62. Origin of Horseshoe Bend, Arizona, and the Navajo and Coconino Sandstones, Grand Canyon − Flood Geology Disproved

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Abstract

Young-Earth creationists (YEC) claim that Horseshoe Bend in Arizona was carved by the Colorado River soon after Noah's Flood had deposited sedimentary rocks during the year of the Flood about 4,400 years ago. Its receding waters are what entrenched the Colorado River in a U-shaped horseshoe bend. Conventional geology suggests that the Colorado River was once a former meandering river flowing on a broad floodplain, and as tectonic uplift pushed up northern Arizona, the river slowly cut down through the sediments while still preserving its U-shaped bend. Both the Jurassic Navajo Sandstone at Horseshoe Bend, and the underlying Permian Coconino Sandstone exposed in the Grand Canyon, are claimed by YECs to be deposited by Noah's Flood while producing underwater, giant, cross-bedded dunes. Conventional geology interprets that these cross-bedded dunes were formed in a desert environment by blowing wind. Evidence is presented in this article to show examples of features that cannot be explained by the creationists' Flood geology model.

Introduction

The purpose of this article is two-fold. The first is to demonstrate that the physical features of the Navajo and Coconino sandstones at Horseshoe Bend and in the Grand Canyon National Park are best understood by contemporary geology as aeolian sand dunes deposited by blowing wind. The second is to describe how Horseshoe Bend and the Grand Canyon were formed by the Colorado River slowly meandering across a flat floodplain and eroding the Bend and the Canyon over a few million years as plate tectonic forces deep in the earth’s crust uplifted northern Arizona and southern Utah. In very sharp contrast, young-Earth creationists propose a Flood geology model for the deposition of all the sediments in this area by a worldwide flood and rapid formation of the stream channel by receding flood water (Walker, 2012). This article shows how their model fails to provide a credible explanation for a variety of features observed in the rocks and the geomorphology of the area. **Figure 1** shows the beauty of Horseshoe Bend and its location in Glen Canyon, Arizona.

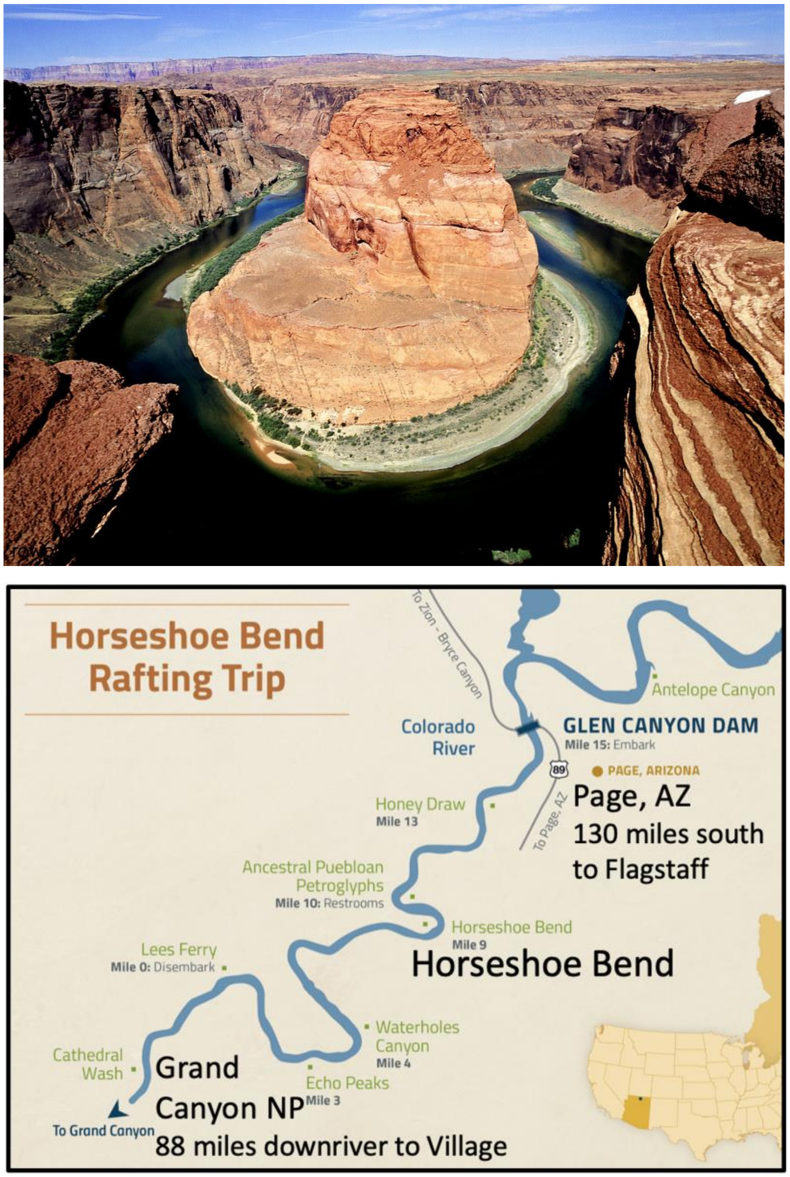

Figure 1. Upper image − Horseshoe Bend, Colorado River, Arizona. Beautiful red rock layers are the Navajo Sandstone formation of Jurassic age. Lower image − Location of Horseshoe Bend, Glen Canyon Dam, and Colorado River, Arizona. (Map courtesy of Wilderness River Adventures, offering Horseshoe Bend rafting, www.riveradventures.com)

For easy reference of the strata, **Figure 2** shows the formations that I mention in this article, and the complete stratigraphy is shown in **Figure 3**.

Navajo Sandstone – Jurassic – Horseshoe Bend

Kaibab Limestone – Permian
Coconino Sandstone – Permian
Supai Group–Sandstones – Pennsylvanian
Redwall Limestone – Mississippian
Tapeats Sandstone – Cambrian
} **Grand Canyon**

Figure 2. Formations described in this article.

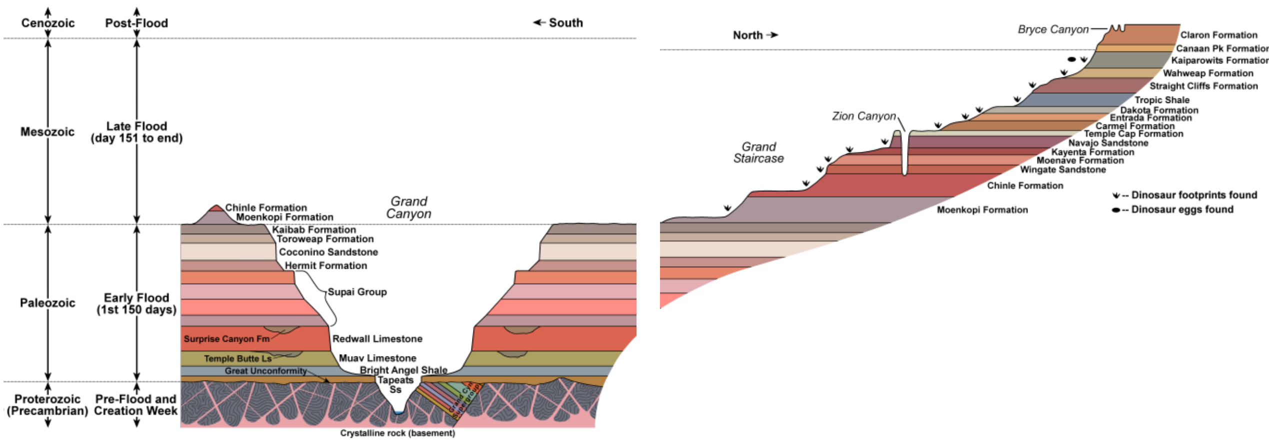

Figure 3. Grand Canyon stratigraphy showing the Paleozoic age position of the Permian Kaibab Limestone (top of the rim of the Grand Canyon; dark brown), the Permian Coconino Sandstone (light cream); the Pennsylvanian Supai Group (shades of red); the Mississippian Redwall Limestone (dark red); and the Cambrian Tapeats Sandstone (tan, bottom layer on top of the Great Unconformity). According to Flood geology, the canyon has Early Flood deposits (1st 150 days). Late Flood deposits (day 151 to end) are of Mesozoic age of the Grand Staircase north into Utah, with the Jurassic Navajo Sandstone (purple) cut by Zion Canyon. Source: Grand Canyon book (Hill, et al., 2016).

Young-Earth Creationist Flood Geology Explanations

In the Flood geology model, all of the Paleozoic sediments from the Tapeats Sandstone sitting on top of the Great Unconformity up through the Permian Kaibab Limestone are considered Early Flood time of the 1st 150 days (Austin, 1994; Vail, 2003). The Coconino Sandstone and Kaibab Limestone (**Figures 2** and **3**) would have been deposited by the Flood waters a few weeks earlier than the 150th day. Then the Mesozoic rocks including the Jurassic Navajo Sandstone would have been deposited near the end of the Flood, in just a few weeks after the 150th day. But sediment deposition did not continue to the end of the Flood year, because drying out was occurring so that Noah could land the Ark on land. Then, in the Flood geology model, Walker (2012) suggested that Horseshoe Bend was created by receding waters of the Flood that first eroded off all overlying Mesozoic age Jurassic and Cretaceous sedimentary layers by sheet erosion (up to the horizontal line at the top of **Figure 3**) and then cut down into the Jurassic Navajo Sandstone to form Glen Canyon where Horseshoe Bend occurs as well as to form Zion Canyon upstream. Thus, this sheet erosion could have been also during the drying out time of Noah's one-year flood time.

In the Flood geology model, the rushing flood waters would have created underwater bars and sand waves. Whitmore (2015) reports that measurements of over 200 cross-bed dips in the Coconino Sandstone were made on these bars and sand waves, and an average dip of 20 degrees was found during these measurement (Whitmore and Garner, 2018). An example is shown in **Figure 4**.

Figure 4. Coconino sandstone showing cross-beds with 20 degree dip. The upper cross-bedded sand of a former supposed dune is underlain by an erosion surface on top of another lower supposed sand dune (bottom of photo) with cross-bedding in the same orientation. This erosion surface is indicated by a horizontal sand layer that extends from left to right above the vertical black arrow (~ 1 m long). (Photo © J.H. Whitmore, July 2009, near Holbrook, Arizona).

On the basis of the 200 measurements, Whitmore argued that such low dip angles near 20 degrees are evidence that this sandstone was deposited by water. Clarey (2020) in his new book "Carved in Stone" supports Whitmore's model that the Coconino Sandstone was deposited underwater. Finally, the Bible supports the position that Noah's Flood was worldwide on the basis that Jesus even pointed to the existence of Noah's Flood (Matthew 24:37-39).

Problems with the Whitmore Model

There are problems with the Whitmore model because everywhere that he measured the dip angles of the cross-bedding in the Navajo Sandstone, the top of the dune in each place has been eroded off and covered by overlying dunes as is illustrated in the bottom part of **Figure 4** where a vertical arrow points to a horizontal sandstone layer that indicates where the top of a lower dune was eroded away by the wind. Thus, his measurements are made on angles in the lower parts of the dunes and not near the top where dips would have been steeper (**Figure 5**).

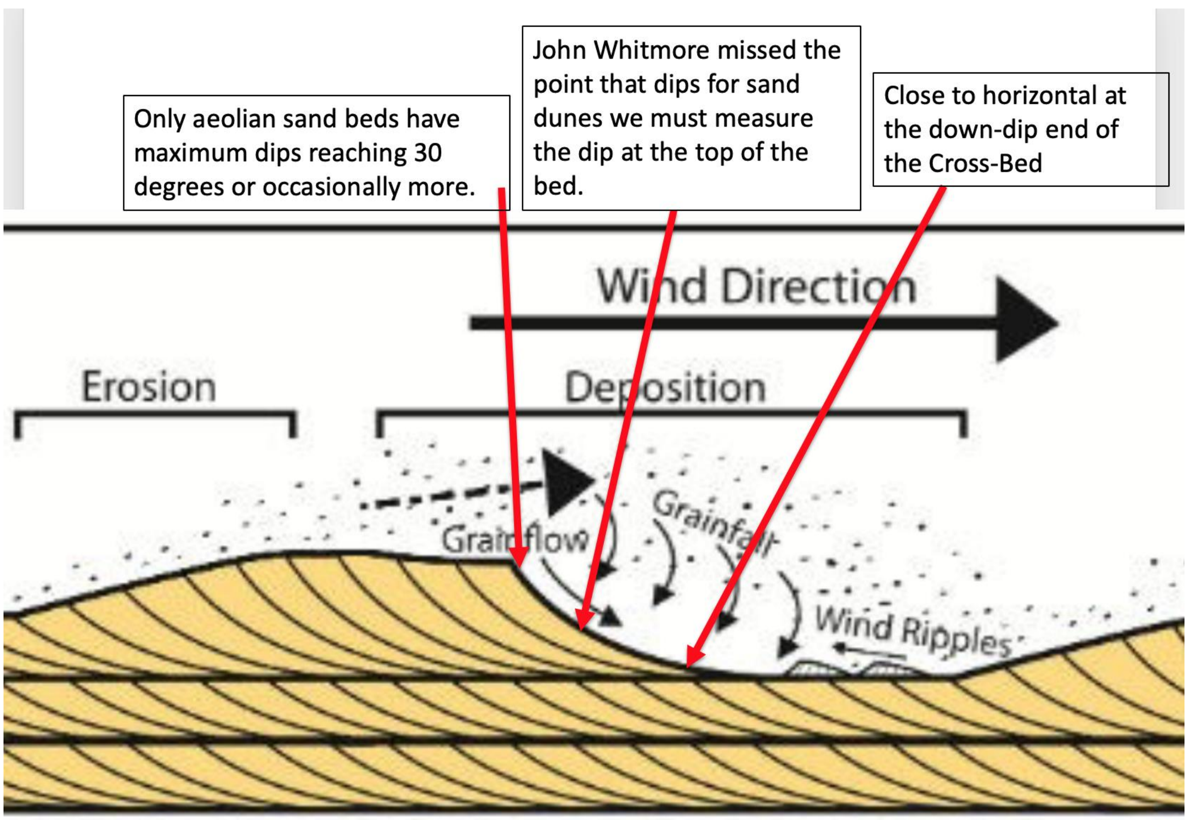

Figure 5. Formation of desert-dune cross-bedding, showing problems with the Whitmore model. Source: Ken Wolgemuth.

Young-Earth creationists, however, fully agree with conventional geology that such is the way, as shown in **Figure 5**, that cross-bedding is produced in dunes in desert regions.

Underwater bars and large sand waves slump easily. The angle of repose is a function of pore pressure (when under water) and water enhanced cohesion on land, but also grain size and shape. The grains can be well-rounded or somewhat angular and when the grains are dry, somewhat-angular, interlocking in sand dunes that are deposited by wind, they hold their positions to much steeper angles before sliding occurs (Lancaster, 1995).

Cross-Bedding of Navajo and Coconino Sandstones − Sand Dunes

Cross-bedding can be found in the Navajo Sandstone that is found in Zion National Park in Utah as well as in areas in Arizona (**Figure 6**).

Figure 6. Areal distribution of the Navajo Sandstone.

In the Navajo Sandstone near Horseshoe Bend, outcrops in Arizona can be seen that show cross-bedding in layers that are relatively thin where the tops of the dunes have been eroded off and covered by wind-transported sand grains (**Figure 7**).

Figure 7. Dune cross-bedding in Navajo Sandstone, Horseshoe Bend area, Glen Canyon, Arizona. The photo has some layers with low angle of dip, but some are clearly more than 30 degrees.

Giant cross-bedding in the dunes of the Navajo Sandstone can be seen in and near Zion National Park (**Figure 8**).

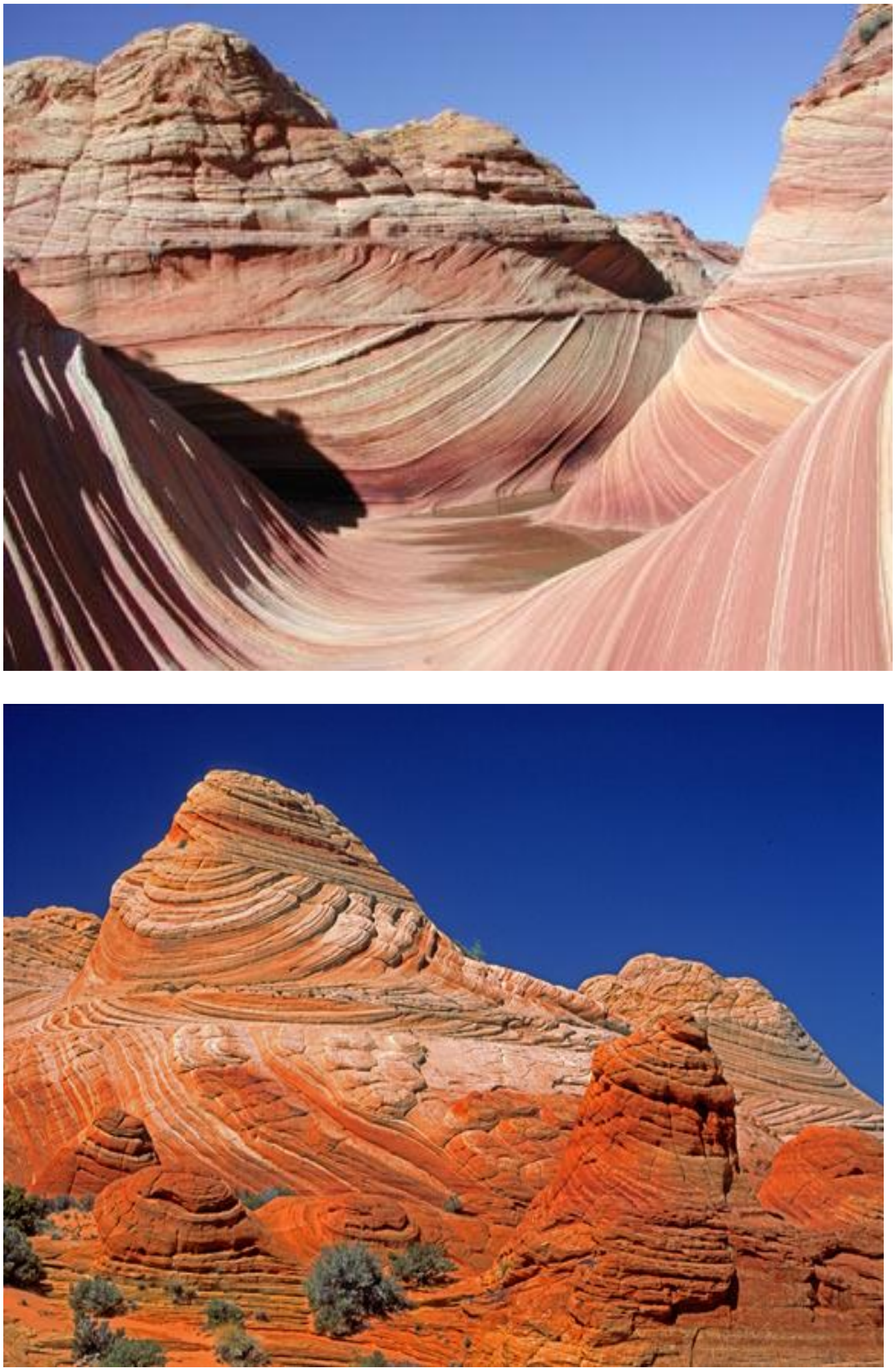

Figure 8. Giant dune cross-bedding in Navajo Sandstone, "The Wave" (Vermillion Cliffs National Monument) and Coyote Buttes area near Zion National Park, Utah. Some dip angles are more than 30 degrees.

Cross-bedding also occurs in the Coconino Sandstone, the thick white layer below the white Kaibab Limestone formation at the rim top of the canyon (**Figure**

9). **Figure 10** shows the cross-bedding with 26.5 and 30 degree dips, both more than the average dips of 20 degrees reported by Whitmore (2015) and more than the maximum angles of dip for stream cross-bedding of 25 degrees (Reineck and Singh, 2012). Lon Abbott (personal communication, 2020) reports that he has measured 30 degree dip angles on the Coconino Sandstone in upper Havasu Canyon and in other places on trails in the Grand Canyon (Abbott and Cook, 2008).

Figure 9. Grand Canyon exposure showing the thick white Coconino Sandstone that is below white Kaibab Limestone at the top of the rim that is underlain by the Toroweap Formation. The dark red sandstone layers in the lower part of the image are in the Supai Group. Source of photo: James St. John, Ohio State University, Newark.

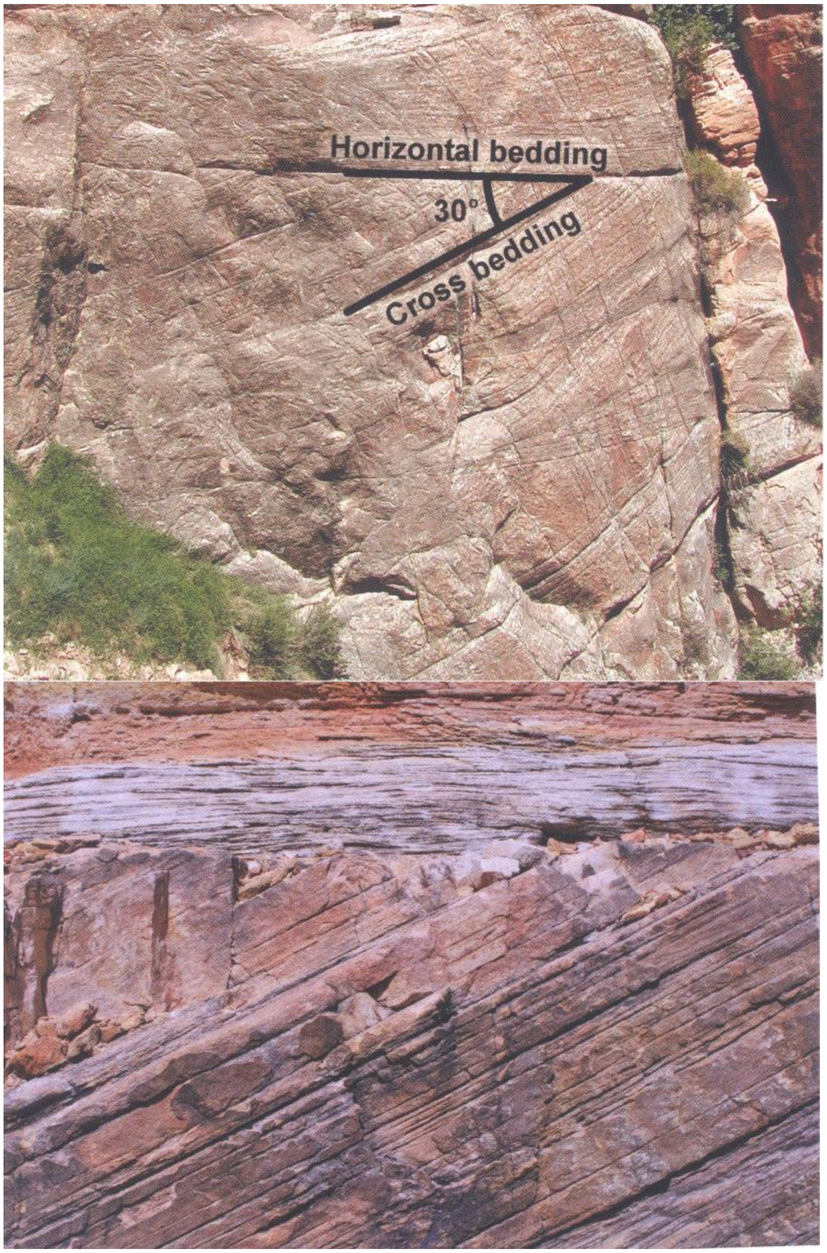

Figure 10. Upper image − Dune cross-bedding in the Coconino Sandstone with 30 degree dip angles. Source: Grand Canyon book (Hill, et al., 2016) Lower image − Dune cross-bedding in the Coconino Sandstone with 26.5 degree dip angles. Note whiteness of horizontal white layer that truncates the cross-beds. Even if the photo shows apparent dip, apparent dip is always going to be shallower than actual dip. Source: Wayne Ranney.

Cross-bedding in the Supai Group and the Tapeats Sandstone.

If one is looking for submarine cross-bedding with low dip angles, they are in the Grand Canyon sedimentary layers and are in contrast to the cross-bedding in the Navajo and Coconino sandstones that indicates aeolian dunes. For example, the sandstones of the Supai Group and Tapeats Sandstone have features that indicate a different environment, namely nearshore (continental) or offshore (marine) water transport and deposition for both the Tapeats Sandstone and the Supai Group sandstones where the oceans both transgressed and regressed with changing sea levels. These include low-angle cross-bedding in sandstone layers in the Supai Group (**Figure 11**) and the Tapeats Sandstone with dips that are less than 25 degrees (**Figure 12**). The Tapeats Sandstone (**Figure 12**) shows the relatively thinner massive sandstone layers lacking cross-bedding in comparison to the thicker cross-bedded layers in the Navajo Sandstone (**Figure 8**) and in the Coconino Sandstone (**Figure 4**). Cross-bedded sandstone layers in both the Supai Group and the Tapeats Sandstone are relatively rare, but much more abundant in the Coconino and Navajo Sandstones.

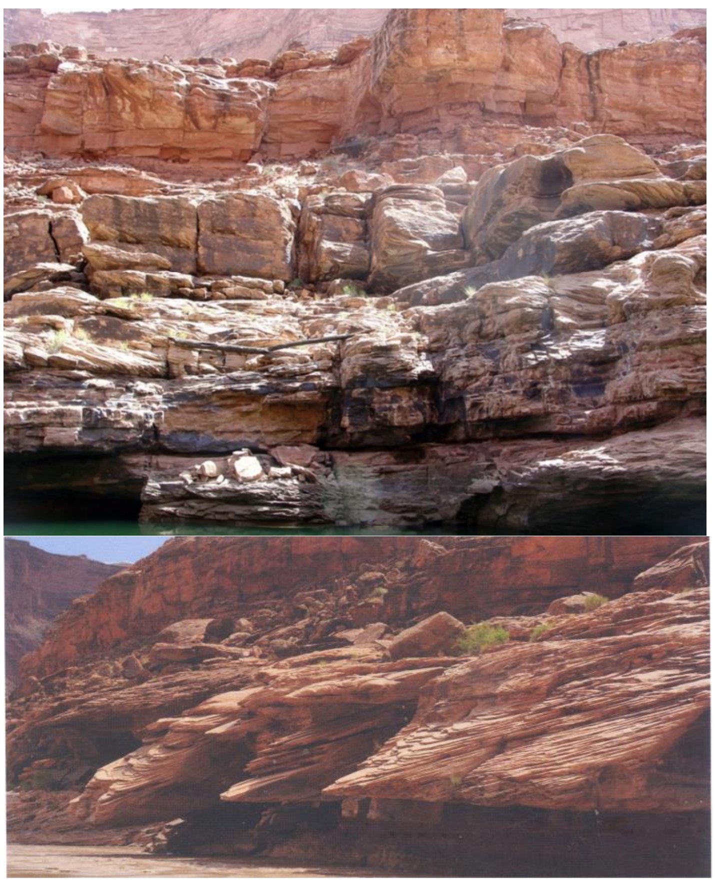

Figure 11. Upper image − Cross-bedded sandstone layer in Supai Group. Angles of tan dipping beds are aligned with two straight sticks (low left side; 10 degree dip). Massive sandstone layers without cross-bedding occur in upper and lower parts of this image as well as in layers in most rocks in the Supai

Group shown in **Figure 9**.   Moreover, such massive beds are found in images of most Supai rocks on the internet. Lower image − Cross-bedded sandstone layer in Supai Group; 18 degree dip.

Figure 12. Upper image - Cross-bedding in the Tapeats Sandstone with 20 degree angles of dip (Clarey, 2020, page 42. Copyright © Timothy Clarey. Used by permission.   Lower image - The man is pointing to stream cross-bedding with low angle dips in the Tapeats Sandstone that is sandwiched between relatively thin, massive, reddish sandstone layers lacking cross-bedding   Source: Arizona State University.

If the Flood geology model is correct that all sand particles carried by the

Flood were transported at tsunami speeds, then all sandstone layers deposited by the Flood should have similar characteristic features. But is that true? If the sand grains in the Supai sandstone layers and the Tapeats Sandstone were deposited in fast-moving water traveling at tsunamic speeds, why are not the cross-bedded layers in the Navajo Sandstone formations of similar minimal thickness? Furthermore, only in a few places are stream cross-bedded layers present in the Supai Group sandstone layers (**Figure 11**) and in the Tapeats Sandstone layers (**Figure 12**). Then, why are not cross-bedded layers in the Supai Group and the Tapeats Sandstone as frequent as in the Navajo Sandstone? The greater thicknesses of cross-bedded layers and their greater abundances in the overlying Navajo Sandstone strongly support their desert-dune origin.

Conventional Geology Wind-origin for the Coconino Sandstone

Evidence that supports the conventional geology wind-origin model for the Coconino Sandstone partly includes the fact that this sandstone is white (**Figure 9** and in a horizontal layer in **Figure 10**). The Coconino Sandstone has a buff color on weathered surfaces but is white on fresh surfaces (**Figure 9**). On that basis, conventional geology suggests that in this sandstone wind has blown the sand grains farther and has winnowed out the heavy magnetite grains (density 7.874 g/cc) and left them behind, transporting only the lighter white sand grains (density 2.65 g/cc); as in the horizontal white layer in **Figure 10**. At this site, the wind carried the sand a great distance and eroded off the top of a dune to create the white layer. Note that this observation does not mean that the total thickness of the Coconino Sandstone (**Figure 9**) is one dune but that within this formation multiple dunes are stacked on top each other whose tops have been eroded off as more sand is blown in to cover lower parts of the dunes.

Support for the winnowing-out-of-magnetite hypothesis is the fact that the Coconino Sandstone in the Sedona area in Arizona is red in the bottom layers and then toward the top it becomes less red and finally white at the top (**Figure 13**). This progression of change in color upward certainly suggests that magnetite grains were progressively winnowed out with time. Note that water transported and deposited sands carrying magnetite grains do not winnow out the magnetite grains as is evident by the deep red color of hematite in the sandstone layers in the Supai Group below the Coconino Sandstone (**Figure 9**).

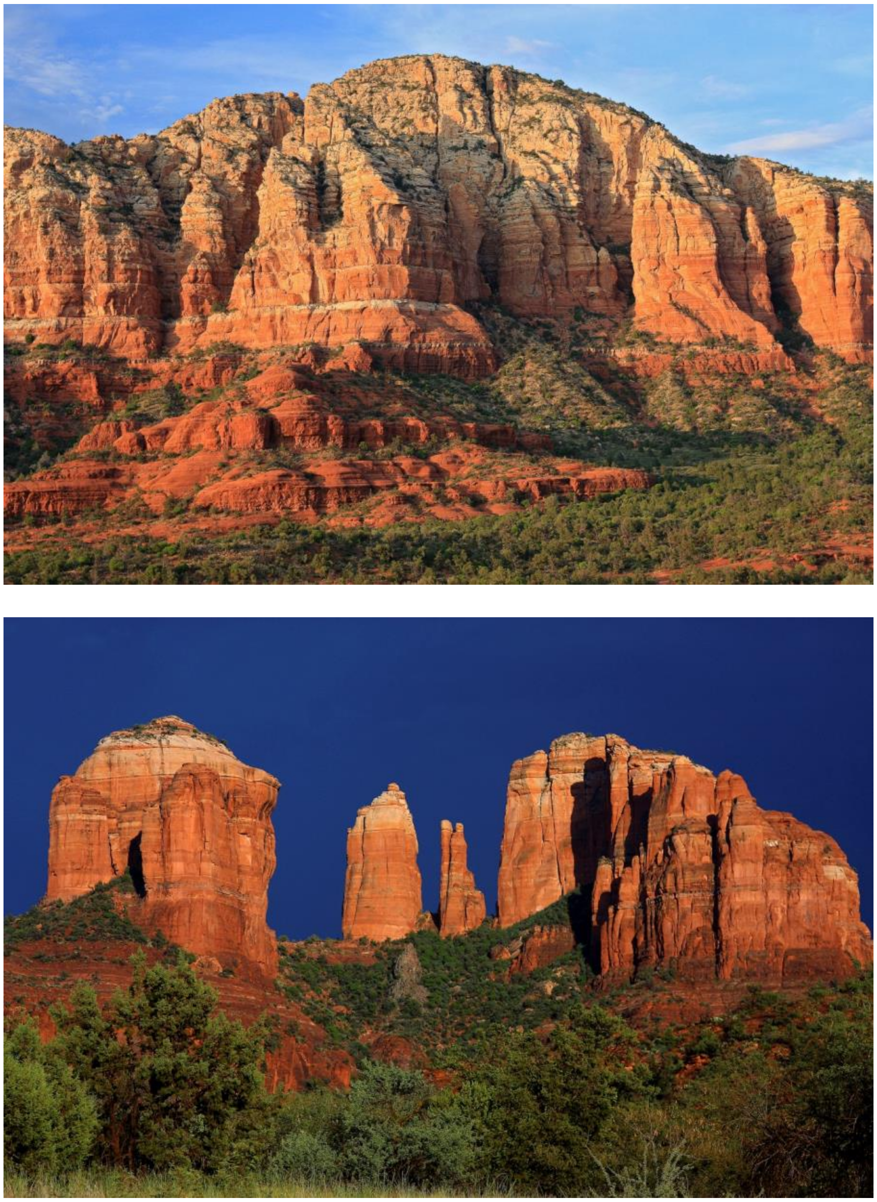

Figure 13. Coconino Sandstone in the Sedona, Arizona, area. Lowermost dark red layers are in the Esplanade Sandstone in the Supai Group (**Figure 11**) and not part of the Coconino Sandstone. Source of images: Mike Koopsen.

Because this area is as much as 120 miles (193 km) away from the Grand Canyon white-sandstone deposits (**Figure 9**), the great distance to the Grand Canyon from Sedona would have provided the additional time for magnetite grains to be winnowed out and make the Coconino Sandstone all white there.

Could Cross-bedding in the Coconino Sandstone be Formed by Flooding Water?

As pointed out by Hill et al. (2016) it is theoretically possible to form cross-bedding in dunes in the Coconino Sandstone by flood rates of 2 to 4 miles per hour and that also, at these speeds, dunes could be produced that are as high as 30 feet, as has been suggested by young-Earth creationists (Snelling, 1992, 2009) in their Flood geology model. But to deposit the entire thicknesses of sand in this geologic formation, which is up to 800 feet thick, in the matter of days near the end of the Flood, more than just a current of water moving at 4 miles per hour is needed. A wall of sand that is several hundred feet thick must be sliding laterally at this speed across thousands of square miles (Austin, 1994). Also, the migration of entire sand dunes, whether by wind or by water, is much, much slower than the movement of sand grains over the surface of a dune and its top to form cross-bedding (Moshier, 2018).

Most significant, even giant waves formed by category 5 hurricanes with wind speeds of more than 156 mph are only able to erode and move sand in offshore barrier bars landward by just 50-100 feet. The volume of sand that might be moved in such a hurricane might be in the order of 100 cubic miles of sand but nowhere near the 10,000 cubic miles of sand that Austin estimated for the volume of the Coconino Sandstone (Walker, 2012). Therefore, in the Flood geology model, the sand dunes with cross-bedding in the Coconino Sandstone cannot have been produced by such 4-mile per hour speeds of transportation of the great volumes of sand that moved. Such is pure fantasy.

Furthermore, not mentioned in the Flood geology model is the fact that young-Earth creationists never include in this model the subject of the origin of the quartz of which the sand grains in the Coconino and Navajo Sandstones are composed (Collins, 2009). It is just assumed by the young-Earth creationists that the quartz was produced in huge volumes on Day Three of the Genesis Week. That is, this quartz was already available as tiny mature grains, ready to be transported by Noah's Flood and deposited across areas that for the Coconino Sandstone, extend from Arizona, Colorado, New Mexico, Kansas, Oklahoma, to Texas and farther east and for the Navajo Sandstone, extend through Nevada, Utah, Arizona, and Colorado (**Figure 6**). But this availability on Day Three requires a miracle of instant creation and not on science. If young-Earth creationists claim that the Bible is scientifically accurate and they want to use science to explain the origin of the Coconino and Navajo Sandstones, then they cannot just selectively choose data that fit their model and ignore what do not.

Therefore, on that basis, to be scientifically honest, the following processes must be considered in regards to the full story as to how the Coconino and Navajo Sandstones were formed. They include: (1) the formation of granitic rocks by crystallization of silica-rich melts deep in the Earth’s crust where the quartz is first crystallized, (2) the uplift of these granitic rocks from their deep sources to form high mountains in the eastern U.S. and Canada, (3) the weathering of these granitic rocks when they become exposed by removal of overlying rock layers so that the hard feldspar matrix that surrounds the quartz can be converted to soft clay, (4) the erosion of the weathered granitic rocks by falling rain so that the quartz grains can be released from the clay, (5) the transportation of the loosened quartz grains as sediment by water in streams and winnowing out of clay particle from the quartz grains, (6) the creation of long periods of drought in Permian and Jurassic times, (7) the transportation of the quartz grains by wind through a combined distance of perhaps as much as 2,000 miles (or more) to produce the cross-bedded dune sands seen in the Grand Canyon and Zion National Park and surrounding underlying buried areas, (8) the burial of these dune sands under other sedimentary rocks of younger Paleozoic and Mesozoic ages that were deposited on top of the dunes, and (9) the uplift of these rocks and eventual erosion by the Colorado River in this area to expose the Coconino Sandstone in the Grand Canyon and the Navajo Sandstone in Zion National Park. All these nine processes must have taken millions of years and cannot be condensed into 6,000 years in the Flood geology model if science is used to explain the origin of these sandstone formations.

Raindrop Prints in the Coconino Sandstone

A clear bit of evidence that the Coconino Sandstone cannot be formed by deposition under water during Noah's Flood is the occurrence of raindrop prints that occur in some places (**Figure 14**). There is no way in which young-Earth creationists can explain such an occurrence in their Flood geology model.

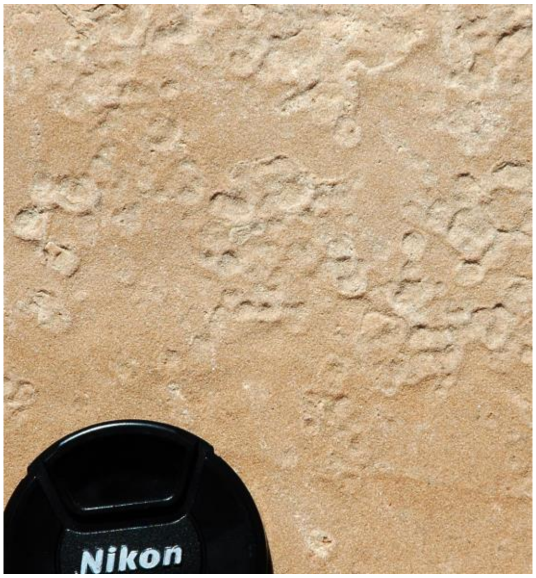

Figure 14. Raindrop prints on the Coconino Sandstone. Source: David Elliott.

Formation of Horseshoe Bend

Now what happened to make the present landscape in Arizona where Horseshoe Bend occurs? In the conventional geology model, it resulted from geologic forces that caused the land surface to be uplifted to a higher level so that base level is farther below its former place that was once near the top of Navajo Sandstone formation. When that happens, the river is rejuvenated (regains youth). Now, the river has renewed energy to erode down into the land toward the lower base level, while maintaining its U-shaped pattern as shown in **Figure 14**. In this way the river is said to be incised or entrenched, and water flowing in the river at Horseshoe Bend was able to carve a deep canyon preserving the "old" horseshoe bend.

In the Flood geology model, Walker (2012) suggested that Horseshoe Bend was created by receding waters of the Flood that first eroded off all overlying Jurassic and Cretaceous sedimentary layers by sheet erosion and then cut down into the Jurassic Navajo Sandstone after the flood. However, this sheet erosion would have happened so quickly (supposedly within a few days after the bulk of the initial flooding occurred) that no time would have existed for the sand grains in the Flood-deposited sand layers to become cemented together to harden into solid rock. Moreover, the sand layers deposited by the Flood that are still not-yet-cemented should have been also still saturated in pore spaces between sand grains with water from which the grains settled out. The fact that the receding waters during the last part of the Flood, sometime after the first 150 days but before the end of the one-year Flood (**Figure 3**), would have so easily eroded away the Jurassic and Cretaceous rock layers that overlaid the area where the Horseshoe Bend is located clearly indicates that these layers were saturated with water (in the Flood geology model) and would have had no physical strength because of water pore pressure. Therefore, the canyon walls that border Horseshoe Bend (or the Grand Canyon) would have slumped, but they did not. So, this model has no merit.

At any rate, if the Flood geology model is going to have any merit, young-Earth creationists must first show a place on Earth where an incised meandering river can be formed by water moving at great speed. An argument against their model is, for example, the geologic evidence that is present where the Missoula floods occurred in the state of Washington (Google for many references). Here, huge glacial lakes periodically suddenly drained with a huge rush of water, and the rush of water did not produce a meandering river. Instead, the water went almost straight down the Columbia gorge, nearly wiping out all rock valley-spurs in its path and depositing sand in giant ripples with low dip angles.

To create Horseshoe Bend, what you have to imagine is that in the ancient geologic past a river was flowing across a nearly flat surface on top of the Navajo Sandstone (**Figure 1**) where the flowing water could barely flow downhill. Conventional geology says that such a river has reached "old age" where the river is flowing at "base level" and is unable to erode down deeper into the landscape. That is, it is near sea level. Where this occurs, the river twists and turns (meanders) in U-shaped bends across an almost flat floodplain, slowly shifting its position by eroding into the outer curve of the U-bends.

In Louisiana, the Mississippi River is in "old age," has numerous U-shaped bends, and the nearly flat floodplain is nearly 200 miles wide. In some places, the river erodes through a bend to cut it off to form an "oxbow lake" (**Figure 15**). In this figure, you can visualize how it can form because a river along the outside of a bend migrates, and the river erodes into itself to allow the river to cut through and abandon its longer distance of travel that is now in an oxbow lake.

Figure 15. Oxbow lake (distant right side) and meandering river with U-shaped bends. Traces of former positions of the river can be seen in the image. Sand (light tan; distant center and lower left) is deposited on the inside of the U-curve.

On the basis of how horseshoe bends are created, as observed in modern-day rivers (**Figure 15**), it is logical that a similar circumstance produced Horseshoe Bend in Arizona. However, there are other ways in which the entrenched meanders can form as is noted by Ranney (2005).

Does Flood Geology Hold Water? – Summary of Evidence

Seven kinds of evidence are presented by conventional geology which show examples of features that cannot be explained by the Flood geology model. The seven are:

(1) The 30 degree (or more) dip angles of the cross-bedding in both the Navajo and Coconino Sandstones.

(2) The whiteness of the Coconino Sandstone that resulted from wind transport that winnowed out heavy iron-bearing magnetite grains that would not have been winnowed out by rushing Flood waters and where, if present, would have resulted in forming red hematite to make the sandstone red, like those in the Supai Group, instead of white.

(3) The presence of only a few cross-bedded sandstone layers in the Supai Group and the Tapeats Sandstone with minimal thicknesses which is unlike what occurs in the Navajo and Coconino Sandstones. In the Flood geology model, all sandstone layers should have the same characteristics where the sand grains were all transported at tsunamic speeds to produce these formations in a short time by the same Flood water, and that is not the case.

(4) The fact that giant waves and wind generated by category 5 hurricanes with winds more than 156 mph can only move sand in offshore barrier bars just 50-100 feet landward is strong evidence that sands deposited as the Coconino and Navajo Sandstones in the Grand Canyon and Zion National Park areas and which were likely transported many hundreds of miles in the Flood geology model makes this model for the origin of these sandstone formations ridiculous.

(5) In the Flood geology model, the carving of the Paleozoic sedimentary Tapeats and Supai Group sandstone layers in the Grand Canyon (**Figure 3**) and of the Mesozoic Navajo Sandstone (**Figures 1** and **3**) by the Colorado River soon after the Flood ended should have resulted in the walls of the Grand Canyon and Glen Canyon and in the canyon in Zion National Park being slumped into the river because the sand grains that were deposited from the Flood would still have been enclosed in residual water from the Flood without any time in just a few weeks for magnetite to be oxidized to make hematite cement around these grains to hold them rigidly in place, and such slumping did not happen.

(6) Young-Earth creationists do not discuss the origin of the mature sand

grains in all sandstone formations in the Grand Canyon and thus must assume that these sand grains were already prepared on Day Three of the Genesis Week ready to be transported. Therefore, their Flood geology model relies on repeated miracles to produce each sandstone formation and that is not science if young-Earth creationists claim they are using science in their model.

(7) Raindrop prints on the surface of Coconino Sandstone dunes.

Conclusions

The Navajo Sandstone and the Coconino Sandstone formations were not created by deposition of sand transported by Noah's Flood but by wind deposition. On that basis, the Flood must have been local, that is, not global, although it could have been an actual large flood that occurred in southeastern Mesopotamia, in biblical times (Collins, 2009). Although young-Earth creationists claim that the Bible supports their position that Noah's Flood was worldwide on the basis that Jesus reported its existence (Matthew 24:37-39), this reporting by Jesus does not necessarily mean that it was worldwide − only that it existed. Therefore, this article is not in conflict with the Bible, even though Clarey (2020), Cupps (2019), and Snelling (2009) (young-Earth creationists) would claim that not to be true. The explanation that Horseshoe Bend is an entrenched meander of a former "old age" river is logical and geologically possible.

Paraphrasing a statement by Thomas H. Huxley, it takes only one ugly fact to ruin a beautiful model, and as stated in a previous section, there are at least seven facts that certainly destroy the Flood geology model.

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