IS GENESIS HISTORY?

The Interviews

Steve Austin, PhD – Geology
Desert View, Grand Canyon

Contents

On September 23, 2015, Compass Cinema interviewed Dr. Steve Austin (PhD in Geology from Pennsylvania State University) and Dr. Del Tackett at Desert View Tower in Grand Canyon, Arizona.

Introduction

DEL: Steve I've got to admit, I've been here several times. I've floated the Grand Canyon, but every time I come here, it is breath taking.

STEVE: It's huge, isn't it? We're small standing here looking at this.

DEL: Give me the big picture. How big is it?

STEVE: 4 to 18 miles wide, a mile deep, 260 miles long. It's visible from outer space. Five million people come and see this thing. It's one of the premiere wonders of the world. Yeah, every time I come I keep asking questions, and things in geology keep bringing me back to the canyon.

DEL: You were saying this is one of your favorite places and I can see why.

STEVE: Besides being at home, Grand Canyon is my favorite place on earth.

DEL: So Steve tell me, what do you see here? What are we looking at?

STEVE: When we look at Grand Canyon, we see or come to grips with the inside story to the ground beneath our feet. There's something here just beyond the different colors and the bigness of the canyon that commands our attention. And we see sedimentation and the process of the formation of the rock layers of the earth here, and we see erosion and we see the power of water in erosion. We see the evidence of volcanos and uplift and upwarp, all kinds of things here. We see geologic process. It's pretty much like the rest of the world, but it's so well displayed here it confronts us.

DEL: So, it's kind of like the picture is that we have these layers all over the world, but we've got this blessing that it's been cut out for us, and now we're looking at all of those layers, right?

STEVE: Yes.

DEL: Steve, why don't you talk about all of these layers. Give us a perspective on what we see here.

STEVE: Ok. We see and we're confronted with the different colors of the canyon and then we see a lot of flat lying layers in the canyon. Erosion has cut through them in some kind of odd ways, but we need to think about the flat layers that occur in the canyon. And we kind of have a layer cake here of strata, sedimentary strata, that have been eroded for our benefit to see the inside structure of the earth.

DEL: So when you say sedimentary strata, you're talking about the layers that we see, and they are laid down as sediment.

STEVE: As sediment. And they're laid down as liquid. And those are particles of sand, of mud, of lime sediment that have been accumulated and then stacked up on top of one another. So the lowest layers in the Grand Canyon are formed first, and then the layers near the top are formed last.

DEL: And they're formed from a fluid state first. So all these layers were fluid at one point.

STEVE: Yes. Those are sediment grains like quartz, sand, feldspar, clay, calcium carbonate that were mixed, separated and flowed in here from different directions and accumulated one on top of another. And then, of course, compacted by the weight of the overburden, they naturally convert to rock. The cement inside the holes in the sediment becomes rock.

DEL: And they appear again to be fairly unique. We have a lot of different kinds of layers, different colors, different thicknesses. How do we explain that?

STEVE: Well, we see in the bottom of the Grand Canyon down there by the river, we see some slightly tilted strata that represent the early earth. Then we see some flat-lying strata on top called the Tapeats Sandstone, and other sandstone layers above it that represent 4,000 feet of the upper part of the canyon. And the 4,000 feet in the upper part of the canyon is very interesting because it is involved with the widespread distribution of strata elsewhere in the world, and then we study that.

DEL: When you said widespread you're talking about these layers here go beyond the canyon.

STEVE: We're standing on the Kaibab formation, a limestone layer that goes from northern Arizona here to Canada. And we have individual sandstone layers in here where participles may have been derived from the Great Lakes region. And we have lime sediment layers that may have come from Colorado. And so things are all stacked up here over a wide area. In fact it's layer caked. That's what we see. We see layer cake lying all the way through the continent essentially, all the way through. So these same layers that I study here in Grand Canyon are also in Colorado, are also in Illinois, are also in Pennsylvania. So I get accustomed to looking at these layers but they're extremely widespread.

DEL: Well, the fact that we have all of these layers would be unknown to us if we were standing on them somewhere else, but they're known to us because they've been cut out. How did that happen?

STEVE: Well, I have 15,000 feet of strata underneath where I live in Pennsylvania, Pittsburgh. We see it so empathically shown here. What's happened is that this plateau has been uplifted above sea level. We're here about 6,000 feet elevation, and because of the upheaval forces, the uplifting of western North America, we create topography that allows a big canyon to be here. Essentially, the reason the big canyon is allowed to be here is because of the elevation relative to the ocean. It would be impossible to have a big canyon in Washington DC or some place near sea level. But, because of the elevation, and because of the process we call tectonics, we see this well-displayed canyon. So a canyon could be here and it's allowed. But just because a canyon is allowed to be here because of elevation doesn't mean there has to be a canyon.

Formation of the Grand Canyon

DEL: Well, I believe that most people heard the story from the beginning in school and so forth that it was the Colorado River that carried all this material away, but you don't believe that and a number of geologists don't believe that now.

STEVE: Well, it was the story that we all learned in grammar school. Colorado River over tens of millions of years cut the Grand Canyon. Most geologists have jettisoned that idea. And it's comfortable to think that way, but the geologists who know the details of the Grand Canyon really have a big problem imagining that. And it's led to essentially chaos among geologists as to which explanations happened to make the Grand Canyon.

DEL: Is that because the evidence here eventually just overwhelmed that story?

STEVE: Yes. The necessary evidence that we would need to have an old and enduring canyon would be a big delta of sediment out to the west and that wasn't found. Instead we found non river sediments sitting there, so the river has to go away. And then time is really not the hero of the plot. Geologists recognize that. It's hard to sustain a canyon like this for tens of millions of years, even a hundred million years. You can't imagine a canyon enduring that long with erosion

DEL: Is that because eventually the sides would have collapsed and broken down?

STEVE: Yes. So the typical thought is the tectonic forces that uplifted the Grand Canyon are about 70 million years ago. And if that's the case, then 70 million years we should have the Colorado River sitting here. But we see the expression of the topography so vividly that it could not be sustained for any great period of time like that in this form or condition. So, geologists are saying the Grand Canyon appeared abruptly, and all of the sudden, and not very long ago.

DEL: So, if it wasn't the river over a long, long period of time, then how in the world do we get this all carved out?

STEVE: Well, there are lots of theories. I have my own theory. But geologists are not of one opinion on that matter, and that's a really big question, of course. But there's general agreement among geologists that the canyon did not have a long history in being eroded. In other words, it appeared abruptly by some technique and pretty much a fully-formed canyon. And that wasn't tens of millions of years ago. That was rather recently. Exactly how recent is recent? But geologists talk about the canyon forming in a fraction of a million years or something like that, and not too long ago. In other words, the canyon is a recent addition to the picture here. And personally I like the idea of catastrophic erosion by drainage of lakes. And out here east of the Grand Canyon we have this enormous Painted Desert which is a low plateau about 5,000 feet above sea level. Here we are at 6,000 feet above sea level. And the plateau behind us, the Kaibab plateau, is at 7 and 8,000 feet above sea level. So there is room in the topography here, not just in the Grand Canyon, but for a big lake. And this big lake likely existed here at about 6,000 feet elevation. There's evidence of a big lake in the Painted Desert, a place called Hopi Buttes. So we call it Hopi Lake, a lake at 6,000 feet elevation, about 500 cubic miles of water in this huge lake. And this lake is up against what? Here we're at the shoreline of the lake at 6,000 feet. So this lake is here and this lake could have failed. The dam could have broken and the basin of the lake drained. And that theory is one of the theories that's been considered now by geologists rather seriously.

DEL: And so the dam breaks and all of that massive amount of water then is now pouring out and carving this.

STEVE: Yes. And not just one lake, maybe many lakes on the Colorado plateau. Anyway, a lake spillover and drainage is one of the primary theories for the origin of Grand Canyon. I like the idea that a catastrophic rupture of the dam—probably leaking and overtopping of the dam—created the spillway for the drainage of this big lake. And then once the spillway is formed, then the whole thing can drain abruptly. My thinking is that's in the post-flood period after the formation of the plateau, and the configuration of the surface rather recently left this lake, and it took 900 cubic miles of material to erode Grand Canyon.

DEL: So, after the Flood, we have these large bodies of water, these lakes that are trapped and still exist. And at some point that dam would be compromised, and then all of that water then begins its erosive process.

STEVE: Yes. After the Flood there was no Colorado River drainage basin. The Colorado Plateau is here and the lowland basins are all around it. They fill with water. They're getting adjusted and we have no Colorado River yet. And then the barriers in the path where a river could be need to be overtopped and broken. And so that would be my theory about how Grand Canyon was eroded.

DEL: Well, you know we saw something like this at Mount St. Helens when we were there, this step canyon that was formed rapidly, and I know you're familiar with that.

STEVE: 600 feet deep through solid rock eroded since 1980, largely by mud flows and catastrophic drainage from the crater at Mount St. Helens. So, hard rock erosion can happen very abruptly by these somewhat mysterious erosion processes.

DEL: So when we look at this we not only have the rapid laying down deposition of this sedimentary layers, but then we have a rapid erosion to carve it out.

STEVE: Yes. And how long would it take to erode Grand Canyon by drainage of lakes? Maybe weeks, maybe years? But not millions of years. Time is not a magic wand that solves all the geologic problems of the world. It's not the hero of the plot, it's the villain of the plot. Jettison that way of thinking about millions of years and then start thinking about catastrophic processes like you've seen at Mount St. Helens and that will help you understand Grand Canyon. It helps me understand Grand Canyon.
DEL: And the sedimentary layers and the erosion of this huge canyon all bring us back to the power of water.

STEVE: The power of water first in depositing and then in eroding.

History of the Layers in Grand Canyon

DEL: Steve, give us the history of all that we see in front of us.

STEVE: We see this layer cake of strata, and we go down to the bottom of the cake to see the earliest events associated with the formation of Grand Canyon. Down by the river around the corner here, we have granite, and we have rock called schist and gneiss. These igneous rock form the core of the continent down deep, and we see them down deep, somehow related to Creation week, I believe. Above those non-stratified rocks, we have a diagonally-tilted package of sandstone and shale and limestone here visible from the rim that are likely pre-flood, but post-Creation week rock. In other words ocean floor at some time in the history of the earth. And then, on top of that, we have flat-lying strata on a beveled surface. And this beveled surface is rather obvious in back of us. But the flat-lying 4,000 feet of strata sits on this erosion surface, a beveled surface, and that's called the Great Unconformity. And then on top of the Great Unconformity is that 4,000 feet of flat lying strata up to the rim.

DEL: That brings us up to here?

STEVE: That brings us right here to the Kaibab limestone on the rim. That 4,000 feet of strata is sandstone, shale and limestone, and it forms this broad blanket sequence that we see across North America and even the world. I think that 4,000 foot interval and that scour surface underneath it, the Great Unconformity, represents the onset of the Flood and the Flood deposition. We have other strata locally in the Grand Canyon region. That's called the Grand Staircase. We have about 10,000 feet—two miles thickness—of strata on top of the Grand Canyon.

DEL: Higher than where we are.

STEVE: Higher than where we are. And that is visible in northern Arizona off into southern Utah, the Grand Staircase. And that represents the later stages of the Flood and the retreat of the Flood water. This surface was beveled by retreat of flood waters and of course it layer acquired lake basins and then the Colorado River was established after the breeching of these big dams and failure of these lakes.

DEL: You're talking about three miles of sediment here then.

STEVE: Three miles of sediment. So, the flat lying strata show the history from the beginning of the Flood into the post-Flood period that we live in right now.

DEL: And are there fossils in all of those layers?

STEVE: There are marine fossils through all the layers, and they're very distinctive like coral, sea lilies, clams, brachiopods, squid fossils. There are organisms that we know today to be marine. So it looks like the ocean was over the continent, and that gives me great comfort and understanding how these layers formed.

DEL: When you look at the layers, what do those layers tell you?

STEVE: Well, the ocean was over the continent. That's obvious. The question is, how many oceans were over the continent? Maybe not very many oceans were over the continent. In other words, a single ocean event. But the standard explanation is that there were 17 different advances and retreats of the ocean over the North American continent, and it was extended over hundreds of millions of years. And then the canyon just all of the sudden appears abruptly at the end of that wonderful long almost mythological story. But yeah, that's what we see.

DEL: And what is the evidence you see here that would say that doesn't seem to make sense?

STEVE: The 4,000 feet of strata here are flat and, relative to one another, we look in between the strata layers and we don't see the passage of time in between layers.

DEL: You mean erosion?

STEVE: Erosion, especially in channeling on any great scale is not visible in Grand Canyon strata. And then we look at the strata themselves, and they provide evidence of rapid, very rapid sedimentation. Just minutes or hours is all that's needed to make layers. It happens abruptly. So the ocean is doing some amazing things and water of incredible power is depositing the layers we see in the canyon.

DEL: Well, the layers themselves as we can see have that straight line with them and I can understand that if they were exposed to the elements for millions of years, that we may not even see the layer, or at least we would see erosion evidence in it.

STEVE: We'd have canyons within canyons, and buried canyons in the strata and that's foreign to what we see in the big picture of strata across the North American continent.

DEL: So we'd see something much more complex here rather than these very nice neat layers?

STEVE: Yes. And we have a layer cake here, and it needs very simple explanation. Not a complicated millions of years explanation. Time is not the magic wand of Grand Canyon. It doesn't solve all the problems. It actually creates problems. And so we need to think in this new domain, outside the box, if you will, and the Creation-Flood-post-Flood model, that explains or helps direct our thinking pattern and challenges us to do our best work.

DEL: Well, the rapid deposition of those layers and then the rapid erosion that we see here brings us back again to the immense power of water.

STEVE: Incredible power of water. Water is able to pulverize solid rock in a hurry in just minutes, in seconds when you get the right kind of flow. Rock can be pulverized by cavitation. Rock can be plucked loose by the impact of water because rock is full of joints and cracks. Water can actually just abrade a surface and, of course, water can dissolve. And so the process of erosion is in many cases catastrophic.

DEL: And that's what we saw at Mount St. Helens with the step canyon.

STEVE: We saw evidence of catastrophic water erosion by mud flows and by water, the canyon, over 600 feet deep, being excavated after the summer of 1980. And so solid lava flows were excavated by moving mud and water over a surface, and a whole miniature Grand Canyon was formed at Mount St. Helens. So we have a natural laboratory at Mount St. Helens for helping us understand how Grand Canyon was made.

The Extent, Content, & Formation of Specific Grand Canyon Layers

DEL: Steve, a lot of people come here for vacation, but you've spent a lot of time here below the rim working. What have you found?

STEVE: I've spent my time looking at those flat-lying strata especially, and that cliff that's above the red strata near the river, that's the Tapeats Sandstone. That fascinates me. It is quartz and feldspar grains that sit over the top of that Great Unconformity, and it forms the beginning of a great layer cake that goes all across the North American continent.

DEL: So that would be at the bottom of sedimentary layers?

STEVE: At the bottom of the flat lying layer cake is this sandstone, and it's incredibly broad and it's found all across the North American continent, over in Europe and Africa. It's called the Tapeats Sandstone, and the Tapeats Sandstone fascinates me.

DEL: It's a global layer then.

STEVE: And it can even be global. And so the Tapeats Sandstone sits on that Great Unconformity, that scour erosion surface. To me, that represents the initial process of erosion that began with the global flood entering where we are in northern Arizona.

DEL: Laid down first then.

STEVE: Laid down first as one of the early flood deposits in Grand Canyon. Another favorite layer of mine is the Redwall Limestone. And in the Redwall Limestone we have calcium carbonate grains that look like they were deposited by giant mud flows. And in that layer we find all these marine fossils. We find coral. We find sponges. We find brachiopods. We find clams. We find sea lilies and we find squid fossils. And the whole arrangement of the ocean organisms in the Redwall Limestone command the interpretation of some type of catastrophic ocean floor mud flow event. And boy, am I interested in studying that. And then up near the rim of the canyon there's that crème colored layer below the rim of the Grand Canyon. That's called the Coconino Sandstone. And it has very distinctive layers inside of it, and diagonal layers within horizontal layers providing evidence of a northward or southward directed current. And there's evidence of a current that flowed to bring in the sand grains for the Coconino Sandstone.

DEL: So those would be formed under water?

STEVE: Under water as well. Under water and that's continuous over a quarter a million square miles.

DEL: Now, my understanding is that for a long time people thought that the Coconino Sandstone formed in a desert.

STEVE: Yes. 350 feet thick of sand. And the signs at the park and museum say it was deposited in a great desert by wind. It wasn't deposited by water at all. And what's happened among geologists now is a reflection on the process that forms sandstone. Many geologists, including some geologists that I've taught about the Coconino Sandstone, have gone on to elaborate this evidence. And there's a new way of thinking about Coconino Sandstone being deposited under water, and it's the last of the 4,000 feet of strata, I suppose, to not want to be deposited under water. I think it was deposited under water in a big ocean that's moving rather fast. And so the power of water is taking over all the interpretations of the canyon. The Coconino Sandstone is known for the cross bedding, the diagonally tilted sandstone layers that were thought to form by big dunes in deserts by sand migrating, by wind blowing into dunes.

DEL: Blowing the sand over each dune.

STEVE: But there are dunes under water in the shallow ocean that we have studied now that look more like that in their configuration than the desert dunes that we're all familiar with. So our tired and rather boring way of thinking about the conventional has now shifted a little bit to a shallow water origin of the Coconino Sandstone by current. The footprints in the Coconino Sandstone, the footprints are really interesting. There are trackways of four-footed creatures that walked on the sandstone sand surface as it was being buried, and those footprints show evidence of being made in wet sand, not in dry sand. And that is another one of the pieces. And then the whole texture of the sand. The texture is rather unsorted. It has quartz grains that are fine and coarse grains that are coarse. That type of texture, the unsorted appearance of the Redwall Limestone is quite different than the fine powdery sand in the desert dunes. And all these things combined, the nature of that dune form, the nature of the unsorted appearance, and the four-footed trackways in the Coconino Sandstone have lent themselves to the thinking that the Coconino Sandstone was formed under water. And I'm glad to have been part of that revolution, if you will, in geologists' ways of thinking, and it's outside-the-box certainly, but it coordinates the data and makes it a good story for the understanding of how the Coconino Sandstone was deposited.

DEL: That seems to be a great example of how a paradigm was driving a particular view and then the data has now radically changed that.

STEVE: Yes, and it illustrates that there are different ways of thinking about one subject. And different points of view can be challenged, and what the conventional story might be completely wrong and replaced by a different point of view. And that's elegantly shown by some of the studies of the Grand Canyon rock layers that we see here, like, for example, the Coconino Sandstone. And so I've been involved with since my education at Penn State University with this catastrophic way of thinking, and it's very beneficial. People need to hear what I have to think in the contrary way of thinking about Coconino Sandstone, of other rock layers in Grand Canyon. And so that makes me feel good. I know I have a paradigm or assumption, but I can challenge the science of my time with a different point of view to help bring a better story. And that's the way I've done it here at Grand Canyon.

DEL: And it seems as if the paradigms we're talking about here, they do have a power, do they not, in terms of how we see things?

STEVE: We see or grow up with a story, and it's comfortable and we think it's the best explanation. And then somebody comes along and challenges that way of thinking with something that is completely different and some piece of data or something and it causes a revolution. And geologists' experience of Mount St. Helens was kind of a revolution in understanding how volcanos work and how natural processes on a catastrophic scale can change things. But there's all kinds of other examples of that. And here in Grand Canyon we need to change our way of thinking to come to grips with this new data.

A Brief History of the Conventional Paradigm in Geology

DEL: Steve, take us back to when that conventional paradigm began. Has it always been in place?

STEVE: No. The evolutionary, materialistic worldview is generated in the post-Enlightenment period by just a few people, and we see it as it was introduced. It was unconventional. So the Biblical idea of the Creation and the Flood were there, and they were replaced by other views of evolution and uniformity and geology and that way of thinking, and that prevails until today. And we need another revolution to go back and modify the previous paradigm to eject it from our thinking.

DEL: Did that begin with Darwin?

STEVE: It began with Lyell. It began before Darwin. The people who taught Darwin are the ones who started this new paradigm. It was slow and gradual, 'the present is the key to the past.' What we see today is all that we need to understand what has been going on with the world. And, of course, it naturally sprung from that line of thinking that there's immense periods of time or geologic ages. And the geologic ages were derivative of that point of view. And, of course, some people feel comfortable in thinking about millions of years. Some people are very uncomfortable with thinking about millions of years. But it goes back to the paradigm.

DEL: Steve, take us back to those people who began that story, that paradigm.

STEVE: There's a famous medical doctor named James Hutton who introduced concepts that later became part of this big paradigm. But influenced another geologist named Charles Lyell, and Charles Lyell about 1830 wrote a book called Principles of Geology where he illustrated the views of Hutton in a very direct way, and it was Lyell who was the teacher of Charles Darwin. And Adam Sedgwick, a catastrophic geologist, and Charles Lyell, a uniformitarian geologist, those were the two primary teachers of Charles Darwin. And Charles Darwin received his education, believe it or not, in geology. He was trained by geologists. And then he went on to write some papers for about ten years till he got sick with some type of general illness. He participated in field trips and did a lot of geology. He wrote geologic papers. And so Charles Darwin was trained by geologists. He performed as a geologist. He thought like a geologist. And for his early career he was a geologist, obviously. He had rock hammer. He did geologic maps. He drew stratagraphic cross sections. Darwin is a geologist just like me, and so I can challenge that paradigm system of Darwin. But Darwin went on to influence the worldview in a very different way. He went into biology and started applying and thinking about natural selection and evolution of species. And when that happened it really changed things and so that whole paradigm shifted. And, of course, today we're going back and we're asking or remembering. I'm remembering that Charles Darwin was a geologist and we need to go back and challenge the foundation of his way of thinking.

DEL: Did they begin with the notion of millions and millions of years, or did that approach, 'the present is the key to the past,' drive them to that?

STEVE: The assumption drove them to the millions of years. They were not talking about the magnitude of time very much at all. They were saying no vestige of a beginning, no prospect of an end. They were thinking about endless time, but obviously the earth is not eternal. And what was geologic time had to be processed out of this 'the present is the key to the past' paradigm system, and that's what happened in our generation as this whole thing unfolded before us.

DEL: Was it data and evidence then that drove them deeper and deeper into millions and billions of years?

STEVE: Not really. It was their paradigm or their belief system that allowed them to process data in a certain way to support the paradigm or to illustrate what they believed about their paradigm.

DEL: So when someone begins to hold that paradigm, what kind of influence does it have then when they come to the Grand Canyon and see the evidence? Does it play in what they see?

STEVE: Well, most people come to the Grand Canyon and what? They know the story they're told and they say, 'wow, what a marvelous canyon the Colorado River eroded over tens of millions of years.' And it's hard not to have a paradigm-dependent understanding of Grand Canyon. And you see it with the popular mythology of dinosaurs, of Grand Canyon, of evolution generally. But we need to go back to data, and ultimately we need to consider what it is that is illustrating our understanding of history here.

DEL: Well I remember when I first saw those tracks in the Coconino Sandstone, and it was very evident that whatever that creature was it was not walking in a straight line. It appeared to be swept. And all of a sudden I began to realize just from that data that this is not just a creature walking across a dune. This creature appears to be struggling to survive.

STEVE: Yeah. The four-footed trackways in the Coconino Sandstone illustrate not just that the animal was grabbing onto the surface, but that he was going in a certain direction. And it wasn't a strong wind that was resisting him. It was a water current. And as you look at the trackways and think about how water would deflect animals versus wind, it becomes very obvious, or maybe more obvious, that water is the better explanation for the origin of the Coconino Sandstone.

DEL: So we're back again to the power of water that lays all these sediments down rapidly, the power of water that erodes this canyon out, the power of water that's even sweeping a creature across a sand dune.

STEVE: Yeah. There's nothing in the Grand Canyon that has eluded the power of water.

A History of Grand Canyon Rocks from Creation to After the Flood

DEL: Steve, from your position as a geologist, would you take us back to when the rocks were first created, through the whole catastrophic event of the Flood, all the way up to what we see here. Give me that panorama.

STEVE: We have the rock record right here to illustrate that story and that's wonderful. We see Creation week rock in the Grand Canyon. I think the crystaline rock, some of the granite layers really deep in the canyon are original Creation rock. There probably is Creation week day three sedimentary material, quartzite rock in the Grand Canyon from back in Creation week. But the dominant thing that we see in the Grand Canyon, of course, is the Flood strata exposed here for our view. And those Flood strata begin with the power of moving water to scour that surface where the pre-Flood ocean floor and Creation week rock was excavated and milled off, and it made that first broad sandstone layer, the Tapeats Sandstone. And then, up above it, all the other layers on top of it, sandstone, shale and limestone generally in sequence made these broad packages of strata that we see through the continent, but right here in Grand Canyon. The 4,000 feet of strata probably represents the early and middle part of the global flood right here in Grand Canyon up to the rim where we're standing on the Kaibab. We have to go elsewhere to see a little bit about the latter part of the story. So the Grand Staircase where we see 10,000 feet of strata on top of this sequence here in the Grand Canyon, that's where we can tell the story about the end of the Flood. The Flood calmed down and then later the beveling of the surface and the broad sheet erosion of the Kaibab plateau is really obvious right here if we look across. And then tectonics was affecting the whole surface of the earth and this was upwarped. This area was upwarped and then water spilled into basins and the post-Flood period came about.

DEL: Steve, let's go back and talk about the contrast of the little nursery rhyme that says the rain came down and the floods came up, which kind of leads you to believe that the earth just got soaked. There's something more catastrophic going on there. What's the first thing that happens?

STEVE: As we look down on the water of the ocean it probably was pretty flat but the ocean floor was in turmoil from day one of the Flood. "In the 600th year of Noah's life on the second month, the 17th day of the month, the same day were all the fountains of the great deep broken up and the windows of heaven were opened" Genesis 7:11. And then verse 19 "and all the high hills under heaven were covered." So the Flood begins with the ocean floor and it goes to the high mountains.

DEL: A catastrophic event occurring there.

STEVE: A catastrophic event. My understanding is an ocean floor upheaval occurred with all the fountains of the great deep. Some type of magna or earthquake upheaval, a water upheaval on the ocean floor propelled the oceans over the continent.

DEL: So we have this catastrophic event occurring at the bottom of the ocean and that is pushing the water of the ocean up onto the continent. Is that what's going on?

STEVE: That seems to be the plain statement in Genesis 7 about how the Flood began and how it prevailed upon the earth.

DEL: And that's why we get these marine fossils in these early layers.

STEVE: Yes. And we have six months that water prevailed upon the earth, another seven months or so for the water to subside. So it was a yearlong world-destroying event that started out on the ocean floor, covered the high mountains, and then went back to the new ocean basins.

DEL: And in that process, before it covers the mountains, we've got a lot of current action going on.

STEVE: Yes. And we've got this water unleashed in all of its magnitude and velocity on the earth. And the earth was reformed by this catastrophic event, the global flood.

DEL: And that's picking up creatures, putting them into the mud flows you talked about and other kinds of flows and those eventually lay down the layers.

STEVE: Yeah. And marine fossils everywhere and on high mountains. Even in the highest mountains we have marine fossils, a testimony of a global flood.

DEL: And so after the Flood has covered the earth, what does it look like from Noah's perspective? Is he seeing all of this catastrophic thing?

STEVE: No, he doesn't see that. All he sees is perhaps the rain coming down and the flatter surface of the ocean. God remembered Noah and the animals in the Ark, they were protected and cared for, but the rest of the world was radically changed.

DEL: Well, that history, that record you were just talking about says that the water rose until it covered the tops of the mountain. Is that implying that this was global? There are some people who say this was just a local flood.

STEVE: I believe it's a global flood, and all the high hills under the whole heaven were covered, a universal statement. But the mountains have risen since then and we shouldn't measure the depth of the Flood waters by the present mountains of the earth, which are largely created by the tectonics during the Flood and after the Flood.

DEL: So we have this picture of the entire surface of the earth covered with water, and then at some point it begins to recede. How does that happen and what is going on when it recedes?

STEVE: In Genesis 8, verses 1-3, the waters begin to recede about the 150th day of the global flood. And as the waters recede they did not assuage continuously. They probably assuaged back and forth.

DEL: When you say assuaged what do you mean?

STEVE: They lightened or they decreased from the surface of the earth. And the waters were coming and going through that retreat of the Flood. And so that has characteristic strata that it would deposit like some of the sandstone and shale we see out here. And as the Flood retreated into the ocean basins, the newly formed ocean basins, then the continents probably uplifted and the Ark, of course, was landed in the high country in the Middle East.

DEL: Did we have then some tectonic movement here where the ocean basins are lowering and the continent is raising or is it just the continent is raising?

STEVE: Psalm 104:6-9 gives us David's paraphrase of the narrative in Genesis, which I think is the most fantastic thing ever because God's Word is telling us what David thought of the global flood. "But at that rebuke the waters fled, the mountains rose, the valleys sank to the place which is the point of them." And of course that's describing the retreat of flood waters off the earth. And then God sent a covenant with Noah that the waters would not cross the boundary that He created. In other words no more global floods.

DEL: We have the waters now receding. What does the world look like at that point? What does Noah see?

STEVE: It's of course a bleak, uninhabited planet. The surface of the earth in many places is like mashed potatoes. Other places it's rather firm. That's why he had to wait in the Ark for so long, almost seven months, before the earth was ready for him with probably seeds sprouting and other things going on. But a big plate of mashed potatoes sitting there and basins forming and lakes and things like that.

DEL: So there was a lot of water then that was trapped and left over after the water receded.

STEVE: Yes. And this Colorado plateau is a quarter million square miles in area. It's uplifted in the late Flood, in the post-Flood period, about a mile above sea level. And that has trapped in it lots of water in basins and it fills. And there's no Colorado River yet, and so the basin of the Colorado plateau is filled with water, and then it overtops and spills. And, of course, that accelerates the erosion and lakes drain catastrophically and that's how we get the Colorado River and a big canyon in the middle of a bowl shaped depression a quarter million square miles in area.

DEL: And that brings us back again to the power of water doesn't it?

STEVE: Everywhere we look we see the power of water and it's water on a colossal scale and that's the story here in Grand Canyon. It's not a little water and a lot of time. It's a lot of water and a little time. That's what the power of water can do here on the Colorado plateau at the rim of Grand Canyon.