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# Phanerozoic Animal Tracks: A Challenge for Catastrophic Plate Tectonics

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## Abstract

**Originally inferred from 2-D and 3-D computer simulations of crustal plate movement across the face of the earth, catastrophic plate tectonics was proposed as a young-earth creationist alternative to naturalistic plate tectonic theory, and has become widely accepted. Catastrophic plate tectonics claims that the Paleozoic, Mesozoic, and, in some instances, Cenozoic stratigraphic sections are Flood deposits. However, the presence of animal tracks throughout these same sections appear to contradict the biblical record, which states that the animals that could have created these tracks were all dead long before the end of the Flood. Catastrophic plate tectonics' adherence to the secular chronostratigraphic geologic timescale, or the standard geologic column, is the source of this apparently insoluble problem. Until advocates of this model can explain how animal tracks could have been produced in strata that supposedly formed *after* the extinction of the track makers, their model exhibits a glaring inconsistency with field data.**

## Introduction

Any concept or idea that claims to explain the intricacies of the global biblical Flood must be carefully examined and tested using datasets consistent with Bible history. This is especially true where naturalistic models such as plate tectonics are adapted and adopted. Catastrophic plate tectonics is based on 2-D and 3-D computer simulations and datasets used to support plate tectonics within the naturalistic framework of the standard geologic timescale/column (see Appendix). Despite its broad acceptance, inconsistencies with the field data continue to appear, often because the field data it calls on for support is interwoven with uniformitarian and evolutionary assumptions, i.e., biostratigraphy and radiometric dating.

Catastrophic plate tectonics asserts that strata comprising the Paleozoic, Mesozoic (Austin et al., 1994; Baumgardner, 1994a), and in some cases the bulk of the Cenozoic eras (Baumgardner, 2002) are Flood deposits (Figure 1). However, if the stratigraphic succession of those eras represents deposition throughout the Flood, the presence of animal tracks found globally in these same Phanerozoic sediments is not consistent with the biblical account that states that all air-breathing life-forms

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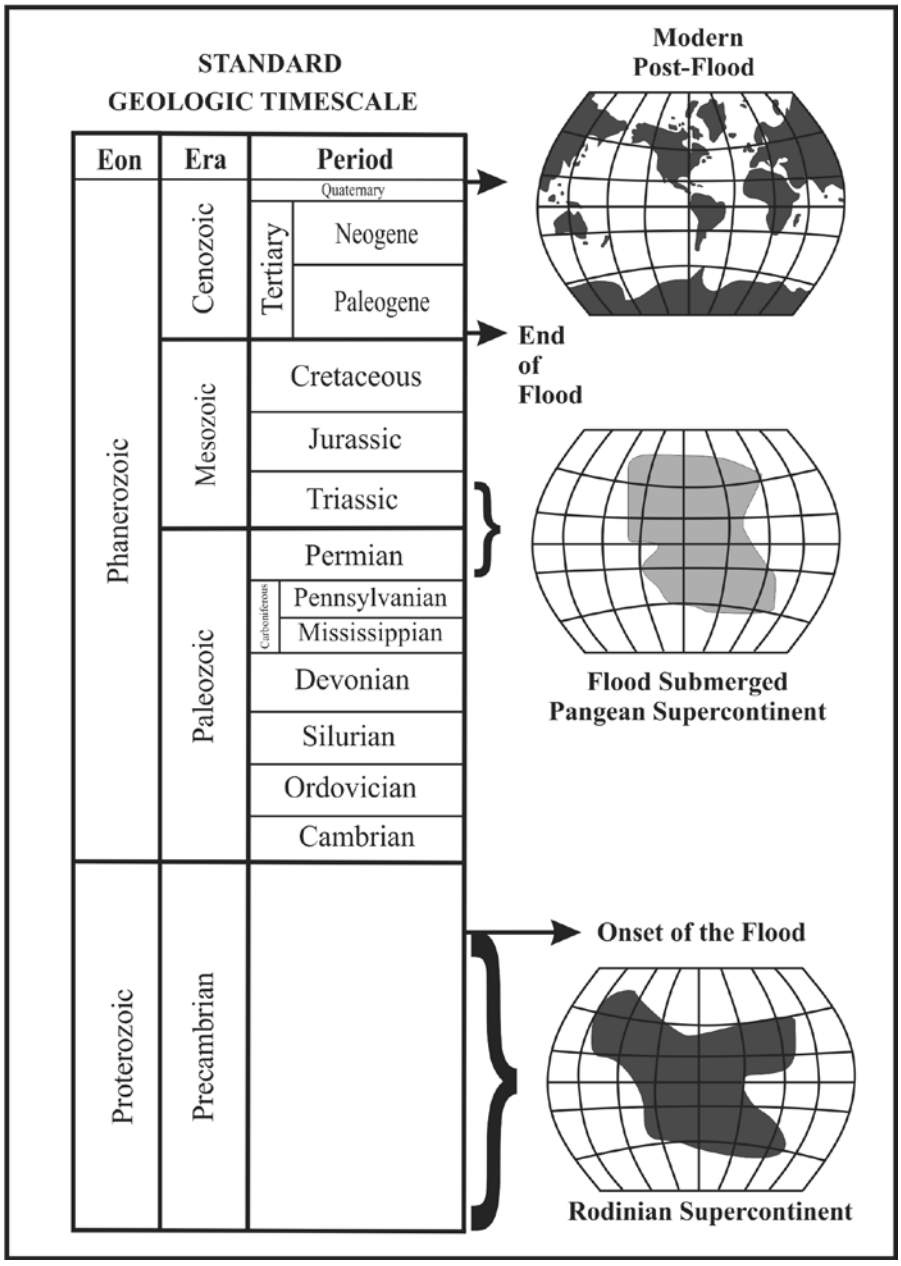


**Figure 1. The Standard Geologic Timescale/Column is used to define Earth history within the philosophical construct of naturalism, and advocates of catastrophic plate tectonics use it absent deep time and evolution. Note times of Rodinia and Pangea. The breakup of Rodinia has recently been proposed as the beginning of the Flood (Snelling, 2014). Overlying strata would have to maintain the sequence of Eons, Eras, and Periods. However, the sequential arrangement of the strata still relies on uniformitarian and evolutionary ideas (Reed, 2008).**

on the continents were killed within the first 40 but no later than the first 150 days of the Flood (Figure 2). How can this inconsistency be addressed?

## Which Supercontinent Broke Apart?

Like most models, catastrophic plate tectonics has been modified by new data and ideas. Originally it called for the initiation of the Flood at or near the Precambrian-Cambrian boundary with the breakup of the Pangean supercontinent (Baumgardner, 1986, 1990, 1994a, 1994b; Austin et al., 1994). From the beginning, this model assumed the validity of the chronostratigraphic (everything but the absolute ages) part of the geologic timescale. We also call this the "standard geologic column," and it represents an organized burial progression from simple plants and animals to the more complex (Baumgardner, 1994a), consistent with secular evolutionary theory and the diluvial theory of ecological zonation (Clark, 1977; Coffin, 1983).

Reed and Froede (2002) pointed out that the selection of Pangea as the pre-Flood supercontinent was inconsistent, since data consistent with the standard geologic column placed that breakup during the Mesozoic and also supported the opening and closing of other supercontinents well back into the Precambrian. Baumgardner (2003, 2009) then identified an earlier unnamed supercontinent as the starting point for the initiation of the Flood, and Snelling (2014) identified Rodinia as that supercontinent. This change in the model kept the Flood-initiating supercontinental breakup close to the Precambrian/Cambrian boundary, included the lower Paleozoic fossil section in the Flood, and addressed evidence for Wilson cycles (Froede, 2002). In this new scenario, Pangea assembled and then quickly splintered late in the Flood, when the continents were still submerged (Snelling, 2014). Whether the onset of the Flood is recorded by the breakup of Rodinia or the breakup of Pangea or even the breakup of a different, unspecified supercontinent, all biblical Flood models must account for the fact that all land-dwelling and air-breathing life on Earth was dead no later than 150 days into the Flood (Genesis 7:17–24).

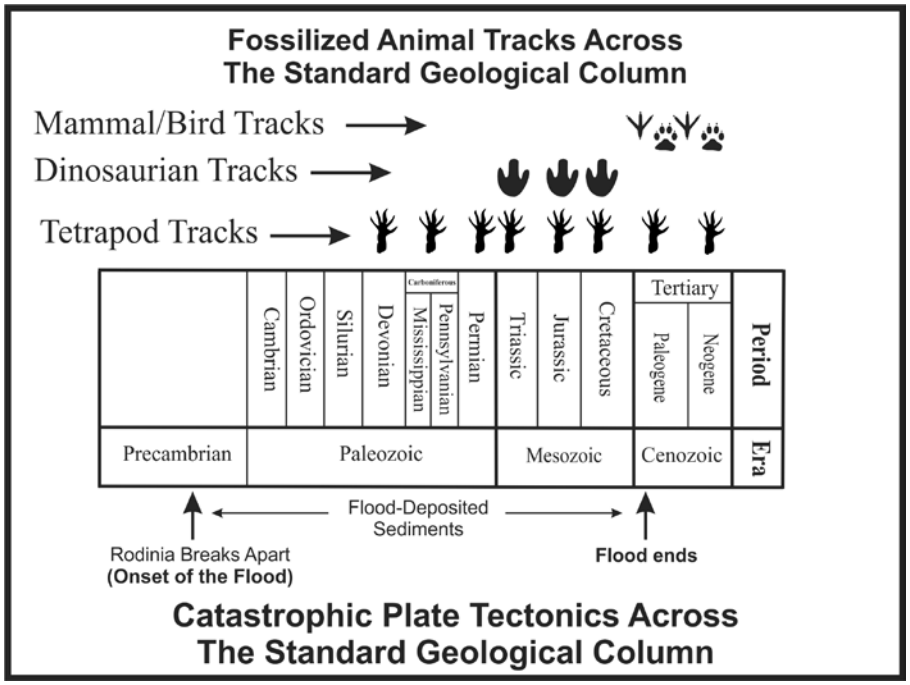


**Figure 2. Catastrophic plate tectonics initiates the Flood with the breakup of the Precambrian supercontinent of Rodinia and ends it at or near the Mesozoic/Cenozoic contact or later in the Cenozoic (depending on the author). Animal tracks span much of this time and actually increase in number and kind as the Mesozoic/Cenozoic boundary is approached. The Bible states that all the track makers would have been dead within—at most—the first 150 days of the Flood. Any interpretation that invokes support from the geological column is at odds with that statement.**

## Phanerozoic Animal Tracks

If the biblical record of the Flood is consistent with catastophic plate tectonics, then we should expect to observe animal traces only in the lowest Paleozoic sediments. Baumgardner conveys the utter destruction of Earth's surface with the onset of the Flood:

> If the earliest Cambrian rocks mark the beginning stage of Noah's Flood just a few thousand years ago, then most of the subsequent geological record, from Cambrian to recent, must be the product of a global catastrophe of a magnitude beyond the ability of the human mind to imagine. (Baumgardner, 1990, p. 35)
>
> The Flood is understood, in terms of normal usage of the words in the Genesis account, to be a global catastrophe that destroyed all the non-aquatic air-breathing life on the earth except for that preserved in the ark. (Baumgardner, 1994a, p. 49)

Whether the Flood ended at the end of the Mesozoic (Baumgardner, 1986; Austin et al., 1994), the lower part of the Cenozoic (Baumgardner, 1994a), or the late Cenozoic (Baumgardner, 2002), the problem remains the same. Animal tracks have been identified in sedimentary rocks extending from the Devonian through the Cenozoic (Figures 3, 4, and 5). Naturalists have documented animal footprints globally (e.g., Olsen et al., 1991; Retallack, 1996; Raath, 1996; Olsen and Huber, 1998; Chen et al., 2006; Lockley et al., 2006; Lucas, 2007; Diedrich, 2008) in sediments that catastrophic plate tectonics defines as Flood deposits (Baumgardner, 1986, 1990, 1994a; Austin et al., 1994).

In fact, the abundance of dinosaurian tracks and trackways in Mesozoic sediments has yielded a plethora of books written by naturalists in an effort to understand and reconstruct their paleoenvironments within an evolutionary framework (Gillette and Lockley, 1989; Lockley, 1991, 1999; Lockley and Hunt, 1995; Weishampel and Young, 1996). Tetrapod tracks, bird tracks, and mammal tracks have all been identified throughout Cenozoic sediments (e.g., Lucas, 2007; McDonald et al., 2007; Remeika, 2001).

If these rocks were deposited during the Flood, what are the ramifications of finding these tracks so late in a column-based Flood model? The investigation of animal tracks in Paleozoic and Mesozoic strata has not been limited to naturalistic scientific studies. Articles have been written about these trace fossils by young-earth creationists, revealing problems, especially for those who adhere to the standard geologic column (Brand and Florence, 1982; Snelling, 1996, 2009; Whitmore, 2009). The recently proposed concept of "Wholistic Geology" (Brand, 2007) shows great promise in interpreting animal tracks and trackways in a Flood context, but since Brand remains committed to the chronostratigraphic timescale, it results in a disjointed chronology.

Some young-earth creationists have realized the problems inherent to the standard geologic column defining Paleozoic, Mesozoic, and lower Cenozoic ichnofossils for the Flood instead of the Flood defining the progression of eras (e.g., Froede, 1995, 2010, 2012; Oard, 2003, 2014; Walker, 1994) [Figure 6]. The Bible leaves only three times in which tracks could be preserved: (1) before the Flood, (2) during the early part of the Flood, or (3) after the

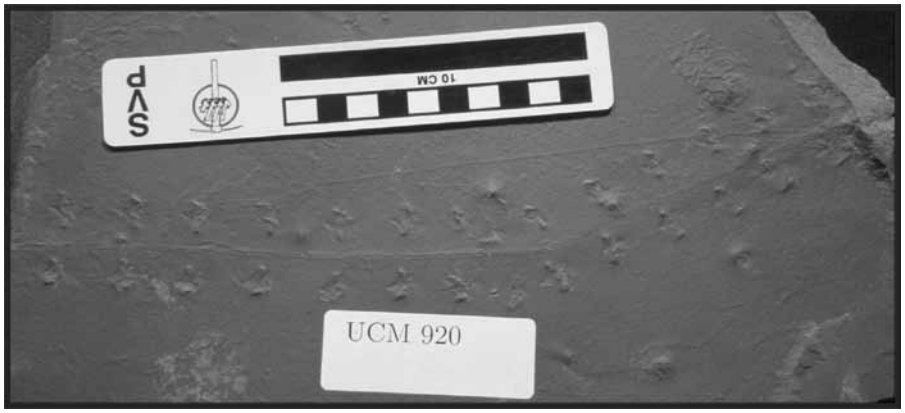


**Figure 3. The underside of a tetrapod (amphibian) trackway from the Union Chapel Mine (UCM), which has been renamed the Steven C. Minkin Paleozoic Footprint Site, in Walker County, Alabama. According to naturalists, this trackway is from the lower Pennsylvanian (base of the Westphalian Stage; Kopaska-Merkel and Buta, 2012). Scale in cm. These tracks occur in sediments overlying coal-bearing layers in the Black Warrior Basin. These animal tracks limit these sediments to the early part of the Flood, indicating problems with models such as catastrophic plate tectonics, which attempt to link the geological column to the biblical record.**

Flood. The presence of tracks in every period from the Devonian constrains all Flood models to reexamine their relationship to the standard geologic column. Strata that are clearly identified as Flood deposits and contain animal tracks must by default be dated to the first 40 to 150 days of the Flood. Tracks also can be preserved in rocks formed after the Flood. However, our focus is on the sequence of strata defined as Flood deposits by catastrophic plate tectonics. Because they assume a linear progression from late Precambrian to either the beginning of the Cenozoic or later in the Cenozoic (depending on the author), there are strata with tracks that the model would place during the mid to late Flood, which is inconsistent with Genesis 7.


**Figure 4. A surface track impression of an *Atreipus* sp. (Archosaurian reptile) from the Triassic Cow Branch Formation, Solite Quarry, near Cascade, VA (see Olsen and Baird, 1986). Scale in cm and inches. These tracks formed in a rift basin partially filled with volcanic sediments capped by silts, clays, and sands. Some sedimentary layers contain animal tracks while others contain body fossils. A vertical tectonic interpretation by Froede (2010) places it in the uplift of the adjacent Appalachian Mountains early in the Flood, contrary to the column.**

**Figure 5. Several different animal tracks and trackways on the surface of the Late Cretaceous Dakota Sandstone (Lockley, 2001), at Dinosaur Ridge, Morrison, Colorado. Field of view in foreground is approximately 8 ft and extends approximately 18 ft. These sediments also contain dinosaur bones and mostly macerated (now charcoalified) plant fossils, suggesting a catastrophic depositional environment (Holroyd, 1992). Tracks in these strata are difficult to reconcile to the column and the Flood.**

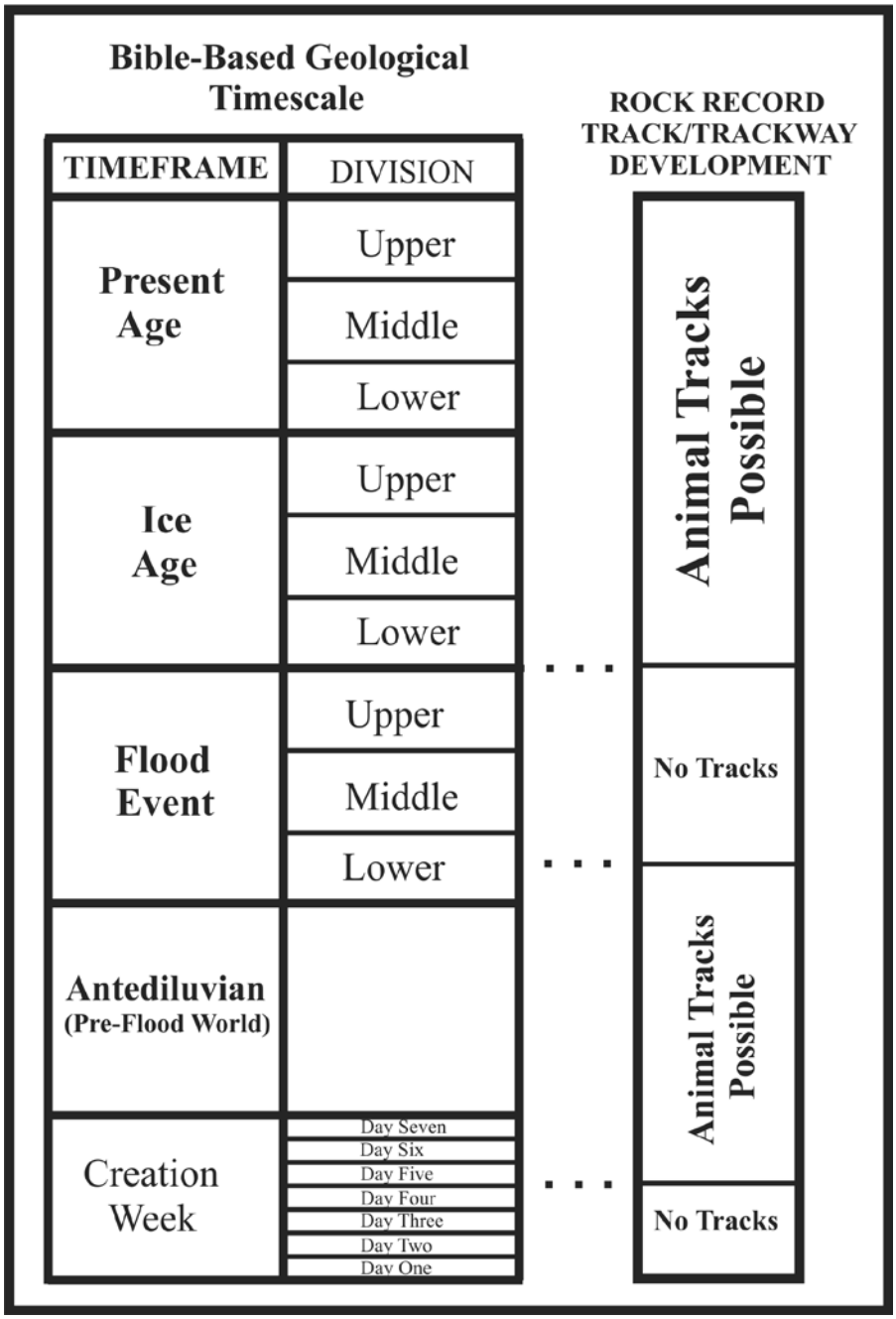


**Figure 6. An alternative for understanding animal tracks and trackways in a biblical geologic framework (Froede, 1995). These ichnofossils could have formed in the antediluvian timeframe, the lower division of the Flood-event timeframe, or following the Flood from the Ice Age to the present-age timeframes. Each occurrence of tracks needs to be interpreted in this framework, without regard for the column.**

## Alternatives

We recognize that Psalm 104:5–9 and Genesis 8:1–19 provide a limited understanding of the tectonic forces in operation at the end of the Flood. However, nothing in Scripture demands or even strongly suggests the necessity of catastrophic plate tectonics. Given its dependence on datasets weighted by uniformitarian and evolutionary assumptions (Reed et al., 1995), creationists should expect inconsistencies because of the inherent inconsistencies between biblical history and today's secular natural history. We are better off working within a biblical framework, recognizing that the standard geologic column may create more problems than it solves.

Other creationists have addressed the stratigraphic distribution of animal tracks and trackways in interesting ways yet have clung to the column to do so. Some (e.g., Tyler and Coffin, 2006) have proposed a "recolonization model," which initiates the Flood in the earliest Precambrian and ends it in the Devonian, placing all animal tracks *after* the Flood. However, this model is not consistent with biblical or field evidence (Reed et al., 2009). Another attempt by Oard (2001) argues that strata up as far as the Cenozoic represent deposition early in the Flood and that later sediment—barren of tracks and trackways—was deeply eroded during late Flood erosion of the continents.

Both of these positions accept the chronostratigraphic column, although Oard (2006) argues that it is only generally true, has exceptions, and is used in this context for discussion purposes only. We suggest that Flood models could be made simpler and avoid such inconsistencies if the assumption of the validity of the column was abandoned. Instead of using the secular chronostratigraphic scale, we suggest that timescales be built on the biblical record, following the work of Walker (1994) and Froede (1995). Both allow the development of a scripturally based, internally consistent, and technically sound understanding of earth history. What remains largely undeveloped is a tectonic framework consistent with those timescales.

There was obviously intense tectonism at the onset of the Flood at the release of the "fountains of the great

deep." There was obviously tremendous vertical movement, upward by the continents and downward by the oceanic basins, to cause the retreat of the waters off the continents and into those basins. We believe this should be the starting point in the development of any biblically based tectonic theory. If advocates of catastrophic plate tectonics believe that lateral movement of the continents is necessary, the burden of proving it rests on them, both scripturally and technically. Since the Scriptures are inconclusive, only forensic historical data and conceptual models are available.

In any case, all Flood models must account for the distribution of animal tracks and trackways. They are a valuable indicator of the time of deposition of the strata that contain them (Figure 6). The presence of tracks and trackways is limited to rocks deposited before the Flood, deposited during the first 40 to 150 days of the Flood, or deposited after the Flood. No tracks or trackways would be expected during the latter part of the Flood. Not every trace, track, or trackway formed during the Flood, and creation scientists should study these ichnofossils within their field context to determine which of the three options they fit.

## Summary and Conclusions

Catastrophic plate tectonics is an impressive computer and conceptual model, but it manifests inconsistencies when compared to the rock and fossil records, especially the ichnological record, largely because it uncritically accepts the standard geologic column. The documented global presence of tetrapod, dinosaur, mammalian, and bird footprints in sediments that should be devoid of them highlights this inconsistency, whether one accepts a Mesozoic/Cenozoic end of the Flood or a late Cenozoic end of the Flood. Like any other Flood model, catastrophic plate tectonics must remain consistent with Scripture. For that reason, its proponents should reconsider their commitment to the standard geologic column.

Creation science will only continue to develop as new tectonic models are crafted within a biblical framework (Figure 6). Until its proponents can adequately address the problem of animal tracks and trackways in strata they would place in the middle and late stages of the Flood, catastrophic plate tectonics must be seen as a flawed theory (Froede and Akridge, 2013).

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## Appendix: The Standard Geologic Timescale

Secular geologists recognize that their timescale consists of two parts: (1) the sequential arrangement and correlation of all strata on Earth and (2) the absolute ages that date the boundaries within that sequence. The former is usually called the "chronostratigraphic timescale" and the latter the "geochronologic timescale" (Ferrusquía-Villafranca et al., 2009). All young-earth creationists reject the geochronologic timescale, but many accept the chronostratigraphic timescale (i.e., the standard geologic column). The problem with accepting this conceptual column is that it rests on the assumptions of deep time, uniformitarianism, and evolution (Reed and Oard, 2006; Reed, 2008, 2013).

None of these naturalistic tenets are consistent with biblical history, and so despite their ubiquity and use, they form a construct that should be rejected. Unfortunately, many creationists disagree. We believe that until this issue is resolved, any Flood model(s) relying on the stratigraphic succession presented by the standard geologic column will present the same inconsistencies seen in catastophic plate tectonics.

The conceptual framework of catastrophic plate tectonics relies on secular datasets that are interwoven with assumptions of deep time, uniformitarianism, and evolution (Reed et al., 1995; Reed, 2001). None of these supporting ideas have been redefined in a manner that provides a consistency with biblical earth history.