Creation Research Society Quarterly 2019 56:68–75.

Compelling Evidence for an Upper Cenozoic Flood/Post-Flood Boundary: Paleogene and Neogene Marine Strata that Completely Surround Turkey

Timothy L. Clarey and Davis J. Werner*

Abstract

The location of the Flood/post-Flood boundary has been debated for decades. The two most commonly proposed candidates are (1) the K-Pg boundary and (2) near the top of the Neogene. In an effort to resolve this issue, we examined the Paleogene and Neogene strata in the region containing the nation of Turkey, the presumed landing site for the Ark. We found uninterrupted marine strata, such as carbonate, salt and glauconitic sands, well above the K-Pg boundary, extending from Europe to the Middle East, that entirely surround modern-day Turkey. These findings lead us to conclude that the Flood/post-Flood boundary logically must lie above the level of these marine layers. We propose that the most likely boundary is near the top of the Neogene, that is, near the N-Q (Neogene-Quaternary) boundary.

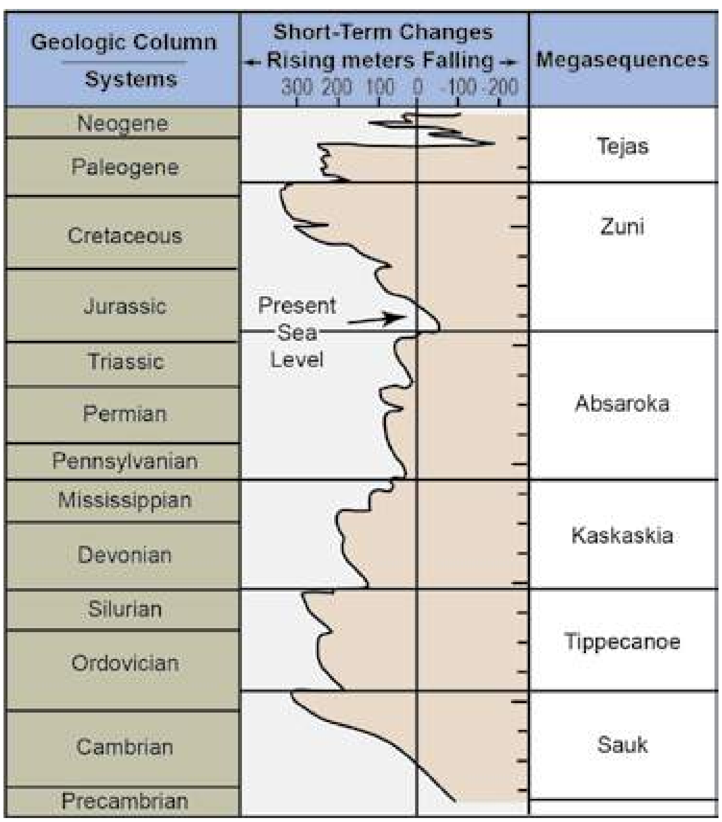

Figure 1. Chart showing the secular timescale, presumed sea level curve, and the six megasequences (Modified from Vail and Mitchum, 1979). The Tertiary system (Tejas megasequence) is now composed of the Paleogene and Neogene systems.

* Timothy L. Clarey and Davis J. Werner, Institute for Creation Research, Dallas, Texas

Accepted for publication December 18, 2019

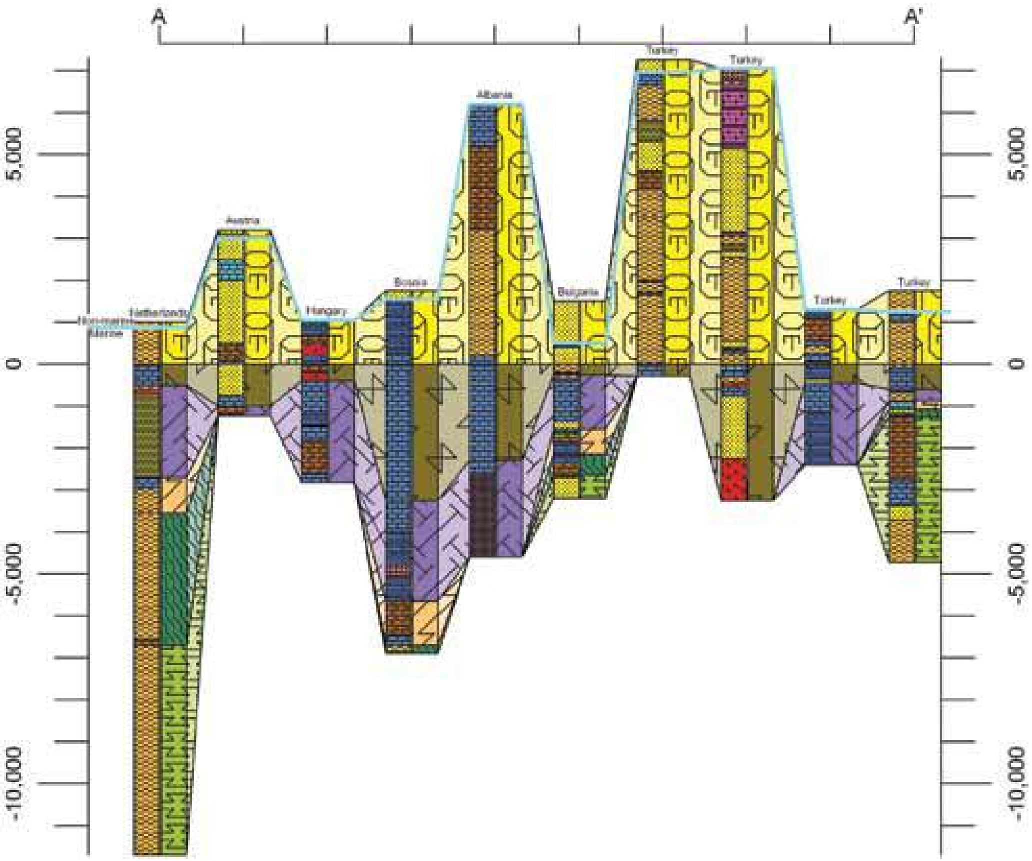

Figure 3 *(left)*. **Stratigraphic cross section A-A' extending from Europe to Turkey showing lithology and megasequence intervals. Flattened on the base of the Tejas, which is approximately the same level as the K-Pg boundary. The blue line extending across the section within the Tejas megasequence shows the marine/non-marine boundary. Non-marine rocks are above the blue line in all cases. Location of section shown on Figure 6. All scales are in meters.**

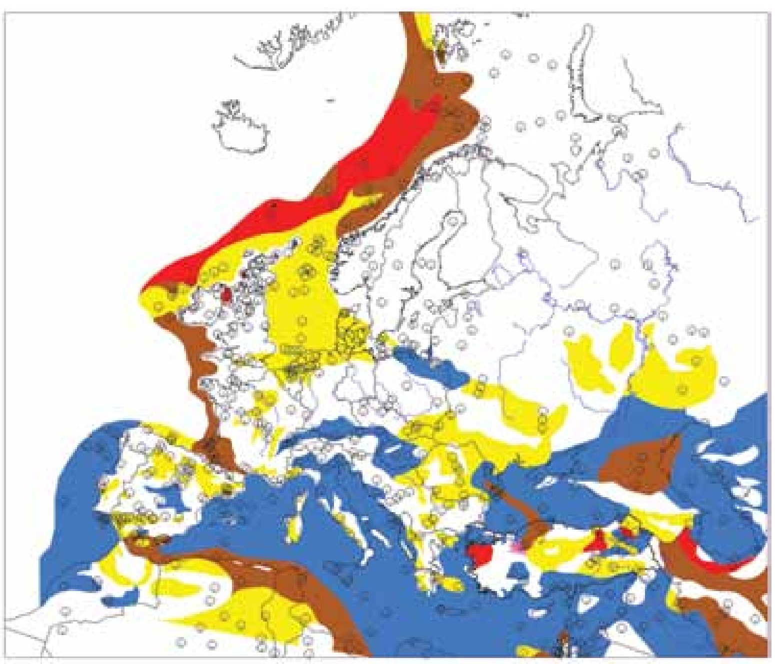

Figure 2. Basal lithology map for the Tejas megasequence for Europe, North Africa, and portions of the Middle East. Color legend is shown in Fig. 4.

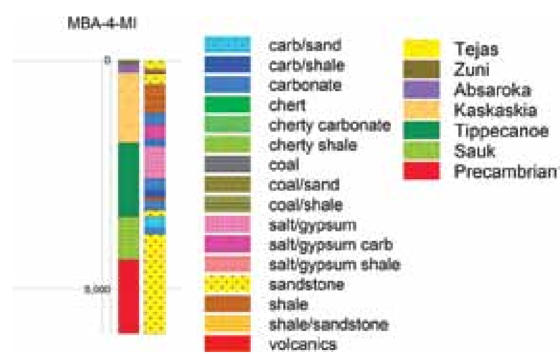

Figure 4. Example stratigraphic column from the Michigan Basin. The colors for the various rock types (lithology) and the megasequences (stratigraphy) serve as the key for the two cross sections (Figs. 3 and 5).

Introduction

The correct identification of the Flood/post-Flood boundary is of utmost importance to the creationist community because it has such profound implications as to post-Flood history. Placing the boundary at the beginning of the Cenozoic portion of the rock record implies, for example, that the Cenozoic mammals must all descend from mammals that survived the Flood cataclysm on the Ark. Over the past few decades, much has been published on the location of the Flood/post-Flood boundary, with debate back and forth relative to its location in the rock record. The two locations advanced more than any others in the creation literature are the Cretaceous-Paleogene, or K-Pg, boundary and a location in the Upper Cenozoic.

The K-Pg location has been championed by many in the creation paleontology community and several prominent geologists. Austin et al. (1994) tentatively advocated the K-Pg Flood/post-Flood boundary based on a "qualitative assessment of geologic maps worldwide":

> Therefore, we tentatively place the Flood/post-Flood boundary at approximately the Cretaceous-Tertiary (K/T) [K-Pg] boundary. We believe further studies in stratigraphy, paleontology, paleomagnetism, and geochemistry should allow for a more precise definition of this boundary.

However, few global studies have been completed since 1994 to further delineate their "tentative" boundary. And especially absent are large-scale, detailed stratigraphic studies that examine the rocks near the proposed boundary.

Those who have advocated a Flood/post-Flood boundary higher in the rock record in the Upper Cenozoic include creation scientists Roy Holt, Mike Oard, and John Baumgardner. Over the years, there has been much debate between the two sides, but no agreed upon resolution. Today, over 25 years later, the debate continues.

Most of those who conclude that the K-Pg marks the end of the Flood have used paleontological studies (Ross, 2012, 2014a; Whitmore and Wise, 2008; Wise, 2009) or local studies of individual units like the Green River Formation (Whitmore, 2006) or studies of a single small nation, like Israel (Snelling, 2010). These scientists have argued that the K-Pg boundary marks the end of marine deposition across the globe, asserting that the truly massive volumes of post-K-Pg sediments observed globally are merely the result of local, post-Flood catastrophes (Ross, 2012, 2013, 2014a, 2014b; Ross et al., 2015; Snelling 2009, 2014; Whitmore, 2013; Whitmore and Garner, 2008; Whitmore and Wise, 2008; Wise, 2002, 2009, 2017).

By contrast, other creation scientists have argued that Flood processes lasted well beyond the K-Pg boundary and continued throughout much of the Cenozoic (Paleogene and Neogene) rock record (Baumgardner, pers. comm. 2017; Clarey, 2016a, 2016b, 2017a, 2017b; Holt, 1996; Oard, 2006, 2007, 2010a, 2010b, 2011, 2013a, 2013b, 2016a, 2016b, 2017a, 2017b). These scientists interpret most of the Cenozoic strata as the result of the receding phase of the Flood. They pick a Flood/post-Flood boundary in the Upper Cenozoic, somewhere near the top or the bottom of the Pliocene (Upper Neogene). This paper uses stratigraphic data across multiple continents, in a region that encompasses the nation of Turkey, in an attempt to bring clarity on the matter.

A Logical Implication of the K-Pg Boundary as the Beginning of the Post-Flood Era

Unfortunately, identification of the K-Pg boundary as the beginning of the post-Flood era has led to a recent acceptance of evolution or "hyper-evolution" by several in the young earth creation community (Wise, 2017). For example, Wise (2009) has openly advocated that some type of four-legged creature "walked" off the ark and then somehow evolved rapidly into the whales we find in the Cenozoic rock record. More generally, his view is that any creature that first appeared above the Lower Eocene in the fossil record level must have "evolved" from an animal that had previously exited the ark (Wise, 2009). Clarey (2017b) has pointed out the difficulties that this vast amount of genetic transformation demands, especially considering the short time spans available and the time requirements necessary for large mammals to attain sexual maturity. Furthermore, Clarey (2016a, 2017b) and Wise (2009) have both noted that these proposed "evolutionary" changes would have had to occur within a few centuries at most between the end of the Flood and the onset of the Ice Age.

In addition, Wise's (2009) pro-evolutionary views have fanned the flames for the critics of young earth creationism (Doyle, 2019). Even old earth advocates, like Hugh Ross, have correctly attacked these ideas of rapid evolution (Doyle, 2019). However, the need for rapid post-Flood evolution disappears completely if the end of the Flood indeed lies higher in the rock record. No "walking whale ancestors" are needed if the boundary is in the upper Cenozoic. In that case, first appearances of fossils above the Lower Eocene level correspond simply to animals buried in the latter stages of the Flood. Their order in the record is merely their order of burial.

In other words, the Cenozoic record is no different from the Paleozoic and the Mesozoic, other than it represents the receding phase of the Flood and, accordingly, contains some different fossil creatures from the pre-Flood world (Clarey, 2017b). In fact, the entire Phanerozoic fossil record consists of sudden appearances, stasis and sudden disappearances of all types of creatures, plants and animals. It is just that the Cenozoic is dominated by larger mammal fossils and more flowering plants compared to the earlier deposits. Ecological zonation seems to best explain these fossil differences within the Phanerozoic strata (Clarey and Werner, 2018a).

Previous Studies of North African and Middle Eastern Stratigraphy

Clarey (2016a, 2016b, 2017a, 2017b) has recently sided with the advocates for the higher Cenozoic Flood boundary. He has presented five geological arguments that Flood sedimentation processes were in operation until well past the K-Pg point in the record (Clarey, 2017b). One of his strongest lines of evidence in these earlier papers is an uninterrupted and continuous carbonate layer across North Africa and the Middle East, from the Cretaceous upwards through, and including, the Upper Cenozoic. He noted that this carbonate layer extends upwards to the top or middle of the Miocene in many countries like Libya, Iraq, Iran, southeast Turkey, Qatar and Oman (Kendall et al., 2014; Clarey, 2017b).

Clarey (2017b) concluded that the Flood could not have ended across North Africa and the Middle East until at least the post-Miocene stage of the record. The uninterrupted carbonate and salt/gypsum rocks that so widely extend across the K-Pg boundary absolutely preclude that boundary as marking the Flood's end.

Methods of the Current Study: European Stratigraphy

To help address further the Flood/post-Flood controversy, we compiled an additional 499 stratigraphic columns across the European continent using oil industry wells, outcrops, seismic data and published cross-sections. At each location, we input detailed lithology data and the Sloss (1963) megasequence boundaries (Fig. 1). These data were input into Rockworks (ver. 17), a commercial software program for geologic data.

From these data we created isopach maps for each of the six megasequences across Europe and corresponding basal lithology maps for the lowermost units in each megasequence (Parkes and Clarey, 2019). We also constructed two regional cross sections using selected stratigraphic columns. One section went across Central Europe and Turkey and another one extended from the Caspian Sea, across Turkey, and south to Syria and Iraq.

Results

Probably of most relevance to the Flood/post-Flood debate is the basal Tejas map shown in Figure 2. This map represents the first rocks deposited and preserved on top of the K-Pg boundary across Europe. The basal Tejas map is the same level as the one we had earlier created across Africa (Clarey, 2017b, his Fig. 9). However, this time we included the nation of Turkey and areas to the north. We compiled both maps as Figure 2. Note how the carbonate rocks (shown in blue) of the lowermost Tejas form a near continuous circle around the nation of Turkey. This lowermost Tejas carbonate layer is part of the same carbonate system we identified earlier across North Africa and the Middle East (Clarey, 2017b).

Figure 2 clearly demonstrates that the Flood waters had not yet receded in any direction around Turkey by the time of deposition of these layers. Recall that Iraq is where the Tower of Babel was most likely located. This is where civilization probably initiated after Noah and his family exited the ark. And the strata across Iraq and Syria (to the south of Turkey) and the areas to the north of Turkey both indicate extensive, uninterrupted marine deposition from the Cretaceous level all the way up through the Middle Miocene level (Grabowski, 2014) and above. The Flood could not have been over at the K-Pg level in this area. There is too much preserved marine rock surrounding the nation of Turkey in the Paleogene and the Neogene for that to be a viable possibility.

Furthermore, our regional cross sections (A-A' and B-B', Figs. 3 and 5, respectively) confirm that a strong marine influence extended well into the Upper Cenozoic across much of Central Europe. Figures 3, 5, and 6 show the regional cross sections and their map locations flattened on the base of the Tejas, which is very near to the K-Pg boundary. Each section shows the corresponding stratigraphic columns, including the megasequences and the lithology at each site. Figure 4 shows the various rock types (lithology) and the megasequences (stratigraphy) we compiled in our study at each stratigraphic column. It also serves as the key for the two cross sections (Figs. 3 and 5).

We also added a blue line marking the bounding surface between marine rocks (below) and non-marine rocks (above). Note, that most of the Tejas across Europe is composed of marine rocks. The marine/non-marine delineation line is based on detailed studies of the geology at each stratigraphic column. For section A-A' (Fig. 3), Vandenberghe et al. (2014) noted that there was still considerable marine influence across northern Europe (Netherlands) through the Miocene (with ample glauconitic sands) and even into the lowermost Pliocene. And it was not until the Pliocene that the marine sedimentation pattern was broken in the Lower Rhine Valley (Vandenberghe et al., 2014). This same pattern extends from the Netherlands across Austria (Janoschek and Matura, 1980), Hungary (Kazmer, 1986), Bosnia (Hrvatovic, 2005), Albania (AKBN, 2019), Bulgaria (Graf, 2001) and even across parts of Turkey (Bozkaya et al., 2007; Caglar, 2009; Kaymakci et al., 2009; Okay, 2008) (Fig. 3). Nearly all of these columns show marine rocks extending upwards through Miocene and even as high as Pliocene strata,

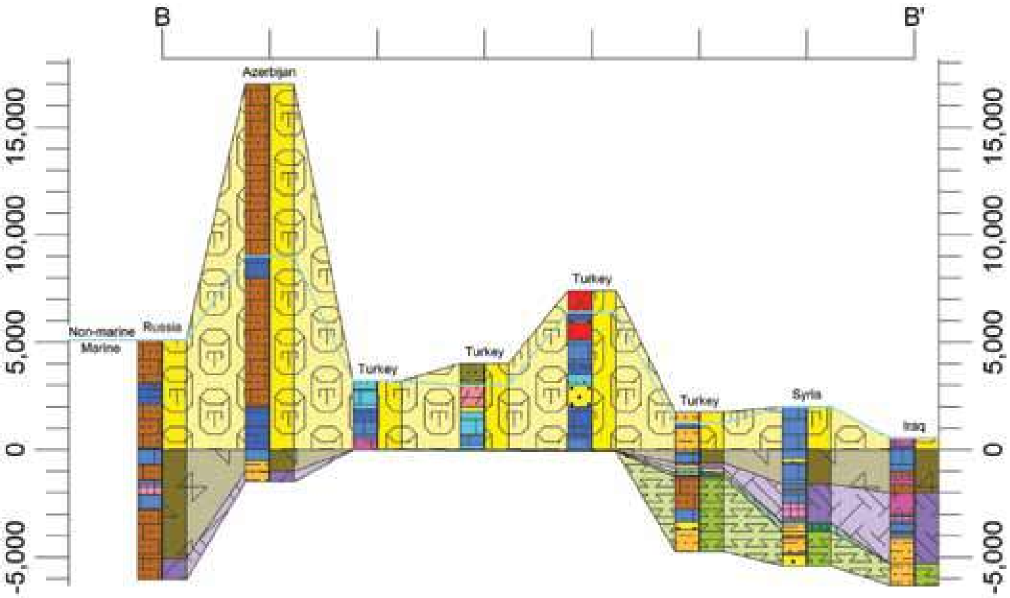

Figure 5. Stratigraphic cross section B-B' extending from the Caspian Sea, across Turkey, to Syria and Iraq showing lithology and megasequence intervals. Flattened on the base of the Tejas, which is approximately the same level as the K-Pg boundary. The blue line extending across the section within the Tejas megasequence shows the marine/non-marine boundary. Non-marine rocks are above the blue line in all cases. Location of section shown on Figure 6. All scales are in meters.

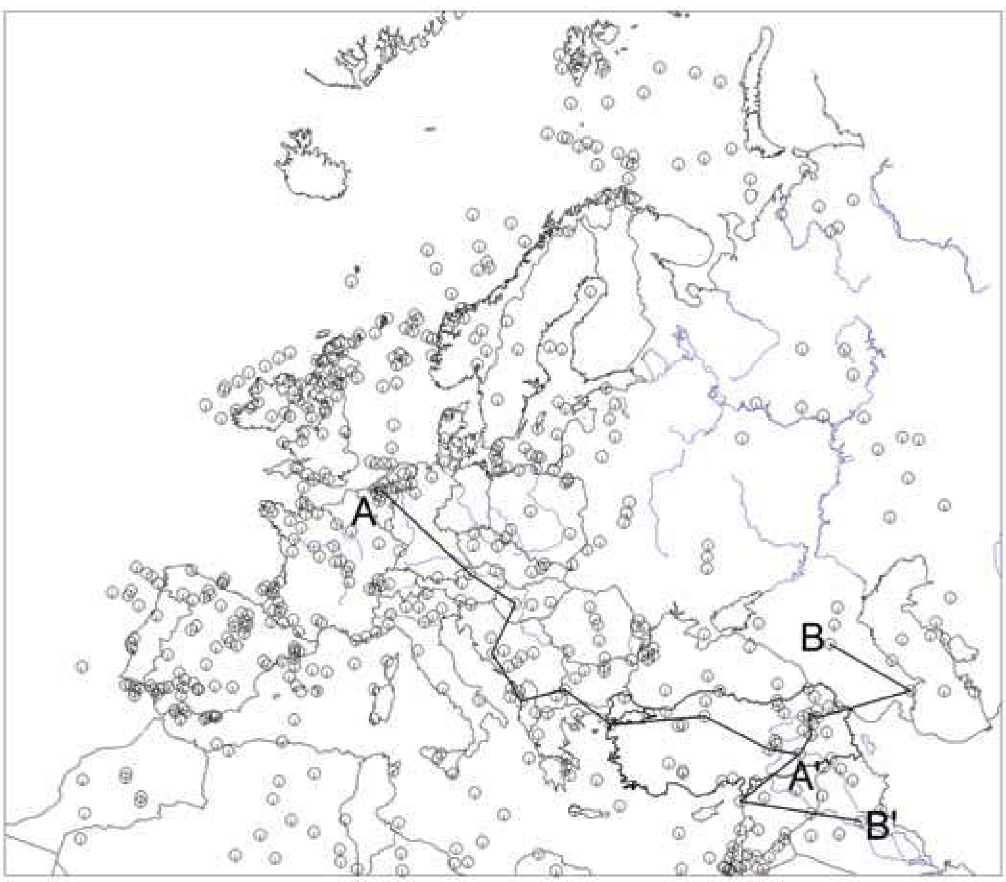

Figure 6. Location map for Stratigraphic Sections A-A' and B-B' showing Europe and parts of Africa and the Middle East. Circles show the locations of the column data used in the construction of Fig. 2.

depending on surface erosion levels at each column location.

Section B-B' (Fig. 5) also shows that the strong influence of Upper Cenozoic marine strata extended east of Turkey to the Caspian Sea area (Guliyev et al., 2001) and also south of Turkey into Syria and Iraq as earlier noted (Clarey, 2017b). The marine/non-marine boundary is either in the Miocene or Pliocene across these columns also, depending on the local surface erosion level (Keskin, 1994; Ulmishek and Harrison, 1981; USGS, 2010).

Conclusions: A New Flood/Post-Flood Boundary at the N-Q

These results dramatically conflict with the choice of the K-Pg as the Flood/post-Flood boundary. Instead, the sedimentary rocks across much of Central Europe, North Africa and the Middle East indicate marine depositional processes continued without interruption from the Cretaceous through the Upper Cenozoic. Many locations show continuous deposition of carbonate rocks right across the K-Pg boundary, from the Cretaceous through Miocene. These results demonstrate that the vast majority of European Cenozoic strata were not post-Flood, but instead represent the receding phase of the Flood. Massive marine deposits across such vast areas of the world indicate Flood processes were still active well into the Upper Cenozoic.

Stratigraphic data is a directly observable record of what has been deposited. Although some of the rock record has obviously been destroyed by erosion, a sufficient volume is preserved globally and can be compiled directly from subsurface data and outcrops.

Figures 2, 3, and 5 show thick layers of Paleogene and Neogene carbonate strata and other types of marine sediments that completely surround and indeed blanket much of the nation of Turkey, the presumed landing place of the ark. How could Noah and the animals have gotten off the ark while these marine layers were still being actively deposited? No other data is as compelling in this debate. In fact, we consider this to be as close to "proof" of a high Flood/post-Flood boundary as you can get in a forensic analysis. The Flood/post-Flood boundary must be placed high in the Upper Cenozoic.

We propose that the correct Flood/post-Flood boundary is near the top of the Pliocene, or close to that level, coinciding with the top of the Neogene and the base of the Quaternary. There is even a major recognizable extinction in the rock record at this level also (Pimiento et al., 2017). Hence, we propose calling this Flood/post-Flood boundary surface the N-Q (Neogene-Quaternary).

These results clearly call into question the claim that marine sedimentation was largely over at the K-Pg level (Austin et al., 1994). In fact, our findings indicate just the opposite is true. Stratigraphic data demonstrate that the marine realm continued, uninterrupted, from the Cretaceous level up through most of the Cenozoic, including much of the Neogene, across Europe, North Africa and the Middle East. This is compellingly strong evidence that the Flood was not over until late in the Cenozoic. Noah could not exit the ark into water. Nor could the Tower of Babel be constructed in water.

Any scientific debate must be measured by the strength of the data supporting each viewpoint. Massive volumes of rock data that support an Upper Cenozoic Flood/post-Flood boundary are far more compelling than conclusions based on limited fossil data from isolated locations. Plant and animal macro-fossils are infrequent in most of the sediment record and are largely dependent on surface exposures and can be misinterpreted. By contrast, rocks are not restricted to surface exposures. Oil wells have penetrated thousands of meters into the subsurface, giving us three-dimensional control beyond what can be observed only at the surface. Rock layers are much more continuous and massive in extent and volume. We can correlate the same rock layers across vast regions, often spanning entire countries and in some cases major portions of continents (Clarey and Werner, 2018b). The overwhelming strength of the global rock record needs to be included and acknowledged in any assessment of the Flood/post-Flood boundary location. It simply cannot be ignored or relegated to secondary importance.

The sheer volume and extent of marine rocks deposited during much of the Tejas megasequence is what tips the scale in favor of the N-Q Flood/post-Flood boundary. Stratigraphic data across Europe, North Africa, Turkey, and the Middle East are so comprehensive and compelling that it makes it nearly impossible to argue otherwise.

Acknowledgements

We wish to thank John Baumgardner, Mike Oard, and John Reed for their thoughtful and helpful reviews of our manuscript.

References

AKBN. 2019. Geological overview of Albania. http://www.akbn.gov.al/images/pdf/hidrokarburet/Geological-Overview.pdf (accessed April 20, 2019).

Austin, S.A., J.R. Baumgardner, D.R. Humphreys, A.A. Snelling, L. Vardiman, and K.P. Wise. 1994. Catastrophic plate tectonics: a global Flood model of earth history. In Walsh, R. E. (editor), *Proceedings of the Third International Conference on Creationism*, pp. 609–621. Creation Science Fellowship, Pittsburgh, PA.

Bozkaya, O., H. Yalcin, and O.O.H. Yilmaz. 2007. Origin and evolution of the Southeast Anatolian Metamorphic Complex (Turkey). *Geologica Carpathica* 58(3):197–210.

Caglar, M.K. 2009. Benthic foraminiferal biostratigraphy of the Tertiary sediments from the Elazig and Malatya basins, eastern Turkey. Journal of the Geological Society of India. 74:209–222.

Clarey, T.L. 2016a. The Ice Age as a mechanism for post-Flood dispersal. Journal of Creation 30(2):48–53.

Clarey, T. 2016b. Fresh Water and Salt Water Don›t Mix. *Acts & Facts*. 45 (11). http://www.icr.org/article/fresh-salt-water-dont-mix Accessed October 6, 2017.

Clarey, T.L. 2017a. Floating forest hypothesis fails to explain later and larger coal beds. *Journal of Creation* 31(3): 12–14.

Clarey, T.L. 2017b. Local Catastrophes or Receding Floodwater? Global Geologic Data that Refute a K-Pg (K-T) Flood/post-Flood Boundary. *CRSQ* 54(2):100–120.

Clarey, T.L., and D.J. Werner. 2018a. Use of sedimentary megasequences to re-create pre-Flood geography. In Whitmore, J.H. (editor), *Proceedings of the Eighth International Conference on Creationism*, pp. 351–372. Creation Science Fellowship, Pittsburgh, PA.

Clarey, T.L., and D.J. Werner. 2018b. Global stratigraphy and the fossil record validate a Flood origin for the geologic column. In Whitmore, J.H. (editor), *Proceedings of the Eighth International Conference on Creationism*, pp. 327–350. Creation Science Fellowship, Pittsburgh, PA.

Doyle, S. 2019. Debating origins. Journal of Creation 33(1): 30–34.

Grabowski, Jr., G.J. 2014. Iraq. In Marlow, L., Kendall, C. C. G., and Yose, L.A. (editors), *Petroleum Systems of the Tethyan Region, Memoir 106*, pp. 379–468. American Association of Petroleum Geologists, Tulsa, OK.

Graf, J. 2001. Alpine tectonics in western Bulgaria: cretaceous compression of the Kraište region and Cenozoic exhumation of the crystalline Osogovo-Lisec Complex. Ph.D. diss., Naturwissenschaften ETH Zurich, Nr.

Guliyev, I., E. Aliyeva, D. Huseynov, A. Feyzullayev, and P. Mamedov. 2001. Hydrocarbon potential of ultra deep deposits in the South Caspian Basin, *AAPG Search and Discovery Article* #10312.

Holt, R.D. 1996. Evidence for a Late Cainozoic Flood/post-Flood boundary. *Journal of Creation* 10(1):128–167.

Hrvatovic, H. 2005. *Geological Guidebook through Bosnia and Herzegovina*. Geological Survey of Federation of Bosnia and Herzegovina, Sarajevo.

Janoschek, W.R., and A. Matura. 1980. *Outline of the Geology of Austria*. 26th International Geological Congress, Paris.

Kazmer, M. 1986. Tectonic units of Hungary: their boundaries and stratigraphy (a bibliographic guide). *Annales Universitatis Scientiarum Bupapestinensis* Div. Sci. Sect. Geol. 26: 45–87.

Kaymakci, N., Y. Ozcelik, S.H. White, and P.M. Van Dijk. 2009. Tectono-stratigraphy of the Cankiri Basin: Late Cretaceous to Early Miocene evolution of the Neotethyan Suture Zone in Turkey. In Van Hinsbergen, D.J.J., M.A. Edwards, and R. Govers (editors), *Collision and Collapse at the Africa-Arabia-Eurasia Subduction Zone*, pp. 67–106. The Geological Society, London, Special Publications 311.

Kendall, C.C. G., A.S. Alsharhan, and L. Marlow. 2014. Stratigraphy and depositional systems of the southern Tethyan Region. In Marlow, L., Kendall, C. C. G., and Yose, L.A. (editors), *Petroleum Systems of the Tethyan Region, Memoir 106*, pp. 29–58. American Association of Petroleum Geologists, Tulsa, OK.

Keskin, M. 1994. Genesis of collision-related volcanism on the Erzurum-Kars plateau, Northeastern Turkey, Ph.D. diss., Durham University, UK.

Oard, M.J., 2006. The case for Flood deposition of the Green River Formation. *Journal of Creation* 20(1):50–54.

Oard, M.J. 2007. Defining the Flood/post-Flood boundary in sedimentary rocks. *Journal of Creation* 21(1):98–110.

Oard, M.J. 2010a. Is the K/T the post-Flood boundary?—part 1: introduction and the scale of sedimentary rocks. *Journal of Creation* 24(2):95–104.

Oard, M.J. 2010b. Is the K/T the post-Flood boundary?—part 2: paleoclimates and fossils. *Journal of Creation* 24(3):87–93.

Oard, M.J. 2011. Is the K/T the post-Flood boundary?—part 3: volcanism and plate tectonics. *Journal of Creation* 25(1):57–62.

Oard, M.J. 2013a. Geology indicates the terrestrial Flood/post-Flood boundary is mostly in the Late Cenozoic. *Journal of Creation* 27(1):119–127.

Oard, M.J. 2013b. Surficial continental erosion places the Flood/post-Flood boundary in the late Cenozoic. *Journal of Creation* 27(2):62–70.

Oard, M.J. 2016a. Flood processes into the late Cenozoic: part 1—problems and parameters. *Journal of Creation* 30(1):1–7.

Oard, M.J. 2016b. Flood processes into the late Cenozoic: part 2—sedimentary rock evidence. *Journal of Creation* 30(2):1–9.

Oard, M.J. 2017a. Flood processes into the late Cenozoic: part 3—organic evidence. *Journal of Creation* 31(1):51–57.

Oard, M.J. 2017b. Flood processes into the late Cenozoic: part 4—tectonic evidence. *Journal of Creation* 31(1):58–65.

Okay, A. 2008. Geology of Turkey: a synthesis. In Yalcin, U. (editor), *Anatolian Metal IV*, pp. 19–42. Bergbau-Museum Bochum, Nr.

Parkes, A.C., and T.L. Clarey, 2019. Characterizing the Phanerozoic Architecture of Europe using Sloss-type sequences. Abstract 123–3. Geological Society of America Annual Meeting. Phoenix, AZ.

Pimiento, C., J.N. Griffin, C.F. Clements, D. Silvestro, S. Varela, M.D. Uhen, and C. Jaramillo. 2017. The Pliocene marine megafauna extinction and its impact on functional diversity. *Nature Ecology & Evolution*. doi:10.1038/s41559–017–0223–6. Accessed online June 28, 2017.

Ross, M.R. 2012. Evaluating potential post-Flood boundaries with biostratigraphy—the Pliocene/Pleistocene boundary. *Journal of Creation* 26(2):82–87.

Ross, M.R. 2013. The Flood/post-Flood boundary. Letter to the Editor, *Journal of Creation* 27(2):43–44.

Ross, M.R. 2014a. A preliminary biostratigraphic analysis of the K-Pg boundary as a post-Flood boundary candidate.

Journal of Creation Theology and Science Series C: Earth Sciences 4:1.

Ross. M.R. 2014b. Improving our understanding of creation and its history. *Journal of Creation* 28(2):62–63.

Ross, M.R., J.H. Whitmore, S.M. Gollmer, D.R. Faulkner. 2015. The Heavens & the Earth: Excursions in Earth and Space Sciences. Kendall Hunt Publishing, Dubuque, IA.

Sloss, L.L. 1963. Sequences in the cratonic interior of North America. *Geological Society of America Bulletin* 74(2):93–114.

Snelling, A.A. 2009. *Earth's Catastrophic Past: Geology Creation and the Flood*. Institute for Creation Research, Dallas, TX.

Snelling, A.A. 2010. The geology of Israel within the Biblical Creation-Flood framework of history: 2. The Flood rocks. *Answers Research Journal* 3:267–309. Retrieved August 14, 2017 from www.answersingenesis.org/arj/v3/geology-israel-flood.pdf

Snelling, A.A. 2014. Paleontological Issues: Charting a scheme for correlating the rock layers with the Biblical record. In Boyd, S.W., and Snelling, A.A. (editors), *Grappling with the Chronology of the Genesis Flood*, pp.145–185. Master Books, Green Forest, AR.

Ulmishek, G, and W. Harrison. 1981. Petroleum Geology and Resource Assessment of the Middle Caspian Basin, USSR, with Special Emphasis on the Uzen Field. Argonne National Laboratory, ANL/ES-116.

USGS. 2010. Assessment of Undiscovered Oil and Gas Resources of the North Caspian Basin, Middle Caspian Basin, North Ustyurt Basin, and South Caspian Basin Provinces, Caspian Sea Area. Fact Sheet 2010–3094.

Vail, P.R., and R.M. Mitchum. 1979. Global cycles of relative changes of sea level from seismic stratigraphy. *American Association of Petroleum Geologists Memoir* 29:469–472.

Vandenberghe, N., M. De Craen, and K. Beerten. 2014. Geological framework of the Campine Basin: Geological setting, tectonics, sedimentary sequences. External Report of the Belgian Nuclear Research Centre, SCK-CEN-ER-262, 14/MDC/P-43.

Whitmore, J.H. 2006. The geologic setting of the Green River Formation. *Journal of Creation* 20(1):72–78.

Whitmore, J.H. 2013.The potential for and implications of widespread post-Flood erosion and mass wasting processes. **In** Horstemeyer, M. (editor), *Proceedings of the Seventh International Conference on Creationism*, Creation Science Fellowship, Pittsburgh, PA.

Whitmore, J.H., and P.A. Garner. 2008. 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. (editor), *Proceedings of the Sixth International Conference on Creationism*, pp. 425–448. Creation Science Fellowship, Pittsburgh, PA.

Whitmore, J.H., and K.P. Wise. 2008. Rapid and early post-Flood mammalian diversification evidences in the Green River Formation. In Snelling, A.A. (editor), *Proceedings of the Sixth International Conference on Creationism*, pp. 449–457. Creation Science Fellowship, Pittsburgh, PA.

Wise, K.P. 2002. *Faith, Form and Time: What the Bible Teaches and Science Confirms About Creation and the Age of the Universe*. Broadman & Holman Publishers, Nashville, TN.

Wise, K.P. 2009. Mammal kinds: how many were on the ark? In Wood, T.C., and Garner, P.A. (editors) *Genesis Kinds: Creationism and the Origin of Species: Center for Origins Research Issues in Creation Number 5*, pp. 129–161. Wipf & Stock, Eugene, OR.

Wise, K.P. 2017. Step-down saltational intrabaraminic diversification. *Journal of Creation Theology and Science Series B: Life Sciences* 7:8–9.