

A Young Grand Canyon?

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A review of *Grand Canyon: Monument to Catastrophe*. Steven A. Austin, editor. Institute for Creation Research, Santee, CA, 1994. 284 pp.

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Growing up in Utah, the desert canyons of the Colorado River drainage were among my favorite places to visit, and they in large part led me to my career in geology. The scenery of the Four Corners area is spectacular, but it is also very instructive because of the unparalleled exposures of sedimentary rock. Upon hearing as a teenager that the earth was very old, it immediately occurred to me that the deep erosional canyons of the Southwest demonstrated this. Try as I might, I could find no satisfactory explanation for the vast canyons and plateaus other than long-term erosion. As I later became an active hiker and caver in the Grand Canyon and began my training in geology, my early impressions were confirmed by much more careful analysis.

I was startled to learn as a graduate student that the Institute for Creation Research (ICR) had begun taking tours through the Grand Canyon over Easter and using this setting to teach that the earth is only a few thousand years old. I could scarcely imagine what kind of strange indoctrination was taking place as creation-hungry Christians were being tutored by the ICR staff in a balanced blend of arm-waving geology and prayer. Feeling that a heresy was being perpetrated against my childhood playground, I decided to investigate. The primary geologist behind this effort was Steven A. Austin, chairman of ICR's geology department and the editor and primary author of the book I am reviewing. Upon request he sent me a preliminary manuscript outlining his theory that the Grand Canyon formed in a single flood event, along with his other publications. I replied with a long list of obvious objections to his theory, to which I received a respectful reply.

Dr. Austin bears little resemblance to his rhetoric-bound mentors Henry Morris and Duane Gish. Ronald Numbers, in *The Creationists* (1992, Knopf), describes him as the first great success story of a creationist getting through a graduate program in geology without losing his faith in a young earth (quite a feat in my opinion as well). Austin has done extensive research on catastrophic processes and has found that many geologic features once thought to require vast periods of time to form can in fact be replicated by short-term events. In his article "Uniformitarianism--a Doctrine that needs Rethinking" he outlines the misconceptions of founding geologist Charles Lyell and shows how uniformitarian thinking has become a misapplied dogma in many cases (the Channelled Scablands of Washington state being the most classic example). I concur with this analysis, as do many geologists. But Austin has swung to the opposite extreme such that he can't see long-term equilibrium even when it's staring him squarely in the face. His attempts to explain every geomorphic feature as a relic of past process leads to some rather humorous and incomprehensible logic.

Grand Canyon: Monument to Catastrophe, with its presumptuous title, was produced as a guidebook for ICR fieldtrips and as the official ICR explanation for "the world's greatest natural wonder," an alternative to the endless list of scientific and National Park Service publications which teach that the Grand Canyon is a monument to time. The book begins with a theological chapter. The Biblical doctrines of a six-day creation, death originating with the Fall of Adam, and the worldwide Flood of Noah are expounded, and special emphasis is placed on Apostle Peter's prophecy that in the Last Days people would deny these doctrines. This creates a logical fallacy because if uniformitarian geologists are set up as the mere fulfillment Biblical prophesy, then their ideas will of necessity be rejected even if they are entirely correct! Such a starting point leads an otherwise rigorous, scientific book in a direction that it cannot avoid. The second chapter and part of the third, in contrast, could almost have been lifted from an introductory geology text. Principles of sedimentation and cross-cutting relations are explained as well as the interpretative framework needed to evaluate data. Clearly the authors intended to fit their theories as best they could within the modern scientific framework.

The part of the book I will focus on is the four chapters in which Austin attributes the Grand Canyon's deposition and

erosion to recent Flood-related events. The Precambrian rocks he considers pre-Flood, but the 4,000 feet of Paleozoic rocks exposed in the canyon he attributes to Noah's Flood because they contain fossils (evidence of death). In discussing these rocks Austin dives headlong into agonizing detail concerning esoteric geologic disputes such as the source of certain sandstones, the origin of shrinkage cracks in mud, and the presence or absence of sedimentary hiatuses. Each point is well- documented from every perspective, but the emphasis is to cast doubt on classic interpretations involving long-term deposition. At the end of each dispute Austin makes a brief comment on how the Flood provides a good explanation for that feature, then he quickly moves on. For example, a non- random orientation of twelve nautiloid fossils is used to show that they were deposited in moving rather than still water. Throughout the discussion Austin makes a special point of rebutting the uniformitarian ideas of old-earth creationist Davis Young, a geologist and critic of the young-earth creationists.

Many of Austin's arguments take advantage of the fact that he is only studying a single region of the earth. For example, by documenting that there are no undisputed reefal limestones in the Canyon, he is able to explain all limestones as carbonate grains reworked by the Flood. The fact that classic reefs of equivalent age are found in nearby New Mexico is never mentioned. Another strategy has to do with scale. He points out the widespread distribution of sedimentary formations and attributes them to a vast flood rather than local coastal environments. But a global flood should produce worldwide sedimentary units, and those in the Grand Canyon cover only a minuscule area compared to the whole earth. Austin also asks why there is so little bioturbation of Grand Canyon sediments if they were deposited over millions of years, but a better question would be why there is any bioturbation at all if the sediments were deposited during a rapid flood. How he can attribute the overlying Mesozoic rocks, famous for their dinosaur trackways, to late in the Flood when all animals outside the Ark were supposed to be dead is even more mysterious. The book never even addresses the single most obvious problem with Flood geology: that the sedimentary rock record is composed of thousands of distinct fossil zones in unvarying order. Austin uses fossils where they suit him, however, such as attributing logs in Petrified Forest National Park, just east of Grand Canyon, to Flood driftwood!

For the most part Austin's research is rigorous and deserves praise, but in the end his logic fails on a count that is typical in creationist literature: he never presents a comprehensive theory of how the Flood took place, where the water came from, or how or from where it moved sediment to form the rocks of the Grand Canyon. In fact, most of these vital issues are never even mentioned! A single diagram is given showing inundation and supposed zones of sedimentation (suspiciously similar to a classic marine transgression but presumably occurring much faster), but this raises far more questions than it answers. Without a comprehensive theory of the Flood there is no way to make a scientific comparison of any kind, so pointing out esoteric problems in the classic theory is trivial and *very* misleading.

Austin doesn't attribute the carving of the Grand Canyon to Noah's Flood, but he considers it a catastrophic event occurring in the Flood's aftermath. Here again he takes rich advantage of geologic disputes.

The Grand Canyon is as deep and spectacular as it is because a major river has eroded through a plateau that has been uplifted by two sequential mountain building events. The Canyon opens on the east as the Colorado River crosses the East Kaibab Monocline, a Laramide fold structure considered to be about 70 million years old. The Canyon ends on the west where the river crosses several faults at the edge of the Basin and Range province that have been active for about the last five million years. This creates semantic confusion as to how old the Grand Canyon is, and Austin makes his readers as confused as possible. He asks where all the sediment is if the Colorado River has been carrying its current load for 70 million years, but this is a meaningless question since it has probably been carrying this high load for only two minor intervals during this period.

The big question Austin raises, which has been raised by others, concerns antecedence. An antecedent river is one that was flowing before an uplift formed and was able to erode at the pace of uplift, thus creating a deep canyon. Most deep canyons are attributed to antecedent rivers because, in most cases, no other explanation makes any sense. Rivers seek low ground, not mountaintops. Rivers can, however, be captured and thus change course, and this appears to have happened at Grand Canyon since some young lake sediments are found near its west end. Course changes of this type are most likely to occur just as uplift begins since softer rocks form gullies that are capable of capture, and deep entrenching is yet to occur. The Grand Canyon can best be explained by antecedence with the caveat that some change in river course occurred west of the East Kaibab Monocline at the beginning of Basin and Range faulting, a view well presented by Ivo Lucchitta in *Grand Canyon Geology* (1990, Oxford Univ. Press). Austin, however, presents the

antecedent and capture hypotheses as two distinct, outdated theories that need to be discarded. In their place he presents a theory of catastrophic flooding that makes the problems of antecedence and capture look trifling in comparison, but, as before, his theory does not receive the same scrutiny as the others.

In brief, Austin postulates that two large lakes breached a dam created by the Kaibab plateau, thus eroding the Grand Canyon in very short order and establishing the present drainages of the Colorado and Little Colorado Rivers. The fact that overland flow would have circumvented the Kaibab Plateau, rather than penetrating it, lead Austin to postulate that the first lake failed by enlargement of an underground conduit. The theory that catastrophic flooding formed the Grand Canyon is not new to creationists, but Austin has expanded the model and radically compressed the timeframe to fit his theological views.

How would we go about testing such a theory, especially when all direct evidence has been washed away? Testing for a flood has its problems, especially if it occurred long ago, but testing for a recent origin of the Grand Canyon by flooding is a simple matter. The question to answer is whether the Colorado river, its tributaries, and the slopes of the canyon walls are in an equilibrium state (i.e. whether they would have the same basic configuration if left to current erosion processes for an arbitrarily long time). Non-equilibrium drainages can be found wherever glaciation, catastrophic flooding, or other non-stream processes have recently dominated. Such "deranged" drainages are typified by numerous lakes, U-shaped valleys, and waterfalls where tributaries enter a river. In equilibrium drainages the tributaries, even washes that only rarely carry water, meet the river exactly at its level, and slopes are controlled primarily by the hardness of the rock units. Is the configuration of the Grand Canyon in equilibrium or relictual? Unquestionably it is the former. Given a million years of current conditions there would be considerable slope retreat, but from all we can tell the general appearance of the Grand Canyon would be virtually identical to what it is now.

Austin cites the Channelled Scablands as evidence that catastrophic flooding and rapid scouring of bedrock can occur, and appropriately so, but he fails to note the radical differences between the features created by the Lake Missoula floodwaters and those of the Grand Canyon. The narrow inner gorge of the Grand Canyon and its equilibrium tributaries are the antithesis of the broad floodplain, multiple overflow channels, and gigantic "ripple marks" of the Channeled Scablands. It would be hard to imagine two canyons more geomorphically dissimilar to one another.

Much more could be said about the ideas presented in this book, it being an easy target for critical analysis. Many readers may even consider it unworthy of a response. I disagree. For a young-earth creationist book it has reached a new level of scholarship, and as such it provides a new opportunity to evaluate an old idea. Although my review has been critical, I want to assure my readers that I've tried my level-headed best to see things through Austin's eyes in hopes of finding some spark of internal consistency and insight previously missed in a catastrophist model of earth history. But having made this attempt with no enlightenment, my childhood view of an old earth and long-term erosion seems more logical than ever.

After corresponding with Austin and other creationists and reading their works, I have no doubt that they believe in their convictions. They have frequently been called dishonest for their blatant flaws of logic, but this is perhaps a trait of human nature common to us all. Belief in a young earth by a trained research geologist is mostly a testimony to the strength of religious faith. Why certain Christians give the Bible the authority they do and why they interpret it so rigidly is hard for the skeptic to understand, but given that this is so, it is interesting to see the efforts to which people will go to make things fit.

Many readers may find this book especially threatening because of its mix of scholarship and creationist dogma, targeted to a natural monument of great popularity. I like to look on the bright side. Scholarship is more likely to lead to rational discussion than pure rhetoric, so why not take the opportunity to discuss these scientific issues with our creationist colleagues. Only by breaking down the invisible walls that separate us can we hope to understand one another and find areas of agreement on which to build. I was pleased to see that the authors of this book break rank with much of fundamentalist Christianity by taking a pro-conservation stand on the environment. Maybe this is the place to begin.

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