THE HISTORY OF THE GRAND CANYON

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INTRODUCTION

First partly explored in 1540 by Coronado's expedition of 13 members, the Grand Canyon (Figure 1) was not successfully fully traveled until 1869 by John Wesley Powell, a Major in the U.S. Army and leader of his surveying party. His success ultimately resulted in published accounts of the canyon's rich geological history, stunning views, the wild Colorado River and ultimately becoming one of the world's most popular sightseeing destinations.[1]

Figure 1. The Grand Canyon

Even though the Grand Canyon is extremely large at 277 miles in length and is about 10 miles wide, rim-to-rim, it is not the world's largest canyon. That title is held by the Yarlung Tsangpo Grand Canyon along the Yarlung Tsangpo River in Tibet that is the deepest canyon in the world with a top-to-bottom reach in some places of 17,657-feet, and about 300 miles in length.[2, 3] However, when comparing the great canyons of the world such as the Verdon Gorge in France, the Cotahuasi/Colca Canyons in Peru, the Copper Canyon in Mexico, and the Fish River Canyon in Namibia, the Grand Canyon in Arizona reigns supreme in global name recognition, scenic variety, and an annual visitor attendance of six million people. Additionally, the Grand Canyon is also one of the best examples of the Earth's geologic history that is visibly displayed in a three-dimensional exposure from the bottom to top walls of the mile deep canyon. As a result, secular science and biblical creationists use the canyon to substantiate their accounts of its creation, history, and age. As these two historical accounts are diametrically opposed, lets look at each viewpoint and then consider how factual science defines the history of the Grand Canyon.

SECULAR SCIENCE

Although there are varying secular scientific opinions on the formation and age of the Grand Canyon, most follow the general outline of the following quote and agree that the canyon was formed about five to six million years ago:

"In the Grand Canyon, the Colorado River has cut through the accumulated layers of the Earth's surface to reach what has been dubbed as the basement of time. A billion years of history can be seen at a glance, from the Precambrian bedrock at the distant river's edge to fossilized sand dunes only a million years old at the rim. Some of the Earth's oldest rock lies at the bottom of the Grand Canyon. Thousands of feet thick, the rock is made up of sediments. About 300 million years after it was formed, monumental geologic forces lifted the rock back up into a great range of mountains that may have been six miles high, or about the height of the Himalayas.

Over time, the mountains eroded into a plain. About one billion years ago, that plain was raised into a second mountain range. These mountains were also worn away by millions of years of rain, wind and frost. During later ages, the entire region sank beneath an inland sea, with primitive shellfish fossilizing in sea bottoms that eventually hardened to shale. Eons later, the region rose again as a high plateau; the former sea bottom was now on top and the ancient rocks below.

This is when the Colorado River went to work, first cutting into the upper layers about six million years ago. Carving inch by inch over the millennia, the river finally reached the oldest rocks nearly a mile below the surface."[4]

In summary, notice the preceding secular scientific history of the Grand Canyon contains five key elements:

- Billions and millions of years were necessary for the canyon geologic history
- The Colorado River was responsible for cutting (eroding) the Grand Canyon over eons of time
- Thousands of feet of sedimentary rock are found in the canyon
- The Colorado Plateau was subjected to multiple uplifts
- There is an obvious absence of any involvement by God
- In summary – little water, much time

BIBLICAL CREATIONISM

From a biblical perspective, most biblical creationists typically agree a flood of water formed the Grand Canyon in a relatively short period of time as outlined in the following quote (shortened for brevity):

"Not long after all the fossil-bearing sedimentary layers of the Colorado Plateau had been deposited by the rising (Noahic) Flood waters, those same waters began to recede. We are told in Psalm 104:8 that at the end of the Flood, the mountains rose and the valleys sank down, causing the waters to drain off the continents and back into the new ocean basins. Massive sheet erosion occurred across the plateau while it was being uplifted, carving the Grand Canyon staircase and leaving behind the colored cliffs, canyons like Zion Canyon, and isolated remnants like Red Butte. As the Flood receded, water would have become trapped behind natural dams north and east of what is now the Grand Canyon area. Some estimate these lakes could have contained about three times the volume of Lake Michigan.[5]

As the floodwaters continued to recede, the sheet erosion across the rising Colorado Plateau would have diminished and the water would have started to channelize. This channelization would have cut the initial path of the canyon. Whether it happened as the Flood year ended, or soon thereafter, the lakes would have soon breached their dams, washing over the plateau and exploiting any channels already there, rapidly carving through the plateau resulting in a deep canyon very similar to what we see today."[6]

In summary, notice the preceding biblical creationist history of the Grand Canyon contains four key elements:

- There was a Noahic Global Flood (initiated by God)
- There is no mention of billions and millions of years
- The Colorado Plateau experienced an uplift
- The Colorado River was not responsible for carving the Grand Canyon
- In summary – much water, little time

FACTUAL SCIENCE

Without a doubt, either from a secular scientific or biblical creationist viewpoint, the Grand Canyon is testimony to the erosive power of water. As there is a noteworthy contradictory difference between the two previous viewpoints, lets look at the factual science of the geological history of the Grand Canyon and see how it applies to secular scientific theories and biblical Scripture.

THE COLORADO RIVER DID NOT CARVE THE GRAND CANYON

Although this statement may surprise many people, lets look at two reasons why factual science supports its validity.

Elevation

Because the northern rim, which includes the Kaibab Plateau through which the canyon is at a high elevation (Figure 2), the Colorado River, as we know it today could *not* have carved the Grand Canyon. The Colorado River starts at

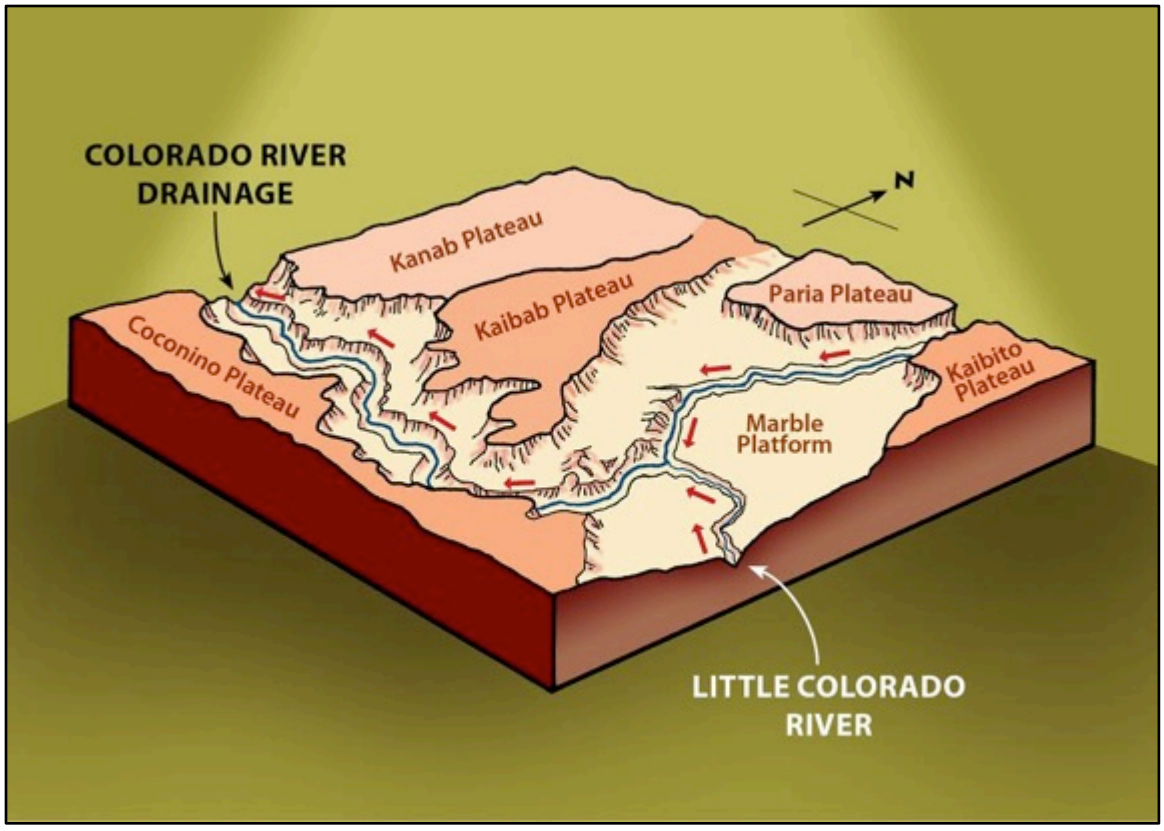

Figure 2. Current Drainage Of The Colorado River

12,000-feet in the Rocky Mountains of western Colorado and by the time it gets to the Grand Canyon area, the river is at about 5,000-feet. The problem is the North Rim of the canyon is over 8,000-feet high! Therefore, for the Colorado River to carve the canyon, it would have to travel over half a mile uphill before

starting its downhill descent to carve the canyon. Obviously, water would rather flow downhill as opposed to uphill. As a result, *the canyon came first, the river came second*.[7]

Sediment

It has been estimated that approximately 1,000 cubic miles of material was eroded to form the Grand Canyon. Based on these scientific calculations, one must consider the question of – "*where did it all go*?" If the canyon was eroded by the Colorado River, a massive delta should be present at the mouth of the river where it empties into the Gulf of California. Yet, the delta only contains a small fraction of this eroded material. Not surprisingly, this same conundrum is present with most large river deltas (i.e., Mississippi River, Hudson River, Rio Grande River, etc.)[8] that also contain enough material to represent thousands not millions of years of erosion.

EXAMPLES OF RAPID CATASTROPHIC EROSION

Not surprisingly, the Grand Canyon is not the only canyon that clearly displays the massive erosive effects of an immense amount of water in a relatively short period of time. First, lets look at some examples that are located in the states of Washington and Texas, and then look at Boundary Layers, Stable Cliffs, No Talus, and Relict Landforms.

Channeled Scablands, Washington

Located in eastern Washington is a 15,000 square mile area of massive erosion called the Channeled Scablands that was initially thought to be the result of slow gradual processes. However, in 1976, new geologic evidence indicated that the Spokane Flood catastrophically eroded the Scablands.[9] This flood was the result of the failure of an ice dam that had created Lake Missoula. Today, the United States Geological Survey has estimated that the flood released 500 cubic miles of water which drained in as little as 48 hours, gouging out millions of tons of solid rock and creating the Scablands that resembles the Grand Canyon (although on a smaller scale).

Mount St. Helens, Washington

In 1980, Mount St. Helens was responsible for 200 million cubic yards of material that was catastrophically deposited by volcanic flows at the base of the mountain in just a few hours. Less than two years later, a minor eruption resulted in a mudflow that carved channels through the previously deposited material in a short period of time (days). Though these channels are 1/40th the size of the Grand Canyon, exposed contacts between the catastrophically deposited layers are similar to the contacts that are observed between the exposed layers in the walls of the Grand Canyon.[10]

Palo Duro Canyon, Texas

The Palo Duro Canyon (Figure 3) near Amarillo, Texas, is the second largest canyon in the United States, behind only the Grand Canyon, and is often referred to as the "*Grand Canyon of Texas*." Secular scientists claim the base of the canyon is about 250 million years old and supports the multi-colored Triassic Tecovas Formation that is claimed to be about 210 million years old. However, these two

Figure 3. Palo Duro Canyon, Texas

layers (that are on top of each other) show no evidence of the alleged 40 million years of missing time between these layers.[11] Clearly visible are flat-lying layers upon flat-lying boundary layers for tens of miles in all directions that look like they were deposited with no time gaps between the layers and are also similar to the Grand Canyon boundary layers (see next section). Additionally, the top rock layer is covered by a sand layer that extends about 174,000 square miles across eight states (Texas to South Dakota). The best explanation for this conundrum is a receding mega-flood – such as the Genesis Global Flood – that would have distributed the sands so evenly across vast regions of the Great Plains.[12]

Boundary Layers/Bedding Planes

According to secular scientific theory, sediment layers such as those found in the Grand Canyon, represent millions of years of time along with various rock formations that underwent gradual cycles of deposition over a time span of 350 million years, resulting in two layers of sediment on top of each other creating a bedding plane. As an example, Figure 4 illustrates the white Coconino Sandstone (dated at 270 million years) overlaying the red Hermit Shale (dated at 280 million

years). Allegedly, the time span between these two layers is thought to be about 10 million years. However, remember that when a sediment formation is exposed as dry land, significant erosion can take place, particularly over millions of years. In contrast to this theory is the obvious "*knife-edge*" bedding plane between the two layers in Figure 4 that argues against the passage of long periods of time between their depositions and also indicates that they were rapidly deposited without time breaks and/or significant erosion between the deposition of each layer or formation. These two beds (also the Coconino Sandstone and Toroweap Limestone formations) validate a continuous, rapid deposition of each layer from a flood on the scale of the Genesis Flood.[13, 14]

Figure 4. A Bedding Plane

Stable Cliffs

Although the Grand Canyon is known for its massive and sheer cliffs of sedimentary rock, it is the color variance and stair-stepped profile of portions of the canyon walls that makes this canyon unique. The dark to blackish color of large sections (Figure 5) is the result of a coating of desert varnish (a thin veneer from seeping water containing clay, minerals and microbes) that develops over

many years,[15] and emphasizes the stability of the cliffs (Figure 5). Where recent rock-falls have occurred, the desert varnish is missing. That the cliffs have maintained their desert varnish color indicates that they are not experiencing rock-falls; thus they are very stable. This is consistent with their recent formation by catastrophic erosion, not millions of years of slow erosion.[16]

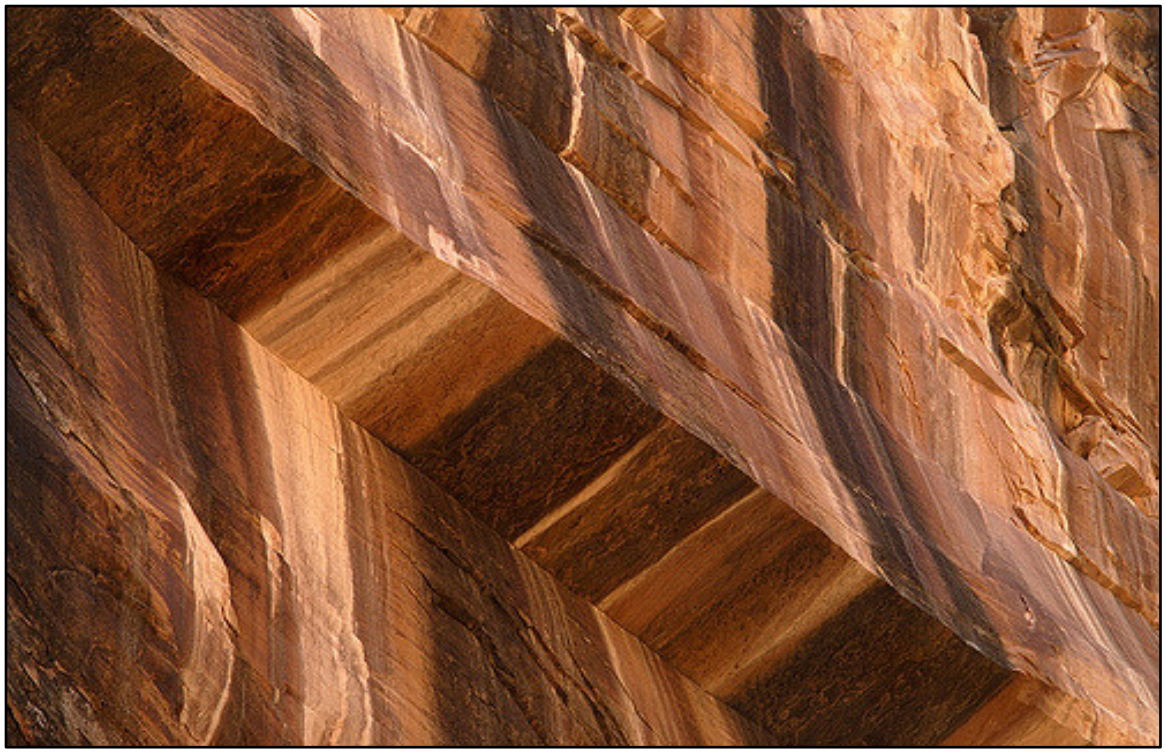

Figure 5. Desert Varnish

No Talus

Geologists define talus as – *"the pile of rocks that accumulates at the base of a cliff, chute, or slope"*[17,18] as in Figure 6. Over long periods of time, such as millions of years, large amounts of talus should be found at the base of the Grand Canyon cliffs, yet the bases of most cliffs are relatively clean with very little talus.[19] This supports a recent canyon thousands of years old, not millions of years old.

Relict Landforms

Residual Landform, also called Relict Landform, is defined as – "*a landform that escaped burial or destruction to remain as part of the present landscape."*[20] The previous discussion on Stable Cliffs and No Talus indicates that the Grand Canyon is a Relict Landform. This supports the viewpoint that the Grand Canyon has undergone minimal changes since it was carved and is a relatively unchanged remnant or relict of the event that eroded it. As a result, the Grand Canyon of today could not have been the end result of the secular scientific dogma of modern slow river processes that have been inferred back into the distant past

Figure 6. Talus

from a result of evolutionary uniformitarianism that is defined as – "*the present is the key to the past* – or – "*the doctrine suggesting the Earth's geologic processes acted in the same manner and intensity in the past as they do in the present and accounts for all geologic changes.*"[21] This principle is fundamental to secular geological thinking and underlies the whole development of the science of geology.

ROCK FOLDING – EVIDENCE OF THE NOAHIC GLOBAL FLOOD

Secular geologists believe that the sedimentary rock layers within the Grand Canyon were deposited and deformed over the past 500 million years. This would have resulted in a slow individual deposition of the sedimentary layers along with sporadic deposition of the layers.[22] However, if this were true, the rock layers would have time to congeal and solidify, particularly over a time span of 500 million years Therefore, when solid and hardened rock layers are folded or deformed as in Figure 7, they will invariably fracture and break because they are brittle.[23,24] Hardened rock will only bend if it is soft and pliable.

In a direct contrast to long-age geologists, the global cataclysmic Noahic Flood would have deposited the individual layers in the Grand Canyon in rapid succession, one on top of the other followed by an uplift of the Kaibab Plateau towards the end of the Flood. The Earth being under water for almost a year,[25,26] provides the only logical explanation how folding of the resultant pliable rock strata could have happened without appreciable fracturing.

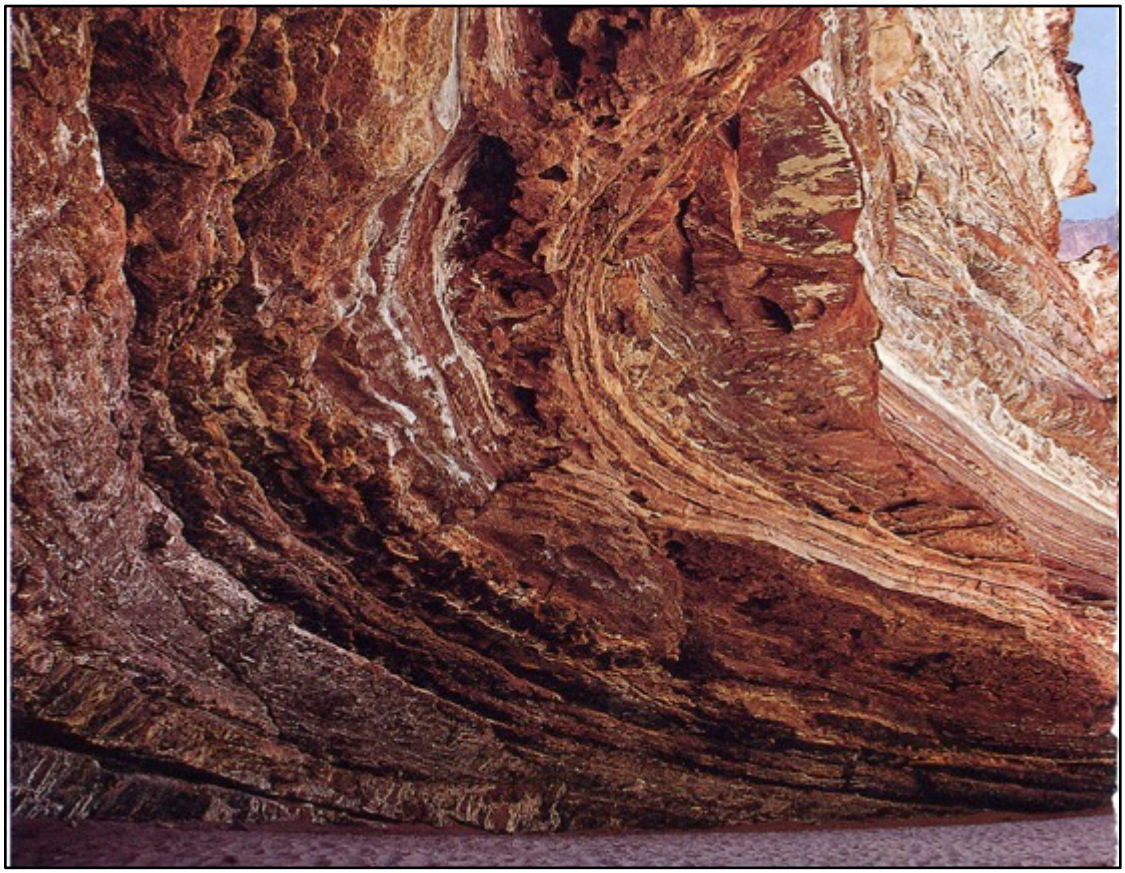

Figure 7. Folded Rock Strata

ROCK DATING –DOES NOT PROVE THE GRAND CANYON IS MILLIONS OF YEARS OLD

Although we have detailed the fallacies of radiometric dating in past programs, lets quickly review why radiometric dating of the Grand Canyon Rock strata does not prove the rocks are millions of years old.

The two most popular radiometric dating methods used by science are carbon-14 and radioisotope dating. As carbon-14 cannot be used to date rocks, radioisotope dating is used as it typically provides ages in the billions an/or millions of years. As an example, the Cardenas Basalt lavas in the Grand Canyon are claimed to be 1,070 million years old based on the radioisotope rubidium-strontium dating method.[27] However, it must be remembered that secular radiometric dating methods depend on three assumptions that cannot be proved, and therefore, are *secular assumptions* as follows:

- The radioactive decay has been constant at today's measured rates
- There has been no contamination of the sample to be measured
- The original quantity of the radioactive element to be measured is known

Obviously, over the alleged 1,070 million year time span for the Cardenas Basalt lavas the preceding three assumptions cannot be verified and are unprovable. Not surprisingly, they are commonly accepted as correct because they yield the desired results/dates. Amusingly, the Cardenas Basalt lavas have also been dated at 516 million years old by the radioisotope potassium-argon method that is less than half the 1,070 million years obtained by radioisotope rubidium-strontium method. So, why the notable difference? The simple answer is that the fatal flaw to secular dating suppositions is that science cannot confirm that the decay rate of the subject radioisotopes has been constant over millions of years, the rock sample has never been contaminated (i.e., water – now you know one of the primary reasons the Noahic Global Flood is not popular in secular scientific academia) over millions of years, and potentially most importantly, the original quantity of radioactive element being measured cannot be known in a rock that is alleged to be millions of years old, it can only be assumed.

At this point in our discussion, a legitimate question is – *"how accurate are radioisotope-dating methods?"* Based on the current measurements of rocks of known ages, radioisotope-dating methods are extremely inaccurate! The following are two examples:

- The Kaupelehu Flow, Hualalai Volcano, Hawaii, is known to have erupted in 1800-1801. Radioisotope dating ranges from 1.32 to 1.76 million years old when they should be 218 years old
- Mt. Saint Helens, Washington, erupted in May 1980. Radioisotope dating of the lava flows yielded dates between 350,000 and 2.8 million years old when they should be 38 years old

Now, lets look at some of the inconsistencies in various radioisotope dating methods when applied to the Grand Canyon:[28]

- The diabase sill at Bass Rapids, Grand Canyon:
  - Potassium-argon…….841 million years
  - Rubidium-strontium……..1,055 million years
  - Uranium-lead……..1,249 million years
  - Samarium-neodymium……..1,375 million years

The large inconsistencies among the previous methods and resultant dates demonstrate they are emphatically not providing reliable absolute dates, and contrary to what is accepted by secular science, radioactive dating has not conclusively proven that the rocks of the Grand Canyon are millions of years old.

CONCLUSION

Factual geological science completely refutes the secular scientific mantra of long ages of billions and millions of years in the formation of the Grand Canyon in addition to the belief that the Colorado River was responsible for carving the Grand Canyon. Instead, the Grand Canyon clearly and visually supports the fact that a global Flood actually happened in addition to reinforcing the fact that the Earth is not billions and/or millions of years old but rather thousands of years old.

ILLUSTRATIONS

Figure 1. Shutterstock
Figure 2: Paul Bunch
Figure 3. Texas Parks & Wildlife
Figure 4. Pinterest
Figure 5. Flickr
Figure 6. Encyclopedia Britannica
Mark A. Wilson
Department of Geology, The College of Wooster
Figure 7. Shutterstock

REFERENCES

1. adventure.howstuffworks.com
2. Wikipedia
3. outsideonline.com
4. adventure.howstuffworks.com
   Grand Canyon National Park
   Editors of Consumer Guide
5. Carving Grand Canyon: Evidence, Theories and Mystery
   2nd Edition
   W. Ranney
   Grand Canyon Association, 2006
6. The New Answers Book 3
   Dr. Andrew A. Snelling and Tom Vail – Canyon Ministries
   Master Books, 2010
7. Grand Canyon: Monument To Catastrophe
   Stephen A. Austin Ph.D.
   Institute for Creation Research, 1995
8. Geology and Tectonic History of the Gulf of California
   P. Lonsdale
   Geological Society of America, 1989

9. Cataclysms of the Columbia
J.E. Allen, M. Burns, S.C. Sargent
Timber Press, 1986
10. Rapid Erosion at Mount St. Helens
S.A. Austin
Origins, 1984
11. The Story of Palo Duro Canyon
D.F. Guy
Texas Tech University Press, 2001
12. Ogallala Aquifer Initiative 2016 Progress Report
United States Department of Agriculture
13. creationsciencetoday.com/15-Presence_Sharp_Contact_BeddingPlanes
14. Grand Canyon – A Different View
Tom Vail, General Editor
Master Books, 2003
15. How Fast Does Rock Varnish Form?
T. Liu and W.S. Broecker
Geology, 2000
16. Earth's Catastrophic Past, Geology, Creation & The Flood
Volume 1&2
Dr. Andrew Snelling
Institute for Creation Research, Dallas, Texas, 2009
17. mrdata.usgs.gov/geology/state/sgmc-lith.php?text=talus
18. Earth Science, BookRags
19. Missing Talus
E.W. Holroyd III
Creation Research Society Quarterly 24, 1987
20. Encyclopedia Britannica
21. Ibid.
22. Rock Layers Folded, Not Fractured
Flood Evidence Number Six
Dr. Andrew A. Snelling, 2009
23. Physics of Deformation, Elements of Structural Geology
E.S. Hills
London: Methuen & Co, 1970
24. Kinematic Analysis, Structural Geology of Rocks and Regions, 2nd Edition
G.H. Davis and S.J. Reynolds
John Wiley and sons, 1996
25. Genesis 7:11, Genesis 8:14

26. How Long Did The Flood Last
Dr. Danny Faulkner, 2015
27. Grand Canyon – A Different View
Tom Vail, General Editor
Master Books, 2003
28. Grand Canyon – A Different View
Dr. Andrew Snelling
Master Books, 2003