A receding Flood scenario for the origin of the Grand Canyon

Peter Scheele

Many creationist geologists have proposed that the Grand Canyon (GC) was formed by a catastrophic dam-breach event. This would have released large quantities of water from impounded lakes east of the canyon that had remained on the plateau after the Flood. This event would have carved the GC, starting from the east moving to the west. Yet there are many features of the GC that cannot be adequately explained by such a dam-breach event. A better explanation is that the GC was formed while the waters of Noah's Flood receded from the American continent. As this receding water flowed from east to west, the GC was mainly carved out in the opposite direction, from west to east. This scenario explains many characteristic and unusual features of the GC, such as its location through the top of a ridge, its branching structure, its numerous major and minor side canyons, its meandering and the presence of multiple 'outflow points' in its terminal escarpment.

The breached-dam theory

Contrary to the uniformitarian view that the origin of the Grand Canyon (GC) was a slow process over 7 million years, creationists have claimed it was carved by a single catastrophic event by the breaching of an enormous natural dam. This breached-dam theory (BDT), as it is called, says that the water from two lakes lying east of the Kaibab Plateau, called Hopi Lake and Green River Lake (or Grand Lake), catastrophically carved through this higher-lying plateau and formed the GC.

Walt Brown presented an account of the BDT in his book *In The Beginning*, which was first published in 1980 and is now in its 8th edition.[1] In the late 1980s, Edmond Holroyd defined the boundaries of the two lakes.[2,3] Steve Austin *et al.* summarized the BDT in his 1994 book about the GC.[4]

Figure 1 is a Digital Elevation Model of the region around the GC and indicates by joining lines of equal contour (calculated by software) the raised water level that defines the possible outline of the lakes.[5]

Brown most explicitly describes the process of the dam-breaching, whereas Austin only roughly outlines the general idea of such a breach. Most often when a BDT is discussed, reference is made to other 'canyons' that have been catastrophically carved, such as:

- Mount St Helens canyons, which were carved following the 1980 volcanic eruption.
- The Scablands, caused by "The Lake Missoula Flood".
- Burlingame Canyon near Walla Walla, Washington,[6] caused by the drainage of storm water.

Nevertheless, as we will see in detail further on, there are many features of the GC that are not adequately explained by such a dam-breach event. To begin with, there are obvious physical differences between the GC (see figure 2) and the canyons listed above. For instance, the canyons of Mount St Helens (figure 3) do not show the branching structure exhibited by the GC. The Scablands has an explicit multi-channelled pattern (figure 4), which is completely absent in the GC, but would be expected if the large amount of water from the two lakes had been unleashed on that landscape.

Mike Oard[7] has listed five objections against the BDT and suggested the possibility that it was carved from west to east as the waters of Noah's Flood receded to the west.

This paper discusses some of the major and unique characteristics of the GC that need to be explained by any theory for the origin of GC and how these characteristics fit with a so-called Receding Flood Scenario (RFS).

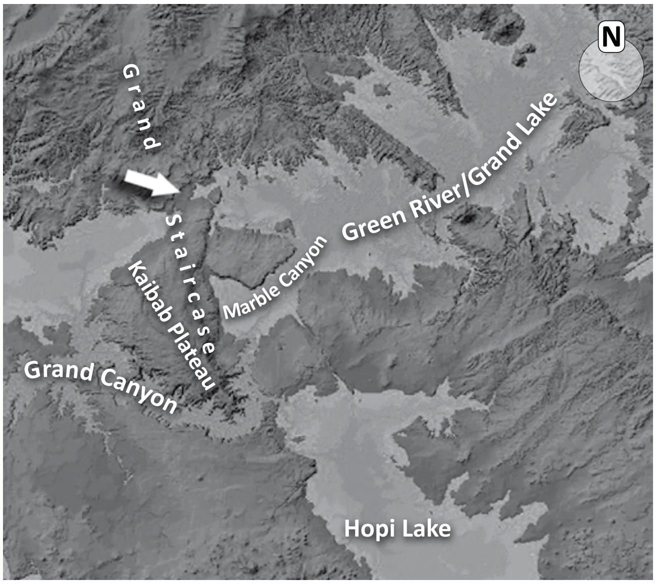

Figure 1. A Digital Elevation Model of the Grand Canyon region with an artificially raised water level. It shows the contours of the lakes that could have formed east from the Kaibab Plateau when the GC still would have been 'closed'. The arrow indicates a more logical point for a breaching event than through the current higher point of the Kaibab Plateau.

High-resolution colour versions of the figures in this article are available at creation.com/canyon-origin.

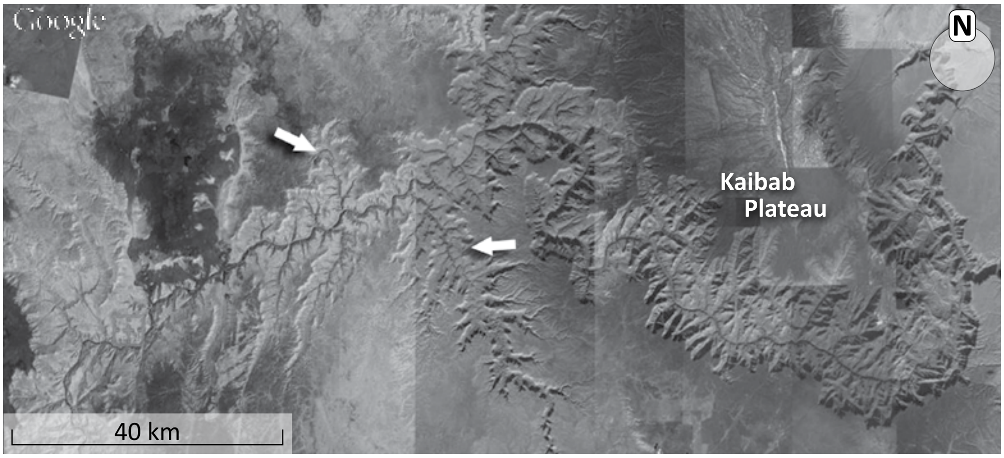

Image generated by Google Earth™ 2008

Figure 2. Wide-angle view of the Grand Canyon, clearly showing its branching structure. The Colorado River flows from right to left (east to west). Arrows show some side branches of the canyon.

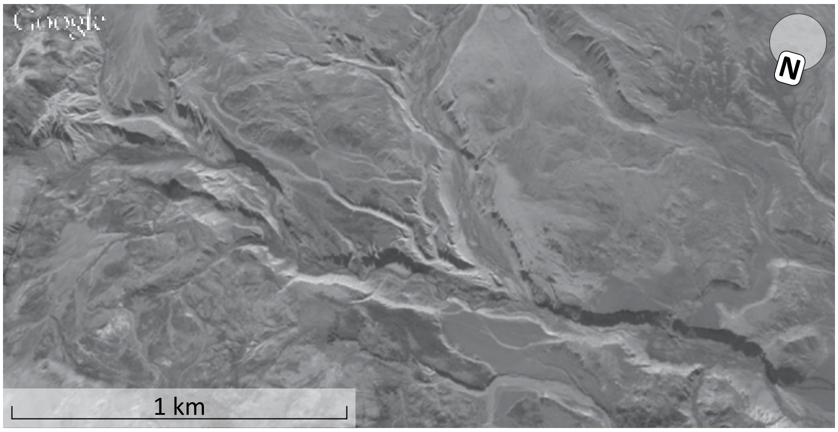

Image generated by Google Earth™ 2008

Figure 3. The edges of the 'Little Grand Canyon' at Mount St Helens are relatively straight and do not exhibit the branching structure of the Grand Canyon.

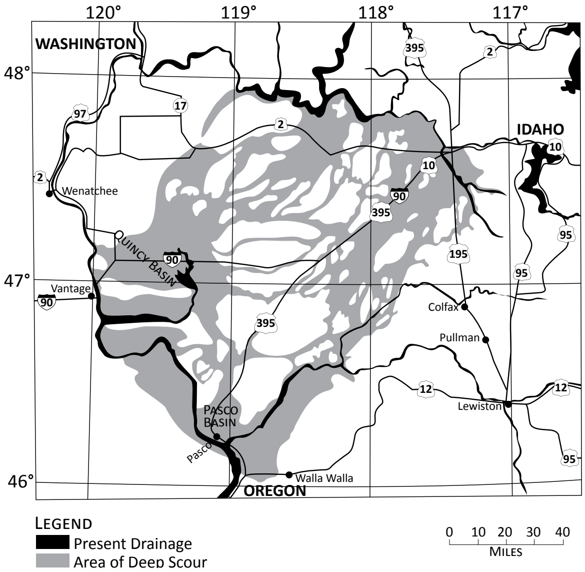

Figure 4. The multi-channeled and parallel structure of The Channeled Scablands in north-west US is quite different from the Grand Canyon. The channels do not exhibit the branching structure evident with the Grand Canyon.

Method of studying: Google Earth

Besides the use of scientific literature, Google Earth has been an important tool in studying the origin of the Grand Canyon. Google Earth uses detailed satellite images of the earth's surface which are projected onto a 3D Digital Elevation Model of the landscape. In that way spectacular overviews and 'fly bys' of the area of interest can be generated that are impossible to realize by ground or field work. Because the Flood was a global event, the unprecedented possibilities of Google Earth can help to better understand the scale of the impacts the Flood must have had in shaping the landscapes of the earth and in this case, the GC.

Features of the Grand Canyon that need to be explained

Feature 1: The GC is carved through the higher points in the landscape

Figure 5 shows a north-south cross-section through the GC area, starting from the northern mountains on the left to the Kaibab Plateau and the GC on the right. This is the so called 'Grand Staircase'. It can be seen that the GC cuts through the higher parts of the Kaibab Plateau on the right and not through the lower level near the Chocolate Cliffs in the middle, which roughly corresponds with the area in figure 1 indicated with the arrow. Why would any breaching occur in a higher part right through a 'mountain' rather than in a lower part?

The Receding Flood Scenario (RFS) is able to explain a cut through higher ground very well. Consider the GC area (indeed the whole North American Continent) being completely covered with water to a depth of 1 km or more. This immense body of water would extend 500–600 km to the east and have a similar north-south dimension. We will call this body of water the Grand Canyon Inner Sea and discuss it in detail later.

Because the continents are being compressed and the ocean basins are sinking, the area of the Colorado Plateau is uplifted and therefore the water within the GC Inner Sea is retreating in a westward direction and the water-level is lowering. The water follows many routes flowing out of the area from higher to lower regions. When there is

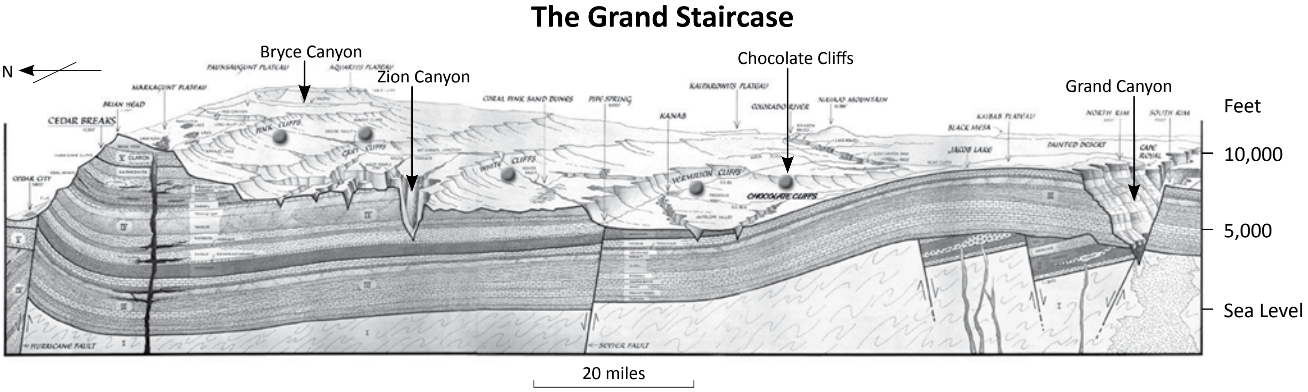

Figure 5. A north-south cross-section through the so called ‘Grand Staircase’ illustrating the geological strata that comprise the walls of the Grand Canyon, which is at the far right.

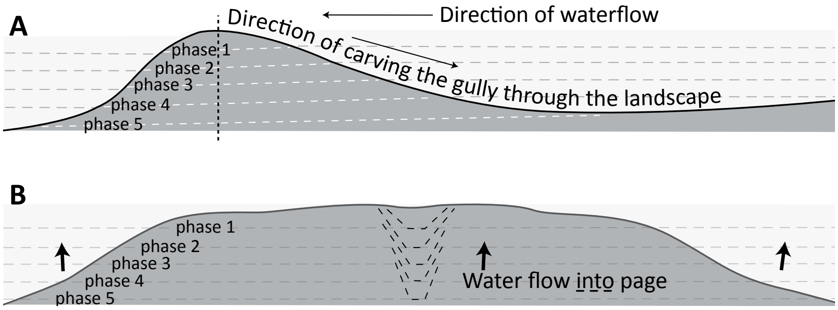

Figure 6. Schematic of how a canyon is carved through higher ground as water levels lower (phases 1–5). Image B is a cross-section of image A at the vertical dotted line. When the water in image A flows from right to left over a submerged elevation it may carve out a gully in the elevation (image B), even though water still flows at the sides. As the gully deepens, it grows in the opposite direction of the water flow (image A).

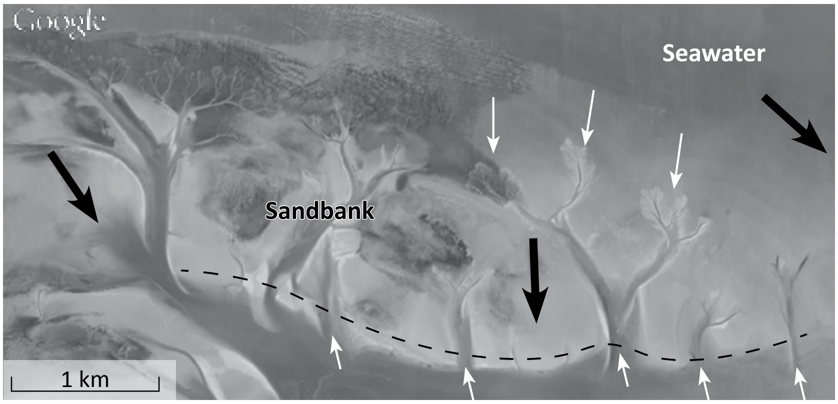

Image generated by Google Earth™ 2007; Aerodata International Surveys 2007.

Figure 7. The Wadden Sea in the Netherlands, a tidal area with sandbanks, illustrates how the daily tides cut through the higher points in the sandbanks to allow the retreating seawater to pass.

a submerged landform, such as a plateau, mountain, hill or ‘sandbank’, the water will not only flow to the left and right of the landform but also over its top as long as it remains submerged. The water flowing over the top will, at a certain point, increase in speed, since there is less and less room for the water to find a way. Therefore some parts of the top of the landform will start to erode faster than other parts or the sides. In this way a channel or gully will form right through the higher parts of the elevation (figure 6).

As the water level keeps falling, the sides of this initial channel will emerge from the water (phase 1 in figure 6). But water will continue to flow rapidly because of the enormous volume of water that still needs to drain out. The underwater mountain hinders the receding water and therefore the water will take every possible route out. Thus the channel will be carved deeper and deeper, even though there might still be water flowing along the sides of the elevated landform. Provided the water level of the Inner Sea lowers slowly enough, water will keep flowing through the channel and erode it deeper and deeper as the water level lowers (figure 6B). As a result, the channel will grow longer in an upstream direction, beginning in the area where the landform is highest and moving to the area where the landform is lower. The most remarkable thing about this process is that the direction in which the gully is carved is opposite to the direction the water flows (figure 6A).

Another remarkable feature of this drainage process is that, once the channel has achieved a certain length, it will start to branch out like a tree as the water continues to drain from the plateau. The main channel will develop side channels, which in turn will develop side channels, and so on. The side channels develop because, as the main channel grows in length, the water on the plateau is then able to flow sideways into the channel. This sideways flow eventually initiates secondary channels that continue to grow sideways (Feature 2 and 6).

It is possible to see today how this process produces a branching structure by observing tidal areas with lots of sand, such as in the Wadden Sea to the north-west of the Netherlands. Gullies are cut by the daily tides through the higher points in the sandbanks to allow the retreating seawater to pass through. Figure 7 shows an example of this effect in the Wadden Sea. The lighter coloured areas are already dry. The dotted line indicates the higher point of the sandbank. The large black arrows indicate the direction of the flowing seawater when the sandbank is submerged. It can be clearly seen how several gullies have been cut through the higher levels (the narrow white arrows pointing upward in the foreground) and branch out in the lower levels that are still underwater in this picture (the narrow white arrows pointing downward in the middle). The structure of these gullies is not exactly the same as in the GC, but this is likely due to:

- The scale of the GC, which is more than an order of magnitude larger.
- The amount of water flowing through these gullies, which is *many* orders of magnitude less than in case of the GC.
- The GC having been a one-time event, with maybe some limited tidal effects. The sandbanks and gullies of the Wadden Sea are the result of long periods of tides, day in and day out.

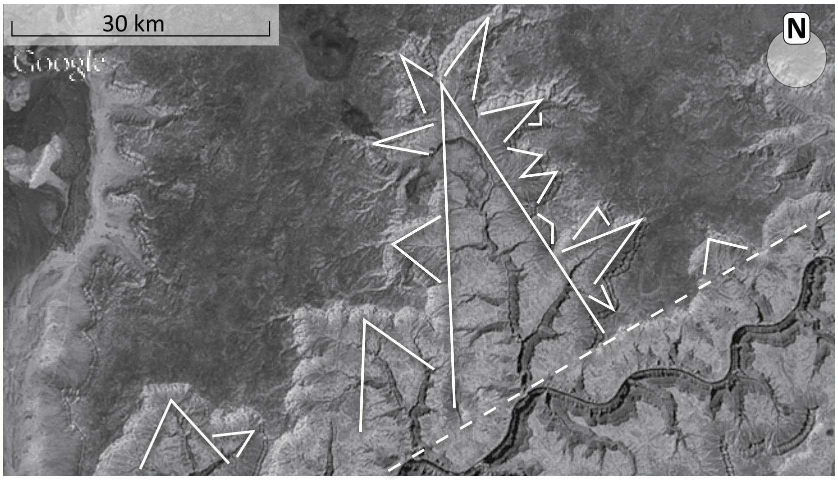

Image generated by Google Earth™ 2008

Figure 8. The branching structure at the western part of the Grand Canyon. Branches are shaped as a V or U with the width tapering away from the outlet of the branch. The branching shapes on branching shapes resemble fractals.

Feature 2: The branching structure of the western half of the GC

Figure 8 shows the typical branching structure apparent along the western part of the GC. The dotted line indicates one side or 'bank' of the GC. At several positions branches can be observed extending away from the GC and these branches become narrower as they extend further away. This narrowing means the edges of these branches tend to have a triangular shape. The branches themselves also have branches, and those might even split further. The edges of the branches always seem to be shaped as a V or a U.

A 'sudden' high-velocity current caused by a dam-breach would carve out parallel channel-like structures, as can be observed in the Scablands (figure 4). It would not create this sort of branching pattern, nor would it create these V- and U-shaped gullies.

A spectacular example of such similar V- or U-shaped erosion on an escarpment, which is still eroding up to this present time, is the notch of the Niagara Falls (figure 9). This shows that a relatively constant supply of low velocity water on the plateau can explain the origin of a V- or U-shape better than a breach event can. Notice also that the Niagara Falls is eroding backward in the opposite direction to the water flow, as discussed previously with figure 6.

Once the V-shape of the main canyon is established, three conditions are needed to form the typical branching type canyons observed in the GC:

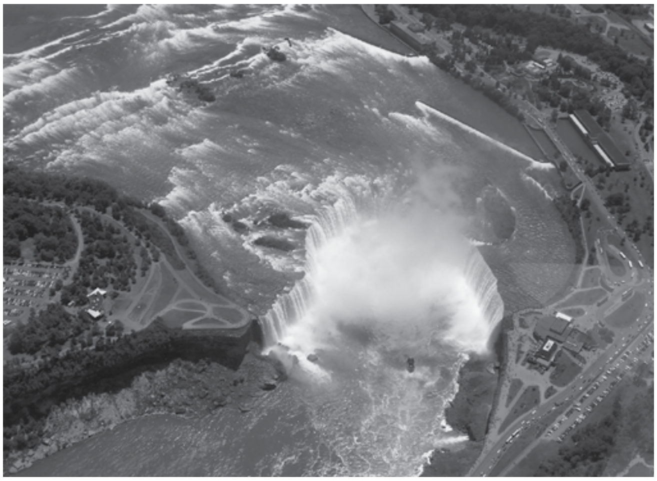

Figure 9. The Niagara Falls illustrates how steady erosion by a constant flow of water produces a U shape. Erosion of the Falls is in the *opposite* direction to the flow of water.

- There needs to be a relatively constant (or regular) supply of a large volume of water covering the raised area and flowing into the main canyon.
- The raised area/plateau needs to be rather flat so the water can flow into the main canyon from both sides. The steeper the downstream slope on the raised area, the shorter and narrower the V-shape of the main canyon will be. When the raised area is flat, it will result in a main canyon with a long, broad V and with more branching.
- The sediments need to be relatively soft; otherwise the erosion would be too slow to keep pace with the lowering water level. In hard rock the water would have flowed away over the sides of the raised area before any gully/canyon had time to be eroded.

The receding water of the Flood is precisely what is needed to create branching V-shaped cuts along the sides of the GC by flowing sideways into the canyon. Therefore we can conclude that many, or all, the cliffs of the GC are former waterfalls! That must have been a spectacular sight. The water had been flowing over the edges *into* the GC and thus carving out V-shapes.

The much deeper channels in the middle of the GC were formed after the main canyon was cut, and they are still being eroded today by the normal drainage of the Colorado River that flows through it (see feature 5, p. 111).

Along the coast of Argentina we can also find beautiful examples of branching structures caused by receding tidal water as shown in figure 10. Note the similarity of the wide flat mud flats, cut by the narrow gully in the middle, with the features of the GC. Also note the steeper 'cliffs' on the sides and the branching 'canyons' towards the lower-lying parts behind the cliffs.

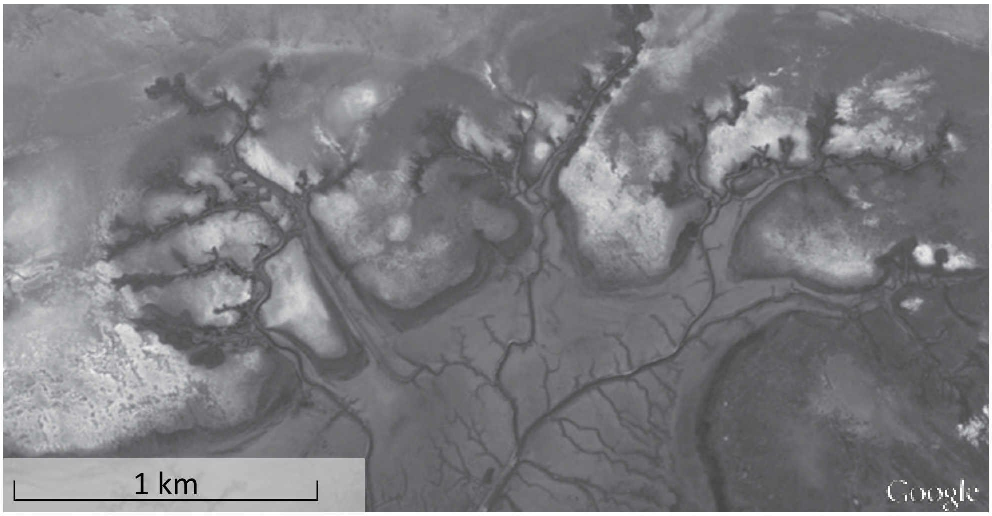

Image generated by Google Earth™ 2007; DigitalGlobe 2008

Figure 10. Branching type channels on the coast of Argentina have an appearance similar to the branching in the Grand Canyon.

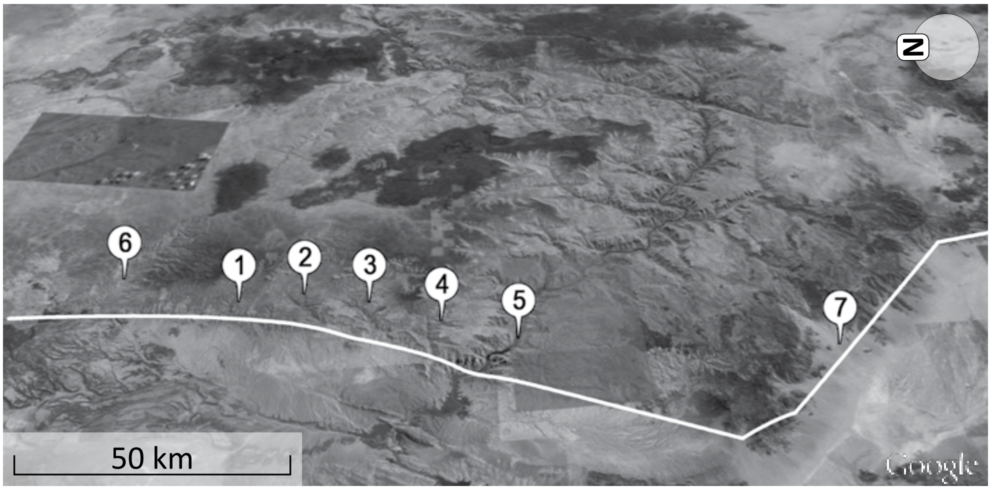

Image generated by Google Earth™ 2007; DigitalGlobe 2008

Figure 11. The westward end of the Grand Canyon looking east across the escarpment to the Hualapai Plateau. Apart from the outflow point of the Grand Canyon (point number 5), there are a number of similar but smaller 'outflow' points (numbered 1 to 4 and 6 and 7).

Feature 3: The non-branching structure of the eastern half of the GC

As shown in figure 2, the eastern part of the GC northwest of the Kaibab Plateau does not exhibit the branching structure evident in the western part. On the North Rim, the canyon shows a typical erosion pattern that can also be observed in mountainous areas. The cliffs located on the South Rim look much like a collection of landslides that slipped into the GC. These features indicate that the process that formed the eastern part of the GC is likely different from the process that formed the branching part in the west. It suggests that the GC was formed in two major steps, a western step and an eastern step. Both steps would have initially involved cutting through higher ground—one through the Kaibab Plateau and one through the Hualapai Plateau (see feature 4 below). Both would likely have been formed at the same time. However, the western arm would eventually extend to connect to the eastern Kaibab section when the water level had lowered enough.

Neither the BDT nor the regular uniformitarian views can adequately explain these differences.

Feature 4: The multiple 'outflow points' at the end of the GC

Figure 11 shows the area where the GC exits at its western end (looking in an eastward direction). This area is characterized by a huge escarpment/ridge (indicated by the white line), which is about 160 km long and up to 1,000 m high. The GC presently cuts through the Hualapai Plateau and ends at the escarpment at marker 5. The Colorado River, which flows through the GC, emerges from the escarpment at this point and runs into Lake Mead, which can be seen in the foreground.

However, there are several other 'outflow points', or gorges, cut back into the escarpment. Although they are smaller than the GC, they have a similar appearance. Markers 1 to 4 identify some of these smaller outlets in the vicinity of the GC. These gullies/canyons are not currently operating as drainage outlets for the catchment area behind them. Marker 6 identifies another such outlet, which *is* currently operating as a drainage outlet. Marker 7 is on the other side of the GC at another outlet, and this one is even harder to explain in terms of being formed by the present drainage system because the GC is right behind it and takes care of all the drainage.

The elevation of the entire plateau area surrounding the GC rises slowly as we move downstream along the GC from east to west, forming a ridge. The elevation of the plateau 'suddenly' drops off at the ridge/escarpment mentioned above. Figure 12 is a view south along this escarpment, with the high plateau to the left and the lower landscape to the right.

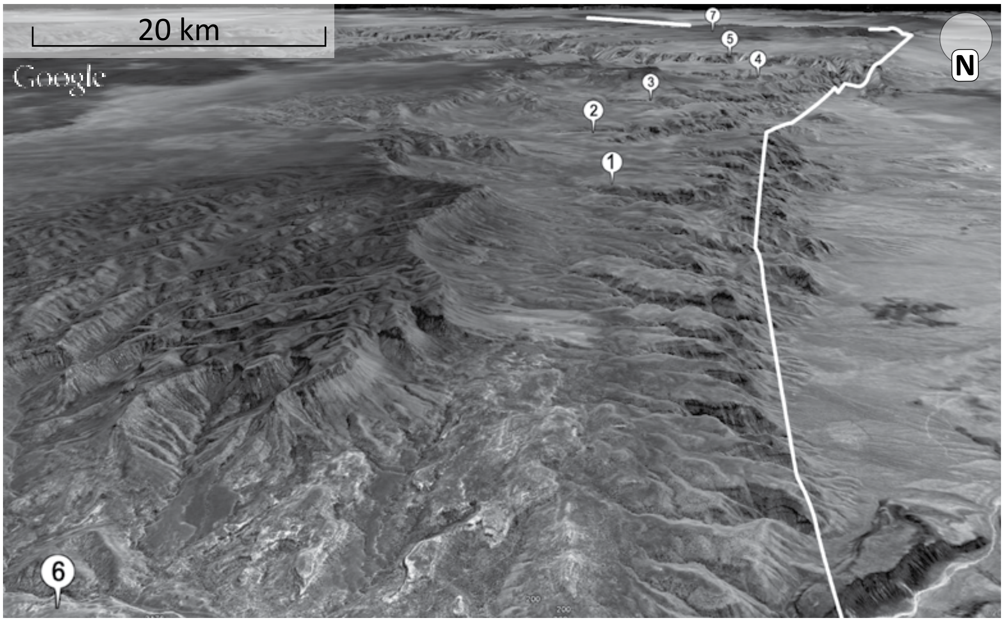

Image generated by Google Earth™ 2008

Figure 12. Looking south across the Hualapai Plateau, showing the same outflow points numbered in figure 11 which are eroded as gorges into the escarpment. The receding floodwaters flowed from east to west, i.e. from left to right.

The global Flood provides a simple, plausible explanation for these multiple outflow points through this escarpment. In the second half of the Flood, as the waters of the GC Inner Sea were receding from the continent into the Pacific Ocean basin (because the continent was compressed and the GC area uplifted), water flowing from the east was trapped behind this ridge. This water was forced to flow over and through the ridge at those 7 outlet points, thus eroding the deep canyons at these points and carving out the branching, V-shaped structures that can be observed at these locations.

As the water level dropped, only one of those outflow points (probably the longest and deepest at that time) continued to flow, whereas the others ceased to serve as outlets. Outflow point number 5 in the Hualapai Plateau remained in service to drain the rest of the water behind it and, as such, continued to erode deeper and further eastward. This is an example of cutting through higher ground similar to that which we saw with the Kaibab Plateau.

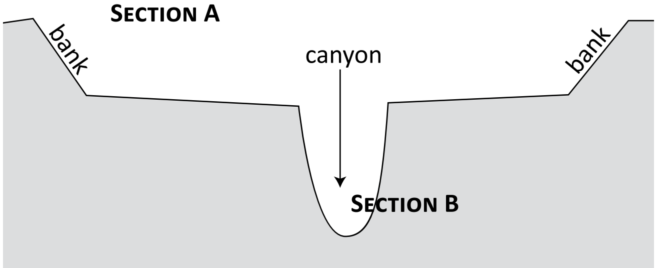

Figure 13. Schematic cross-section of the Grand Canyon, showing the dual structure: section A, which is wide and shallow, and section B, which is narrow and deep.

Different erosion patterns on the north and south rim of the GC outlet

Allen Roy concluded that a 'recent gigantic flood' eroded the Hualapai Plateau.[8] An outflow point, as described above, fits this observation very well. Strangely enough, branching, V-shaped structures are not present on the southern side of this GC outflow point as they are on the northern side. When we examine the landscape, we can see that this must have been because the northern parts served as outflow points for the higher northwest region of the plateau, but the southern parts did not need to drain the lower southern area. They served as a bend in the miles-wide 'river' mouth of the receding water (see figure 15) and thus more smoothly eroded the Hualapai Plateau there.

At the most southerly point (at the 'question mark' in figure 15, called Peach Springs) there might even have been another second large, but temporary, outflow point for this GC 'river'.

Feature 5: The dual cross-section of the GC

As shown in figure 13, the cross-section of the GC has two distinct shapes. The canyon of section A is broad and relatively shallow. The canyon of section B sits in the middle of section A. It is much narrower, is carved much deeper and has steeper sides.

The Colorado River flows through section B. The present size of the Colorado River is a good fit with the size

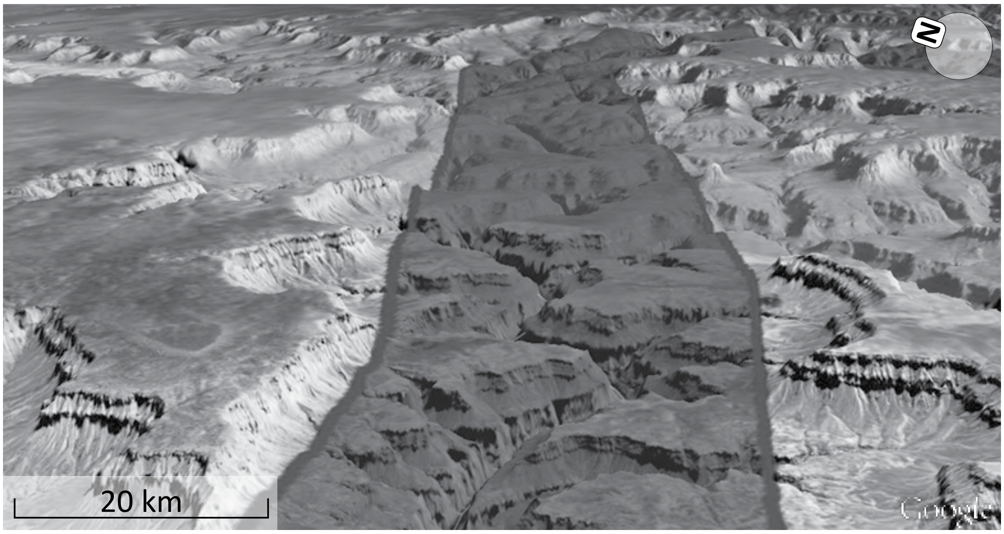

Image generated by Google Earth™ 2008

Figure 14. When lines are drawn at both sides of the Grand Canyon alongside the innermost projections of the intact sides, the size of the immense 'river' that drained the receding floodwaters becomes clear.

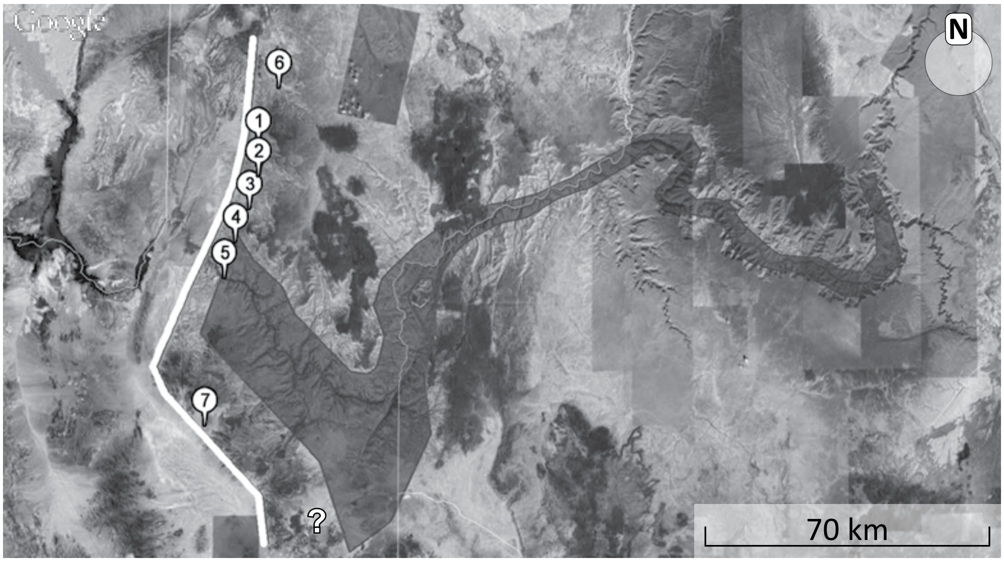

Image generated by Google Earth™ 2008

Figure 15. When the sides/banks of the Grand Canyon are connected (ignoring the side canyons), the magnitude of the initial water channel that carved the canyon becomes clear. The channel is much broader at its mouth (to the left of the figure in the west) than upstream toward its source (to the right in the east). This whole 'river' is basically another V-shape.

of this deeper canyon, indicating that this deeper section was eroded by the Colorado River over time. It also means that the flow in the Colorado River in the past (when the narrow canyon first began eroding) was similar to the flow in the river at the present time.

However, the broader section, A, could not have been eroded by a river with the same size and flow as the Colorado River. It would have had to have been eroded by a river with an immensely larger volume of flow. Using Google Earth, we can estimate the size of the 'river' and superimpose it on the map (figure 14 and figure 15). By connecting all the sides/banks of the GC (ignoring the side canyons), we can see this is an immense river of unparalleled scale. We may conclude that this broad river represents the Flood drainage-river that carved the section-A portion of the GC.

This 'river' is much broader at its mouth than at its beginning, which basically is another stretched V-shape drainage structure. In other words, the volume of water flowing through the long canyon was greater at its outlet than in its upstream portions. This is because a lot more water flowed out of the area when the water level was high than when it had lowered.

This dual cross-section indicates that the initial volume of water flowing through the GC outlet point must have been huge. When the water level lowered, its volume decreased, creating a narrower river and eroding a narrower channel in the lower parts.

The deeper canyon (figure 13 section B) in the middle of the broad canyon (section A) only started to erode after all the floodwater on the plateau has drained. It was eroded by the normal drainage of the huge Colorado basin, which continued to flow through section A. Erosion at this reduced scale continues up to the present day.

Feature 6: The large side 'arms' of the GC

The GC has two very large side canyons visible in the middle of figure 2, one extending north and the other south. It also has several smaller side arms on its western part. The larger branch in the north is called Kanab Canyon and the one in the south is called Havasu Canyon. Those side arms themselves also exhibit the typical branching, V-shaped structure. They are broad where they join the GC and narrow at their extremities. On first impression, these branches look like drainage systems for the catchment area they are located in, not like channels caused by a sudden flood of water from the east. The side branches are

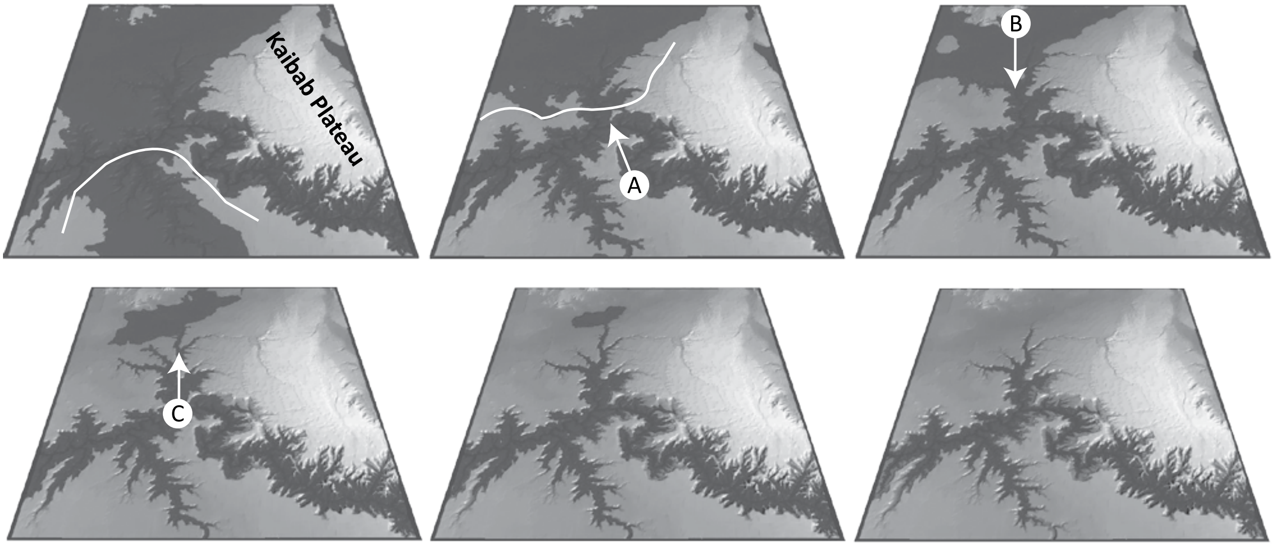

Figure 16. Simulation of the Grand Canyon region as the water level lowered. The white lines indicate local elevations by which the huge northern and southern lakes are separated from the Grand Canyon. Arrow A shows where the northern lake connects to the Grand Canyon. Arrow B indicates the direction of water flow from the northern lake as it carved Kanab Canyon. Arrow C shows the direction in which Kanab Canyon was carved as the water lowered and the northern lake emptied.

perpendicular to the direction of the main part of the GC, which means they cannot have been formed by a dam-breach event. A dam breach releasing water from behind the Kaibab Plateau would have carved canyons *in the direction* of flow, as illustrated in figure 4, not perpendicular to it.

However, these side branches are beautifully explained by the RFS. These canyons would have formed in a similar way to the rest of the GC but after much of the CG Inner Sea had drained from the plateau. The side branches extend into regions where there were still huge amounts of water that still needed to drain. The only way these enormous amounts of water could drain was to the lowest point in that area, which was toward the GC channel.

We can simulate the water flows at the time the floodwaters receded by ‘lowering’ the water level in the GC region using software and a Digital Elevation Model. Figure 16 shows a sequence of six steps as the water level drops, making it clear what areas of the landscape emerge and what areas remain underwater at subsequent stages.

It can be seen that a large lake forms in the northern part. As this lake drains into the GC, its borders decrease, closely following the tip of the arm of Kanab Canyon right until the lake is completely drained. This is in line with the speculations of Williams *et al.*[9] who stated that the drainage of a lake formed Kanab Canyon.

We need to take into consideration that a lot of water from the northeastern part of the Colorado Plateau also would have found its way through Kanab Canyon until the water level was so low that the gap north of Kaibab Plateau at Chocolate Cliffs (arrow in figure 1) was closed.

The Havasu Canyon to the south only shows a lake in the first picture of figure 16. It does not show a diminishing lake at its very tip as occurs with Kanab Canyon. This may suggest that Havasu Canyon would have formed differently or much quicker than Kanab Canyon. Yet, it is the larger of the two and it still has exactly the same patterns. Therefore it seems justified to conclude that there might have been some relative tilting of the southern part compared to the northern part after the canyon was created.

This simulation assumes that the levels of the landscape today are still similar to the levels when the GC originated, which, of course, would not necessarily be correct if the whole plateau had tipped in the process. It is well known that the region has undergone severe uplift and compression. From a Flood perspective, it is likely that this uplift was the driving force behind the drainage of the area. Therefore it would not be unreasonable that the landscape today has remained similar to what it was back then and that the subsequent changes have only been relatively small.

To compensate for the possible tilting of the southern part and to make a more accurate estimation of the situation with the side arm lakes, figure 17 has been created. This figure illustrates how that, as the water level was

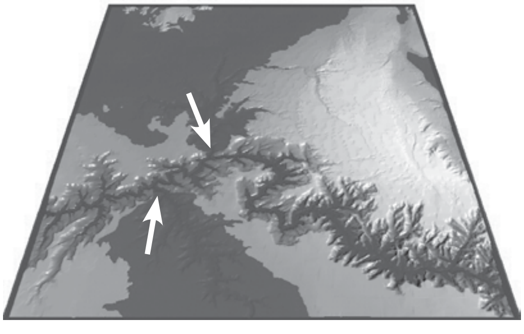

Figure 17. Possible temporary situation where two large northern and southern lakes drain their contents into the Grand Canyon. The arrows indicate the location of the initial waterfalls which carved backwards to excavate the side canyons as the lakes emptied.

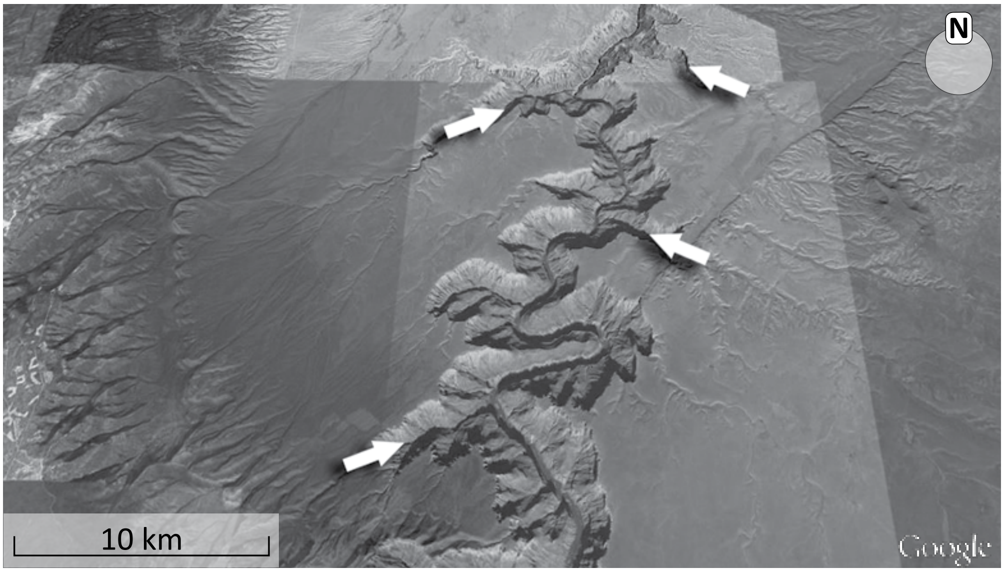

Image generated by Google Earth™ 2008

Figure 18. In Marble Canyon the Colorado River meanders through hard rock, which is impossible. The arrows indicate branches that face upstream against the flow of the Colorado River.

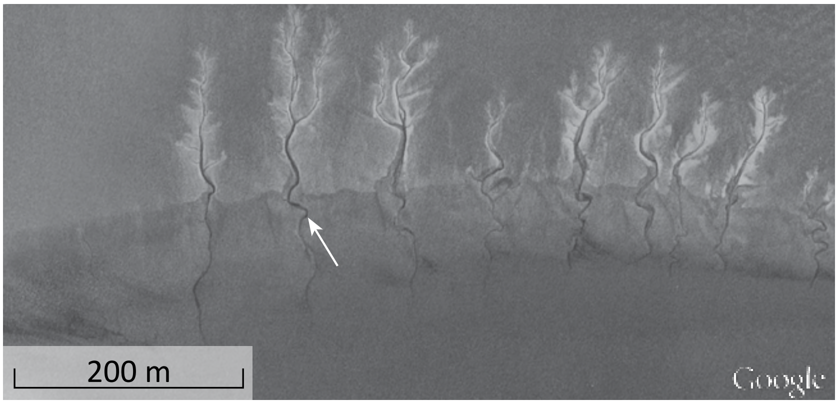

Image generated by Google Earth™ 2007; Aerodata International Surveys 2008.

Figure 19. Meandering gullies (example at arrow) caused by receding tidal waters in the Wadden Sea, The Netherlands.

lowering and the GC ‘river’ was diminishing, two lakes formed on the plateau, one trapped to the north and the other to the south. These lakes released their water into the side branches of the GC in the same way that the GC Inner Sea earlier flowed into the GC on the Hualapai Plateau. At the overflow points of these lakes (indicated with the arrows) waterfalls like the Niagara Falls, but much larger in size, were carving both side canyons at the same time.

Feature 7: The Colorado River is meandering at Marble Canyon

Figure 18 shows the Colorado River at the level of Marble Canyon, and, as can be seen, it is *meandering* in hard rock!

One prerequisite for a river to meander is that the sediments it flows across are soft, not hard. Meandering is caused by a combination of erosion and deposition of sediments. What could possibly explain that the Colorado River is meandering in hard rock? The likely answer to this would be that such rock wasn’t that hard when the Colorado River originally carved its first shape.

Another prerequisite for meandering is that the water has to flow slowly enough to deposit the sediments. Therefore the BDT is not adequate to explain this, but the RFS is.

The uniformitarian explanation for this feature is that the river first formed in deposited alluvium and that after uplift of the Colorado Plateau it continued eroding down through the hard rock.[10–15] Nevertheless, at Marble Canyon there is no alluvium on the plateau, neither is there any trace of a previous alluvium.

Figure 19 is an example of meandering gullies caused by receding tidal water in Wadden Sea. It clearly demonstrates that slowly receding waters are well capable of creating meandering structures. This means receding Flood water is the best explanation for the meandering Colorado River at the level of Marble Canyon.

Feature 8: Some branching canyons in Marble Canyon point in the opposite direction

Some of the side canyons of the Colorado River in Marble Canyon point upstream to the river instead of the normal downstream direction (see arrows in figure 18). Brown[1] tries to use this as evidence for a dam-breach theory, but a more logical explanation is provided by the RFS. The level of the rim of Marble Canyon and the surrounding plateau slopes ‘uphill’ against the direction of the flow of the Colorado River. Of course the *river* doesn’t flow uphill, but it does cut through higher ground and therefore the rim becomes higher as we go downstream. The reason that the Colorado River flows through an uphill area is the same reason that explains the other parts of the Colorado River: receding waters cut it out. Therefore the side arms connecting to the Colorado River point in their logical direction: downhill to the east, which happens to be in upstream direction of the Colorado River that now flows to the west.

The Receding Floodwater Scenario

We cannot be completely certain of the precise extent and size of the drainage basin, the GC Inner Sea, that

Figure 20. Possible extent of temporarily impounded water on the western part of the continent forming an inland 'sea' that drained through the Grand Canyon into the ocean.

emptied through the area of the GC because, for instance, there has been compression in the north of the region and the Colorado Plateau has been uplifted. Nevertheless a rough impression of its size can be made by following the current higher mountains as its borders (hatched area, figure 20).

However, the current drainage system of the Colorado River extends even further north beyond the borders of the map. It is possible that there might have been another continental sea of similar size, the water of which eventually also found its way out through the GC area (plain area, figure 20).

According to the RFS, the erosion process had already begun before the waters of the inner sea became completely trapped. This is because water flowing across the continent would have flowed over and around submerged mountain ridges. For a small period of time during this stage of the Flood there would have been simultaneous overflow points at several locations that left their mark on the landscape. But the carving of the GC fully began when that complete body of water became trapped and had no other way out than through that one single outflow point.

There is something to say for simultaneously cutting the canyon at two locations. Because the Kaibab Plateau is also at a high point in the landscape, the carving process should have begun there *before* the lower side arms began to form. This means that there might have been a western and an eastern part of the GC that only interconnected later on when the water was low enough. We have to take into account that the region has been uplifted. This would have been caused, not only by tectonic compression, but also the removal of the weight of water resting upon it.

As with any model, the RFS is based on certain assumptions. The first, of course, is that the entire region, and thus the whole American continent, was fully covered by water. It also assumes that any continental movement associated with the concept of plate tectonics happened quickly, over weeks and months, during the year of the Flood (as in the Runaway Subduction Model). In addition, the consequent compression of the western part of the American continent probably was nearly almost finished by the time the waters started to recede.

These considerations result in the following scenario:

1. As the floodwaters were receding the GC likely started eroding at the two higher points in the landscape, first in the east (Kaibab Plateau), since that was probably higher than in the west (Hualapai Plateau). At this point all the sediments, which were deposited earlier in the Flood, were still soft and wet and not hardened rock.
2. On the escarpment/ridge to the west some 5 to 7 overflow points developed simultaneously as the waters receded. One of these points carved further, faster and deeper and therefore remained to serve as an outflow for the GC Inner Sea that became trapped on the continent behind the ridge. The other overflow points stopped releasing water as the level dropped.
3. The upper cliffs of the borders of the western Grand Canyon are former waterfalls that drained the water of the GC Inner Sea into the GC and created the branching structures. These waterfalls were relatively short lived. At this time the 'Grand Canyon' was a huge 'river' kilometres wide.
4. When the southern Havasu and northern Kanab side arms where cut, the waters that kept flowing through the Kaibab outflow carved a connection with the main system, thus establishing almost the entire length of the GC.

5. Eventually, Marble Canyon was cut out by the waters trapped behind the Kaibab Plateau after its level was so low that it was not able to flow through the northern opening anymore.
6. During the process the entire area was gradually lifted up, partly because tectonic forces where compressing the continent, and partly because the weight of its Inner Sea was decreasing, resulting in isostatic adjustment of the continent.
7. In the ages after the Flood, the sediments dried out and hardened to solid rock. The Colorado River continues to flow through the GC but is a magnitude smaller than the GC 'river' that drained the receding floodwater. Therefore the rate and pattern of erosion dramatically changed compared to what it had been initially, carving the narrower, deeper and steeper, inner canyon. More 'normal' post-Flood weathering and smaller-scale drainage erosion has also extended the borders and cliffs of the GC but only in a relatively small measure.

Conclusions

There are a number of unusual and characteristic features of the GC that need to be explained by any model for its origin. These features include the branching structure of the western half of the GC, its numerous major and minor side canyons, and the location of the canyon in the higher parts of the region. Other unusual characteristics of the GC include the meandering parts of the Colorado River and the existence of multiple 'outflow points' from the escarpment, some of which are now 'dried up'.

These features demonstrate the shortcomings of the uniformitarian model, which assumes only present-day processes to explain the canyon and therefore needs to fall back on *ad hoc* secondary hypotheses.

These characteristic features of the GC also run counter to a sudden draining of post-Flood lakes in a dam-breaching event.

A Receding Flood Scenario, whereby the North American continent was once covered by water kilometres deep that needed a way out after becoming trapped in a gigantic bowl when the area was uplifted, is a relatively simple model that incorporates and explains all of these features elegantly. The volume and extent of the water that drained was of a scale even larger than the entire GC itself and the processes involved are hard to research or even imagine without satellite images and modern software.

References

1. Brown, W., *In the Beginning: Compelling Evidence for Creation and the Flood*, Center for Scientific Creation, Phoenix, AZ, 1995–2008.
2. Holroyd, E.W., Missing talus on the Colorado Plateau, *ICC2*, 115–128, 1990.
3. Holroyd, EW., A remote sensing search for extinct lake shore lines on the Colorado Plateau, *ICC3*, 243–254, 1994.
4. Austin, S. (Ed.), *Grand Canyon, Monument to Catastrophe*, Institute for Creation Research, Santee, CA, pp. 92–107, 1994.
5. DEM 3D 2.0a, U.S. Geological Survey, 2002.
6. Morris, J., A canyon in six days! *Creation* **24**(4):54–55, 2002.
7. Oard, M.J., Comments on the breached dam theory for the formation of the Grand Canyon, *CRSQ* **30**:39–46, 1993.
8. Roy, A., Some evidence of a gigantic flood on the lower Colorado River at Grand Wash Cliffs and Hualapai Plateau Arizona, *CRSQ* **41**:196–205, 2004.
9. Williams, E.L., Goette, R.L. and Meyer, J.R., Kanab Canyon, Utah and Arizona: Origin speculations, *CRSQ* **34**(3):162–172, 1997.
10. Tarbuck J.T. and Lutgens F.K., *Earth—an Introduction to Physical Geology*, 5th ed., Illinois Central College, Prentice Hall Inc., Upper Sadle River, NJ, p. 242, 1996.
11. Shaver, M., Flood geology sheds light on Unaweep Canyon mystery, *CRSQ* **36**:232–238, 1999.
12. Waisgerber, W., "Triassic" of Colorado National Monument possibly of equivalent age to "Middle Cambrian" of Grand Canyon, *CRSQ* **34**(1):24–25, 1997.
13. Beus, S.S. and Morales, M., *Grand Canyon Geology*, Oxford University Press, Oxford, New York,1990.
14. Stanley, S.M., *Earth System History*, W.H. Freeman and Company, 1999.
15. Harris, A.G., *Geology of National Parks*, 5th edition, Kendall/Hunt Publishing Company, Dubuke, IA, 1995.

Peter Scheele has studied Electrotechnical Engineering and Theology. In 1997, in The Netherlands he published several books including *Degeneration: The End of the Evolution Theory*. He has defended creation at all the universities in The Netherlands in forum discussions with professors. He is regularly invited to speak on creation in churches and youth groups in The Netherlands. For more information: www.peterscheele.org and www.evolutionisdegeneration.com.