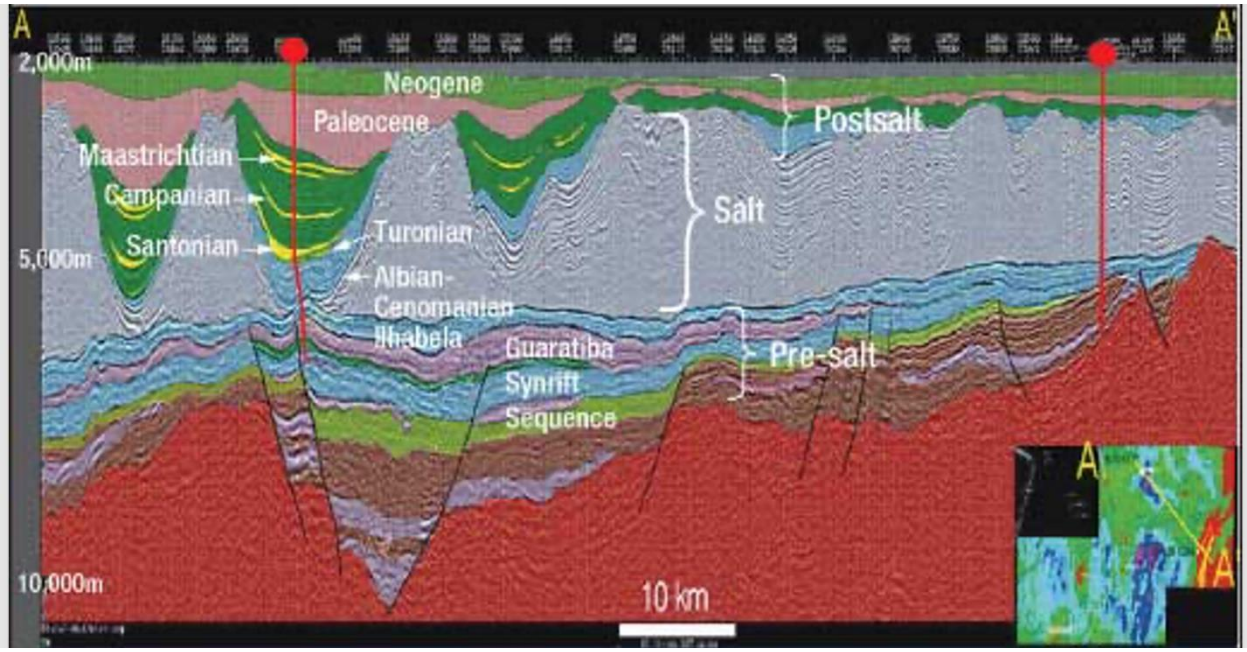

Figure 10. Salt layers near east coast of Brazil of Cretaceous age.

It has been suggested that the "great fountains of the deep" (Genesis 7:11) that supposedly supplied some of the water in Noah's flood could have locally spewed out concentrations of hot salt-bearing water that precipitated to form these salt deposits, but all of the oceanic spreading centers are far from where these fountains are said to have come from. Even so, salt is so soluble in water that upon landing in ocean water, the salt in this hot water would only be further dissolved and spread in the ocean water and not be precipitated. See article at this link. **Time to Accumulate Chloride Ions in the World's Oceans** RNCSE25.5-6cdt (csun.edu)

The “fountains of the deep” referred to in the Bible (Gen. 7:11) are likely gushing fountains of cold water emerging from limestone tunnels where some of the rain falling on the nearby Zagros Mountains during the storm that produced the water for Noah’s flood went underground to emerge in springs in eastern Mesopotamia to feed the flood waters accumulating in the Tigris River floodplains (**Figure 6**). See this link: **Fountains of the Great Deep and Noah's Flood** Nr64Fountains.pdf (csun.edu)

Sixth, the sedimentary particles in Noah’s supposed global flood deposits have to come from somewhere. The layers of sandstones and mudstones (shales) that occur in the Grand Canyon and around the world contain sand (quartz particles) and clay mineral particles that if the Creator were to arrange for their availability to be deposited during Noah’s flood, these particles are just not miraculously produced on Day 3 of the Genesis Week to be moved around the globe during a flood – if science is used to explain the origin of these sedimentary layers. That is, quartz and clay particles come from granitic rocks that have been weathered and eroded. First, the granite has to be formed from molten magma at depths as much as 5 km down in the Earth’s crust and then cooled and crystallized, which takes millions of years because of the slow cooling rate of the granite in the crust. Then, this granite must be uplifted and the overlying rock eroded off before the granite can be eroded to release the quartz grains from its matrix, and its feldspar contents must be weathered by hydrous fluids to produce the

clay minerals. Because sandstones account for 20 to 25 percent of the Earth's sedimentary crust and because mudstones (shales) account for ~65 percent of the sedimentary layers in the Earth's crust – to produce enough quartz grains and clay mineral particles for all these layers would take millions of years.

Also, the limestone layers are composed of calcite crystals or of shells of animals, both with calcium carbonate ($CaCO_3$) compositions. If Noah's Flood waters transported the calcite crystals, those crystals have to be created somewhere before they can be transported. But to provide the calcium ions (Ca^{+2}) to form the calcium carbonate in calcite, the calcium has to be dissolved out of calcium-bearing rocks, such as in plagioclase feldspar crystals in basalt. However, this basalt must be erupted from volcanoes and the lava solidified before it can be weathered to release the calcium ions. The amount of time to provide enough calcium for limestone layers that are as much as 10 to 15 percent of the volumes of sedimentary rocks around the world would take millions of years. Where in the Bible verses is the reported existence of great amounts of volcanic basaltic eruptions and for the long periods of time necessary for such weathering of basalt prior to Noah's Flood to occur?

Also, the quartz particles in the sandstones and the clay mineral particles in the shales in the Grand Canyon show evidence of having been transported by streams and not by fast moving currents in ocean waters. For example, the Cambrian Tapeats Sandstone at the bottom of the geologic column of sedimentary rocks on top of the **Great Unconformity** (**Figures**

2 and **9**) has stream cross-bedding and contains muscovite and potassium feldspar and the underlying Precambrian rocks have very little muscovite and potassium feldspar. See article at this link. **Critical Analysis of Snelling's Model for the Folding and Origin of the Tapeats Sandstone, Grand Canyon, Arizona, and Postscript** Nr80Tapeats.pdf (csun.edu) In fact, this sandstone contains illite (a kind of clay mineral) which forms from the hydrous weathering of potassium feldspar and, therefore, the sand and clay particles that occur in the Tapeats Sandstone likely came from a very distant source. That source could have been from the former 12,000- to 15,000-foot-high Appalachian Mountains 3,000 miles away, and these mountains contain granite and have folded sedimentary rocks that were once deposited in the Atlantic Ocean before being shoved by plate tectonics onto eastern North America. On that basis, the eroded sedimentary particles from these high mountains were carried west by these streams across the United States to be deposited in layers in the Grand Canyon as well as in other layers of the same geologic ages that are equivalent to those in the Grand Canyon. In other words, the sedimentary layers in the Grand Canyon, in part, represent re-cycled sediments from the Atlantic Ocean and not sediments transported by Noah's Flood waters.

Seventh, raindrop prints (**Figure 11**) cannot exist on shales and sandstones around the world if the layers of sedimentary rock are alleged all to be deposited under water by Noah's Flood.

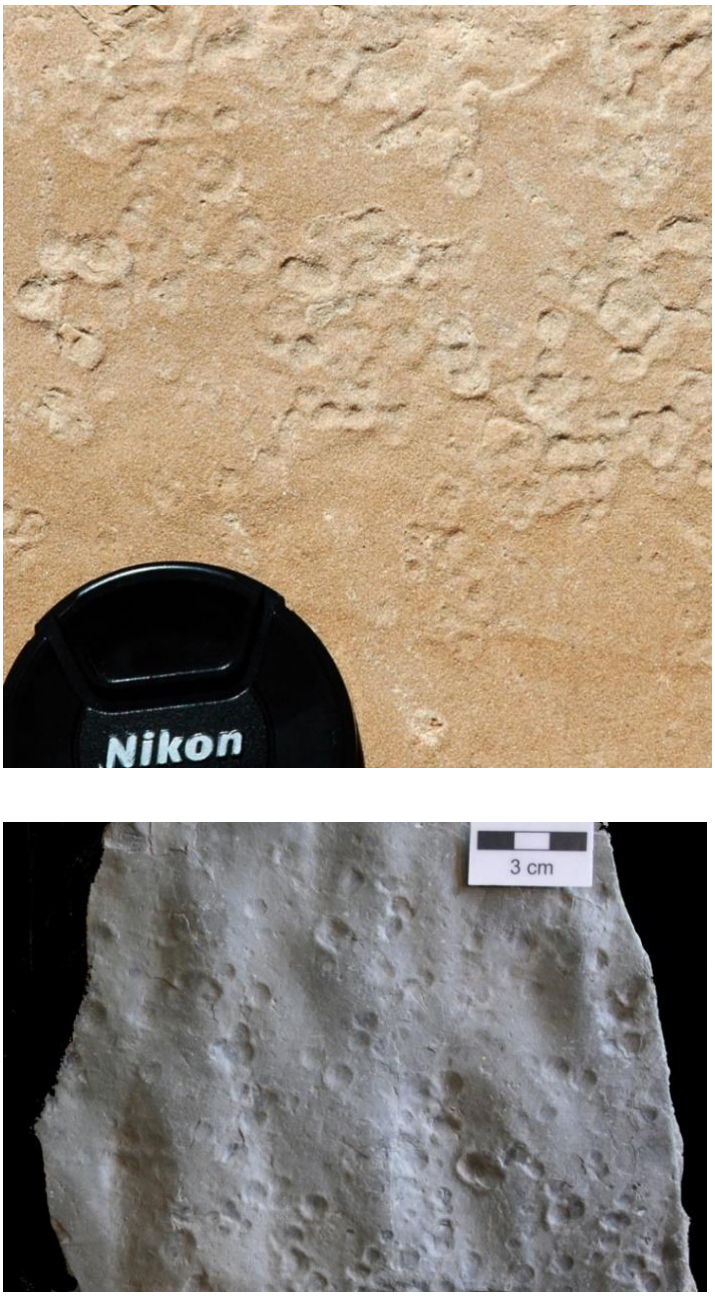

Figure 11. Top image, raindrop prints in Permian Coconino Sandstone, Grand Canyon. Bottom image, raindrop prints in Mississippian rippled rock in Nova Scotia.

Eighth, dune cross-bedding in a desert cannot be formed during Noah's flood and clearly exists in the Navajo Sandstone of Jurassic age in an area north of the Grand Canyon (**Figure 12**). See this link. **62. Origin of Horseshoe Bend, Arizona, and the Navajo and Coconino Sandstones, Grand Canyon − Flood Geology Disproved** MEMO (csun.edu)

Figure 12. Giant desert dune cross-bedding in the Navajo Sandstone near the Grand Canyon.

Summary and Reasons Why Noah's Flood Was Not Global

First, it makes logical sense that the whole world for the early biblical people experiencing Noah's flood was local in southeastern Mesopotamia where Noah from his ark could see nothing but water in all directions because the curvature of the Earth dropped the distant mountains below his sight. Second, the chief reason that Noah's flood had to be local and not global is that no matter how strong the wind in the storm that occurred while rain was falling during this storm, the waves created in this storm have only circular motions that cannot erode the bedrock to produce any particles and then support and transport them great distances around the world as far as the Grand Canyon. Third, in one year's time 13 different overlying coal beds cannot have *Lepidodendron* trees growing 100 feet tall nor can 4,000 different species of very tiny radiolarians, ranging in age from the Cambrian to the present time, be sorted out in an evolutionary sequence by rushing flood waters. Fourth, thick layers of salt cannot be deposited during Noah's flood when drying and evaporation is required to deposit the salt. Fifth, there is not enough time in one year of Noah's flood to erode the bedrock, weather it, and produce the particles that occur in all the continental areas that average a total thickness of 1,800 feet of combined sediment in sandstones, shale, and limestone layers around the world. Sixth, raindrop prints cannot exist if all sedimentary rocks are said to be deposited underwater by Noah's flood, and neither can desert sand dunes with giant cross-bedding be created. On the basis of all these facts, the

evidence provided in this article clearly shows that Noah's Flood was never global.

Author's description

Lorence Collins, PhD University of Illinois, is a retired professor of geology at California State University Northridge and has written a book "**A Christian Geologist Explains Why the Earth Cannot Be 6,000 Years Old – Let's Heal the Divide in the Church.**" He has website in **Opposition to Creationism** with 98 articles at: OPPOSITION TO CREATIONISM (csun.edu)