Book: *Carved in Stone* - Dr. Timothy Clarey

An Old-Earth Response

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Dr. Timothy Clarey's book, "*Carved in Stone*" (*CIS*) provides a new view of the Young Earth Creation (YEC) interpretation of the geologic record. Older YEC writings from the early 1900's through the 1980's typically reflected very poor understandings of geology and the data involved. Books such as this one and a few others, written from the 1990's to the present, reflect greater understanding of the rocks and some of the limits that they impose on interpretations. Dr. Clarey has a PhD in geology from Western Michigan University and is well acquainted with more standard geological ideas. For instance, Clarey recognizes the validity of the recognized order of rock deposition that is reflected in both local and global geologic columns. Early influential writers, such as George McCready Price (1870–1963) and John Whitcomb (1924-2020) and Henry Morris (1918–2006) believed that the globally recognized geologic periods and eras were fabrications developed to support evolution, despite the fact that they were in place before Charles Darwin presented his theory. Clarey also realizes that the changes in the types of fossils found in rocks through time are real, regardless of how much time was involved. This fossil succession is not a construct to support evolution but a real observation that ultimately must be explained. Clarey accepts and tries to incorporate the theory of plate tectonics and continental drift into his flood geology (FG) model.

Over and over, Dr. Clarey makes a statement that I strongly agree with: "*Rocks don't lie*". Clarey is the first YEC that I have read who actually tries to look at the rock record and make a model based on his observations of stratigraphy at a large scale. He has not worked quite globally, but does interpret sediments over 3 continents. I was a bit amused by his suggestion that he is the first to do this, but he may be the first to do so from a young Earth perspective. He wrote, "*But, as this book will reveal, they have never looked at the rock record across multiple continents simultaneously*." (p. 23). I know that such work has been done by many geologic groups over time. The best work that I am aware of is not actually available in the public domain, because it resides in private international oil companies. ExxonMobil, where I worked, maintains and is continually improving their global maps, and I know others do the same. They have access to seismic and well data that is just not available to the public. I spent several years working regional geologic studies in West Africa, and we were constantly linking to South America. Multi-continent studies are common.

As with most YEC, Clarey interprets Genesis to demand that the Earth is ~6000 years old. and most of the rock record he says resulted from the global flood that is recorded in Genesis. He bases his FG model on a few key assertions that he presents in the first six chapters. Most are consistent with other YEC literature. He draws heavily on the work of other YEC such as John Baumgardner, Michael Oard, Stephen

Austin, Russell Humphreys and Andrew Snelling. It seems that some writers are coming towards a more consistent model. Currently there are still a lot of significant differences.

His assertions include:

- Sediments from his interpreted flood interval were almost all deposited very rapidly by moving water (p.36).
- Dating methods used by modern geologists, such as radiometric methods, are flawed and misleading (p. 71).
- All flora and fauna species (or at least "kinds") were alive at the beginning of the flood. Their distribution in the rock record is explained by his model of flood development (p. 90).
- The young age of sediments is proven by soft tissues preserved in rocks interpreted to be hundreds of millions of years old (p.98).
- The flood was driven by "catastrophic plate tectonics" (CPT) that says that the continents moved at rates of "meters per second" (p. 131).
- Water was brought onto the continents by vast numbers of tsunami waves caused by "runaway subduction (p. 144).
- Large animals survived the early flood by migrating to high grounds. One example is his "*Dinosaur Peninsula*" which is proposed as an explanation for where the dinosaurs migrated to escape the flood at first (p. 247).

Modern geologists are reported to use "*strict uniformitarianism*" to interpret the rock record (p.37) because they are blinded by their indoctrination in schools. He declares, "*The need for deep time is based on the secular belief in slow evolution*." (p. 447). Most geologists see a very different picture. We find that the data clearly point to a long timeframe and to rock formation by processes that simply do not fit the model proposed. Dr. Clarey presents in this book, a view of the rock record, at a very large scale, on three continents. His observations of lithology, at that scale, can be interpreted many ways, including ways that fit the modern geological understanding held by most geologists. Evaluating the models involves looking at the data a bit closer. He interprets, as above, that the rocks from his flood interval were all deposited very quickly by moving water. The dominant driver he suggests was many tsunami waves. We can evaluate that prediction by looking at the rocks. If any bed or set of beds took longer than a year to deposit, or if we find processes that are inconsistent with a large flood, then this model fails for at least that portion of the interval. The flood interval in question shows many examples of rocks and processes that demonstrate long periods of time and many were deposited in arid environments and other settings that just were not part of a global flood. In the areas where I have worked around the world, I have not seen any areas where thick intervals are consistent with tsunami deposits. In the document below, we will look in more detail at comments from this book and data from the rock record.

<u>CPT</u> predicts that huge amounts of volcanic and igneous materials were emplaced in the modern oceans to form the oceanic crust that we see today. I am a stratigrapher, not a tectonic modeler, but I do not see how we could have had the oceanic crust across the Atlantic Ocean, emplaced a few thousand years ago, and it to be as cool as it is today. Large igneous bodies take time to cool, and yet the oceanic crust, particularly farther away from the Mid-Atlantic Ridge is far cooler than I would expect. I question this mechanism in many ways and would expect to see that evidence for it, if it occurred, to be very obvious and it is not. Plate movement today is very consistent with the radiometric dates, fossil development

and the observed effects. One article documenting this is Dr. Lorence Collin's article: Emperor Seamount Chain and Hawaiian Ridge – Ancient Age or 4,350 Years Old. CPT is not a reasonable explanation.

Many issues arise when we look at the fossil distribution found in the rock record and the *CIS* explanations for them. The book recognizes that the fossils preserved through the sedimentary record changed over the time of deposition, regardless of how long this was. There are regional characteristics evident in the fossils preserved, but some forms and assemblages can be correlated globally. Dr. Clarey does not pretend to have full explanations for the fossil record. He wrote, "*Why certain animals and plants are only found in certain rock layers is still largely unresolved*." (p.112) He summarized his general explanation this way: "*Floodwaters would tend to transport different organisms as the tsunami-like waves washed across the continents from slightly different directions and water levels got higher*". (p. 95). If waves were washing across the continent from repeated waves, one would expect species to reappear at many points. It is difficult to imagine this process resulting in a consistent fossil pattern on all of the continents, but that is what the rock record shows. Orchestrating such a synchronization would seem incredible. One could claim that this was miraculous, but the main apparent purpose would have been to confuse us and that is out of God's character.

Why are there no fossils from modern lifeforms in the early rocks? If we assume that all of the flora and fauna that we have today were created during creation week, then why does Clarey's preflood section have no modern forms, not even pollen or microfossils? The same question applies to the rocks interpreted to have been deposited in the early flood. It is not just that they don't have fossils from humans or mammals, though that is troubling, one should find modern microfauna or pollen. It is very difficult to find sediment from today, particularly shales, without these microfossils. The changes in these tiny fossils over time is also problematic for any flood model. Paleontologists can recognize much about depositional environments, ancient climates and the original water depth using microflora and faunal assemblages. Even so, changes in these assemblages are apparent through the different periods represented in the rock record. Why would this result from a global flood?

Here is another problem: if the Earth was being rocked by massive earthquakes and tsunamis, why were none of the earlier non-marine fauna killed and washed down to the coast and deposited there? The book reports, "*Animals would also migrate to higher elevations, including dinosaurs and animals that lived at lower elevations.*" (p.253). Apparently, the evacuation orders were a lot more effective then than they are for hurricanes today. It would seem logical that some animals would have died from the start and their bodies would have washed down. Some should have been preserved. What we actually find is that fossil species are found in rocks deposited over some period of time, and then disappear, never to be seen again. We find no mammals or dinosaurs in the Paleozoic. Why?

Yet another problem is how the Bible, which FG desires to defend, describes Noah's Flood as rising rapidly in response to 40 days and 40 nights of rainfall, strongly implying (while remaining a bit vague) that the flooded area was inundated by the 40th day. Yet Dr. Clarey's proposals seem to require that it was possible for animal life to stand, walk, and run on land well beyond the 40th day.

Modern flora and fauna don't appear until very late in the rock record. Isn't it surprising that all modern forms avoided the coastlines? It is not just the latest forms that are missing in the earliest rocks, but also whole faunal assemblages that we no longer have today. What about the immobile species? Dinosaurs provide a dramatic example of the problem, but most examples are not as eye-catching. However, on the basis of the locations of dinosaur fossils, rocks deposited above and below the dinosaurs appear to

have come from the same environments. Surely some would have died earlier. Then, where did they go later? Dr. Clarey wrote, "*Finally the last massive herds of stampeding dinosaurs are found in the Cretaceous rocks of northern Wyoming, Montana, and Alberta, Canada, as they were inundated by tsunami waves*." (p. 295). This would have been dramatic, but isn't it incredible that none chose to stampede to the area where the humans and other mammals ran to? Remember many dinosaurs were small and highly mobile.

YEC have to reject radiometric dating methods as these methods directly contradict all YE models. Despite massive efforts to discredit the techniques, few scientists find that their studies have raised any significant concerns. It is beyond the scope of this review to either explain or defend these dating techniques here, but it remains a fact that these techniques use well understood physics with technology that is now very accurate and reliable. There are reasonable explanations for unexpected dates and there are many, many older dates that show a consistent age model. Why do we see so few dates that fit the YE age model in the large number of analysis available? I don't have the time, data or expertise to explain every result that YEC show, but I will recommend some great resources that evaluate the YE proposals at the end.

Dr. Clarey's positions are usually attempts to demonstrate possible alternatives to "deep time" evidence from modern geology, rather than positive evidence for a young age. He considers the discovery of soft tissue from dinosaurs and other ancient animal as positive proof that these animals lived no more than a few thousand years ago. Such discoveries, reported originally by Mary Schweitzer in 1993, certainly did shock the scientific community and cause them to rethink what is possible in terms of preservation and how it can happen. Again, I am not a biochemist nor biologist of any kind. Like many, I was skeptical when I first heard about the discovery of cell structures and possible blood cells from dinosaurs. Now enough examples have been found and studied even more effectively that they seem quite valid. In this case, the idea that such structures could never be preserved was a case of bad assumptions, and we all know that assumptions can be dangerous. A number of mechanisms are now proposed and work continues and understanding grows. In 2019, Dr. Elizabeth Boatman published a paper in which she documents the role of iron in helping preserve tissue and in her conclusions, she says this:

> *"These data represent the first comprehensive chemical and molecular characterisation of vascular tissues recovered from this* T. rex *specimen (USNM 555000). By combining synchrotron and laboratory techniques with verified and well-understood immunological, diffraction, and microscope imaging methods, we provide the first identification of reducible, intramolecular (immature) and irreducible, intermolecular (mature) crosslinks in preserved, ancient vessel tissues. These data strongly support the previous hypothesis invoking transition metal (Fe)-mediated mechanisms as an agent of vessel preservation." (Boatman, 2019)*

Dr. Fazale Rana of "Reasons To Believe" wrote a short easy-to-read book on this subject, titled "*Dinosaur Blood and the Age of the Earth*". This quote from Rana helps to keep the dinosaur soft tissue discovery in perspective:

> *"Schweitzer and her fellow researchers did not discover blood vessels, but chemically transformed, chemically cross-linked structures derived from original blood vessels, yet still retaining the original shape. Some of the structures are flexible, but as Schweitzer discovered when surveying dinosaur remains for soft tissue remnants, others are crystallized and inflexible.*

> *She did not find original red blood cells and osteocytes, but structures derived from original cells."*

I expect that we will continue to learn of ways that forms that preserve early life structures can be preserved. When paleontologists and biochemists claimed that such early structures could not be preserved for millions of years, they based that on assumptions that have proven false, but this does not mean that the age estimates for fossils in the millions of years have been disproven.

In the detailed section below, several specific issues for the proposed flood interval will be addressed. In each case, we will see evidence of characteristics that do not fit the *CIS* model. Topics addressed include:

- Tsunamites – modern deposits show what features might be expected, regardless of the size of the tsunami.
- Rates of deposition – the *CIS* proposed timing dictates that enormous rates of deposition would have occurred, far beyond numbers quoted in the book.
- Sedimentary rock depositional processes – *CIS* claims that sedimentary rocks were almost all deposited rapidly by moving water, but actual rocks formed in many places by other processes.
- Fossils, such as stromatolites, dinosaur tracks and petrified forests – show that deposition took place, not over just one year, buy many years. Some of the evidence presented to support the "*Dinosaur Peninsula*" turns out to be invalid.

Many other questions and issues could also be discussed but these issues show that the proposed model is insufficient to explain the rock record, while the deep time model is well supported.

Dr. Clarey claims that the age of the earth does not matter in day-to-day geology, as it is practiced in enterprises such as mining or the oil industry. (p.62) It is certainly true that on a routine basis, it is the relative order of the units studied that is most critical for their work. There are exceptions, but many jobs seldom use the absolute age. However, I know that petroleum geologists use their knowledge of how rocks were originally deposited and by what processes they were deformed in their work. The flood geology model does not fit the rocks observed in sedimentary basins. Geologic models using deposition over deep time have been highly successful in hydrocarbon exploration, development and production.

I appreciate Dr. Clarey's desire to be faithful to the Word of God. In his book, he has tried to force an interpretation of the earth's history onto the rock record based on his Young Earth understanding of Genesis. The proposal fails because the rocks tell a very different story. "*Rocks don't lie*". Evidence of the Earth's age and the processes involved is found at many scales. I would challenge him to prepare paleogeographic maps in more detail through a large area and let the rocks reveal the events and timeframes involved. The maps that he presents here for the base of the Sloss megasequences could be starting points, but these maps need to explain the changes in lithology that occurred, including the deposition of cherts and evaporites. Where did these come from? When one generalizes away all the geologic complexity that exists in the world into megasequences, all of the information revealed by the details is lost or ignored. The flood model becomes harder and harder to support the closer one looks at real areas.

Readers of this book should be aware that many other Christians also want to be faithful to the Bible. Many Christians find other ways to interpret Genesis, ways that allow them to be faithful to the Bible

without ignoring the evidence for the great antiquity of creation. As Christians study God's word and the natural world, we should be in great awe of our majestic Lord.

Further examination of "Carved in Stone"

This section will discuss a series of specific issues. It is not meant to be comprehensive, but simply the ones that I choose to address now as serious concerns.

Framework and structural development

The YEC column proposed in Dr. Clarey's *CIS* book is similar to that of the highly influential YEC book, "The Genesis Flood" by Whitcomb and Morris, published in 1963. A comparison of various YEC views of stratigraphic events is discussed on this website here: Flood Geology and the Stratigraphic Record.

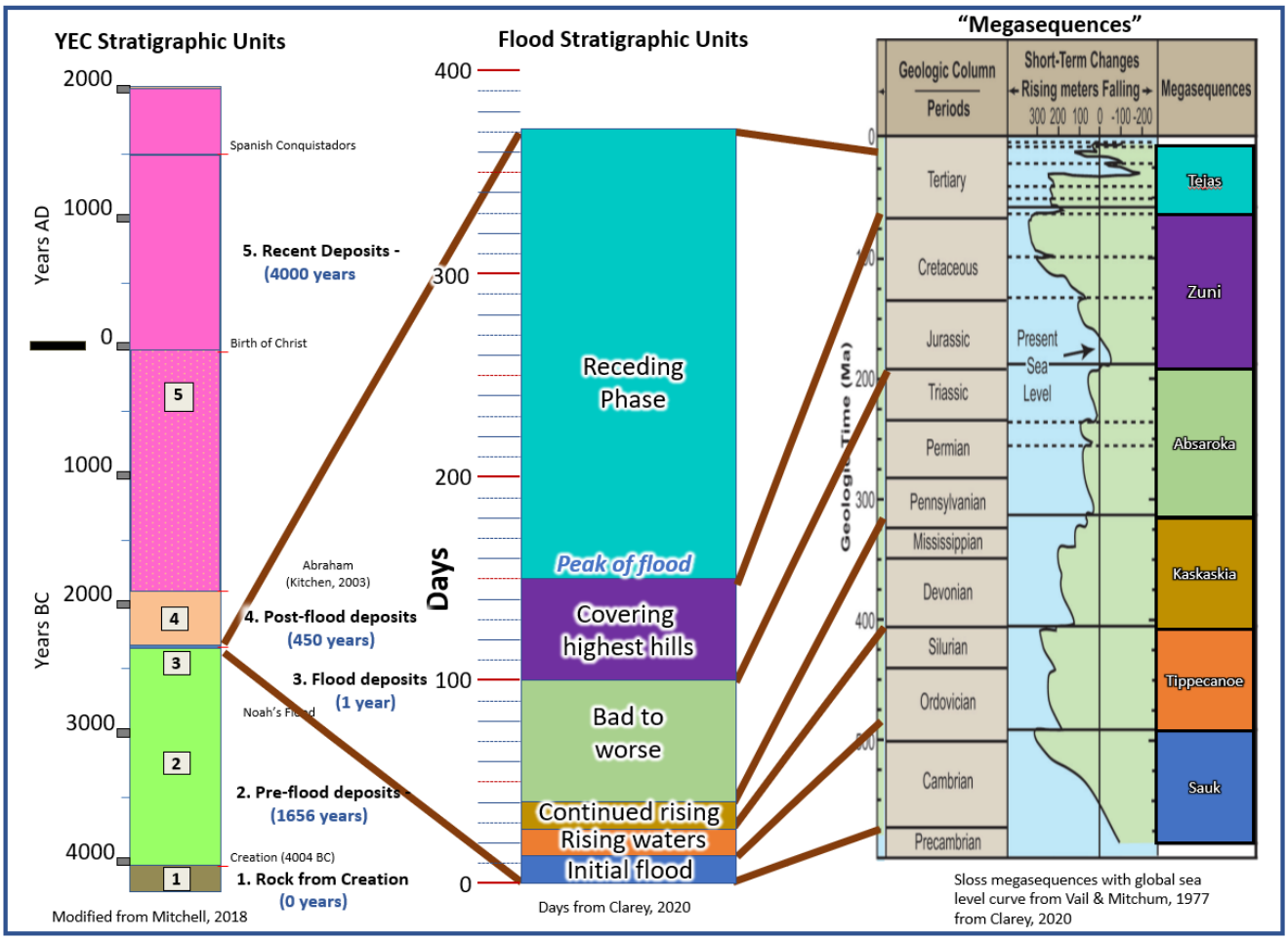

Figure 1. The left column shows the geologic column from a YEC point of view as presented in "*A Texas-Sized Challenge to Young Earth Creation and Flood Geology*", 2018. The middle column represents the stages of Noah's flood as characterized in *CIS in terms of* days. The right column shows the Sloss (1963) megasequences as shown in *CIS* with colors added. Conventional age dates in millions of years are shown on the right column.

CIS builds its central argument upon the packages and major unconformities used by Dr. Laurence Sloss in 1963 to divide up the stratigraphy of North America. These represent major surfaces, but stratigraphers today recognize many more important unconformity surfaces that can be carried globally. Dr. Clarey describes the Sloss sequences in terms of "idealized megasequences" (p.51), but I don't find these idealizations very useful. *CIS* "discovers" that seas covered more of the continents in the late Cretaceous Period than at any other point in the Phanerozoic Era, but geologists have recognized this point for a long time. His interpretation that this was the high point of Noah's flood is not proven. Higher order sequences separated by unconformities show that sea level has gone up and down many times and these sequences have predictable stratigraphic development associated with them. Dr. Clarey is skeptical of unconformities that do not show obvious erosion on them (p.69, p. 459). However, it can be demonstrated that such surfaces often represent much time. In some places, when the surface is correlated out of the area where it appears conformable, the thicknesses of rock can be measured in miles that are younger than the rocks below the unconformity and older than the sediments above. I described examples of this in some detail in a discussion of the Llano Estacado and Palo Duro Canyon here: Llano Estacado in New Mexico and Texas Vs. YEC and Flood Geology. Erosion is subtle across stable shelfs today and that should have been true in the past, particularly in periods that did not have the dramatic rises and drops in sea level that resulted from the many glaciations of the last 800,000 years. Dramatic unconformities are not the rule through geologic time in most parts of the world, but, in my experience, the subtle unconformities can always be traced to areas where they appear more dramatically.

CIS, like many YEC documents, interprets that there was really only one ice age. In fact, ice ages have been documented throughout the Cenozoic. These are identified by integrating many different observations, but the identification of separate soils above glacial deposits has been key in delineating the different ice ages (Bayne, et al, 1971). Soils don't develop quickly. Most experts believe that it takes hundreds of years to form one inch (2.5 cm) of good soil. Many of these soils took ~12,000 years to develop (Pierce, et al, 2011). Just one inch of any of these blows the timeline proposed by Dr. Clarey. Many paleosols are found in the geologic record. Periods without sharp glaciations would not be expected to have the dramatic erosion that we see in the later periods. It is not surprising that unconformities that developed in such periods are often more subtle.

Tsunamites

Using work from YEC geophysicist, John Baumgardner, the *CIS* model is that the flood water was brought onto the continents by large numbers of tsunamis as a part of CPT. Certainly, there are faults all around the world that have moved at different times in the geologic past and potentially generated tsunamis. Vast numbers of tsunamis would have resulted in deposits, but most of the processes involved would have been the same processes that we see in modern tsunamis.

On 26th December 2004, a magnitude 9 earthquake in the Indian Ocean generated a deadly tsunami that hit the west coast of southern Thailand, Indonesia and many coastal nations. Net deposition from such modern tsunamis is typically relatively thin. Deposits from the destructive 2004 tsunami were typically less than 12 cm (4.7 in.) thick (Srisutam and Wagner, 2009). This major disaster prompted a lot of new work to understand tsunamis and their deposits. The hope was to be able to examine the past record in order to understand how often they have occurred and more about their characteristics.

Progress was made, but many other types of geologic phenomena can result in similar deposits, making identification less certain, unless a deposit is actually tied to a historical event.

Studies have helped to characterize known tsunamites (deposits from tsunamis). Over the course of a few hours, beds are recognized that formed by bringing materials inward from a seaward direction (run-up) and deposits from flows going seaward (backwash). Srisutam and Wagner, 2009 made these observations regarding the 2004 Indonesian deposit:

- "The tsunami deposit is a sand layer overlying pre-existing soil (rooted soil) with coarse particles near the base and fine particles toward the top. In a few places, the tsunami deposit contains small rip-up clasts eroded from the pre-existing soil."
- "From those depositional sequences, it seems likely that the study areas were reached by three waves, which generated three run-ups."
- "Fining-upwards sequences developed from each wave during the process, with coarser particles settling out first and finer ones later."
- "Onshore tsunami sediment transportation analysis shows that, deposits fine in the direction of transport."
- "Sediments created by run-up are more significant than sediments created by backwash."

These observations are consistent with other published studies such as descriptions of the 1755 Lisbon tsunami in Spain (Cuven, et al, 2015). Eight beds that together formed a 25 cm (10 inch) thick tsunamite are described. Some beds fine upwards, but in general, most are poorly organized, highly energetic flow deposits that have erosional bases and include sand injections and rip-up clasts. The article notes: "Sedimentary features such as laminations, convolutions, dunes, and even antidunes attest to a change in flow dynamics during a single event."

Richmond et al, 2011 shows that in some situations, highly energetic tsunamis can move larger stones, though the average thickness of the tsunamite beds can be thinner than the stones they carry. They report:

> "*Deposits from two historical tsunamis on southeast Hawai'i are identified on elevated basalt platforms. They are characterized by boulder-strewn gravel fields with large clasts and thin sediment accumulations with sheet-like sand and gravel deposits in topographic lows. These deposits extend inland over several hundred meters. Many of the clasts are angular to sub-angular and show little evidence of reworking or sorting. Most of the larger clasts appear to be derived from the upper seaward edge of the adjacent sea cliffs*."

Shanmugam, 2006 points out that the backwash from major tsunamis can also result in debris flows, turbidity currents and suspension clouds that deposit in adjacent deepwater settings. Such deposits would be difficult to distinguish from deposits from other origins.

The *CIS* proposal to account for much of the world's vast sediment deposits in their flood interval by repeated tsunamis seems to be more of an idea that might theoretically work well in a computer model, but that doesn't seem to fit the rock data. Even repeated tsunamis would result in deposits that would be dominated by cycles that have chaotic internal character and to fine upwards. That simply is not the major character of the rock record. We see many trends of coarsening and thickening upwards sediment packages in progradational cycles and these are not tsunamites. Tsunamites would be expected to fine

away from their sources, while the major trends in the rock record fine towards the basin. If the global flood involved dramatically larger events, then like the Hawaiian example, larger poorly sorted chaotic packages should have been the result and that is not what we observe. Sinuous channel patterns work well in fluvial systems and are seen over and over through geologic history, embedded in non-marine shales, but they would not be the result of tsunamis. Reef trends such as I have shown through the Paleozoic and Mesozoic in the area I wrote about in Mitchell, 2018 cannot be re-interpreted as tsunami deposits, nor can the sabkha deposits that were laid down shoreward of them.

Rates of deposition

CIS provides an interpretation, based on the Sloss megasequences, of how the geologic periods correspond to various phases of the flood and how many days some of the phases lasted. (**Figure 1**)

> *"Dr. John Baumgardner demonstrated that cavitation processes from tsunami waves generated by the Flood could have eroded and deposited tremendous volumes of sediment, up to 40 feet per day." (p. 33)*

This statement is based on Dr. Baumgardner's (2018) numerical model where he modeled that thick bodies could be deposited rapidly by turbidity flows caused by large-amplitude tsunamis. He calculated that today's average thickness of sediment on the continents [1800m (5900 ft)] would require an average rate of deposition of 12m (39 ft per day). I do not know if this calculated average thickness includes the continental shelves where large amounts of sediment are found today. If not, his estimate of sediment to be produced is far too low. Both Clarey and Baumgardner believe that cavitation of bedrock caused by the tsunamis would break down existing pre-flood rocks into the components of our current sedimentary rocks. That is quite an assumption. Were the pre-flood sediments lithified?

Dr. Clarey's statement "*Dr. John Baumgardner demonstrated that cavitation*…" is loaded with hidden issues that his readers will likely not be aware of. It turns out Baumgardner never actually demonstrated that the cavitation process could accomplish such phenomenal erosion. (Tim Helble, personal communication). When Baumgardner set up his tsunami erosion model, he misused a simple expression from a scientific publication (Whipple et al., 2000) that was intended to describe what cavitation is proportional to in a steep gradient, bedrock river channel. He then converted this expression to an equation to calculate cavitation by creating a proportionality constant "E" and assigned this parameter a constant value (1.0×10^{-6}). This value seems small, but there wasn't really any research to substantiate it. When Baumgardner executed his model, his value for "E" caused the equation to simulate an astounding amount of continuous erosion from coastal zones -- about 25 vertical feet per day for the first 20 days of the Flood and similar amounts after that. The parameter value is clearly unrealistic, because known river gorges exist with high flow velocities that are close to those in Baumgardner's global Flood scenario. While Whipple et al. showed that cavitation occurs in such gorges, the channels have existed for at least hundreds of years with barely perceptible change and haven't been obliterated by cavitation as Baumgardner's erosion equation would suggest. For example, water flowing over Niagara Falls reaches speeds up to 68 mph, yet the falls have only migrated upstream about 1,000 feet since recorded observations started in 1678.

Average rates over an entire continent are really useful but it is also important to consider how fast the deposition had to be in the thicker areas. These higher rates also help to constrain what depositional processes had to have occurred. We can use Dr. Clarey's proposal for the duration of the flood periods to calculate minimum sedimentation rates in specific regions on the earth, where the thickest deposits are preserved. I estimated across my study area, the maximum thickness of sediment preserved today from the geologic periods/epochs of the Phanerozoic. The study area included the states of Texas and New Mexico, part of northern Mexico and the western Gulf of Mexico out to the Sigsbee escarpment. (Mitchell, 2018). Notice that this is not the thickness at any particular point for all of the periods, but the thickness for the thickest Cambrian sediments, the thickest Ordovician section, etc. It so happens that for the older section, the Paleozoic, for many of the intervals, the thickest parts are located in the thickest part of the Delaware Basin. The thickest intervals for other periods are located in other areas. **Figure 2** shows this maximum thickness graphically as one stratigraphic column. The calculated sedimentation rate results shown on the figure, demonstrate that, using the time constraints proposed in *CIS*, the resulting maximum rates are an order of magnitude greater than the "up to 40 feet per day" quoted above. The areas with these maximum thicknesses are in sizable sedimentary basin, not local anomalies nor reflecting tectonic thickening due to repeat sections or such. These are by no means global maximum thicknesses either. It should also be recognized that Clarey is not saying that deposition was continuous anywhere, and so if some days had no significant deposition, then the average rate for actual days of deposition would have been even higher. I am not saying that great thicknesses can never be deposited in a short time. We recognize deposits in deepwater environments where thick deposits known as turbidites can be deposited in a matter of minutes to hours. Deposits in Spain described as "megaturbidites" can be up to 656 feet (200 m) thick (Seguret, Labaume, and Madariaga 1984). However, these are dramatic exceptions. Geologist recognize that such thick units have no clear analog today. Dr. Clarey suggests that geologist by training try to force rocks into a "strict uniformitarian" mold. That would mean that "the present is the key to the past" means that the ancient record should only be interpreted in terms of processes that are active today. I suspect that no geology department has taught that for 100 years. When I was in school in the 1970's, we were taught that "the present is one key to the past". That is to say that studying depositional processes of the present is a very useful tool in understanding the past, but it cannot be rigorously applied. We expect exceptions.

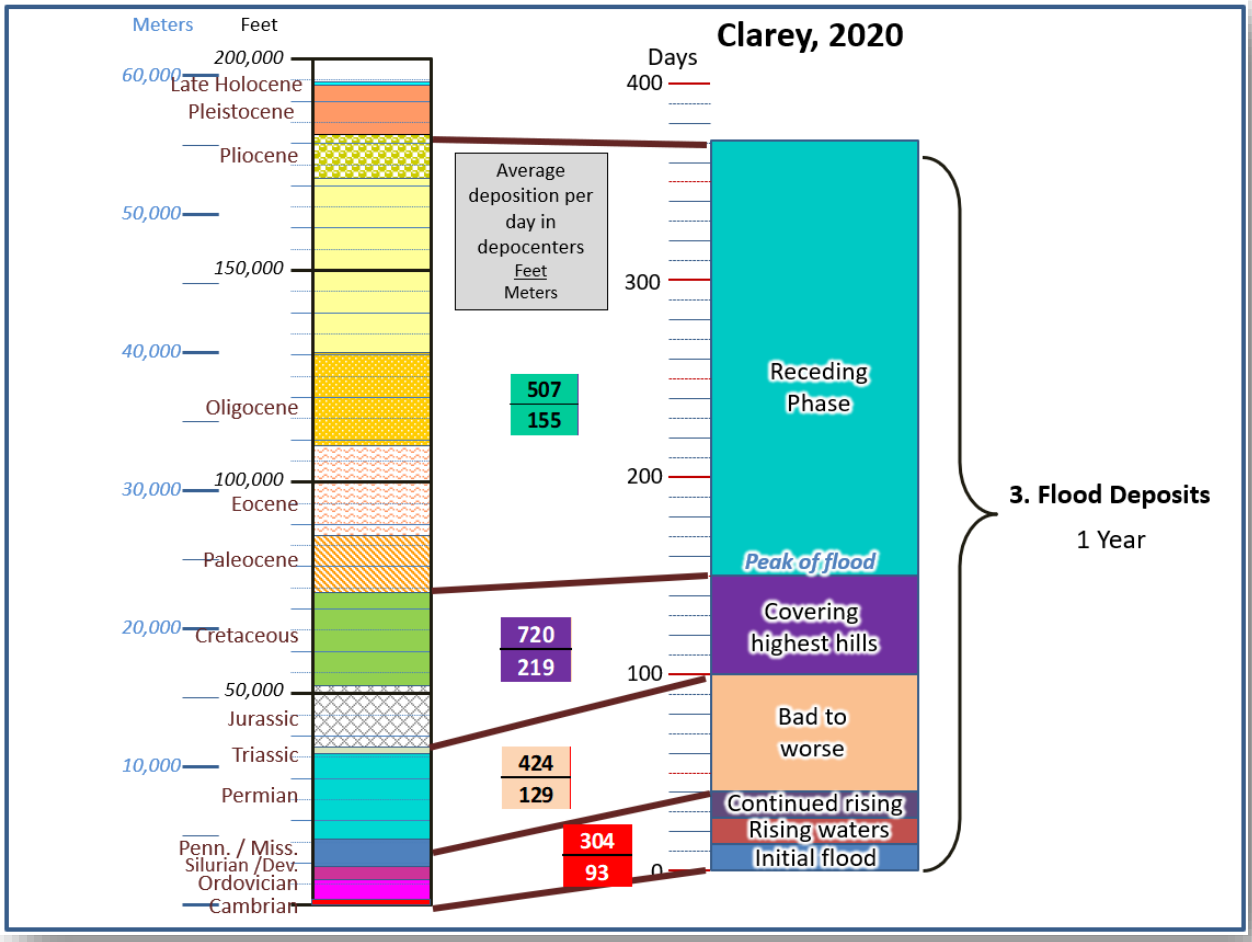

Figure 2. Stratigraphic column for Texas and New Mexico, part of northern Mexico and the western Gulf of Mexico, showing the maximum thickness of sediment for each of the time intervals across the area. On the basis of the correlative Sloss sequences, shown on the right and the *CIS* estimate of time, the average rate of deposition for each unit was calculated and is shown in feet and meters per day.

Sedimentary Depositional Processes

The YEC claim that much of the rock record was deposited in the 1-year long flood inherently includes the claim that sedimentary rocks "were all deposited very rapidly by moving water". Geologists don't dispute that some rocks were formed quickly. The flood model proposed by Dr. Clarey demands that all of the Paleozoic, Mesozoic and most of the Cenozoic were deposited extremely rapidly (Figure 2). He points to a few articles that show selected examples of rapid deposition of muds and limestone. The fact that in some places, these sediment types can be deposited quickly is taken to prove that all shales and limestones were deposited quickly. That is as true as saying some cars are red, therefore all cars are red.

Shale and mudstone

This logic is used with shale and mudstones. Dr. Clarey writes:

> "*Clay-rich rocks like shale and mudstones often exhibit fine laminations or thin-bedded layers than only form by moving water, not stagnant water. How do we know? Recent empirical evidence demonstrates that laminated clays must be deposited in energetic settings by moving water.*" (p. 38)

It is quite true that laminated mudstones can form from moving water, a fact that was underappreciated a few years back (Schieber, et al., 2007). When settling as individual particles, clay particles are so small that they settle incredibly slowly, and one bed would invalidate YEC models. However, as pointed out in the *CIS* book, particles can join together as flocculates and be deposited much quicker. One has to wonder what type of flow rate would be required to deposit thick shales across the Delaware Basin, if the average rate of deposition was 500 ft/day. It is not true that all mudstones are laminated or that all laminated mudstones formed in "energetic settings by moving water". As an example, consider the Woodford Shale, one of the Devonian shales Dr. Clarey described in the chapter on the Kaskaskia megasequence. Ochoa, et al, 2013, examined shales in detail, including the Woodford Shale, and found that it includes both beds with high quantities of flocculates (hemipelagites) and beds with few flocculates (pelagites), as described in this quote:

> "*In this modified usage, hemipelagite is defined as a rock composed of fine-grained sediments of biogenic and terrigenous sources transported to the site of deposition by a variety of processes in which vertical settling may have been delayed by failure- or flood-initiated flows, bottom currents, or other processes. Alternatively, the* ***pelagite term refers to fine-grained sediments of mainly biogenic source that settle vertically through the water column under the influence of gravity*** *with minor influence of other processes that delay deposition*." (emphasis added)

Shieber et al. (2007) examined cores of the Woodford Shale, and they were found to have both kinds of beds. The slower accumulating pelagites were found to have more organic matter and higher permeability than the hemipelagites, making them the important beds for source rocks for oil. Hemipelagites incorporate terrigenous materials and probably represent distal portions of turbidite beds. Such beds may have formed relatively quickly, though a column of hemipelagites typically represents a lot of time. The pelagite beds formed from the slow settling of very fine material. These are the beds that are responsible for creating most of the hydrocarbon source potential in the Woodford. It is just not correct to claim that all laminated mud-rich rock were deposited quickly. Each pelagite bed represents many years of slow accumulation.

Carbonates: Limestone and dolomite

CIS also claims that limestones were deposited rapidly as shown by this quote:

> *"Another long-held uniformitarian belief has been exposed as false. Flume experiments have verified that carbonate is not deposited slowly but rapidly by wave and current action. Laboratory experiments demonstrate that water flowing between 10 and 20 inches/second creates ripples and laminated carbonate mud layers identical to those observed in carbonate rocks." (p.39)*

Clarey, quoting Schieber, et al., 2013, wrote "*These experiments showed unequivocally that carbonate muds can also accumulate in energetic settings*" and "*Observations from modern carbonate environments and from the rock record suggest that deposition of carbonate muds by currents could have been common throughout geologic history*. (p.39) Notice what they say: "**can also accumulate**" and "**could have been common**". This is a long way from claiming that all carbonate muds were deposited rapidly, let alone all carbonate rocks. The original article by Schieber, et al., 2007 cites Shinn, et al, 1993 as a key example in the literature. Shinn describes what he observed:

> *"During our reconnaissance seven weeks later, we observed lime-mud beds exposed in the troughs of submarine oolite dunes and ripples. The mud layers were underlain and locally covered by ooid sand. The* ***mud beds were lenticular and up to 5 cm thick****." (emphasis added)*

There is no reason to doubt that some thin carbonate muds have been deposited by moving water. Just like with mudstones, this probably was not recognized in many places, years ago. Carbonates rocks are highly variable rocks that formed by a fascinating variety of processes and in a wide variety of environments. In many places, the individual beds are characteristic of the environment, but more typically the entire suite of rocks, features and the setting provide the context that allows the geologist to understand the rock, how it was deposited and the key changes that took place after deposition. It should also be pointed out that when Dr. Clarey argues that carbonate muds can accumulate in energetic settings, he is completely avoiding the issue of where such a huge quantity of carbonate sediment came from in the first place. The only time he addresses that issue is on page 160, where he states "*Austin et al believe that significant thicknesses of pre-Flood sediments existed.*"

Many years ago, I was charged with developing a detailed reservoir description of Mobil Oil Company's acreage in one of our fields in West Texas. We took over 2000 feet of core and it was slabbed, sanded and then described under a microscope, foot by foot. Many pieces were selected for special microscope analysis, using "thin sections", allowing even more detailed analysis. At the end of the study, I documented six major cycles of sedimentation. Porosity was controlled by carbonate sands and fossils that were deposited in ancient tidal channels in very discontinuous sand bars, just like those we find today off of Andros Island in the Bahamas. The packages with the tidal channels were separated by zones of Permian supratidal (above normal high tide) deposits, made up of storm deposits and algal deposits known as stromatolites. All of the units showed features that made it clear that the area had been arid in the Permian such as we find today in the Persian Gulf. These packages were definitely not deposited by tsunamis or any other rapid mechanism.

I find the stromatolitic intervals from these drill cores and in many other places in geologic record especially telling. These formed as sediment was trapped by microbial mats of cyanobacteria, showing alternate periods of flooding and exposure, typically by tides. Dr. Clarey discussed stromatolites, but did not discuss how long they take to develop, or how the periodic flooding and exposure would have taken place. Periodic exposure periods are especially hard to imagine during a global flood, with sediment being deposited at rates of hundreds of feet per day. Modern laminations have been measured to grow at rates of 1.6 to 5.6 years per lamination (Petryshyn 2013). Modern examples from Shark Bay, as pictured in *CIS,* have been studied and found to grow at average rate of less than 0.4mm per year (Chivas, Torgersen, and Polach 1990). They determined that the classic columns found in Shark Bay developed over the last one thousand years. Certainly, rates may have been faster in the past, but there are limits to what we might expect. Examples are found throughout the geologic record with

morphologies much like the Shark Bay example that *CIS* shows. Should we really believe they grew in a day? The examples that I studied, in core from West Texas, prove even more difficulties for a flood interpretation. Soon after they formed, they were exposed for a long period, leached out by fresh water, and the cavities were filled later with anhydrite just as they do today in the dry climate of the Persian Gulf. Arid climates don't fit the flood model.

Evaporites such as salt, gypsum and anhydrite are usually taken as strong indications of periods of evaporation, often in arid environments. The *CIS* explanations for these rocks are unreasonable. For instance, he reports, "*Salt and gypsum-rich rocks seem to result from ocean rifting (seafloor spreading)*." (p.266). The Permian deposits in New Mexico and West Texas contradict this dramatically. No seafloor spreading was around at all. He wrote: "*Salt beds are only deposited in an underwater marine setting. So how did the ocean mysteriously and suddenly disappear, exposing a massive pure salt layer and then become a terrestrial desert all in the blink of an eye*?" (p.306). Again, the Permian deposits contradict this theory. The Jurassic Louann Salt is at a different scale. Dr. Clarey claims that this is a problem for modern geology because we have no direct modern analog and geologists are supposed to be constrained to "strict uniformitarianism". Modern geologists are, therefore, wrong if they appeal to "the present is the key to the past" or wrong if they say that there were processes that we don't have a perfect scaled modern analog for. The present is a great help in understanding the past, but not in every case. In this case, the present does help to understand the same sets of features from the past. It should also be pointed out that while Dr. Clarey is correct that salt beds can be deposited in an underwater marine setting, he fails to provide a coherent explanation for how they could form at the astronomical rates required by a year-long global flood.

Sandstones

Two sandstone bodies are used in *CIS* as blanket sands that are supposedly unexplainable to modern geologists. They are 1) the Whopper Sand (p.334) in the Gulf of Mexico and 2) the Ogallala Formation in the Texas Panhandle (p. 336). As it happens, I discussed the Whopper Sand when I wrote the "A Texas-Sized Challenge to Young Earth Creation *and Flood Geology*" (2018). The sandstone body was an unexpected surprise when it was discovered, but, in context, it makes perfect sense. It was deposited as coalesced submarine fans. I refer you to that book for details.

A description of the sandstones of the Ogallala Formation is included in this blog post: Llano Estacado in New Mexico and Texas Vs. YEC and Flood Geology. The Ogallala sandstones are part of a beautifully documented fluvial system that was deposited in the Pleistocene. *CIS* misrepresents this sandstone and then never mentions the ancient soils that make up the layers which make the Llano Estacado the broad flat mesa that it is today. The caliches that hold up the mesa were deposited in a finely balanced semiarid climate as ancient soils, paleosols. Paleosols are recognized throughout the flood interval as recognized by Dr. Clarey. Tabor and Montanez (2004) recognized 31 different paleosols in the Pennsylvanian section alone on the Eastern Shelf of central Texas. As noted earlier, most experts agree that soils take a long period to develop. The flood model demands that they formed almost instantaneously.

Issues such as these that I have brought up appear throughout *CIS*. **Figure 3** is adapted from my book showing issues that I recognized in the area that I studied for this book. If the area were expanded, many more issues would be included.

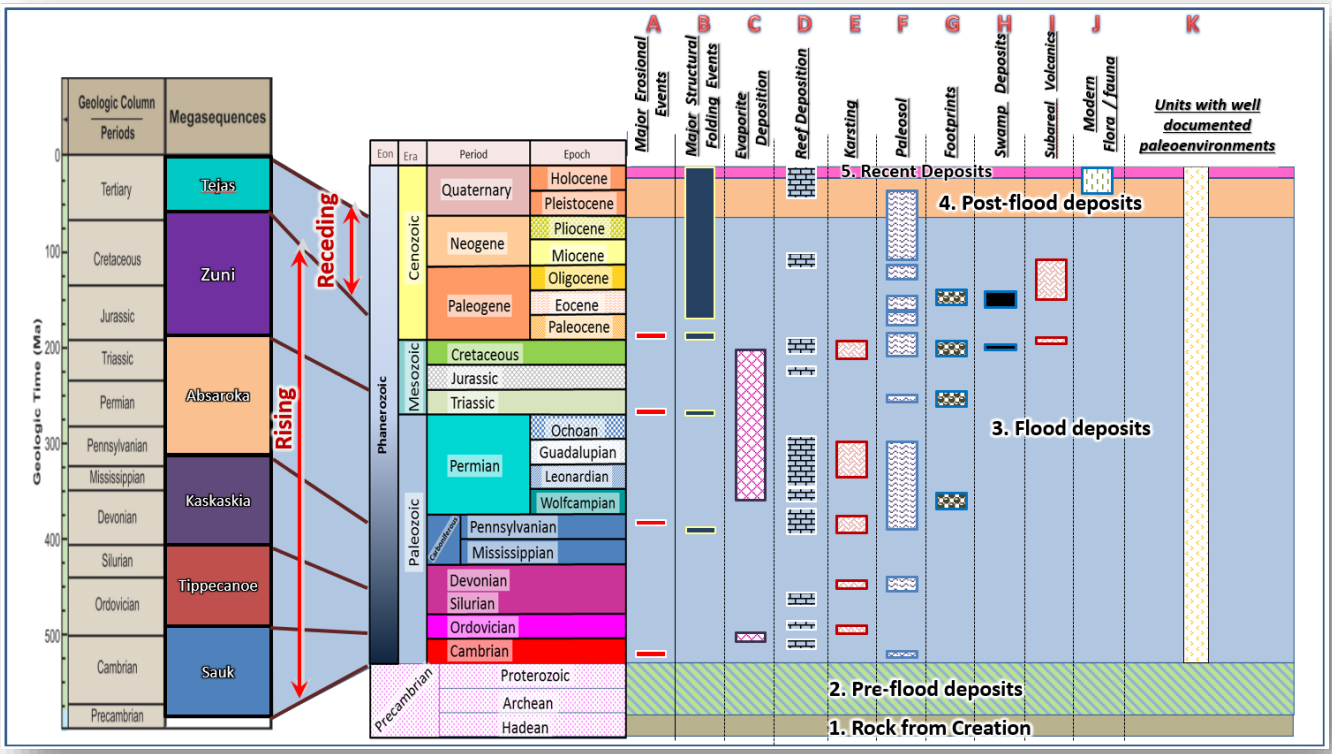

Figure 3. Sloss megasequences with *CIS* interpretation of the flood interval, with columns representing features identified in Texas and New Mexico, part of northern Mexico and the western Gulf of Mexico that are difficult to explain in FG models. Some are problems because they document more time than the entire flood time period and others are problematic because they document environments that would not have existed during the flood.

Fossils

Dr. Clarey recognized that the life forms in the rock record changed over time and that this must be explained if the flood model is to be considered viable. This fossil succession was recognized before the theory of evolution was proposed and is not an artifact. It is beyond the scope of this review to discuss the details of most fossils, but I do want to point out some further issues here.

Dinosaurs

First, I want to consider further the question of dinosaur tracks. With this in mind, we can look at dinosaur tracks in the rock record and how they relate to Clarey's proposed "Dinosaur Peninsula" (p. 247). *CIS* claims to have identified an ancient high ground where the dinosaurs went migrated to in their attempt to escape the advancing floodwaters. One way this area was identified was the recognition of areas of thinned or absent Paleozoic rocks. Thinning of stratigraphy is a very reasonable way to identify early high areas. In *CIS*, page 249, the claim is made that the "*traditional*" geological model for the

Paleozoic stratigraphy between Bryce Canyon and the Grand Canyon is wrong. Clarey provides a figure showing the Paleozoic thins dramatically from the Grand Canyon, northward into the Bryce Canyon area. Tim Helble (personal communication) reports that the proposal of a thin Paleozoic in the Bryce Canyon is contradicted by the actual well control. Helble, referencing Hintze and Kowallis (2009), described the issue here:

> *"The problem with this claim is that it's just not true… I found a great appendix in the back of Lehi Hintze and Bart Kowallis' book "Geologic History of Utah" with over a hundred stratigraphic charts. It turns out there is abundant data available from drill logs showing that the lower Paleozoic (Cambrian through early Pennsylvanian, or STK) layers are plenty thick in the Bryce Canyon (3,100 feet) and Zion Canyon (4,230 feet) areas. In fact, they are thicker than they are in the Grand Canyon, which Hintze and Kowallis' chart shows to be 2,140 feet. Hintze and Kowallis' charts show that the lower Paleozoic layers are plenty thick throughout the Colorado Plateau - for example, in the Canyonlands NP area they are 2.000 feet thick and in the Capitol Reef area they are 3,230 feet thick. They're even thicker to the north and west of the Colorado Plateau in places like Flaming Gorge and Oquirrh Mountains. Admittedly, the graphic with even-thickness layers that Clarey presents as Figure 11.5 is overly simplistic, but that is why the National Park Service stopped using it a few decades ago."*

It seems that Dr. Clarey did not have enough well control to recognize the actual thickness relationships in this area. Understanding the geology of three continents is a large job and it is understandable that there are things missed or misunderstood. It should also be mentioned that, even if the lower Paleozoic layers in southern Utah and northern Arizona were only a few hundred feet thick, there would still a problem for flood geology, because all water deposition requires water and dinosaurs would still have to swim until the Mesozoic layers started to be deposited. The *CIS* proposal for a "Dinosaur Peninsula" is basically an attempt to use a feature known in geologic literature as the "Transcontinental Arch" that was prominent from the Cambrian through Devonian periods. It was not really relevant after that time. (Carlton, 1999). Clarey's use of it to explain the lack of dinosaur tracks in the early Grand Canyon strata is not supported.

Here are some general observations regarding the trace fossils that are tracks from large terrestrial animals:

Observations:

1. Tracks are located both inside and far beyond the outline for the "Dinosaur Peninsula" (**Figure 4**)
2. Many kinds of tracks are found, going in many directions, and with no preference for going away towards the "Dinosaur Peninsula" for higher ground.
3. Dinosaur tracks are found on multiple beds at the same sites.
4. Dinosaur tracks with desiccation mudcracks are found in both New Mexico and in Utah.
5. Cretaceous dinosaur trails in Utah are in silt above a coal seam with many tree roots in place. (Balsley 1980) (see Dinosaur Tracks and Flood Geology (Part 2))
6. Triassic to Cretaceous dinosaur tracks are common in eastern U.S. states. (see Dinosaur State Park, Connecticut)
7. Dinosaurs tracks and bones are absent from Paleozoic and Cenozoic sections, though other tracks are well represented in the Permian.

8. Permian tracks do not include dinosaurs but many large reptiles that presumably lived in the same environments. (Great examples are found in southern NM with tracks of ancient arthropods (insects), spiders, crustaceans, amphibians, and reptiles, along with well-preserved conifer fronds from an ancient tidal flat (Lucas, et al., 1998).
9. Mammal tracks are unknown in the Paleozoic and only appear in the late Mesozoic. They are common in the Cenozoic.
10. Usually, there are thousands of feet of sediment beneath beds with dinosaur tracks, all from Noah's flood in the YEC model.
11. Many sites, such as those near Glen Rose, Texas in the Paluxy Formation, contain all the features that we find in modern meandering river and sandy beach environments (Mitchell, 2018).
12. Sedimentary units with the same range of features, apparently from the same type of environments are found for units through the entire column from the Paleozoic through the Cenozoic.

Based on these observations, inferences can be made regarding what we learn from dinosaur tracks. These include:

1. "Dinosaur Peninsula" may have had many dinosaurs, based on tracks and bones from that region, but dinosaurs ranged over a much larger area. (observations 1 and 6)

2. Tracks do not represent a single episode or even just a few isolated episodes formed by fleeing animals. (observations 2, 3, and 5)

3. Tracks are located in settings with features just like those we find in modern settings where such large animals might live. (observations 2, 4, 5, and 11)

4. The rocks where we find tracks do not have features consistent with tsunamis or rapid flood deposits (observations 3,4,5 and 11)

5. The relative ages of the strata containing tracks (and bones) are consistent with dinosaurs arising in the early Mesozoic and going extinct at the end of the Mesozoic era. (observations 6, 7, 8, 9, and 12)

6. Lack of mammal tracks in the Paleozoic & most of the Mesozoic is consistent with them arising later. (observations 9 and 12)

7. Given the rate of deposition posited by the flood model, it is difficult to explain animals walking around on thousands of feet of flood deposits. (observation 10)

The distribution of dinosaur tracks is directly related to: 1) the ages they lived, 2) today's distribution of rocks deposited during those ages, and 3) those depositional settings where such animals would have lived to make tracks. There is no reason to doubt that many dinosaurs lived in the area that Dr. Clarey's book calls the "Dinosaur Peninsula", however, they roamed over a much wider area. Tracks are common in rocks deposited in settings where dinosaurs lived. For example, we don't find them in rocks that were deposited in deep marine settings. Tracks are found in layers that were buried rapidly, but seldom laid down by chaotic processes such as flood models predict.

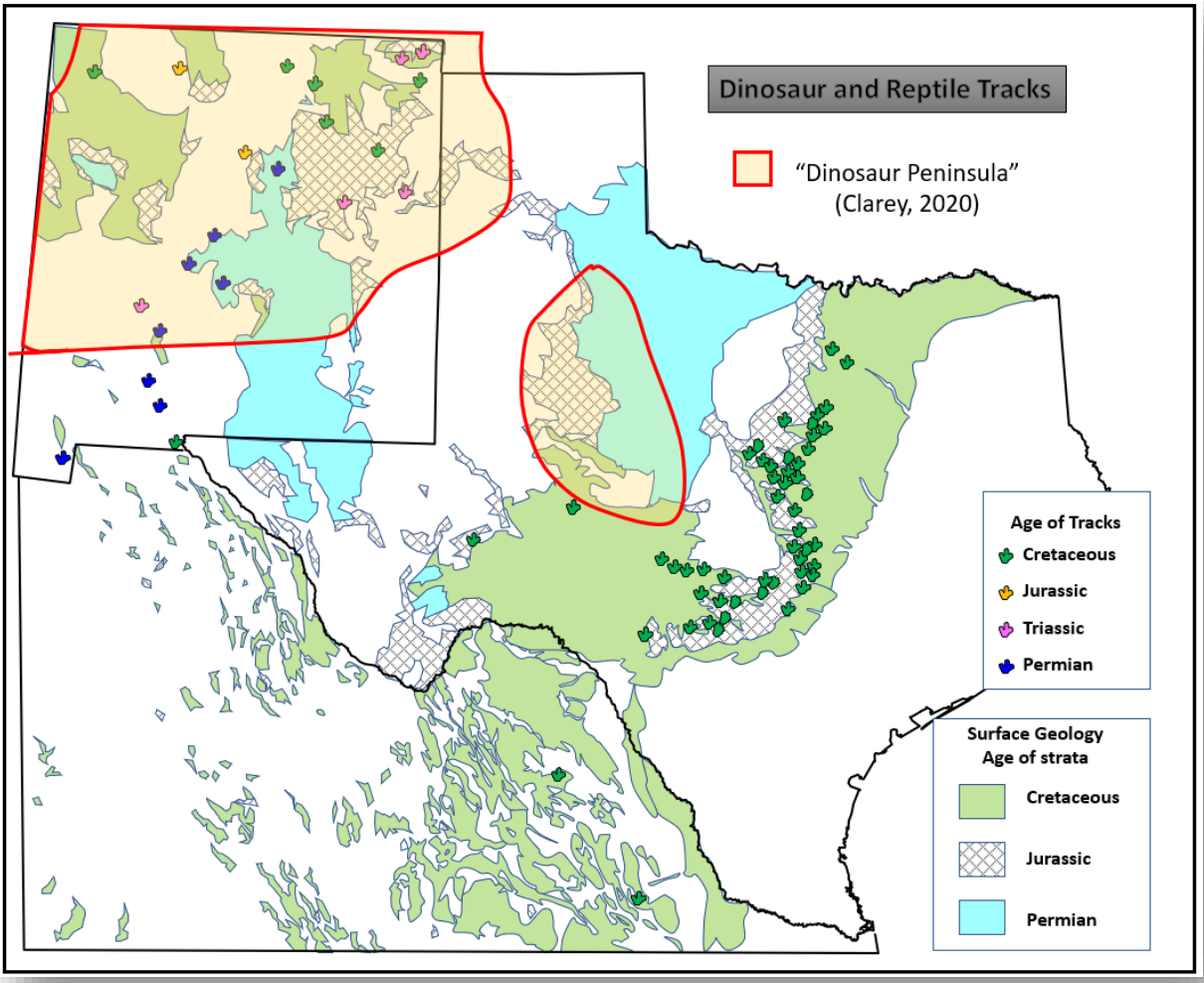

Figure 4. Dinosaur track map adapted from Mitchell (2018) showing "Dinosaur Peninsula" outline in this area. The Permian and Mesozoic surface outcrop distribution is shown at a large scale. Many smaller outcrops are not shown. Tracks are colored by the age. Permian tracks are actually reptile tracks, not dinosaur tracks.

Petrified forests

Ancient trees are reflected in the rock record in many ways, including: leaf and frond impressions, pine cones, pollen, and petrified wood pieces that range in size from chunks to logs to trees in growth position. It is interesting that none of the tree forms is found in rocks older than the Devonian. Why not? Afterall, we see evidence of soils before that. Another problem for FG models is the fact that we also find pebbles of petrified wood in rock that *CIS* would place in their flood interval. A pebble in this position indicates that at least the following steps occurred:

1) A tree grew.
2) The tree died and was buried.

3) It was petrified – turned to stone.
4) The petrified wood was eroded out of the rock that it was buried in.
5) The rock was worn down to a pebble, in most cases, in an ancient fluvial system.
6) The fluvial rocks were then buried and lithified.

That all seems really difficult to do during a one-year flood to me. In fact, each of the steps took more than one year.

CIS refers to petrified forests in several places. Like other YEC articles, this book claims that deposits associated with the Mount St Helens' eruption in 1980 show a way for trees in apparent growth position to be consistent with the flood model. This is important, because if trees are found in actual growth position anywhere in the interpreted flood interval, then, unless they could grow to maturity in days or hours, the flood mechanism cannot be invoked for the section where they are found. The YEC point that trees with root balls can be transported in a catastrophic event is quite valid. When the volcanics collapsed on Mount St Helens, the resulting debris flow incorporated many trees with root balls. The resulting debrite in Spirit Lake, Washington included about 4-13% of the trees in upright position. (Fitz and Harrison, 1985). How would we be able to tell if trees in the rock record are in true growth position? Fitz and Harrison, 1985 listed a number of possible criteria, though some were found not to be useful. The key characteristics that are potentially useful are in **Table I**.

	Transported Stumps		In situ Stumps
1	Large diameter roots broken	1	Large roots intact
2	Short broken trunk with a wide root system	2	Often have long trunks with a high trunk/root ratio
3	May include a mixture of flora & fauna from different environments	3	Flora & fauna from compatible paleoenvironment
4	High energy depositional environment	4	High or low energy depositional environment

Table 1: Key Criteria helping to differentiate between transported upright stumps and actual in situ stumps (Fitz and Harrison, 1985)

There are many examples of petrified logs in vertical positions in the rock record around the world, in rocks of many different ages. It is likely that some of these were transported into position. In many cases, root systems are not preserved or those preserved are too poorly exposed to be interpreted confidently. One exception is stumps from an Eocene forest which are preserved at the Florissant Fossil Beds National Monument in Colorado where they seem to have been preserved in growth position. However, the most complete examples that I am aware of come from Utah, in the Upper Cretaceous Blackhawk Formation. I referred to them above because of the dinosaur tracks around them in the ancient forest. Dr. John Balsley documented these in a report on the ancient wave-dominated deltas. It was used in field

courses that he taught for petroleum geologists for many years. (Balsley 1980) (see Dinosaur Tracks and Flood Geology (Part 2)) (also documented in part in Parker and Balsley, 1989). These outcrops in Utah are located in the Book Cliffs region and include coal deposits that have been mined for many years. The great exposures there have made these some of the most studied sedimentary sections in the world. Listed below are some observations regarding the coals and dinosaur tracks based on Balsley's report.

Observations from Blackhawk Formation, Upper Cretaceous, Utah

- Coal beds were deposited in three different settings
    - Fluvial lower coastal plain
    - Delta-flank embayments and strand-plain environments (strand plains are sand ridges adjacent to wave-dominated deltas)
    - Laterally continuous delta plains and strand plains
- Evidence indicates that thick peats formed because a delicate balance between the level of the water table and the rate of organic accumulation was maintained – controlled by the rate of subsidence and its effect on the water table
- There are two distinct populations of coals, distinguished by the sulfur content – fresh water sourced and brackish water sourced.
- Coal beds settings are distinguished by the type of beds above and below them. Examples are
    - Fluvial (river) deposits both above and below
    - Overlying sandy foreshore environments and overlain by fluvial channels
- Balsley recorded this observation in a sequence of coals on the strand plains: "*Small roots typically extend several feet downward into the sandstone beneath the coal*".
- Small channel deposits occur through the coal beds. In addition to sand, channel beds include: "*logs, branches, leaves and macerated plant material from the swamp*".
- Coals primarily are all composed of coniferous material. Authors interpret that often shorelines had a "carpet of green vegetation that extended down to the shoreline" with conifers as the most abundant trees. (These were supported by root-penetrated sediments). Away from the shoreline, the forest were more commonly redwood trees. (silicified trunks and logs)
- Peat deposition was occasionally interrupted by thin siltstone beds interpreted as storm deposits (consistent with both their internal character and external geometry)
    - "*Deposition of overbank sediment in the swamp forests during relatively instantaneous flood events has preserved the trees in grown position and infilled dinosaur track impressions in the forest peat beds. As a result, the flood deposits have preserved the record of a very short time interval – a day or two – in the history of a Cretaceous coal swamp*."
    - After the silt beds were deposited, some of the trees then grew roots into the silt.

    - Imprints of leaves are best preserved in fine-grained, more distal storm deposits.
- Trees are preserved in growth position at the base of the storm deposited siltstone
    - Both large and small roots are well preserved. Maps show the large roots extending out unbroken, several feet from the trunk.
    - Tree spacings were "*similar to spacing of Cypress trees in the modern Okefenokee Swamp*".
- Fallen logs are common and the orientation of logs and the root systems suggest they were influenced by the prevailing winds
- Coal beds include charred layers with "charred stumps, logs, and charcoal", suggesting that during dry periods, the swamp burned across, such as swamps do today.
- Dinosaur tracks were best preserved in delta plain and strand plain environments.
    - The large number of tracks suggest that the delta plain was the "*principal dinosaur habitat*".
    - Maps only show the largest and most complete tracks but many more were evident.
    - Three-toed tracks are most common, and are attributed to duck-billed hadrosaurs.
    - Tracks located beside trees in growth position are interpreted to have been made as the dinosaurs fed on foliage from the trees.
    - Paths can sometimes be traced for a considerable distance.
- Dinosaur tracks also preserved in siltstones from pond-lake sediment and channel deposits
    - Iguanodon tracks are found in this setting with desiccation mudcracks, reflecting periods when the area dried out.
    - Vegetation and roots are evident before and after repeated small flood events.
- "*A flood basin palm thicket preserved in growth position by flood-deposited silt*" is shown in the map of the roof of one coal mine.

The coals are located in the right setting and the root systems document several different forest types and settings. Explaining these deposits as transported flood deposits would require a lot of hand waving. In Dr. Clarey's model, all these features would have to come into existence in a matter of days, as the Blackhawk Formation was deposited as part of the Zuni megasequence. Dr. Clarey interprets the fossil trees in Carboniferous coal beds in Scotland as having grown before the flood and preserved in place (p. 436-438) but that would be impossible for the Utah example. *CIS* suggests that the evidence of forests in Antarctica supports its flood model, but, as shown in **Figure 5**, forests are reported as in "growth position" in sediments of multiple ages, and some appear to be clearly in situ.

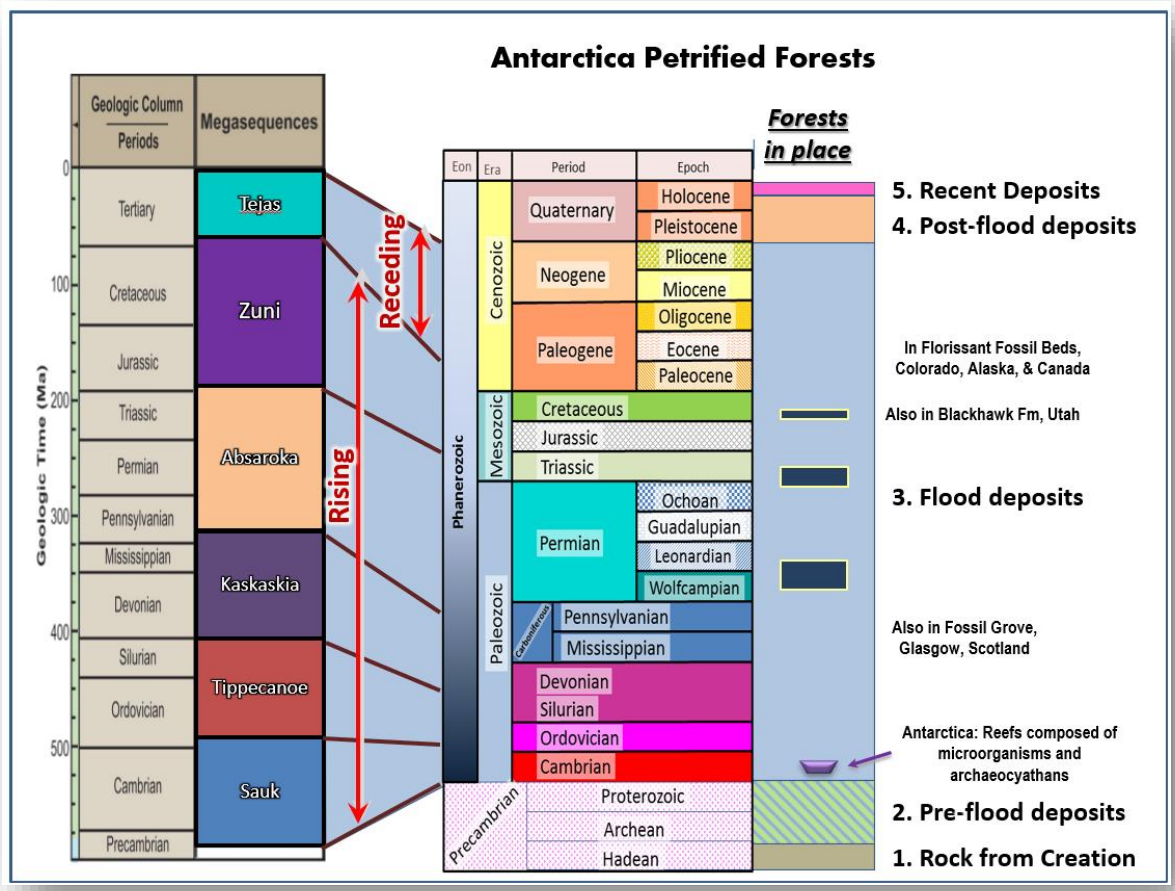

Figure 5. Sloss megasequences with *CIS* interpretation showing in situ forest identified in Antarctica and the timing of some of the other documented in situ forests. Also of interest is the reefs documented from the Cambrian period in Antarctica. (Triassic: Decombeix, et al, 2011; Permian: University of Wisconsin-Milwaukee, 2017; Miller, et al, 2015; Cretaceous: Alfred Wegener Institute, 2020; Carboniferous: Fossil Grove website, nd; Cambrian: Rees, et al, 1989, Eocene: Walker, 2011).

Final comments:

Once again, I would borrow this line from *CIS*: "*Rocks don't lie*". The tremendous rates of deposition that the megasequence interpretation demands when forced into the flood model dictate that extremely rapid processes would have been required. In many areas, they would have needed to have been an order of magnitude greater than the author suggests, using his assumptions of the time involved. It is several orders of magnitude more rapid than the geological understanding of the net rates of deposition. The actual rocks show that periods of slow deposition occurred, whether the lithology was shale or sandstone or coal or salt. Trees grew, soils developed and basins filled. Lifeforms changed as the stage was being set for the drama of mankind to begin. No doubt, God was glorified in the lives of these many forms, from trilobites to dinosaurs, and He had a purpose for each one. When their purpose had been served, they moved off the stage. Daniel referred to Jesus as the "Ancient of Days" (Dan. 7:9). When we recognize that, even in terms of our own timeline, God created the universe, not just a few thousand years before, but perhaps thirteen billion years before, the "Ancient of Days" becomes even more real and impressive. We become smaller because He is greater. David wrote, "Show me, O Lord, my life's end and the number of my days; let me know how fleeting is my life. You have made my days a mere handbreadth; the span of my years is as nothing before you. Each man's life is but a breath" (Ps. 39:4–5). The geologist's recognition of the age of the earth has provided emphasis for this and a greater understanding of how tiny is our time in this life.

Thank you so much to Dr. Lorence Collins and Dr. Timothy Helble for reading and improving this article.

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