Flood processes into the late Cenozoic: part 1—problems and parameters

Michael J. Oard

An integral part of any comprehensive Flood model is discerning the distinction between Flood processes and post-Flood catastrophism in the rock record. The characteristics of the continental shelf, slope, and rise suggest that the location of the boundary was reasonably synchronous on a global scale. However, there is no consensus among Flood geologists on where the post-Flood boundary should be placed. The geological column concept provides a useful framework of discourse for examining different approaches to the post-Flood boundary among creationists. There are three main schools of thought: (1) the Precambrian/Paleozoic Boundary Model, (2) the K/T Boundary Model, and (3) the Late Cenozoic Boundary Model. Each one makes different assumptions and has specific issues that need addressing. Multiple criteria spanning several fields of study need to be used to examine this issue since just one can be equivocal.

The development of a sophisticated Flood model is important to creation scientists and Christians alike. A model that is capable of integrating geology, geophysics, paleontology, and geomorphology into a coherent description of the global Flood would have great apologetic value. An integral part of such a project is understanding the nature, scope, and intensity of Flood and post-Flood processes reflected in the rock record. Distinctions that can be discerned between Flood and post-Flood phenomena will aid us in determining the location of the Flood/post-Flood boundary.

The Flood/post-Flood boundary can be defined as a horizontal line in a vertical sequence of rock and sediments below which rocks were deposited during the Flood, and above which rocks and sediments have been deposited after the Flood. Placement affects many details of a Flood model, especially the late Flood period. Our understanding of where the post-Flood boundary is located is affected by how we understand the distinction between Flood and post-Flood processes. It also reflects how we understand the extent and intensity of post-Flood catastrophism because we need to explain the rocks, fossils, and sediment above the boundary as deposited by post-Flood processes. Baraminology is affected as well, since it determines the degree of post-Flood animal and plant diversification.[1,2] Unfortunately, within Flood geology, the scope and intensity of post-Flood catastrophism, the relation between Flood and post-Flood processes, and hence the location of the Flood/post-Flood boundary are all still very controversial.

Is there a boundary?

Some may ask: "Is there a discernible boundary?" Did the Flood end before Day 371 in some places but continue on for some time, possibly many years, in other places? Or was the Flood complete on Day 371 everywhere on Earth? Either way, there has to be a boundary at numerous locations,[3] whether it is synchronous or not. Nonetheless, unique features of the continental margins suggest the latter.

The uniqueness of the continental margin

Although few uniformitarian scientists address this issue, the continental shelf and slope are unique geomorphological features that are difficult for them to explain. The continental shelf is a seaward extension of the continent, or coastal plain, from the shoreline to the shelf break or shelf edge. The shelf edge is the seaward terminus of the continental shelf and the beginning of the continental slope. The continental shelf dips very gently seaward at less than 0.1°, with a subdued relief of less than 20 m. The seaward width of continental shelves varies considerably from several km to more than 400 km, the average being 80 km. At least one shelf is over 1,000 km wide.[4] The widest shelves are found along the Arctic Ocean. The Bering Sea, Grand Banks, and Newfoundland shelves are also very wide. The continental slope is a sharp 'drop-off' down to abyssal depths. The sedimentary rocks that make up the continental margin are often very thick, reaching over 15 km, and show a seaward thickening wedge of slightly dipping sediment rocks (figure 1). The margin is like a *continuous sheet* of strata around all continents and large islands.

King described the problem of the origin of the continental margin:

> "There arises, however, the question as to what marine agency was responsible for the leveling of the shelf in early Cenozoic time, a leveling that was preserved, with minor modification, until the offshore canyon cutting of Quaternary time? Briefly *the shelf is too wide, and towards the outer edge too deep*, to have been controlled by normal wind-generated waves of the ocean surface [emphasis added]."[5]

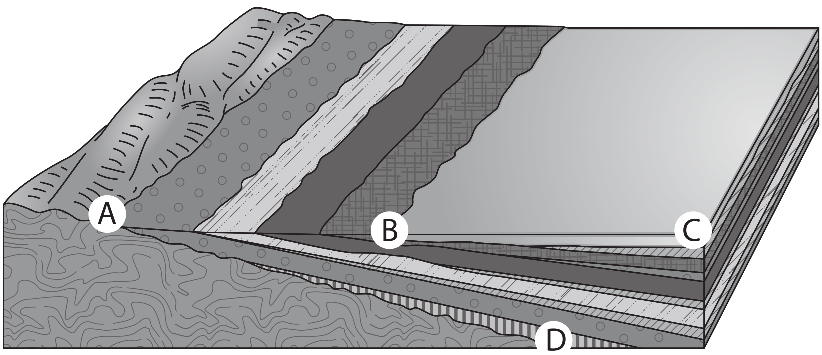

Figure 1. The seaward thickening wedge of sedimentary rock (drawn by Mrs Melanie Richard)

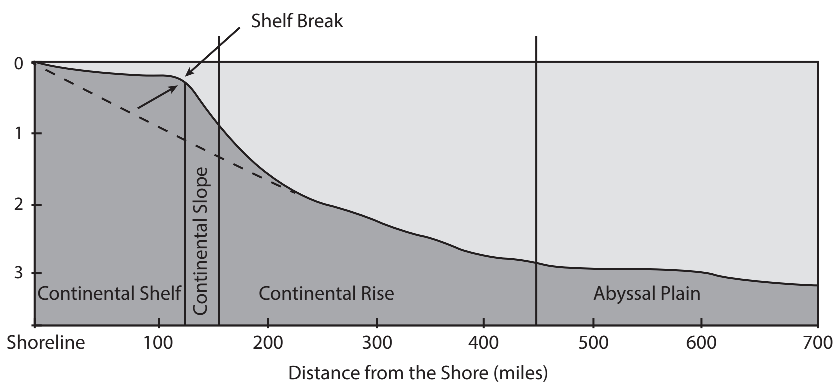

Figure 2. Principal features of an Atlantic-type margin with a vertical exaggeration of about 1/50 (drawn by Mrs Melanie Richard). Note the dashed line, which represents the slope that should occur after millions of years of the action of normal wind-driven currents in the ocean today.

When King wrote, it was widely believed submarine canyons were of Quaternary age, but now they are believed to be much older. It would seem that natural processes, such as shore parallel currents and mass wasting, would favour a gradual descent of the slope to the ocean depths. Figure 2 contrasts the shape of the continental margin today versus what seems more likely under actualistic conditions.

Continental margins formed by Flood runoff

The continental margins represent massive, widespread deposition over a huge area. It is logical to conclude that the margin sediments came from the continents. Their shape and form indicate sediment-filled, continent-wide Flood currents once rushed into the deepening ocean.[6] Continental slopes likely signify the edge of this sheet flow deposition. This deposition would be analogous to the formation of a river delta; the top of the delta

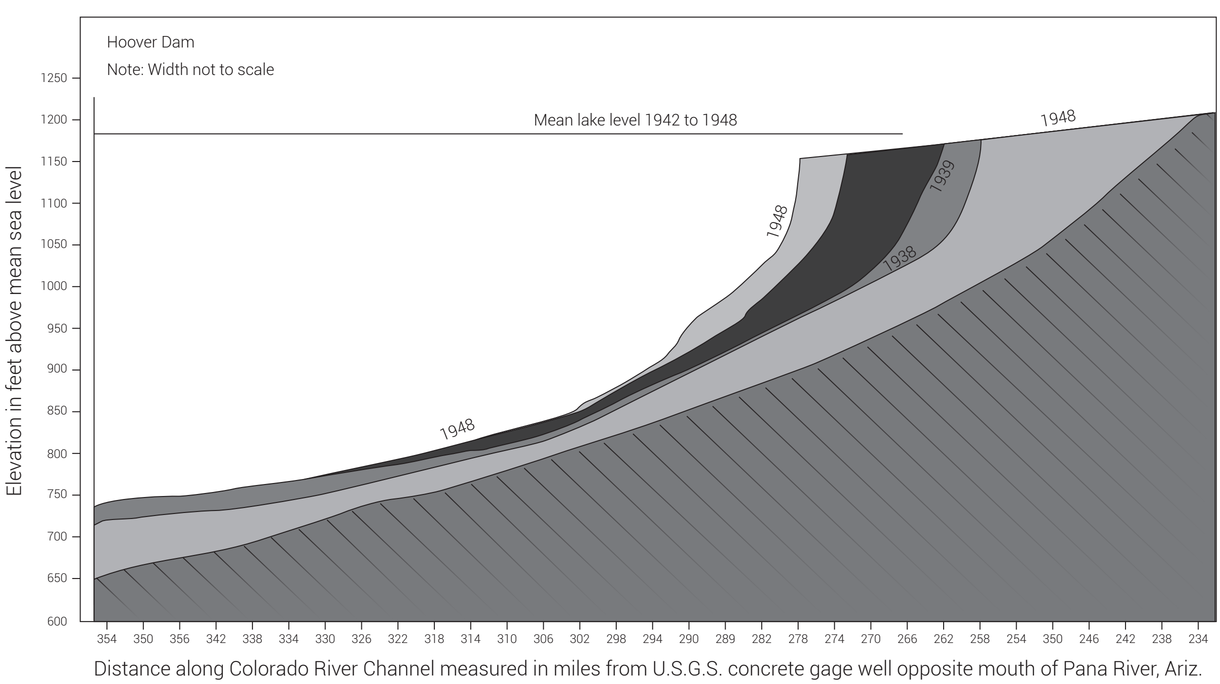

Figure 3. The yearly prograding Colorado River delta into Lake Mead in the Lower Granite Gorge from 1938 to 1948 (drawn by Mrs Melanie Richard; from Kostic *et al.*)

resembles the continental shelf and the edge of the delta the continental slope. The analogy breaks down, since most deltas can spread parallel to the shore.

However, a case where the delta could not move parallel to the shore is found in the recently formed delta of the Colorado River.[7] It formed as Lake Mead filled with water and the Colorado River met with Lake Mead in the narrow Lower Granite Gorge (figure 3). There were no currents along the shore to spread the sediments since they were deposited in a narrow gorge. As such, deposition developed parallel to the flow of the river. Figure 3 shows the top of the delta is nearly flat with a slight lakeward slope until it reaches a steep drop-off. If the Colorado River delta feature is comparable to the continental shelf and slope, this example gives an illustration of how the continental shelf and slope would likely have formed when wide Flood sheet currents flowed off the rising continents.

The top of the continental slope is generally at a *consistent depth* of 130 m off all continents, except Antarctica where there has been isostatic depression by the massive ice sheet.[8] If the Flood continued for many more years on some continents and not others, this shelf break would not have a similar depth. Instead it would be at variable depths due to variable offshore flow and vertical tectonics. It takes *energy* to erode and transport sediment to the margin. This would have to be supplied by continuing tectonics. The similar depth implies the tectonics and energy sustaining the Flood stopped at about the same time everywhere on Earth. If one continent continued to rise slowly for e.g. 100 years after the Flood, it would then have only weak currents with weak tectonics and form small continental margin sediments at different water depths (figure 4). In that situation shore-parallel deposition would be more likely. A chaos of small delta-like features should be found along the continental margin.

Considering the geomorphology of the continental margin, it appears the Flood and differential vertical tectonics ended everywhere by Day 371 (there could of course have been very minor tectonics at the margins). It appears the Flood did not stop in one part of the world and continue on in other parts.

The geological column as a tentative reference system

Communicating the location of the post-Flood boundary is an important part of the task of assessing different conceptions of post-Flood catastrophism. Uniformitarian scientists have developed a global sequence of events called the geological column but can this geological column be used as a first approximation for the sake of discussion? The geological column is another controversial issue within creation science.[9] Some creationists believe the geological column is an absolute sequence of biblical earth history, while others believe we should discard it entirely, and some, like myself, take a middle position that the geological column represents a general order with time with many exceptions.[10–12] The geological column would then represent a Flood depositional order. Ecological zonation would be one major ordering variable.

Table 1. The three main schools of thought for the location of the Flood/post-Flood boundary assuming the geological column

Model
The Precambrian/Paleozoic Boundary Model
The K/T Boundary Model
The Late Cenozoic Boundary Model

Nonetheless, these different views are focused on the usefulness of the geological column *for describing the empirical rock record*, not its usefulness *as an established convention of geological discourse*. And since the geological column is an established framework of geological discourse, it serves as a useful way to communicate the location of the post-Flood boundary across ideological lines. If there is a globally synchronous post-Flood boundary identifiable with some level in the geological column, then it would obviously make sense to use the geological column to communicate the location of the post-Flood boundary. However, even if the post-Flood boundary is identified as e.g. Upper Miocene at one location and Middle Pleistocene at a different location, this doesn't invalidate the use of the geological column as a convention for discourse, though it may call into question its accuracy as a reflection of the empirical rock record. The Flood geologist can say that the catastrophic nature of the Flood and the compressed absolute timescale reflected in the rock record (relative to the deep time framework) both provide enough reason in themselves to expect some geographical variation in the stratigraphic placement of the post-Flood boundary with respect to the geological column. Flood geology has no *a priori* commitment to the geological column. Therefore, using the geological column as a convention for discourse doesn't necessarily imply either that there is, or that there isn't, any real-world correspondence between the empirical rock record and the geological column. As such, if we merely use the geological column as a convention for geological discourse, we can set aside the debates about how well the geological column represents the reality of the empirical rock record and focus our attention on the placement of the boundary without the need to engage in an extended discussion on the reality of the geological column. Later, we can go back and remove the assumption of the geological column and either refine the placement of the Flood/post-Flood boundary within local or regional rock columns or use another global model, such as Walker's biblical geological model.[6]

The Flood/post-Flood boundary controversy is mainly focused at or above the Cretaceous/Tertiary boundary in the geological column; i.e. in the Cenozoic erathem (figure 5). The 'early Cenozoic' corresponds to the Paleogene system and the 'late Cenozoic' corresponds to the Neogene and Quaternary systems (figure 5). If all or most of the Cenozoic is post-Flood, then the activity deduced from geology, paleontology, tectonics, and geomorphology of the Cenozoic must occur *after* the Flood and diversification as seen in Cenozoic fossils occurred after the Flood. Conversely, if the boundary is in the late Cenozoic, especially in the very late Cenozoic, diversification after the Flood evinced in the rock record is slight.

The three main schools of thought

Three main schools of thought or models have developed in regard to the location of the Flood/post-Flood boundary (table 1).[13] They represent a considerable divergence of opinion and as a result, contradictory concepts of the Flood have developed.

The Precambrian/Paleozoic Boundary Model

The first school of thought believes that the Flood/post-Flood boundary is generally in the late Paleozoic.[14–22] One suggested model is the recolonization model, which states that the rocks and fossils in the geological column above the boundary represent a 'recolonization' of organisms from Flood refugia. According to this model, animals came off Noah's Ark and spread from the "mountains of Ararat" beginning in the Paleozoic. However, some advocates place the boundary event even lower—in the late Precambrian. One such model is the Collapse Tectonics Model,[23] which was recently reviewed in this journal.[24]

Advocates of the Precambrian/Paleozoic Boundary Model believe that certain features in the rocks seem to require much more time than a one-year Flood allows, such as dinosaur tracks, eggs, and scavenged bonebeds. They attempt to find more time for these features to form after the Flood. Because of the scale of the sedimentary rocks, they must posit at least regional- to continental-scale post-Flood catastrophes,[23] such as continental split at the time of Peleg[25] to explain such a large amount of post-Flood sedimentary rocks and fossils. Moreover, they do not seem to be careful in suggesting certain features of the rocks and fossils could not be produced during the Flood. We have a few hundred such challenges in the earth sciences anyway. Some we have found good answers for,[26] while many others await research.

Few creation scientists accept the Precambrian/Paleozoic location of the Flood/post-Flood boundary. Because the model is not well developed, I will not compare this model in this series of papers. Many find that the model causes many more problems than it solves.[27]

The K/T Boundary Model

The second school of thought believes the Flood/post-Flood boundary is near the Cretaceous/Tertiary (K/T) boundary in the geological column.[28–33] Some within this school believe the boundary could be in the early Cenozoic,[34,35] at least in places. I will simplify and group all these positions into the K/T Boundary Model for the sake of discussion, realizing that some favour the early Cenozoic.

In this school of thought, most, if not all, the Cenozoic strata would have been laid down after the Flood. Similar to advocates of the Precambrian/Paleozoic Boundary Model, they conclude that certain rocks and fossils, as well as deduced processes, take more time than a one-year Flood. For instance, they point out that the Cenozoic cooling curve, especially from ocean bottom sediments, is evidence of slow cooling after the Flood.[36] They also believe that kangaroos found in karst deposits in Australia, dated as old as Miocene, show that the boundary is near the K/T.[37] The kangaroos would have to spread out from the "mountains of

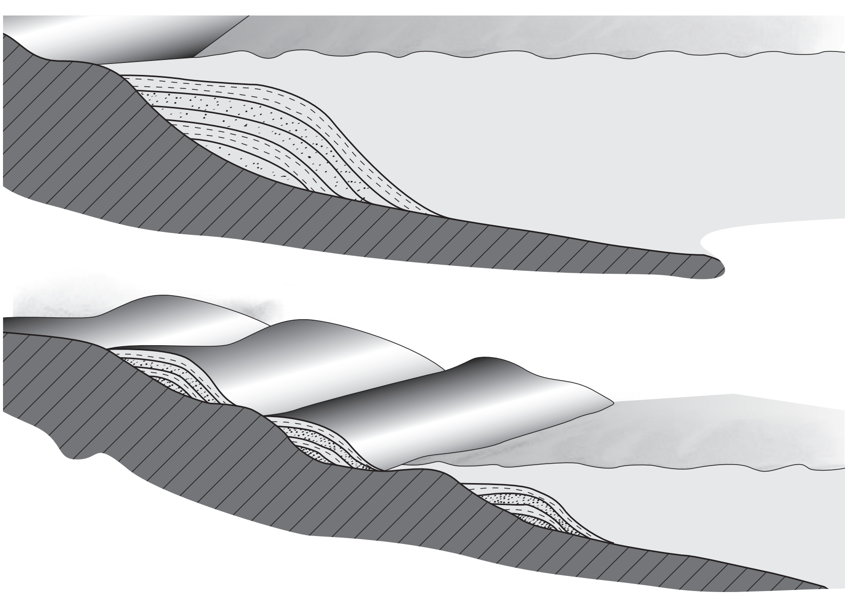

Figure 4. Comparison of the continental shelf and slope today (top) with multiple continental shelves that likely would have formed if the Flood did not end for many years in some areas (bottom) (drawn by Mrs Melanie Richard)

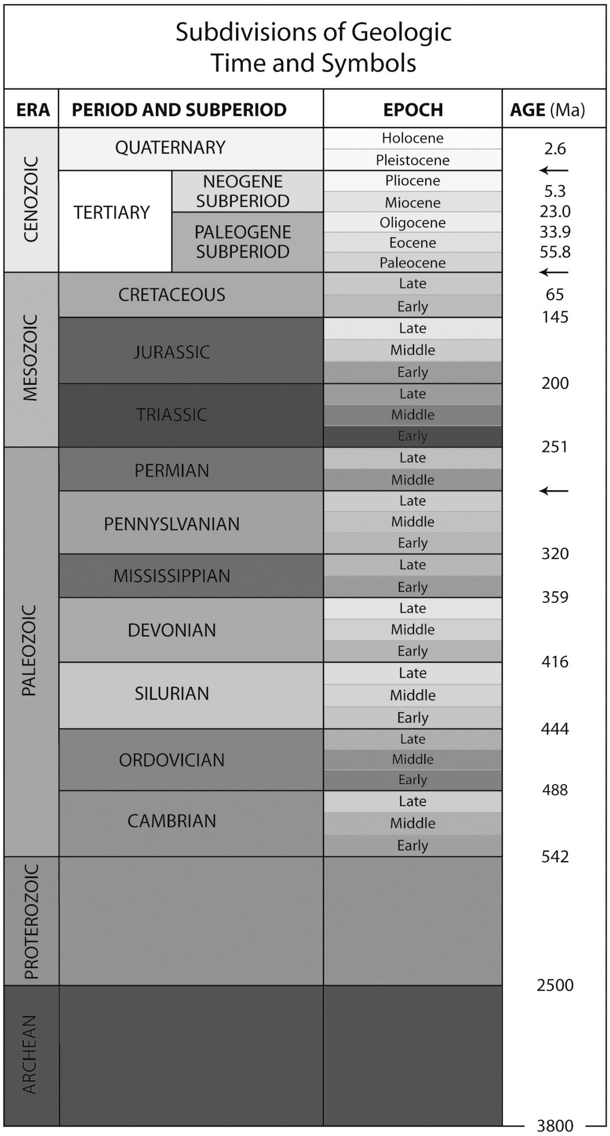

Figure 5. The geological column from 3.8 Ga ago to the present. Arrows on right side show the three main boundary locations.

Ararat" and reach Australia in the early to mid Cenozoic. Fossil occurrences also seem to indicate that much of the Cenozoic is post-Flood.[38–40]

However, this school of thought needs to explain geomorphological features on the Earth's surface that appear to have been formed by fast-moving water.[41,42] For instance, planation and erosion surfaces have planed folded and faulted rock, sometimes leaving behind erosional remnants (figure 6). Some of these planation surfaces are huge, such as the one that has flattened much of Africa with variable faulting and folding afterwards.[43] Hard, well-rounded quartzite cobbles and boulders have been transported by water for many hundreds of kilometres east and west from their source in the Rocky Mountains of central and northern Idaho and extreme western Montana.[41,42] The long transport is about 1,200 km into central Saskatchewan and south-west Manitoba, Canada, from Idaho. Another example is the thick Cenozoic strata found in many basins of the world, such as the 26–28 km of mostly Cenozoic strata from the 450 km diameter South Caspian Basin![44] There is also the problem of thick, widespread coal seams.[45]

Recently, Whitmore has offered an explanation for how the Cenozoic can be post-Flood.[46] This defence extends his previous articles on the subject from the 2008 International Conference on Creationism.[47,48] He has presented a case that post-Flood mass wasting of generally unlithified sediments occurred during mountain uplift, heavy precipitation, a lack of vegetation, giant earthquakes, meteorite impacts, and massive volcanic activity. Whitmore concludes he can explain the geology, paleontology, tectonics, and geomorphology by placing the Cenozoic after the Flood. Mass wasting or mass movement refers to all the processes by which soil and rock are eroded and transported downslope by gravity.[49] It includes slow displacements, such as creep, and rapid movements such as rock falls, rockslides, and debris flows.

The Late Cenozoic Boundary Model

The third school of thought believes the Flood/post-Flood boundary is near the end of the Cenozoic.[50–60] Critics of this position have claimed advocates believe the boundary is at the Pliocene/Pleistocene.[33] This is not so. Late Cenozoic is a broad range because we are assuming the geological column, which is not precise enough to pinpoint the boundary worldwide. There too many problems with the precise dating of the geological column to use it for more than a general order.[10–12]

In practice, this school of thought believes that most of the lithified sedimentary rocks are from the Flood, and the boundary is near or at the surface of these rocks. Therefore, it assigns practically all Cenozoic catastrophes to the Flood. This school of thought questions whether inferences made from Cenozoic activity could have taken place after the Flood. For instance, how can thousands of metres of erosion over wide areas occur? How can thousands of metres of deposition occur in basins and other areas of the world? How can thick, widespread Miocene coal seams be explained? How can thick, widespread 'evaporites' from the late Miocene of the Mediterranean area be explained after the Flood? Post-Flood catastrophism in this model would include greater volcanism, earthquakes, shifts in the land at faults, probably due to the earth settling down after the Flood, but on a considerably smaller scale than other schools of thought. And of course the Ice Age is one of these 'catastrophes' postulated by this school.

On the other hand, the late Cenozoic Flood Model must explain a few hundred earth science challenges that appear

Figure 6. The erosion surface with erosional remnants on the eastern Australia Tableland (view west). The sedimentary rocks below the erosion surface of the Tableland are tilted at various angles.

to take more time than a one-year Flood would allow, such as 'fossil reefs', worm burrow zones, basalt lava flows, and buried soil zones.[61] The Flood/post-Flood boundary can be very difficult to pinpoint in some regions, for instance the Ashfall Fossil Beds State Historical Park in north-east Nebraska, USA,[62] the super-eruptions of Yellowstone National Park,[63] and the sediments and sedimentary rocks along the Arctic coast of North America.[64]

An interdisciplinary approach required

There is a great deal of subjectivity in such an evaluation of post-Flood catastrophism:

> "The list of criteria is not exhaustive, and there may be debate on the relevance of each criterion. The criteria are currently qualitative, but it is hoped that further research will enable quantification."[55]

Whitmore and Garner concur:

> "Obviously, this is a subjective evaluation on our part and may be open to criticism. Other young-age creationists may disagree with us concerning the relative importance of our criteria and may be able to suggest other criteria we have not included."[65]

This is precisely why defining the post-Flood boundary must be an interdisciplinary endeavour. Because of the importance of developing a sophisticated Flood model, and the controversy over the nature and extent of post-Flood catastrophism, it is essential to study as much evidence as possible before determining the Flood/post-Flood boundary. Just a few fields of study, such as sedimentology, paleontology, or geomorphology, are not enough. They should be included but along with other fields of earth science. One field taken alone may be misleading.

The way forward

The only way forward on this contentious issue is to lay all the 'cards' on the table. For this I am grateful that Whitmore has presented mechanisms that can account for the Cenozoic being post-Flood. For my part, I too will encourage disagreement. In this way, we can all analyze the pros and cons of our different assessments of the nature of post-Flood catastrophism, and hopefully come to a consensus.

In forthcoming papers, I plan to identify over 30 features generally evident into the Late Cenozoic rocks that reflect Flood processes rather than post-Flood catastrophism. I will not address just one field or subfield of study but many within the earth sciences. I will also reflect on current assessments of these features by those who apportion most of the Cenozoic to post-Flood catastrophism to determine the relative difficulty current post-Flood explanations of these features face.

It is possible that with more research the K/T Boundary Model may be able to explain one or several of these evidences better than the Late Cenozoic Boundary Model. However, the K/T Boundary Model would have to better explain most of these 30-plus evidences to be the superior model.

Acknowledgements

I thank all the reviews and editors, including my wife Beverly, for improving the content and the flow of this article.

References

1. Cavanaugh, D.P., Wood, T.C. and Wise, K.P., Fossil equidae: a monobaraminic, stratomorphic series; in: Ivey Jr, R.L. (Ed.), *Proceedings of The Fifth International Conference on Creationism, technical symposium sessions*, Creation Science Fellowship, Pittsburgh, PA, pp. 143–153, 2003.
2. Wise, K.P. and Croxton, M., Rafting: a post-Flood biogeographic dispersal mechanism; in: Ivey Jr, R.L. (Ed.), *Proceedings of The Fifth International Conference on Creationism*, technical symposium sessions, Creation Science Fellowship, Pittsburgh, Pennsylvania, PA, pp. 465–477, 2003.
3. This would especially apply in areas of continuous deposition through the boundary. But even in areas of post-Flood erosion or mass wasting, there would be a boundary if deposition occurred afterwards.
4. Hedberg, H.D., Continental margins from the viewpoint of the petroleum geologist, *AAPG Bulletin* **54**(1):6, 1970.
5. King, L.C., *Wandering Continents and Spreading Sea Floors on an Expanding Earth*, John Wiley and Sons, New York, p. 199, 1983.
6. Walker, T., A Biblical geological model; in: Walsh, R.E. (Ed.), *Proceedings of the Third International Conference on Creationism*, technical symposium sessions, Creation Science Fellowship, Pittsburgh, PA, pp. 581–592, 1994.
7. Kostic, S., Parker, J. and Marr, G., Role of turbidity currents in setting the foreset slope of clinoforms prograding into standing fresh water, *J . Sedimentary Research* **72**(3):353–362, 2002.
8. Kennett, J., *Marine Geology*, Prentice-Hall, Englewood Cliffs, NJ, p. 29, 1982.
9. Reed, J.K. and Oard, M.J. (Eds.), *The Geologic Column: Perspectives within Diluvial Geology*, Creation Research Society Books, Chino Valley, AZ, 2006.
10. Oard, M.J., The geological column is a general Flood order with many exceptions; in: Reed, J.K. and Oard M.J. (Eds.), *The Geological Column: Perspectives within Diluvial Geology*, Creation Research Society Books, Chino Valley, AZ, pp. 99–121, 2006.
11. Oard, M.J., Is the geological column a global sequence? *J. Creation* **24**(1): 56–64, 2010.

12. Oard, M.J., The geological column is a general Flood order with many exceptions, *J. Creation* **24**(2):78–82, 2010.
13. Tyler, D.J., Flood models and trends in creationist thinking, *Creation Matters* **2**(3): 1–3, 1997.
14. Garner, P., Where is the Flood/post-Flood boundary? Implications of dinosaur nests in the Mesozoic, *J. Creation* **10**(1):101–106, 1996.
15. Garner, P., Continental flood basalts indicate a pre-Mesozoic Flood/post–Flood boundary, *J. Creation* **10**(1):114–127, 1996.
16. Garton, M., The pattern of fossil tracks in the geological record, *J. Creation* **10**(1): 82–100, 1996.
17. Tyler, D.J., Tectonic controls on sedimentation in rocks from the Jurassic Series (Yorkshire, England); in: Walsh, R.E. (Ed.), *Proceedings of the Third International Conference on Creationism*, technical symposium sessions, Creation Science Fellowship, Pittsburgh, PA, pp. 535–545, 1994.
18. Tyler, D.J., A post-Flood solution to the chalk problem, *J. Creation* **10**(1): 107–113, 1996.
19. Robinson, S.J., From the Flood to the Exodus: Egypt's earliest settlers, *J. Creation* **9**(1):45–68, 1995.
20. Robinson, S.J., Can Flood geology explain the fossil record? *J. Creation* **10**(1): 32–69, 1996.
21. Scheven, J., The Flood/post-Flood boundary in the fossil record; in: Walsh, R.E. and Brooks C.L. (Eds.), *Proceedings of the Second International Conference on Creationism*, volume II, Creation Science Fellowship, Pittsburgh, PA, pp. 247–256, 1990.
22. Scheven, J., The Carboniferous floating forest—an extinct pre-Flood ecosystem, *J. Creation* **10**(1):70–81, 1996.
23. Budd, P.G., *Earth in Cataclysm*, self-published, 2014.
24. Whitmore, J.H., The importance and necessity of quality peer review, review of *Earth in Cataclysm* by Philip G. Budd, *J. Creation* **28**(2):51–54, 2014.
25. Nelson, D.P., *Peleg: Early Earth Movements*, self-published, 2007.
26. Oard, M.J. and Reed J.K. (Eds.), *Rock Solid Answers: The Biblical Truth Behind 14 Geological Questions*, Master Books and Creation Research Society Books, Green Forest, AR and Chino Valley, AZ, 2009.
27. Reed, J.K., Kulikovsky, A.S. and Oard, M.J., Can recolonization explain the rock record? *Creation Research Society Quarterly* **46**(1):27–39, 2009.
28. Austin, S.A., A creationist view of Grand Canyon strata; in: Austin, S.A. (Ed.), *Grand Canyon—Monument to catastrophism*, Institute for Creation Research, Santee, CA, pp. 57–82, 1994.
29. Austin, S.A., Baumgardner, J.R., Humphreys, D.R., Snelling, A.A., Vardiman, L. and Wise, K.P., Catastrophic plate tectonics: a global flood model of earth history; in: Walsh R.E. (Ed.), *Proceedings of the Third International Conference on Creationism, technical symposium sessions*, Creation Science Fellowship, Pittsburgh, PA, pp. 609–621, 1994.
30. Brand, L., *Faith, Reason, and Earth History*, Andrews University Press, Berrien Springs, MI, 1997.
31. Wise, K.P., *Faith, Form, and Time: What the Bible Teaches and Science Confirms about Creation and the Age of the Universe*, Broadman & Holman Publishers, Nashville, TN, 2002.
32. Wise, K.P and Richardson, S.A., *Something from Nothing—Understanding What You Believe about Creation and Why*, Broadman & Holman Publishers, Nashville, TN, 2004.
33. Ross, M.R., Evaluating potential post-Flood boundaries with biostratigraphy—the Pliocene/Pleistocene boundary, *J. Creation* **26**(2):82–87, 2012.
34. Snelling, A.A., *Earth's Catastrophic Past: Geology, Creation & the Flood*, volume 2, Institute for Creation Research, Dallas, TX, pp. 751–761, 2009.
35. Snelling, A.A., The Geology of Israel within the Biblical Creation-Flood Framework of History: 2. The Flood Rocks, *Answers Research J.* **3**: 267–309, 2010.
36. Vardiman, L., *Sea-Floor Sediments and the Age of the Earth*, Institute for Creation Research, Dallas, TX, 1996.
37. Snelling, A.A., *Earth's Catastrophic Past: Geology, Creation & the Flood*, vol. 2, Institute for Creation Research, Dallas, TX, pp. 760–761, 2009
38. Ross, M.R., Evaluating potential post-Flood boundaries with biostratigraphy—the Pliocene/Pleistocene boundary, *J. Creation* **26**(2):82–87, 2012.
39. Walker, T. and Ross, M.R., Forum on the Flood/post-Flood Boundary, *J. Creation* **28**(2):60–68, 2014.
40. Arment, C., Fossil snakes and the Flood boundary in North America, *J. Creation* **28**(3):13–15, 2014.
41. Oard, M.J., *Flood by Design: Receding Water Shapes the Earth's Surface*, Master Books, Green Forest, AR, 2008.
42. Oard, M.J., ebook. *Earth's Surface Shaped by Genesis Flood Runoff*, 2013; michael.oards.net/GenesisFloodRunoff.htm.
43. Oard, M.J., The remarkable African planation surface, *J. Creation* **25**(1):111–122, 2011.
44. Knapp, C.C., Knapp, J.H. and Connor, J.A., Crustal-scale structure of the South Caspian Basin revealed by deep seismic reflection profiling, *Marine and Petroleum Geology* **21**:1073–1081, 2004.
45. Oard, M.J., Comment on "Fossil snakes and the Flood boundary in North America", *J. Creation* **29**(1):56–57, 2015.
46. Whitmore, J., The potential for and implications of widespread post-Flood erosion and mass wasting processes; in: Horstemeyer, M. (Ed.), *Proceedings of the Seventh International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, 2013.
47. Whitmore, J.H. and Garner, P., Using suites of criteria to recognize pre-Flood, Flood, and post-Flood strata in the rock record with application to Wyoming (USA); in: Snelling, A.A. (Ed.), *Proceedings of the Sixth International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, pp. 425–448, 2008.
48. Whitmore, J.H. and Wise, K.P., Rapid and early post-Flood mammalian diversification evidences in the Green River Formation; in: Snelling, A.A. (Ed.), *Proceedings of the Sixth International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA, pp. 449–457, 2008.
49. Neuendorf, K.K.., Mehl, Jr, J.P., and Jackson, J.A., *Glossary of Geology*, 5th edn, American Geological Institute, Alexandria, VA, p. 397, 2005.
50. Whitcomb Jr, J.C. and Morris, H.M., *The Genesis Flood*, Baker Book House, Grand Rapids, MI, 1961.
51. Holt, R.D., Evidence for a late Cainozoic Flood/post-Flood boundary, *J. Creation* **10**(1):128–167, 1996.
52. Woodmorappe, J., Studies in Flood geology: clarifications related to the 'reality' of the geological column, *J. Creation* **10**(2):279–290, 1996.
53. Baumgardner, J., CPT explains the rapid sea level drop in the latter portion of the Flood, *J. Creation* **25**(2):61–64, 2011.
54. Oard, M.J., Where is the Flood/post-Flood boundary in the rock record? *J. Creation* **10**(2):258–278, 1996.
55. Oard, M.J., Defining the Flood/post-Flood boundary in sedimentary rocks, *J. Creation* **21**(1):98–110, 2007.
56. Oard, M.J., Is the K/T the post-Flood boundary?—part 1: introduction and the scale of sedimentary rocks, *J. Creation* **24**(2):95–104, 2010.
57. Oard, M.J., Is the K/T the post-Flood boundary?—part 2: paleoclimates and fossils, *J. Creation* **24**(3):87–93, 2010.
58. Oard, M.J., Is the K/T the post-Flood boundary?—part 3: volcanism and plate tectonics, *J. Creation* **25**(1):57–62, 2011.
59. Oard, M.J., *The Flood/Post-Flood Boundary Is in the Late Cenozoic with Little Post-Flood Catastrophism*, 2014; michael.oards.net/PostFloodBoundary.htm.
60. Clarey, T., The whopper sand, *Acts & Facts* **44**(3):14, 2015.
61. Budd, ref. 23, p. 23.
62. Oard, M.J., Are the Ashfall site sediments and fossils post-Flood? *Creation Research Society Quarterly* **46**(2):81–91, 2009.
63. Oard, M.J., Relating the Lava Creek ash to the post-Flood boundary, *J. Creation* **28**(1):104–113, 2014.
64. Oard, M.J., The Flood/post-Flood boundary Arctic coast of North America, *J. Creation* (submitted).
65. Whitmore and Garner, ref. 47, p. 434.

Michael J. Oard *has an M.S. in atmospheric science from the University of Washington and is now retired after working as a meteorologist with the US National Weather Service in Montana for 30 years. He is the author of* Frozen in Time, Ancient Ice Ages or Gigantic Submarine Landslides?, Flood by Design, Dinosaur Challenges and Mysteries, *and* Exploring Geology with Mr. Hibb. *He serves on the board of the Creation Research Society.*