# Is the K/T the Post-Flood boundary?—part 1: introduction and the scale of sedimentary rocks

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**Like many other forensic uncertainties, the location of the Flood/post-Flood boundary should be subject to the principle of multiple working hypotheses. There is no doubt that it is an important question and stratigraphic locations abound. One of the most popular locations is the K/T boundary. Evidence has been presented to support that choice, one of which is a change from worldwide/continental to local/regional sedimentation. However, a close analysis of this evidence suggests that it raises more questions than it answers, supporting the idea that the end of the Flood corresponds to the Late Cenozoic.**

Creationists have shown that geological and paleontological observations are congruent with the Genesis Flood and problematic for secular natural history. Uniformitarian[1] scientists cannot explain or ignore an increasing number of phenomena that contradict their interpretations, such as the lateral extent of many strata and the absence of erosion between layers.[2–4] In addition, many creationists are constructing comprehensive models to explain the Flood, for example Brown;[5,6] Budd;[7] Hunter;[8] Oard;[9] Setterfield and Setterfield;[10] Tyler;[11] and Wise *et al*.[12]

Disdaining creationism, secular scientists seem unaware of much of this work. For instance, in a new book critical of biblical history, a recent creation, a global flood, and the accounts of Genesis, Young and Stearley[13] misstate much about creationism and Flood geology, seemingly content with straw men of their own devising to fill its many pages. Unfortunately, this example of poor scholarship illustrates the deceptive influences of those opposed to God's truth.[14]

But for those interested in discerning truth, much work still remains. Controversies remain within Flood geology, reflecting a variety of opinions, such as the location of the Flood/post-Flood boundary. More important is the disagreement over our method. Some creationists believe that competing ideas are a sign of problems. But this fails to acknowledge the inherent uncertainty of historical study. Both geology and paleontology are complex, with many unknowns, and for that reason, it is *healthy* to have multiple ideas to test, providing direction for our research. The idea is as old as science, popularized by the late geologist, T.C. Chamberlin, in 1895 in the *Journal of Geology*. It was reprinted in 1995 with an introduction by David Raup.[15] Chamberlin acknowledged the rudimentary stage of geology in his day, and argued that multiple working hypotheses were better for the science than one 'ruling hypothesis'. He explained that advocates of a ruling hypothesis tend to ignore contrary data or force data to fit their hypothesis, rather than test the hypothesis by the data:

> "The theory then rapidly rises to a position of control in the processes of the mind and observation, [and then] induction and interpretation are guided by it. From an unduly favored child it readily grows to be a master and leads its author withersoever it will."[16]

Flood geology is nowhere near the advancement of uniformitarian geology at Chamberlin's time. Thousands of geologists and large amounts of money had taken the science from the 'gentleman amateurs' of the early 1800s to a position of influence in academia and society. Thus, we must be even more careful of 'ruling' hypotheses that distract from important questions and investigations. So, those proposing hypotheses or models must accept the professional give and take that should mark science, much less science done by Christians. I encourage the development of ideas, but not the tendency to reject criticism and questioning. This is an application of what the Bible calls 'iron sharpening iron' and will promote progress that will be otherwise retarded by 'ruling' theories.

## The alternatives

Given this methodological approach, I wish to examine the location of the post-Flood boundary. I must first acknowledge opposition to the often-unspoken assumption that the geological time scale is the metric for arguing this boundary. Three positions were argued in Reed and Oard:[17]

(1) the geological time scale represents a correct chronostratigraphic (relative) arrangement of the rock record,[18]
(2) it is an anti-biblical template not useful to diluvial research because it uses time as its stratigraphic key,[19] and
(3) the geological column is a general sequence with many exceptions.[20] The third position is mine, and I believe it to be a middle ground between the two, based on field evidence I have studied. For more information, I recommend reading the cited literature.

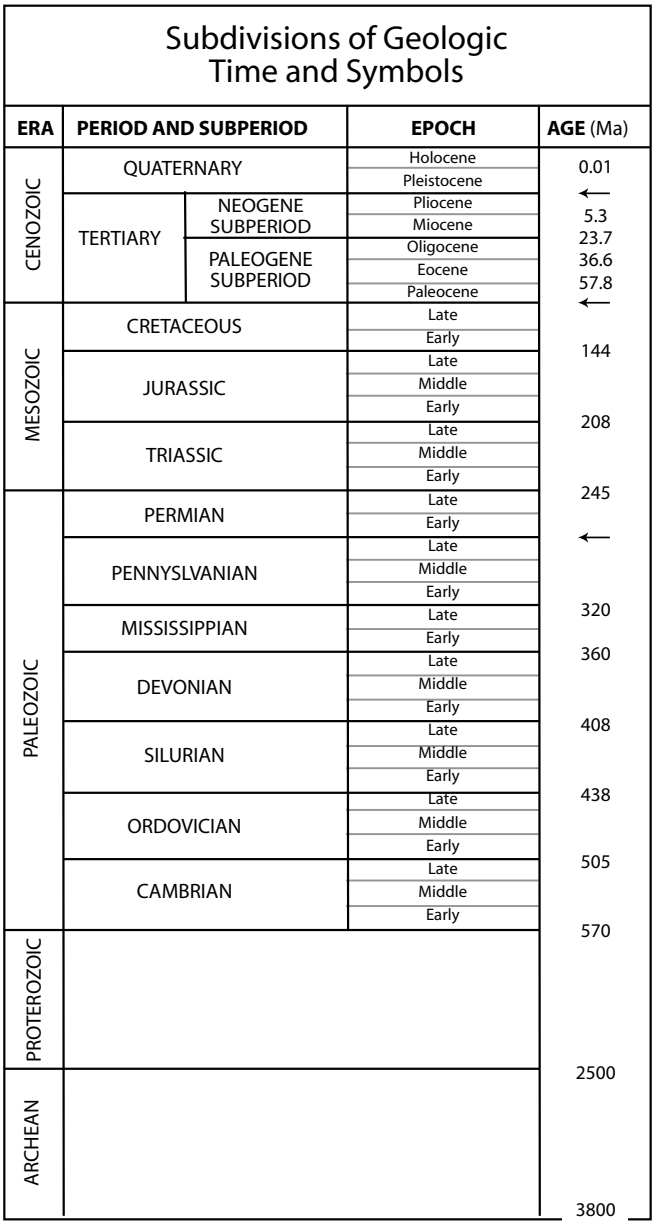


**Figure 1.** The geological column with the three Flood/post-Flood boundary locations as shown by the arrows in the right hand column.

For those who choose to use the time scale as at least an approximate yardstick, there are three major proposals for the post-Flood boundary (figure 1). These are, from oldest to youngest: (1) the Carboniferous, proposed by advocates of the recolonization model,[11] (2) the K/T boundary,[12,21,22] and (3) the Late Cenozoic.[23–27]

### Why is the boundary important?

Creationists are interested in identifying the post-Flood boundary for several reasons. Perhaps the most important is to show the presence of the Flood in the rock record to those who do not believe it ever occurred. These include uniformitarians, theistic evolutionists, and other old-earth creationists. Many of these people believe there is little or no evidence for the Flood. For example, anti-creationist geologist, Arthur Strahler proclaimed:

> "Mainstream science has no obligation whatsoever to attempt to refute Flood geology—a hypothesis vaguely and confusingly worded, lacking in completeness of statement, and nearly devoid of evidence."[28]

Strahler at least grudgingly admits we have a little evidence. But, the Christian geologist, Davis Young, now retired as a geology professor from Calvin College, is surprisingly less generous: "… there is no geological evidence to confirm the idea of a universal deluge."[29]

A second and associated apologetic reason is to encourage confidence in the truth and inerrancy of Scripture among Christians, who are fed a steady diet of the contrary position by our culture and by Christians who believe too many Enlightenment ideas. In addition to these apologetic reasons, the boundary constrains the part of the rock record caused by the Flood, a crucial component of any Flood model.

Third, it also allows a geologically-based understanding of post-Flood processes and events, providing a context for the times between the Flood and the founding of the Mesopotamian empires, which can be forensically studied by archeology. Among creationists, the question of the extent, nature, and severity of post-Flood catastrophes is a question that continues to be debated. On the other side of this stratigraphic boundary is information about late-Flood processes and events, which can provide understanding about the nature of the changes during that time.

Fourth, the timing of the end of the Flood helps us understand the approximate number of animals that formed the faunal baseline for later diversification and migration. For example, if the correct location is the K/T boundary, the Tertiary would include sediments and fossils laid down after the Flood. Given the extent and thickness of some of these deposits, it would have been a time of waning catastrophes. Tertiary fossils show a great variety of mammals all across the planet, requiring a model for the fecund repopulation and rapid spread of these animals immediately after the Flood.[22] If the correct location is in the Late Cenozoic, then the paleontological evidence would suggest a slower and less dramatic post-Flood diversification. The number of animals spreading out from the 'mountains of Ararat' would need to be explained only by the variety we see today and during the Ice Age.[30] Thus, the boundary placement affects the burgeoning subfield of baraminology.

A fifth reason is the timing of the Ice Age. Did it begin immediately after the Flood in favorable locations, such as the mountains of Scandinavia, eastern and central Canada, the Greenland mountains, and Antarctica, or was it delayed for several centuries by large-scale post-Flood catastrophism?[31] Would it have been possible on a globally warm post-Flood Earth to delay the Ice Age, as shown by Cenozoic fossils at high latitudes?[32–34]

Sixth, since the boundary placement is foundational to developing Flood models, effort may be wasted if the location is not known. Any creationist who assumes an incorrect boundary will likely be wrong about events after the Flood and during the late Flood period.

Finally, the responsibility of teaching the truth binds creationists to try to discern as best they can the nature of the Flood, which they will teach to the church. We should remember 1 Thessalonians 5:21: "Examine everything carefully; hold fast to that which is good" (NASB).

## Reasons for a Late Cenozoic boundary

As a new creationist many years ago, I was influenced by the idea of significant post-Flood catastrophism. I accepted the 'Miocene' Columbia River Basalts (CRBs) as post-Flood; the arguments seemed valid.[35] I accepted the 'Pliocene' dam breach hypothesis for the formation of Grand Canyon.[36,37] If asked, I would have suggested the end of the Flood at the K/T boundary,[38] though I had not thought through the issues.

But studies of the Ice Age, which began about 35 years ago[28,38,39] and studies of geomorphology, which began about 20 years ago,[40] raised a number of questions about my boundary assumptions. I discovered a large body of evidence against the Flood/post-Flood boundary being at the K/T boundary, especially geomorphological evidence—a field often ignored by both secular geologists and creationists. There are many surficial features that can only be explained by Floodwater drainage.[40] The late Roy Holt went through a similar metamorphosis:

> "When beginning this research, I was slightly biased toward placing the Flood/post-Flood boundary near the Cretaceous/Tertiary boundary. This bias came from private discussions with creation researchers and reading creation research suggesting this location. It was only after collecting most of the data presented herein that I became convinced that the boundary was much later in the geologic record."[41]

Just like Holt, and after much literature and field research, I came to the conclusion that the boundary is located in the Late Cenozoic.[26,40,42] However, it is important to note that there will be exceptions because the geological time scale is not always an accurate reflection of biblical earth history, even in its relative chronostratigraphy.[20] Therefore, it is extremely important that creationists abandon absolute confidence in a globally exact time scale and analyze each location on its own merits. Since the various stages were developed by uniformitarian evolutionists, based on the evolution 'seen' in the fossil record, skepticism is an appropriate creationist response. In one location, the post-Flood boundary may be at the Pliocene/Pleistocene boundary, while at another it could be early in the Pleistocene, or even the Pliocene. But for sake of discussion, I will use the divisions of the geological time scale to discuss the general location of the boundary.

I presented eleven geological and paleontological criteria to define the boundary,[42] but some are qualitative and thus questionable. However, all of them pointed to a Late Cenozoic boundary. Most areas that I have examined from either field or literature research indicate a very Late Cenozoic boundary, often in the Early to Mid Pleistocene in areas not affected by glaciation. This follows Holt,[23] who also developed boundary criteria. Though I am open to new research, I must take the advice of G.K. Chesterton, who said: "Merely having an open mind is nothing. The object of opening the mind, as of opening the mouth, is to shut it again on something solid."[43]

I believe that the boundary question is important to help discern truth in the various Flood models that have appeared, and hope to generate a profitable exchange. Hopefully, by applying multiple working hypotheses, the location of the real boundary can be determined. To do so, we must first examine the evidence for the K/T boundary proposal.

## The K/T Boundary hypothesis

The belief that the post-Flood boundary lies at the Cretaceous/Tertiary interface is accepted by many creation geologists, although some state that the boundary is not precise and could be in the Early Tertiary in some locations:

> "Although creationists today are still working through exactly where Flood and post-Flood boundaries are found in the rock record, the authors of this book currently interpret the Primary [Paleozoic] and Secondary [Mesozoic] rocks as Flood sediments and the Tertiary/Quaternary rocks as post-Flood."[44]

A necessary corollary of this model is large-scale, post-Flood catastrophism, based on Tertiary deposits and tectonism. Leonard Brand[45] placed the boundary generally near or a little above the K/T boundary, based mainly on his interpretation of Tertiary events not expected in the Flood:

> "Exactly where in the fossil record the initial year of the flood ends is especially difficult to determine. It is probably somewhere between the Cretaceous and the Pliocene—a big range of uncertainty. Much more work is needed before we have an adequate understanding of how to relate the end of the flood to the Cenozoic fossil record … In this book, I have placed most of the Cenozoic in the postflood period. This is only a working hypothesis. Other options must be kept in mind."[46]

The origins of the K/T boundary model are obscure, but it reflects the opinion that the Flood cannot account for certain features of the Tertiary rock and fossil records. But these have not been adequately specified, and proponents need to present more concrete evidence.

Wise and Brand admit that the K/T boundary is controversial and that their boundary is merely a working hypothesis. They are to be applauded for this sensible caution. But they sometimes do not follow that method, writing as if the K/T boundary is certain. Thus, they place

many important Tertiary events after the Flood.[31,44,45] Hopefully, they will regain a proper skepticism and examine the data with an eye towards multiple possibilities.

## Critique of the K/T Boundary model

Evidence supporting the K/T boundary position is sparse, although recent work has provided more information.[21,22] Whitmore and Garner[21] provide multiple criteria in which to distinguish the post-Flood boundary—a method similar to that of Oard.[42] Unfortunately, some criteria for either position are equivocal, and so a range of data must be evaluated. Whitmore and Garner[21] think that coal deposits formed during the Flood, tailing off in the post-Flood period to the present day. There are abundant Tertiary coal deposits, and I question whether such large accumulations could happen after the Flood, and believe their graph should show all the coal forming during the Flood and very little to none after. One way to answer this question would be to derive convincing post-Flood coal formation mechanisms that would account for thick, extensive, nearly pure coal seams, like those in the Early Tertiary of the Powder River Basins of southeast Montana and northeast Wyoming.

Whitmore and Garner[21] appear to lean too heavily on uniformitarian paleoenvironmental indicators. If these are not acceptable for Flood deposits, then why are they acceptable for those under question? Transgressions, regressions, deltas, alluvial plains, coastal features, and terrestrial deposits are often identified by a combination of field data and presuppositions contrary to biblical history. Thus, logical consistency demands that we examine the conclusions of secular scientists with some skepticism.

For example, secular geologists find terrestrial fossils in a deposit and thus consider it a terrestrial environment. There is no consideration that terrestrial fauna may have been catastrophically transported and buried in a marine setting. We know this is possible because many terrestrial fossils occur in rocks that we all agree are Flood deposits. Uniformitarian paleoenvironmental deductions stem from a different worldview.[47,48]

One of the key locations in this boundary dispute is the Tertiary Green River Formation, which Whitmore[49–51] and Whitmore and Wise[22] interpret as a post-Flood lake. They present evidence, but there is also evidence for Flood deposition,[52–54] including the post-Green River erosion of approximately 5,000 m of sedimentary rocks from the San Rafael Swell. Another problem is the scale; the Green River Formation is over 100,000 km$^3$, or two and a half times the volume of the Flood-deposited Coconino Sandstone.[55] And it is not just the rocks; in 2005, scientists estimated that the recoverable oil in the Green River oil shale would meet the oil needs of the United States for 100 years! Fossils found in the Green River Formation, such as palm trees and crocodiles, are typically found in tropical and subtropical settings, but in a post-Flood Ice Age, the climate would have been much colder. Even if the Ice Age could be delayed, the inland, high altitude location of the Green River Formation would preclude tropical and subtropical organisms.

**Table 1.** Evidence for the K/T boundary proposal.

| | |
|---|---|
| 1. | Change from worldwide/continental to local/regional sedimentation |
| 2. | The Tertiary cooling trend |
| 3. | Tertiary mammals of the western United States |
| 4. | Tertiary bird and mammal tracks and the Devils corkscrews |
| 5. | Tertiary volcanism in the northwest United States |
| 6. | The cooling of ocean basalt while the continents rise |

But looking at the overall evidence for the K/T boundary proposal, I have found six major points to be analyzed below. I will analyze the first evidence in this part and the next five in part 2 of this article.

## The change from worldwide/continental to local/regional sedimentation

One of the major reasons offered by proponents of the K/T boundary hypothesis is the diminishing scale of sedimentation during the Tertiary. This presumes that all Flood deposits will be extensive and post-Flood deposition would be restricted. Wise *et al.* stated:

> "For our purposes here we would like to define the Flood/post-Flood boundary at the termination of global-scale erosion and sedimentation. Based upon a qualitative assessment of geologic maps worldwide, lithotypes change from worldwide or continental in character in the Mesozoic to local or regional in the Tertiary. Therefore we tentatively place the Flood/post-Flood boundary at approximately the Cretaceous/Tertiary (K/T) boundary. We believe further studies in stratigraphy, paleontology, paleomagnetism, and geochemistry should allow for a more precise definition of this boundary."[56]

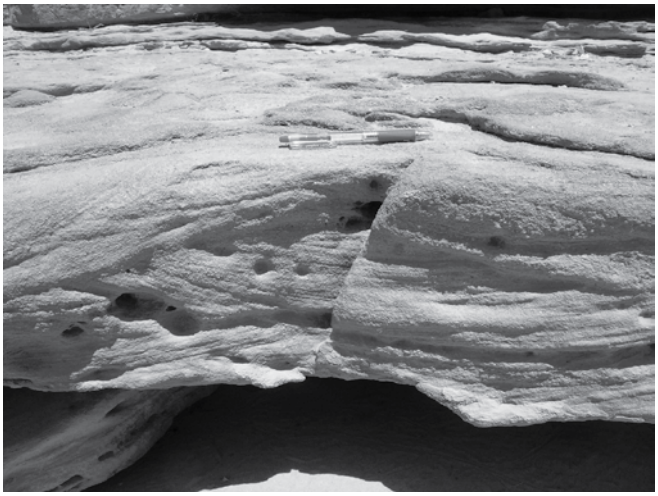

**Figure 2.** Tapeats Sandstone in the Grand Canyon, Arizona, USA, with coarse-grained quartz pebbles.

**Figure 3.** Bright Angel with worm burrows in the Grand Canyon, Arizona, USA.

**Figure 4.** Flathead Sandstone in the Shoshone water gap, west of Cody, Wyoming, USA, with coarse-grained quartz pebbles.

Despite this call for further work to pin down the *tentative* choice, those studies have not been performed.

There are several problems with this argument. First, terms such as 'local' and 'regional' are subjective and unquantified. Second, large-scale Flood strata of the same lithology are not global or continental; they are regional to megaregional. Snelling noted that the Tonto Group at the bottom of the Grand Canyon covers only parts of the United States and Canada.[3] It is an extensive deposit—inexplicable to uniformitarians—but the criteria for correlation are not always precise. It is interesting that a similar sequence of lithologies is found in many places: Grand Canyon (figures 2 and 3), Wyoming, and Montana (figures 4 and 5). The sequence is: (1) Precambrian igneous or metamorphic basement, (2) erosion down to an erosion surface, (3) coarse sandstone, (4) shale, and (5) carbonate. Reed saw a similar sequence in the midcontinent region, but attributed it to the initial Flood transgression;[57] in other words, to the Flood's hydraulic processes rather than particular periods of time.

**Figure 5.** The Gordon Shale, a green shale above the Flathead Sandstone in Dearborn Canyon, southwest of Great Falls, Montana, USA, with multiple worm burrows.

Thus, creationists who see the rock record as a record of periods of time (even short ones during the Flood) rather than a record of hydrodynamic sedimentation, look for correlations based on ages determined by methods that they reject. Claiming, for example, that the Tonto Group extends over most of North America not only lacks convincing documentation, but it assumes correlation by time rather than process. Fossils or cycles determined by uniformitarian scientists are questionable at best in the Flood paradigm; it must be the *lithological* sequence and its inherent hydraulic properties that are documented. It is the lithology of the above sequence that can be correlated from Grand Canyon to Montana, but has this lithological sequence been verified for northern Canada and the Appalachian Basin west of the Blue Ridge Mountains?

Because uniformitarians have historically relied on biostratigraphy (based on evolution) to date strata, and because neocatastrophists have proposed nothing new, and because the International Commission on Stratigraphy is resorting to defining stage boundaries by fiat,[58] the true extent of Flood strata is unknown, and correlation is next to impossible. Geologists have tried and abandoned lithology, fossil content, and index fossils. Radiometric dating is unreliable, and problems abound with magnetostratigraphy and correlating sediments to astronomical cycles. Thus, Flood geologists must examine the question of correlation and seek a return to an empirical stratigraphy.[59]

But approximations are possible. For example, it appears that the Redwall Limestone at Grand Canyon might be correlated with the Madison Limestone in Wyoming, Montana, and the Black Hills of South Dakota. These in turn might be correlated to late Paleozoic limestones in the Midwest and the Appalachian Mountains. But none of this can be verified without extensive field and literature research. The Coconino Sandstone in Grand Canyon can be tracked east into New Mexico and western Texas

and probably into Kansas and Oklahoma,[60] but these are hardly continental-scale lithologies.

Mesozoic lithologies are not even subcontinental in scale; one type of strata cannot be traced too far. Mesozoic sedimentary rocks occur in great variety. For example, in the western United States, lithologies vary, but can be correlated over regional scale distances, such as the Jurassic Navajo sandstone and its equivalents (figure 6). The Morrison Formation covers over one million km$^2$ from southern Alberta and Saskatchewan, Canada, south to New Mexico, USA (figure 7). But lithology varies, and it is difficult to determine if it represents a single sedimentary event during the Flood, since it is dated by dinosaur fossils. Mesozoic sediments are rare in the Midwest and less extensive in the eastern United States. In any case, no geologist claims to be able to trace a single formation across North America.

This illustrates a presuppositional dilemma for creationists who accept the time scale as an accurate template of the rock record. It leads them to unconsciously follow their uniformitarian colleagues in thinking in terms of time rock units rather than specific formations. No Mesozoic stratum can be traced across North America, but the Mesozoic as a time unit represented by a variety of formations, can be. This illustrates a need for creationists to be more consistent in their work.


**Figure 6.** Extent of the Navajo Sandstone and its equivalent formations in the Western United States.

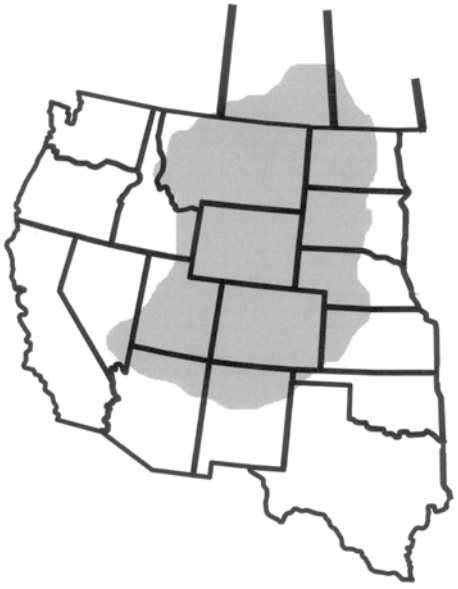

**Figure 7.** Area of Morrison Formation. (Drawing by Melanie Richard.)

This argument will not work if the *sedimentation events*, and not simply the era or period, are spread across the continent. Despite the presence of 'Mesozoic' rocks around the world, Flood geologists must recognize that the wide variety of lithologies and assemblages have been so named by applying the *a priori* template of the time scale, thus shortcutting the field work needed to really examine how the rock units can be correlated. Furthermore, the 'regional' scale of some western Mesozoic lithologies should, by the criterion under discussion, be post-Flood.[12]

Although Tertiary sedimentary rocks are smaller in scale than Paleozoic sedimentary rocks, their thickness and lateral extent is still abnormally large compared to present depositional environments. These sediments fill numerous basins in the western United States, often exceeding several thousand meters in thickness. The Hanna Basin in south-central Wyoming contains 7 km of upper Cretaceous, about 4.0 km of Early Tertiary (Paleocene), and 0.5 km of Late Tertiary sedimentary rock.[61] In southwest Montana, the Big Hole Valley contains 4,575 m of Tertiary sedimentary rocks. This basin is 75 km long by 20 km wide, with an average elevation of 2,135 m above sea level. More startling, erosion has removed an undetermined thickness of the top layers of Tertiary sediments. Examples could be multiplied—Imperial Valley in Southern California contains about 6,000 m of sedimentary rocks dated as 'Late Tertiary'.

The western United States is not unique. Many thousands of meters of Tertiary sedimentary rocks form the continental shelf, slope, and rise as a sheet around all continents and large islands. There is especially a vast volume of post-Cretaceous sedimentary rock in the Gulf Coastal Plain and Gulf of Mexico, as well as the massive thickness of the Atlantic Coastal Plain and its extension as the continental shelf. Thick Tertiary deposits are found all over the world and would extend this paper to book length to describe. For instance, Late Tertiary sedimentary rocks are 6,000 to 8,000 m thick in the basins surrounding the Himalaya Mountains.[62] The point is that these rocks, while not as continuous or extensive as their Paleozoic or Mesozoic counterparts would be virtually impossible to describe in terms of post-Flood processes. In many cases, they fit much better into the category of late-Flood deposits, created as the Floodwater drained from the continents, eroding and depositing in one last burst of sedimentation.

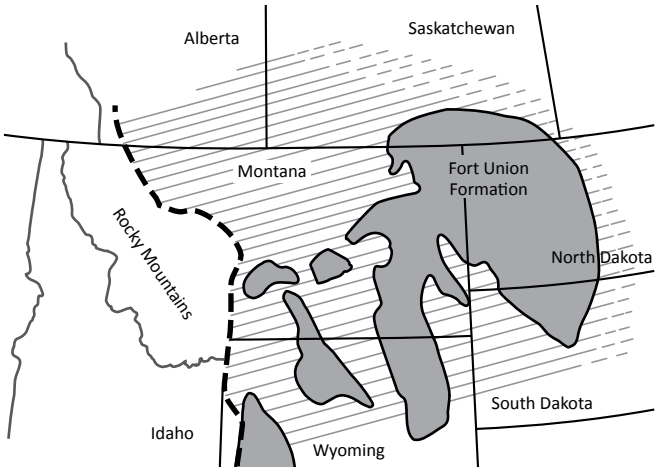


**Figure 8.** Extent of the Fort Union Formation (solid pattern) and the area from which uniformitarian scientists believe it was eroded (slanted pattern). The combined area is about 450,000 km$^2$. Some creationists believe this formation was laid down and eroded after the Flood. (Drawing by Melanie Richard.)

**Figure 9.** Wyodak coal seam, Powder River Basin, near Gillette, Wyoming, USA.

**Figure 10.** Sentinel Butte, western North Dakota, USA, a flat-topped mesa about 300 m above the Fort Union Formation. This mesa shows that at least 300 m of sedimentary rock was eroded from on top of the Fort Union Formation.

Photograph by John Whitmore

**Figure 11.** 600-m high sedimentary erosional remnants in the background from the northern Greater Green River Basin, southwest Wyoming, USA. The Boar's Tusk, the throat of a volcano over 100 m high, is in the foreground.

Advocates of post-Flood deposition of these rocks need to specify the processes that would have deposited them in the biblical timeframe. Nebulous 'post-Flood' catastrophes seem incomplete at best. Consider the western United States basins. Erosion from surrounding mountains is difficult to believe if base level was modern sea level, since the mountains reach altitudes above 3,000 m. If synchronous tectonism occurred, it created basins up to about 10 km deep that were then filled. That scale of tectonism in a short time period argues for Flood scale processes. How would Ark survivors propagate and fill such dangerous regions to provide all the fossils needed?

The early Tertiary Fort Union Formation covers about 150,000 km$^2$ of eastern Montana, western North Dakota, parts of Wyoming and South Dakota, and part of adjacent Saskatchewan, Canada (figure 8). The area where it is suppose to have been eroded is about 300,000 km$^2$. Whitmore and Garner[20] think this formation is post-Flood. But it includes dozens of coal layers combining to more than 100 m thick, including the Wyodak Coal Seam at Gillette, Wyoming (figure 9). What is the source of plant material after the Flood and how was it transported, concentrated, and buried here? Could thick, nearly pure, extensive coal seams have formed after the Flood? To make it more difficult to explain, at least 300 m of sedimentary rock above the Fort Union Formation was eroded (figure 10).

It seems unusual that these events would occur after the Flood. Also, where is the erosional debris from these post-Flood catastrophes? We do not find it on the continent. That means that these post-Flood catastrophes transported rocks from the center of North America to the surrounding oceans—a feat more likely of the Flood. It is even more unlikely if they accept uniformitarian classifications of these rocks as 'non-marine'. We need concrete hypotheses and mechanisms.

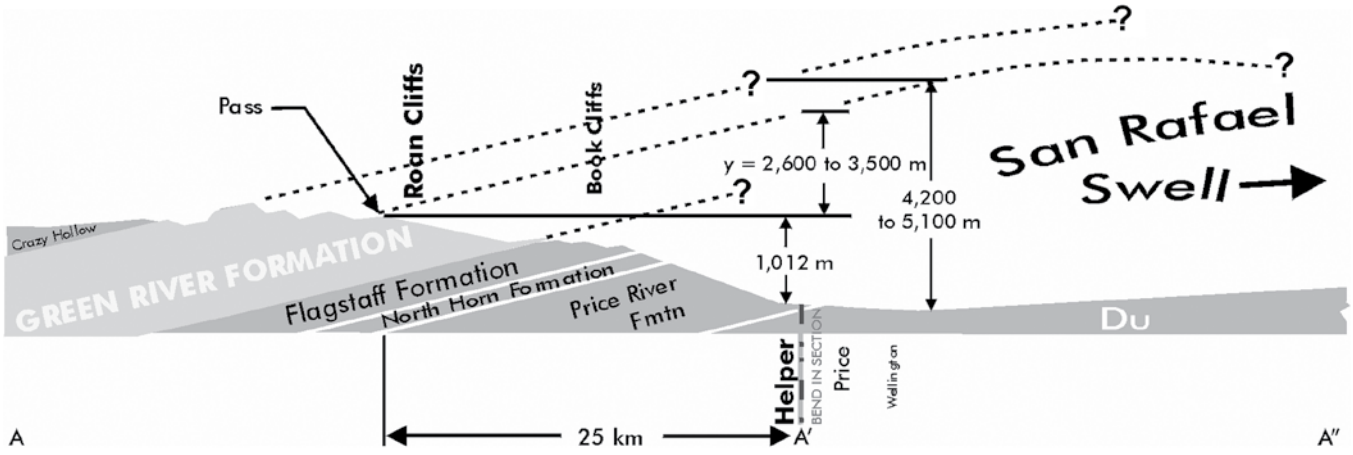


**Figure 12.** Cross-section of the sedimentary rocks of the north limb of the San Rafael Swell, central Utah, USA. Dashed lines with question marks show the strata projected up over the San Rafael Swell, assuming no change in thickness. 'Du' means diluvial undifferentiated. Note that the total erosion is 4.2 to 5.1 km. (Drawn by Peter Klevberg.)

Finally, an examination of the geomorphology of the western United States shows widespread scour and erosion that occurred *after* Tertiary sedimentary rocks were laid down. Thousands of feet of sedimentary rock were removed. Valley fills have been eroded at least 300–600 m, for instance in the Greater Green River Basin and Fossil Basin of southwest Wyoming, based on erosional remnants and eroded anticlines (figure 11). The best-known example is the Colorado Plateau which lost an *average* of 2.5 to 5 km.[63] Since the Colorado Plateau is 337,000 km$^2$, the volume of erosion was 842,000 to 1,700,000 km$^3$. In one area of the northwestern Colorado Plateau, is the San Rafael Swell, an eroded anticline about 125 km long by 50 km wide.[64] Its north limb lost between 4.2 to 5.1 km to erosion,[55] near Price, Utah (figure 12). Since the uppermost eroded formation is the Green River, then this vast erosive event must have occurred well after the Flood. How did it happen, and where is the sediment?

The timing is clear (at least for those accepting the time scale sequence). Practically all of this erosion took place in the Tertiary. Schmidt stated:

> "What erosional mechanism has been capable of removing such an amount of material [2,500 to 5,000 m] since the period of denudation began in a geologically brief timespan, i.e. since the beginning of the Tertiary in the anticlinal uplifts and since the end of the Eocene in the basins?"[65]

He asks a good question of both uniformitarian and post-Flood catastrophists. These problems can be easily resolved, however, if it is attributed to the Retreating Stage of the Flood.[40,66] If not, then alternative, reasonable mechanisms must be suggested to account for the deposition of thick Tertiary deposits and the vast erosive scour of the continent after the Flood. Even tsunamis, supervolcanic eruptions, hypercanes, and meteorite impacts cannot account for the actual field data. Hypercanes, for instance, require still air and hot water to develop, and these conditions would not exist or else would be rare after the Flood.[55] Besides, hypercanes, just like hurricanes, would dissipate rapidly moving inland, and therefore would be ineffective in causing huge amounts of rain for erosion far inland from the oceans.

I have examined one area in detail—the western United States, but I suspect that it is the same all over the world. The claim that Tertiary sedimentary rocks are post-Flood because they extend over a smaller area than the supposed continental scale of some Paleozoic and Mesozoic rocks ignores the inability of non-Flood events to accomplish this work and it ignores the mechanisms operating during the Flood—mechanisms that would have produced quite different results during the early, middle, and late stages of the Flood. Furthermore, to say that small-scale sedimentation could not happen during the Flood makes a cartoon of the event, ignoring the vast variety in hydraulic and geologic conditions that would have existed at different times and places. Table 2 summarizes the problems with this first argument for the K/T boundary as the end of the Flood.

**Table 2.** Summary of some of the difficulties with assuming that the Flood/post-Flood boundary is the change from worldwide/continental to local/regional sedimentation.

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| 1. Definitions of local, regional, and subcontinental not specified |
| 2. Continental/global scale lithological sequences not demonstrated |
| 3. Mesozoic 'regional' |
| 4. Tertiary deposits can be thick and of regional extent |
| 5. Great erosion of the tops of Tertiary and other sedimentary rocks. |

## Conclusion

At one time, the K/T boundary was considered a logical post-Flood boundary. Evidence has been suggested to support that position. Part 1 of this article focused on one of these

evidences: the change from worldwide/continental to local/regional sedimentation. However, this criterion is vague in that the definitions of local, regional, and subcontinental are not specified. Furthermore, it is doubtful there are any continental scale lithological layers or sequences, not to speak of worldwide. Mesozoic and Tertiary sedimentary rocks, although local and regional, are commonly of great thickness and relative extent—far beyond any present day observed processes. Then after all the sedimentary rocks were laid down, a great erosion event eroded off over 5 km of sedimentary rocks in places. It is also doubtful that any post-Flood catastrophic scenarios can account for such observations. Five other evidences suggested for the K/T boundary hypothesis will be analyzed in part 2.

## Acknowledgement

I thank John Reed for reviewing an earlier manuscript and offering many helpful suggestions. I also thank Melanie Richard for drawing figures 7 and 8.

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*CRSQ—Creation Research Society Quarterly*

*JofC—Journal of Creation, formerly TJ* and *Creation Ex Nihilo Technical Journal*

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